NORTH Dakota | Environmental Quality
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September 24, 2025

Re: Final Permit Decision on Riverview ND, LLP “Herberg Dairy”

Dear Sir or Madam:

Under the authority of North Dakota Century Code (NDCC) § 61-28-04, the North Dakota Department of Environmental Quality (Department), has issued State Animal Feeding Operation Permit NDAFO-0908 with modified conditions for Herberg Dairy. This facility is to be located in Traill County, seven miles east and five miles south of Hillsboro.

During the permit application process, the Department reviewed all comments and web links received during the 45-day public comment period. In addition to considering all comments, the Department followed North Dakota Administrative Code (NDAC) § 33.1-16-03.1 and the *North Dakota Livestock Program Design Manual,* Revision Date December 3, 2021, in making its final decision.

The State Animal Feeding Operation Permit and fact sheet have been updated as a result of public input during the public comment period.

Enclosed is a copy of the final State Animal Feeding Operation Permit, updated fact sheet, and the Department response to comments. Additional support documentation is available on the Department’s webpage https://deq.nd.gov/WQ/2_NDPDES_Permits/. A set of these documents, cover letter, permit, and fact sheet, will also be provided to the City of Hillsboro’s government office and the Traill County Auditor’s Office.

The final decision package may also be obtained by contacting the Department at 701-328-5210 or can be viewed at:

North Dakota Department of Environmental Quality
Division of Water Quality
4201 Normandy St.
Bismarck, ND 58503

Requests for printed copies may be charged a fee for making a copy.

Sincerely,

Marty Haroldson
Director
Division of Water Quality

Enc.

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State Animal Feeding Operation Permit NDAFO-0908

Effective Date: Date of Signature
Expiration Date: April 30, 2030

STATE ANIMAL FEEDING OPERATION PERMIT

NDAFO-0908

In compliance with North Dakota Administrative Code (NDAC) 33.1-16-03.1 of the North Dakota Department of Environmental Quality rules as promulgated under Chapters 61-28 and 23.1-06 of North Dakota Century Code (NDCC), authorization of the **Herberg Dairy** facility located in the North ½ of Section 34, Township 145 N, Range 49 W, in Traill County, North Dakota is granted provided the following conditions are met:

1) The application indicated the facility is a CAFO that will house **25,000 dairy cattle. The dairy cattle consist of 21,250 milking dairy cows with an average weight of 1,250 lbs. and 3,750 dry dairy cows with an average weight of 1,250 lbs.** The department must be notified in writing if there is an expansion in the number of livestock, change in ownership of the facility, significant changes in the physical operation of the facility or if the lot area where livestock are concentrated is expanded. Changes may require an update to the permit or issuance of a new permit.

2) Operation and Maintenance plans and standard operating procedures must be followed as submitted to the department. Changes to the Operation and Maintenance plan must be reviewed by the department prior to being implemented. There must be regular and adequate maintenance and upkeep to prevent degradation of the structures, to ensure the system continues to operate as designed, to ensure the storage pond does not overflow, and to ensure manure or wastewater does not discharge into waters of the state. Operation and maintenance plans shall include:

   a. Weekly inspections of all storm water diversion devices, runoff diversion structures and devices channeling runoff to the manure storage structure;
   b. Daily inspection of water lines, including drinking water or cooling water lines; and
   c. Weekly inspections of the manure storage structures noting the level of liquid in the structure as indicated by the depth marker. (North Dakota Livestock Program Design manual, section 6)

3) The operator shall notify the department within thirty days of construction completion of the manure storage or water pollution control structures. The operator shall provide certification from the engineer or the designer that construction of manure storage and water pollution control structures was completed according to designs provided with the application or the department-approved changes. (NDAC 33.1-16-03.1-07(5))

4) Mortality shall be disposed of in accordance with NDCC section 36-14-19, in a manner acceptable to the North Dakota Board of Animal Health, and so they will not impact waters of the state. The facility plans to ship all mortalities off-site every 72 hours using a rendering service. Prior to shipment off-site, the dairy will store mortalities in a roofed building with concrete sides and floor. The building is designed to allow conversion to a composting building if a rendering service becomes unavailable.

5) Land application of manure shall be in accordance with the nutrient management plan. Manure shall be applied in a manner so it will not be washed into waters of the state. When applying manure within ½ mile of an occupied residence, building, or public area where people may be present; it is recommended that the operator review and follow the guidelines of the North Dakota Livestock Program Design Manual, 7.6, section 4 and incorporate the manure within 8 hours of land application.

6) The following records pertaining to nutrient management shall be maintained for a minimum of 5 years:

   a. The crops grown and expected realistic crop yields;
   b. The date(s) manure, litter or process wastewater is applied to each field;
   c. Weather conditions during application, 24 hours prior and following application;
   d. Test methods used to sample and analyze manure, litter, wastewater and soil;
   e. Results from annual testing of manure, litter, and process wastewater, and annual soil sample results for land where manure was applied that year;
   f. An explanation of how the application rates were determined in accordance with standards established by the department;

g. Calculations showing nutrients applied to each field, including other nutrient sources;
h. Total amount of nutrients actually applied to each field, including documentation of calculations for the total amount applied, and;
i. Method used to apply the manure, litter or process wastewater; inspection of manure application equipment including method, frequency, dates and repairs made if leaks were found; and setbacks, vegetated buffers or other alternative practices used when land applying manure near surface water or potential conduits to surface water. (North Dakota Livestock Program Design Manual, 7.7, section 2)

7) If manure is transferred to other persons or entities not associated with the facility, the following conditions shall apply:
   a. Owners/operators shall provide the recipient of the manure, litter or process wastewater with the most current nutrient analysis prior to transfer;
   b. The analysis provided shall be consistent with the requirements of section 7.4 in design manual, and;
   c. The owners/operators of the CAFO shall retain records for five years after the transfer date documenting the recipient's name and address, the approximate amount of manure transferred, and the date the manure was transferred. (North Dakota Livestock Program Design Manual, 7.7, section 3)

8) All open manure storage structures shall maintain a depth marker which clearly indicates the minimum capacity necessary to contain the runoff and direct precipitation from a 25-year, 24-hour rainfall event.

9) Any deficiency discovered during an inspection shall be corrected as soon as possible. Chemicals or other contaminants handled on site shall not be disposed of in a structure used for storage or treatment of manure, process wastewater or stormwater unless it is specifically designed for that purpose. The operator of a livestock facility should maintain a rain gauge at the production area and record measurable rainfall events. (North Dakota Livestock Program Design manual, 6.2)

10) The owner/operator of a CAFO shall make the following records available to the department for review upon request:

   a. Records documenting the visual inspections;
   b. Weekly records of the depth of the manure and process wastewater in the liquid manure storage structure as indicated by the depth gauge in storage structure; records documenting any actions taken to correct deficiencies;
   c. Deficiencies not corrected within 30 days must be accompanied by an explanation of the factors preventing immediate correction;
   d. Records of management and practices used;
   e. Record documenting current design of any manure storage structures, including solids accumulation volume, design treatment volume, total design volume and the approximate number of days of storage capacity;
   f. Records of the date, time and estimated volume of any overflow; and records documenting the land application of manure. (North Dakota Livestock Program Design Manual, 6.5)

11) This permit shall in no way authorize the discharge of any objectionable odorous air contaminant which is in excess of the limits established in NDAC Chapter 33.1-15-16 of the North Dakota Air Pollution Control Rules. If the department determines odors from the facility exceed limits, steps shall be taken, within a reasonable time, to control and reduce odors from the facility site. This may include requiring the installation of a cover on the ponds or other odor control measures.

12) There must be regular and adequate maintenance and upkeep to prevent degradation of the structures, to ensure the system continues to operate as designed, to ensure the containment system does not overflow, and to ensure manure or wastewater does not discharge into waters of the state.

13) The department must be notified if there is a change in address or other contact information for the facility.

The above conditions are considered part of the proper operation of the facility. If any of the above conditions are not met, the department must be notified in writing, within five (5) days. Any noncompliance with the permit conditions or with state requirements must be reported to the department as soon as possible after the facility becomes aware of the noncompliance condition. Failure to meet these requirements may result in monetary penalties and/or revocation of this permit.

Construction may begin upon signature of this permit by the department. The permit is based on construction being completed as per the design plans reviewed by the department. If any structural changes are made that are different than these design plans, the department must be notified in writing and prior approval obtained, before making these changes.

Authorized department personnel shall be permitted access to the facility to determine compliance with department rules and regulations. Department inspections will abide by all security measures implemented by the owner or operator to protect the health and safety of the workers and animals at the facility.

The owner/operator of this facility shall comply with all State and Federal environmental laws and rules, and shall also comply with all local building, fire, zoning and other applicable ordinances, codes, and rules.

Notice of Completion and results of testing completed on the clay liner or the manure storage structures shall be received by the department within 30 days of completion of construction.

I certify that I have read and understand the above information and agree to operate the facility in a manner that will meet all the conditions listed herein.

OWNER/OPERATOR CONSENT	FOR THE NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
By _____ (signature)	By _____
By _____ (print name here)	By Marty Haroldson, Director Water Quality Division
Date _____	Date _____

Application to Obtain a State Permit Associated with Animal Feeding Operations

FOR DEPT. USE ONLY

Application Number
Date Received

APPLICATION TO OBTAIN A STATE PERMIT ASSOCIATED WITH ANIMAL FEEDING OPERATIONS

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY
SFN 8296 (08-2021)

GENERAL INFORMATION

1. Legal Name of Organization Responsible for Facility		2. Telephone Number	
Riverview ND, LLP		320-392-5609	
3. Mailing Address	4. City	5. State/Province	6. Zip Code
26406 470th Avenue	Morris	MN	56267
7. Name of Facility	8. Contact Person Name	9. Contact Telephone Number	
Herberg Dairy	Brady Janzen	320-392-5609	
10. Contact Mailing Address	11. City	12. State/Province	13. ZIP Code
26406 470th Avenue	Morris	MN	56267
14. Contact Email Address			
brady.janzen@riverviewllp.com			
15. Location of the facility		16. County	
SEC. 34 TWP. 145N RGE. 49W		Traill	

ANIMAL INFORMATION

17. Animal Type	18. Max Number of Animals	19. Avg Weight of Animals	20. Days Animals Handled per Year	21. Confinement Type
Dairy Cow, Milking	21,250	1,250	365	Under Roof
22. Animal Type	23. Max Number of Animals	24. Avg Weight of Animals	25. Days Animals Handled per Year	26. Confinement Type
Dairy Cow, Dry	3,750	1,250	365	Under Roof
27. Animal Type	28. Max Number of Animals	29. Avg Weight of Animals	30. Days Animals Handled per Year	31. Confinement Type
Dairy Heifer	N/A			

WASTE CONTAINMENT AND STORAGE

32. Containment/Storage Type	33. Max Capacity (indicate units)	34. Est. amt. Waste Generated per Year (indicate units)	35. Material
Ponds	26,346,481 Cu. Ft.	27,381,108 Cu. Ft.	Manure
36. Containment/Storage Type	37. Max Capacity (indicate units)	38. Est. amt. Waste Generated per Year (indicate units)	39. Material
Ponds	4,235,950 Cu. Ft.	4,870,664 Cu. Ft.	Process Wastewater
40. Containment/Storage Type	41. Max Capacity (indicate units)	42. Est. amt. Waste Generated per Year (indicate units)	43. Material

WASTE HANDLING

44. Total Acres Controlled and Available for Land Application	45. Est. amt. of Waste Transferred per Year (indicate units)	46. Material
32,448.5 acres	27,381,108 Cu. Ft.	Manure
47. Total Acres Controlled and Available for Land Application	48. Est. amt. of Waste Transferred per Year (indicate units)	49. Material
32,448.5 acres	4,870,664 Cu. Ft.	Process Wastewater
50. Total Acres Controlled and Available for Land Application	51. Est. amt. of Waste Transferred per Year (indicate units)	52. Material

53. Provide a brief description of how animal mortalities will be handled

Mortalities will be removed from the facility with equipment and located in a secure rendering depot facility with impervious concrete floor surface and locked gate. Mortalities will be picked up daily by a professional rendering service.

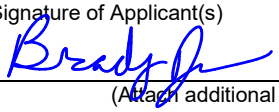
The following additional attachments must be submitted at least 180 days prior to the time permit coverage is needed in addition to this application:

1. A topographic map of the area where the facility is or proposed to be located which shows the specific production area.
2. Designs, including location, for all manure storage and water pollution control structures and site-specific background information as specified in the North Dakota Livestock Program Design Manual. Design plans developed by anyone other than the facility owner must be signed by the engineer who prepared or supervised the preparation of the plans under North Dakota Administrative Code chapter 33.1-16-03.1-08.
3. Site-specific information on topography, surface water, groundwater, and soil geology.
4. A nutrient management plan or information related to a nutrient management plan as specified in subsections 4 and 5 of North Dakota Administrative Code 33.1-16-03.1-08.
5. All submitted applications where local zoning has been properly established shall contain documentation of approval from the zoning authority. If such documentation has not been provided, the application process shall be put on hold until the required approval documentation has been received by this department.

Facilities must receive department approval prior to construction.

SIGNATURE

<table>
<tr><td rowspan="3">RETURN COMPLETED APPLICATION TO:
North Dakota Dept. of Env. Quality
Division of Water Quality
4201 Normandy Street
Bismarck, ND 58503-1324

Telephone: (701) 328-5210</td><td colspan="2">I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.</td></tr>
<tr><td>54. Printed Name of Applicant(s)
Brady Janzen</td><td>55. Title
Authorized Partner</td></tr>
<tr><td>56. Signature of Applicant(s)
  </td><td>57. Date
9/16/2024</td></tr>
</table>

(Attach additional pages if needed)

FOR DEPT. USE ONLY

☐ Individual	☐ General	
Design	NMP	Zoning

Instructions

Submission of this application is notice that the applicant identified on the application intends to obtain coverage under a state individual permit associated with Animal Feeding Operations in the state of North Dakota.

General Information

1. **Legal Name of Organization Responsible for Facility.** List the individual, company, organization or entity for which the legal responsibility falls.

2. **Telephone Number.** Provide a valid telephone number of organization responsible for facility.

3 through 6. **Mailing Address.** Provide a valid mailing address for organization responsible for facility.

7. **Name of Facility.** Provide the name of the facility.

8. **Contact Person Name.** Provide name of the main contact for the facility.

9. **Contact Telephone Number.** Provide a valid phone number for the main contact for the facility.

10 through 13. **Contact Mailing Address.** Provide a valid mailing address for the main contact for the facility.

14. **Contact Email Address.** Provide a valid email address for the main contact for the facility.

15 through 16. **Township, Range, Section, and Quarter Section.** Provide the numerical township, range, section and county of the facility. Provide the quarter section in the ABCD format. (*See Figure 1*).

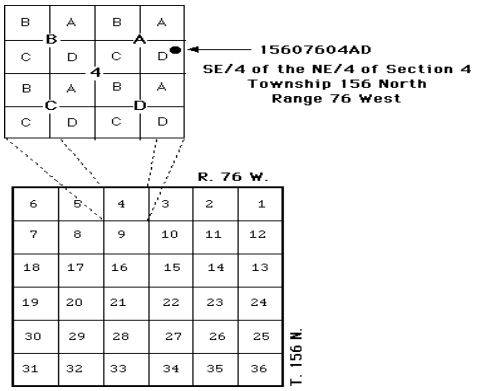


Figure 1: ABCD Quarter Section format

17, 22, and 27. **Animal Type.** Select the animal type from the drop down.

18, 23, and 28. **Max Number of Animals.** Enter the maximum number of animals the facility is designed for.

21, 26, and 31. **Confinement Type.** Select the confinement type from the drop down.

32, 36, and 40. **Containment/Storage Type.** Select the containment/storage type from the drop down for waste generated at the facility.

33, 37, and 41. **Max Capacity**. Enter the maximum capacity of the containment/storage structure along with the units (e.g. gallons, million gallons, etc.).

34, 38, and 42. **Est. amt. Waste Generated per Year.** Enter the estimated amount of waste that is produced at the facility per year.

35, 39, and 43. **Material.** Select the type of material the waste is from the drop down list.

44, 47, and 50. **Total Acres Controlled and Available for Land Application**. Enter the total number of acres that are controlled and available for land application.

45, 46, and 51. **Estimated amount of Waste Transferred per Year.** Enter the estimated amount of waste which is transferred per year and indicate the units.

46, 49, and 52. **Material.** Select the material type from the drop down list.

53. **Provide a brief description of how animal mortalities will be handled.** Describe how animal mortalities are planned to be handled.

54. **Printed Name of Applicant(s).** Enter the name of the applicant(s).

55. **Title.** Enter the title for the signatory listed.

56. **Signature of Applicant.** Signature of applicant listed. Signature must be an original "wet ink" signature.

57. **Date.** Enter the date which the application was signed.

Fact Sheet for State AFO Permit NDAFO-0908

FACT SHEET FOR STATE AFO PERMIT NDAFO-0908

Herberg Dairy
Herberg, ND

DATE OF THIS FACT SHEET – September 24, 2025

INTRODUCTION

The North Dakota Department of Environmental Quality (department) has been designated the state water pollution control agency for all purposes of the Federal Water Pollution Control Act, as amended [33 U.S.C. 1251, et seq.], and is hereby authorized to take all action necessary or appropriate to secure to this state the benefits of the act and similar federal acts. The department's authority and obligations for the control of pollution from animal feeding operations in the North Dakota Administrative Code (NDAC) chapter 33.1-16-03.1 which was promulgated pursuant to the North Dakota Century Code (NDCC) chapter 61-28. The State of North Dakota is delegated primacy of the Animal Feeding Operation program by EPA. The Rules and Regulations for the Control of Pollution from Certain Livestock Enterprises were first issued in 1972 and updated in 1989, 2005, and 2018.

The following rules or regulations apply to feedlot operations permits:

- Operations requiring a permit (NDAC Section 33.1-16-03.1-05),
- Authority for issuing Feedlot Permits (NDAC Section 33.1-16-03.1-01),
  The Department of Environmental Quality has been authorized to provide and administer this chapter relating to the control of pollution from animal feeding operations under the provisions of North Dakota Century Code Section 61-28-04.
- Procedures the department follows for issuing Feedlot permits (NDAC Chapter 33.1-16-03.1),
- Standards of Quality for Waters of the State (NDAC Chapter 33.1-16-02.1)

According to the NDAC section 33.1-16-03.1-13, if the department determines a significant degree of public interest exists regarding new or expanding facilities, it shall issue a public notice requesting comment on applications for both individual permits and general state animal feeding operation permits. The department shall provide a period of not less than thirty days during which time interested persons may submit comments.

For more information regarding preparing and submitting comments about the fact sheet and permit, please see **APPENDIX A – PUBLIC INVOLVEMENT INFORMATION**. Following the public comment period, the department may make changes to the draft permit. The department will summarize the responses to comments and changes to the permit in **APPENDIX D – RESPONSE TO COMMENTS.**

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BACKGROUND INFORMATION

Table 1 – General Facility Information

Applicant:	Riverview ND, LLP
Facility Name and Address:	Herberg Dairy 172nd Ave. SE and 5th St. SE Hillsboro, ND 58045
Permit Number:	NDAFO-0908
Permit Type:	CAFO
Hydrologic Code:	09020107 Elm-Marsh

FACILITY DESCRIPTION

Herberg Dairy is located seven miles east and five miles south of Hillsboro, in Traill County. The planned facility sits in the North ½ of Section 34, Township 145 North, Range 49 West, 5th Prime Meridian. The coordinates are Latitude 47.331465° N, Longitude -96.878340° W.

An application was received by the department on September 16, 2024, which indicated a maximum of 25,000[1] ~~25,500~~ dairy cattle at the proposed facility. These dairy cattle would consist of 21,250 milking dairy cows with an average weight of 1,250 lbs. and 3,750 dry dairy cows with an average weight of 1,250 lbs. Livestock would be living in a free-stall barn. The facility would have four manure storage ponds, one feed pad leachate wastewater pond, and three stormwater storage basins. The manure storage and wastewater ponds have been designed to contain all generated manure and wastewater as well as precipitation from a 25-year, 24-hour rainfall event.

GROUNDWATER AND SURFACE WATER

Geology:

> This facility is located in the Red River Valley section of the Central Lowland physiographic province. This is a flat-lying area composed of thick sequences of sediments deposited from glaciers that overlie bedrock formations of sandstone and shale. The surficial, glacial deposits consist predominantly of relatively impermeable, clay-rich, till and lake sediments. Permeable sand and gravel beds were deposited along an ancient shoreline of glacial Lake Agassiz forming the Galesburg aquifer. (U.S. Geological Survey, *Geological Map of North Dakota*, 1980) (John P. Bluemle, *Geology and Ground Water Resources of Traill County Part 1 - Geology, 1967*, p. 6, 49).

Topography:

> The local area is gently sloping with local relief less than 25 feet (John P. Bluemle, *Geology and Ground Water Resources of Traill County Part 1 - Geology*, 1967, p. 6).

Slope:

> The slope is 0.4 percent (%) in the proposed facility area. Slope is used to estimate runoff flow calculations when precipitation can contact areas containing manure.

[1] Language changed based on Commenter 12

Runoff:

All manure produced on the proposed facility would be contained in the barn or working areas until it can be processed through the solid separation process. The solids separation process consists of a mechanical rotary screw press that produces dewatered manure solids and a liquid manure portion. The solids would be stored on the manure stacking pad and the pad runoff would enter the leachate wastewater pond. The separated manure solids would be repurposed as packed bedding in the barn. Wastewater from the 28-acre feed storage pad would be routed to the leachate wastewater pond.

Elevation:

According to the United States Geological Survey Quadrangle maps, this facility is at an approximate elevation of 873 feet.

Site Drainage:

The proposed site is located on a field section with natural drainage into a road ditch and then an unnamed seasonal creek to the east. The creek then flows east to the Red River. During storm events, the three stormwater basins would catch rainwater from the barn roof.

Water Bodies:

The North Branch of Elm River is approximately 2.5 mile south of the proposed site, and the Red River is approximately 1.5 miles east of the proposed site.

Soils:

The primary soils at the site, as indicated by National Resource Conservation Service (NRCS) web soil survey, include Dovary silty clay, Hegne-Enloe silty clays, and Bearden-Lindaas silty clay loams. These soils consist mostly of elastic silt (MH) materials. The seasonal water table is 0 to 2.5 feet deep. (See Appendix C, Table 8)

Aquifers:

The facility does not overly a surficial aquifer. The nearest surficial aquifer is the Hillsboro aquifer, which is located 8 miles to the west.

Public Wells:

There are no irrigation wells, municipal wells, observation wells, or monitoring wells located within two miles of the site (Appendix C, Table 7).

Private Wells:

There are four domestic wells identified in the area, each being roughly two miles from the proposed site. Wells in the general area range from 135 feet to 238 feet deep (Appendix C, Table 7).

MANURE HANDLING AND DISPOSAL

Facility Operation:

The facility would incorporate a free-stall barn, milking parlor, holding pen, shop, and separator building. This facility would develop its own heifers including milking and dry cows which would both be on-site for 365 days a year.

Manure Handling:

Manure handling would be conducted according to the submitted Operations and Maintenance (O&M) Plan. Manure would be generated in the free stall barn, holding pen, and parlor facilities. These structures are proposed to be cleaned daily. Manure would be collected from the barn to the day pit located in the separator building by vacuum trucks. Manure from the holding pen and the parlor gravity drains into the wastewater tank adjacent to the holding pen and pumps into the day pit. The day pit would route manure through screw press solid separators to reduce solids. The liquid portion is pumped to Manure Pond 1 which can flow into Manure Ponds 2 through 4. All manure and wastewater storage ponds would have a synthetic cover to reduce odors. The solids portion is collected in the separator building and then hauled to the manure stacking pad. These solids would be used as bedding in the free stalls. The liquid manure would be land applied according to the nutrient management plan (NMP).

Expected Manure Quantities:

The estimated amount of liquid manure, wastewater, and leachate estimated to be produced at the facility is detailed in the tables below.

Table 2 – Manure and Wastewater Generation[2]

Livestock Information	Amount	Type	Average Weight (*lbs*)	Manure Production (*ft³/day/head*)
	21,250	Dairy Cow, Milking	1,250	2.1
	3,750	Dairy Cow, Dry	1,250	2.1
			ft³/year	*Mgal/year*
Total Generated Manure			19,162,500 ~~18,012,750~~	143.3 ~~134.7~~
Liquid Manure Portion			18,012,750	134.7
Manure Solids Portion**			1,149,750	8.6
Generated Wastewater			9,368,358 ~~9,368,339~~	70.1
Total Liquid Volume			27,381,108 ~~27,381,089~~	204.8

**Manure generation values sourced from USDA Ag Waste Management Field Handbook, Part 651, Ch. 4 Agricultural Waste Characteristics **Solids are reused as bedding, stored on storage pad, or applied according to NMP*

[2] Table updated based on Commenter 12

Table 3 – Runoff and Leachate Generation[3]

Facility Information	Feed Pad and Pond Precipitation	Volume
Feed and Stacking Pad Area	25-Year, 24-Hour Storm Event (4.27 in)	Runoff: 725,153 *ft*^{3}
	25-Year, 24-Hour Runoff (4.62 in)	
46.8 *acres*	Unpumpable Solids Buildup	minimal*
Combined Pond Area	Annual Evaporation (34 in)	0**
	Total Wastewater Generated Annually	28,106,242 *ft*^{3}
68.53 *acres*	Total Storage Volume Available***	37,963,656 ~~38,272,014~~ *ft*^{3}

**Pump-out ports installed **Covered ponds prevent evaporation ***see Table 4*

Mortality Disposal:

Mortality shall be disposed of in accordance with NDCC section 36-14-19, in a manner acceptable to the North Dakota Board of Animal Health, and so they will not impact waters of the state. The facility plans to ship all mortalities off-site every 72 hours using a rendering service. Prior to shipment off-site, the dairy would store mortalities in a roofed building with concrete sides and floor. The building is designed to allow conversion to a composting building if a rendering service becomes unavailable.

ODOR CONTROL

Potential Sources:

A source of potential odors appears to be the wastewater ponds, solids stacking area, and feed storage area. Odors from the barns and ponds would be minimized with good house-keeping practices. All manure storage ponds would be covered with synthetic covers to control odors. The barns would utilize a cross-ventilated design to ensure properly ventilated animal housing for odor mitigation. Land application may present a source of short-term odor events. However, land application is exempt from state odor restrictions (NDAC Section 33.1-15-16-02(3)). State zoning regulates the nature, scope, and location of this operation. There are 15 residences/farms within two miles of the site. All measurements are approximate based on aerial maps.

House 1.43 miles S	House 1.0 miles N	House 1.79 miles ENE
House 1.72 miles S	House 1.14 miles N	House 1.97 miles ENE
House 1.00 miles W	House 2.02 miles N	House 1.89 miles ENE
House 1.14 miles WNW	House 1.48 miles NE	House 1.80 miles ESE
House 1.67 miles NW	House 1.37 miles NE	House 1.36 miles SE

CONSTRUCTION SPECIFICATIONS

Manure and Wastewater Storage Structures:

The storage structures on site would be constructed according to the design plans. The following tables show the dimensions of the ponds and the evaluation of design capacity.

[3] Table 4 was renamed to Table 3 and updated based on Commenter 12

Table 4 – Manure and Wastewater Storage Structures[4]

	Manure Storage Pond 1	Manure Storage Pond 2	Manure Storage Pond 3	Manure Storage Pond 4	Leachate Storage Pond 5
	2025	2025	2025	2025	2025
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 1
Structure's Dimensions (*ft*)	1000 by 600	1000 by 600	560 by 1075	560 by 1075	1400 by 415
Top Liquid Area (ft^2)	552,900	552,900	553,850	553,850	510,000
Bottom Surface Area (ft^2)	290,625	290,625	284,750	284,750	279,400 ~~258,000~~
Design Volume (ft^3)	8,098,573 ~~8,088,485~~	8,098,573 ~~8,088,485~~	8,049,374 ~~8,032,217~~	8,049,374 ~~8,032,217~~	5,667,762 ~~6,030,611~~
Storage Depth (*ft*)	21 ~~19.5~~	21 ~~19.5~~	21 ~~19.5~~	21 ~~19.5~~	16
Total Depth (*ft*)	24 ~~22.5~~	24 ~~22.5~~	24 ~~22.5~~	24 ~~22.5~~	20

The combined storage of all ponds is 37,963,656 ft^3 or 284 *Mgal* at pond freeboard elevation. The facility has the capacity to store the wastewater and manure produced on the facility, as well as runoff from a 25-year, 24-hour storm event.

~~Both~~ All manure storage ponds, and the feed pad wastewater storage pond were designed to hold up to 415 days of manure and runoff generation as well as a 25-year, 24-hour storm event. This is more conservative than the NDDEQ requirements of 270 days of storage of manure generation and a 25-year, 24-hour storm event.

Soil Summary:

The proposed location is determined to be suitable based on soil survey and ground water survey information. The borings indicate that the Unified Soil Classification for the subsoil at the site is generally heavy clay material (CH) to a relative (~) depth of ~31 to ~36 feet below the pond floor. The bottom of the proposed manure storage ponds would be at a relative elevation of ~16 feet below surface grade (Appendix C, Table 9).

Clay Liner Construction Testing:

A two-foot clay liner is required in both the manure storage ponds and wastewater pond due to the required depths of standing liquid manure and runoff according to the North Dakota Livestock Program Design Manual (Design Manual). Clay material onsite is suitable for the construction of the clay liner and would be installed in 6-inch lifts. Each lift would be compacted using controlled travel compaction equipment so that fill area would be uniformly compacted to 95% Standard Proctor Density (American Society for Testing and Materials (ASTM) D-698). Moisture content during compaction shall be maintained between 1% dry of optimum to 3% wet of optimum. For both ponds, permeability falls well below 1/16-inch per day (0.0015 and 0.002 inch/day), a standard in the Design Manual Section 5.3.5. During construction, compaction and moisture testing to ASTM standards would be conducted on the clay liner.

[4] Table 3 was renamed to Table 4 and updated based on Commenter 12

Manure Storage Structure Considerations:

The facility has incorporated four manure storage ponds into the design. Two manure storage pond floors would each be ~~1000~~ 775 feet by ~~600~~ 375 feet, and the other two would each be ~~560~~ 850 feet by ~~1075~~ 335 feet.[5] Each pond would have a 5:1 internal embankment slope. The influent pipe from the separating building would enter Pond #1 onto a concrete chute/splash pad. The chute would run from the pipe outlet down and extending onto the pond floor. It would be 6 inches thick, 12 feet across, and be reinforced with #4 rebar. Each pond would have a linear low-density polyethylene cover in place. Each pond has been designed to be pumped out completely. Each pond would have a concrete manhole for pump out access. The manholes would extend down below the grade of the floor of the pond, and each would have a 30" Standard Dimension Ratio 26 PVC pipe extending out to the pond floor. This design would enable all sludge and wastewater to be pumped out as described in the Operations & Management Plan.

Each pond would have a liquid level gauge. The liquid level gauges would be constructed of pressure-treated wood, steel, PVC, fiberglass, or concrete. They would be permanently installed to be easily visible, with clearly marked divisions marking depth.

Concrete & Rebar:

The splash pad concrete and rebar specifications follow the guidelines of the American Concrete Institute's (ACI) publication "Building Code Requirements for Structural Concrete", ACI 318. Concrete would be air entrained ranging from 5% to 8%. The compressive strength of the concrete for the base slab and footings would be 4,000 psi.

Earth Fill:

The facility would be constructed as the design plans indicate. Vegetation and organic material would be stripped and removed from the footprint of the embankment. Appropriate topsoil would be used as cover material on the outside slopes of the embankment. The embankment would be seeded to a shallow rooted perennial grass and vegetation would be maintained. The embankment would be constructed out of existing soils located on site. These soils would contain no frozen material, ice, snow, sod, brush, roots, other perishable materials, rocks, or debris larger than two inches in diameter.

Groundwater Monitoring Plan:

The area of interest (AOI) does not lie above any surficial aquifers or sensitive groundwater areas. A search of the NRCS' web soil survey indicates that the soil within the AOI is primarily heavy clay. There are no drinking water wells within one mile of the site. It was determined by the department that monitoring wells are not recommended due to these factors.

[5] Language updated based on Commenter 12

Operation and Maintenance Plan:

The operation and maintenance plan would be as submitted. This includes the following: Settling areas would be required to be cleaned and repaired as needed to maintain original condition. Ponds must be pumped when wastewater reaches maximum capacity indicated by each individual pond marker. Earth work and concrete must be inspected annually and repaired to original design grades and specifications. Drains and diversions must be mowed and maintained when soil is dry and firm. Sediment buildup or erosion in drainage ways must be cleaned and re-graded to original condition. According to the nutrient management plan, accumulated manure would be removed annually, and land applied.

NUTRIENT MANAGEMENT PLAN AND MANURE APPLICATION

General Conditions:

Managing and applying manure to ensure surface waters are not impacted and minimize nuisance concerns for nearby residents is a requirement. Factors to consider when choosing methods of manure management and application include but are not limited to: the volume of manure, the topography, location of surface and ground water sources, and distance from neighboring residents.

Application Rates:

Liquid manure and wastewater would be pumped from the ponds and injected into fields with a knifing system in spring and/or fall. Manure application on fields would be at appropriate agronomic rates. This rate is dependent on crop variety grown, crop yield goals, and soil test results. Manure shall be land applied at a rate not to exceed nitrogen levels recommended for the crop of the following production year.

Separated manure solids would be spread onto fields with a manure spreader at agronomic rates. Solid manure would be applied in spring and/or fall.

Record Keeping:

The facility is required make the following records available to the department for review upon request for a minimum of 5 years from the date they are created:

- Document routine visual inspections of the production area and containment structures.
- How, when, and where the manure, litter, or process wastewater was reused or disposed.
- Weather conditions at the time and 24 hours prior to manure application.
- Mortalities management and practices used.
- The date, time, and estimated volume of any overflow outside of the containment area.
- Annual nutrient sampling of: manure, litter and/or process wastewater and soil samples where manure has been applied that year.
- An explanation of how the manure application rates were determined with calculations of the planned and actual total nitrogen and phosphorus to be applied to each field.
- The crops grown and crop yields for all fields where manure was applied.

- If manure, litter, or process wastewater is transferred to other persons or entities; the recipient's name and address, approximate amount transferred, and the date of the transfer should be documented.
- Any actions taken to correct deficiencies.

Land Application of Manure:

The endpoint for all manure and manure solids produced at the proposed facility is to be land applied on local fields. The table below details the quantity of manure and nutrients estimated to be produced on the facility.

Table 5 – Expected Manure Nutrient Generation*[6]

Facility Source	Manure/Wastewater (*gal/day*)	Nitrogen (*lbs/day*)	P_2O_5 (*lbs/day*)	K_2O (*lbs/day*)
Dairy Cows, Milking	258,294	5682	2144	5682
Dairy Cows, Dry	45,581	1003	378	1003
Flush Water	192,002	4224	1593	4224
Wastewater Daily Total**		Nutrient Daily Total (*lbs/day*)		
561,125 *gal/day*		10,909	4,116	10,909
Annual Wastewater Generation		Nutrient Annual Generation (*lbs/yr*)		
204,810,548 *gal/yr*		4,505,832	1,699,928	4,505,832
Total Per Year after 30% N storage loss, 2% N application loss, and 80% P availability		3,091,001	1,359,942	4,505,832

**Manure nutrient values sourced from manure nutrient test submitted from Riverview, Morris Dairy: 22 lbs N/1000 gal, 8.3 lbs P_2O_5/1000 gal, 22 lbs K_2O/1000 gal **Combined manure and flush water after solids removal*

When estimating land needed for manure application, if the nutrient management plan's phosphorus risk assessment indicates a medium to low risk of movement of phosphorus, facilities are allowed to apply at agronomic nitrogen rates in accordance with the phosphorus index. If the nutrient management plan's phosphorus risk assessment indicates a high potential for movement or if soil test show phosphorus levels in the high range, the facility is required to apply the manure at agronomic phosphorus rates.

Table 6 – Agronomic Application Rates and Crop Nutrient Uptake

Crops Grown	Planned Acres	Crop Ratio	Projected Yield	Nitrogen* uptake/unit	N rate lbs/acre	Total N lbs	P_2O_5 Rate lbs/acre	Total P_2O_5 lbs
Corn, Silage	16,622	55%	20.5 ton/acre	10.4 lbs/ton	213	3,543,714	73	1,219,856
Soybeans	2,418	8%	40 bu/acre	2.5 lbs/bu**	100	241,768	28	67,308
Alfalfa	6,044	20%	2.8 ton/acre	0 lbs/ton	0	0	34	205,962
Wheat	3,022	7%	54.7 bu/acre	2.5 lbs/bu	137	413,272	38	115,716
Sugar Beets	2,115	10%	28 ton/acre	6.5 lbs/ton	182	385,016	79	167,038
Total	30,221	100%				4,583,770		1,775,880

**NDSU Ag Extension publication SF-822 (revised), (May 2007), Tables 2, 9, 23, and 26.*

[6] Updated based on Commenter 12

*** "Nutrient Removal Values for Major Agronomic Crops in Missouri" by Manjula V. Nathan and Yichang Sun, and David Dunn, (2006) Table. 2*

Amount of land needed for spreading on nitrogen basis: 20,379 acres.
Amount of land needed for spreading on phosphorous basis: 23,143 acres.
Amount of land identified by applicant for land application: ~~30,221~~ 30,176 acres.[7]

The department realizes that the nitrogen in manure is not all available to the crop the first year and therefore the manure would typically be applied at rates higher than the rates listed above. However, the organic nitrogen becomes available the following year(s) so the manure cannot be applied at the same rate in subsequent years. These figures are used to estimate the total acres that would be needed over several years of application using proper rotation of cropland and/or calculating nitrogen that is carried over to the following years. Table 6 above, details how all generated nutrients might be taken up by crops on the reported application acres.

Disclaimer:

This design review is intended to assess a livestock facility's ability to contain, divert, store, and properly apply manure and/or runoff water to meet department requirements, to prevent detrimental impacts the quality of waters of the state, and to minimize the potential for odor concerns from livestock facilities. It does not include an assessment of the structural integrity of livestock facilities or manure handling structures such as those made of concrete, metal, wood, plastic, or other material.

PERMIT ISSUANCE PROCEDURES

PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause. This includes the establishment of limitations or prohibitions based on changes to Water Quality Standards, the development and approval of waste load allocation plans, the development or revision to water quality management plans. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

PROPOSED PERMIT ISSUANCE

This proposed permit application meets all statutory requirements for the department to authorize a State Animal Feeding Operation Permit. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the State of North Dakota. The department proposes to issue this permit for a term of five (5) years.

[7] Language updated based on Commenter 12

APPENDIX A – PUBLIC INVOLVEMENT INFORMATION

The department proposes to issue a permit to **Herberg Dairy**. This fact sheet describes the facility and the department's rationale for requiring permit conditions.

The department will place a Public Notice of Draft on April 18, 2025 in the **Hillsboro** Banner to inform the public and to invite comment on the proposed draft North Dakota State Animal Feeding Operation Permit and fact sheet.

The Notice-

- Indicates where copies of the draft Permit and Fact Sheet are available for public evaluation.
- Offers to provide assistance to accommodate special needs.
- Urges individuals to submit their comments before the end of the comment period.
- Informs the public that if there is significant interest, a public hearing will be scheduled.

You may obtain further information from the department by telephone at (701) 328-5210, or by writing to the address listed below.

North Dakota Department of Environmental Quality
Division of Water Quality
4201 Normandy Street
Bismarck, ND 58503

The primary author of this permit and fact sheet is Cameron Gilley.

North Dakota Department of Environmental Quality Public Notice
Issue of an AFO Permit

Public Notice Date: 4/18/2025 Public Notice Number: ND-2025-013

Purpose of Public Notice
The Department intends to take public comment to ensure the following Animal Feeding Operations (AFO) Permit follows the authority of the Section 61-28-04 of the North Dakota Century Code.

Permit Information
Site Name: Herberg Dairy
Application Date: 9/17/2024 Application Number: NDAFO0908
Applicant Name: Riverview ND, LLP
Mailing Address: 26406 470th Ave Morris MN 56267
Telephone Number: (320) 392-5609

Proposed Permit Expiration Date: 4/30/2030

Facility Description
The application is for a dairy facility that would be located seven miles east and five miles south of Hillsboro, ND in Traill County. The planned facility site is the North ½ of Section 34, Township 145N, Range 49W. The application indicates the facility would have a maximum of 21,250 milking dairy cows with an average weight of 1,250 lbs. and 3,750 dry dairy cows with an average weight of 1,250 lbs.

Meeting Purpose and Location

A public hearing will be held to discuss the Department's review of the proposed facilities. This opportunity for oral comment on the application will be provided at the location described below. The Department is seeking input in the review process of the proposed livestock facility.

The public hearing will be held **May 20, 2025** from 5:00 p.m. to 8 p.m. at the following location:

Hillsboro High School Gym
12 4th street NE
Hillsboro, ND 58045

Tentative Determinations
The submitted application and supporting documentation have been reviewed by the Department. They assure that State Water Quality Standards will be protected, and the system will be constructed and can be operated in compliance with the North Dakota state requirements for storage and handling of manure and wastewater for an Animal Feeding Operation.

Information Requests and Public Comments
Copies of the application, draft permit, and related documents are available for review. Comments or requests should be directed to the ND Department of Environmental Quality,

Division of Water Quality, 918 East Divide Ave, Bismarck ND 58501-1947 or by calling 701.328.5210.

All comments received by **June 2, 2025,** will be considered prior to finalizing the permit. The Department will issue the final permit within sixty (60) days of this notice.

The NDDEQ will consider every request for reasonable accommodation to provide an accessible meeting facility or other accommodation for people with disabilities, language interpretation for people with limited English proficiency (LEP), and translations of written material necessary to access programs and information. Language assistance services are available free of charge to you.

To request accommodations, contact NDDEQ Non-discrimination Coordinator at 701-328-5210 or deqEJ@nd.gov. TTY users may use Relay North Dakota at 711 or 1-800-366-6888.

APPENDIX B – DEFINITIONS

DEFINITIONS Standard Permit (BP 2019.09.23)

1. "Animal feeding operation" means a lot or facility, other than an aquatic animal production facility, where the following conditions are met:
   a. Animals, other than aquatic animals, have been, are, or will be stabled or confined and fed or maintained for a total of forty-five days or more in any twelve-month period; and
   b. Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.
2. "Bedding material" means an absorbent substance applied to dirt or concrete flooring systems, including wood shavings, wood chips, sawdust, shredded paper, cardboard, hay, straw, hulls, sand, and other similar, locally available materials.
3. "Best management practices" means schedules of activities, prohibitions of practices, conservation practices, maintenance procedures, and other management strategies to prevent or reduce the pollution of waters of the state. Best management practices also include treatment requirements, operating procedures, and practices to control production area and land application area runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
4. "Concentrated animal feeding operation" means an animal feeding operation that is defined as a large, medium, or small concentrated animal feeding operation or any animal feeding operation designated as a concentrated animal feeding operation under section 33.1-16-03.1-04. For purposes of determining animal numbers, two or more feeding operations under common ownership are considered to be a single animal feeding operation if they adjoin each other or if they use a common area or system for the disposal of wastes.

5. "Earthen storage pond" or "pond" means a topographic depression either below or above ground level, manmade excavation, or diked area formed primarily of earthen materials, although it may be lined with man-made materials or other seepage control materials, and used to store manure, process wastewater and runoff from the production area of a facility.

6. "Engineer" means a professional engineer registered to practice in the state of North Dakota.

7. "Facility" is an animal feeding operation.

8. "General permit" means a general state animal feeding operation permit. This is a permit issued to cover multiple facilities of the same or similar type, without requiring each facility to be covered under an individual permit.

9. "Large concentrated animal feeding operation" means any animal feeding operation that stables or confines as many as or more than the numbers of animals, not including unweaned young, specified in any of the following categories:

    a. Seven hundred mature dairy cows, whether milked or dry;

    b. One thousand veal calves;

    c. One thousand cattle other than mature dairy cows or veal calves. "Cattle" includes, but is not limited to, heifers, steers, bulls, and cow/calf pairs;

    d. Two thousand five hundred swine, each weighing 55 pounds or more;

    e. Ten thousand swine, each weighing less than 55 pounds;

    f. Five hundred horses;

    g. Ten thousand sheep or lambs;

    h. Fifty-five thousand turkeys;

    i. Thirty thousand laying hens or broilers, if the animal feeding operation uses a liquid manure handling system;

    j. One hundred twenty-five thousand chickens (other than laying hens), if the animal feeding operation uses other than a liquid manure handling system;

    k. Eighty-two thousand laying hens, if the animal feeding operation uses other than a liquid manure handling system;

    l. Thirty thousand ducks, if the animal feeding operation uses other than a liquid manure handling system; or

    m. Five thousand ducks, if the animal feeding operation uses a liquid manure handling system.

10. "Litter" means a mixture of fecal material, urine, animal bedding material, and sometimes waste feed.

11. "Manure" means fecal material and urine, animal-housing wash water, bedding material, litter, compost, rainwater, or snow melt that comes in contact with fecal material and urine, and raw or other materials commingled with fecal material and urine or set aside for disposal.

12. "Manure handling system" means all of the water pollution control structures used at the production area of a facility.

13. "Manure storage pond" means an earthen storage pond that stores liquid manure and process wastewater from indoor confined animal feeding operations.

14. "Manure storage structure" means any water pollution control structure used to contain or store manure or process wastewater. It includes earthen manure storage ponds; runoff ponds; concrete, metal, plastic, or other tanks; and stacking facilities.

15. "Medium animal feeding operation" means any animal feeding operation that stables or confines the numbers of animals, not including unweaned young, specified within any of the following ranges:

    a. Two hundred to six hundred ninety-nine mature dairy cows, whether milked or dry;

    b. Three hundred to nine hundred ninety-nine veal calves;

    c. Three hundred to nine hundred ninety-nine cattle other than mature dairy cows or veal calves. "Cattle" includes, but is not limited to, heifers, steers, bulls, and cow/calf pairs;

    d. Seven hundred fifty to two thousand four hundred ninety-nine swine, each weighing 55 pounds or more;

    e. Three thousand to nine thousand nine hundred ninety-nine swine, each weighing less than 55 pounds;

    f. One hundred fifty to four hundred ninety-nine horses;

    g. Three thousand to nine thousand nine hundred ninety-nine sheep or lambs;

    h. Sixteen thousand five hundred to fifty-four thousand nine hundred ninety-nine turkeys;

    i. Nine thousand to twenty-nine thousand nine hundred ninety-nine laying hens or broilers, if the animal feeding operation uses a liquid manure handling system;

    j. Thirty-seven thousand five hundred to one hundred twenty-four thousand nine hundred ninety-nine chickens (other than laying hens), if the animal feeding operation uses other than a liquid manure handling system;

    k. Twenty-five thousand to eighty-one thousand nine hundred ninety-nine laying hens, if the animal feeding operation uses other than a liquid manure handling system;

    l. Ten thousand to twenty-nine thousand nine hundred ninety-nine ducks, if the animal feeding operation uses other than a liquid manure handling system; or

    m. One thousand five hundred to four thousand nine hundred ninety-nine ducks, if the animal feeding operation uses a liquid manure handling system.

16. "Medium concentrated animal feeding operation" means a medium animal feeding operation that meets either one of the following conditions:

    a. Pollutants are discharged into waters of the state through a manmade ditch, flushing system, or other similar manmade device; or

    b. Pollutants are discharged directly into waters of the state which originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

17. "North Dakota Livestock Program Design Manual" means the guidelines established for use by the department in the review and permitting process for animal feeding operations.

18. "Nutrient management plan" means a written description of the equipment, methods and schedules by which:

    a. Manure, litter, and process wastewater is beneficially reused in an environmentally safe manner such as being applied to land at appropriate agronomic rates as nutrients or fertilizers; and

    b. Water pollution and air pollution, including odors, are controlled sufficiently to protect the environment and public health.

19. "Open lot" means livestock pens, feeding or holding areas at the production area of an animal feeding operation which are outside and not under roof, and where rain can fall directly on the lot area.

20. "Open manure storage structure" means an earthen pond or storage tank for holding liquid manure which is not covered so rainfall can fall directly into the pond or tank.

21. "Operation and maintenance plan" means a written description of the equipment, methods, and schedules for:

    a. Inspection, monitoring, operation, and maintenance of the animal feeding operation, including manure storage structures, water pollution control structures, and the production area; and

    b. Controlling water pollution and air pollution, including odors sufficient to protect the environment and public health. It includes emergency response actions for spills, discharges or failure of a collection, storage, treatment, or transfer component.

22. "Operator" means an individual or group of individuals, partnership, corporation, joint venture, or any other entity owning or controlling, in whole or in part, one or more animal feeding operations.

23. "Overflow" means the discharge of manure or process wastewater resulting from the filling of wastewater or manure storage structures beyond the point at which no more manure, process wastewater, or storm water can be contained by the structure.

24. "Pollutant" means "wastes" as defined in North Dakota Century Code section 61-28-02, including dredged spoil, solid waste, incinerator residue, garbage, sewage, sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

25. "Process wastewater" means water directly or indirectly used in the operation of the animal feeding operation for any or all of the following: spillage or overflow from animal or poultry watering systems; washing, cleaning, or flushing pens, barns, manure pits, or other animal feeding operation facilities; direct contact swimming, washing, or spray cooling of animals; or dust control. Process wastewater also includes any water which comes into contact with any raw materials, products, or byproducts, including manure, litter, feed, milk, eggs, or bedding material.

26. "Production area" means those areas of an animal feeding operation used for animal confinement, manure storage, raw materials storage, and waste containment. The animal confinement area includes open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milking rooms, milking centers, cattle yards, barnyards, medication

pens, walkers, animal walkways, and stables. The manure storage area includes lagoons, runoff ponds, storage sheds, stockpiles, under-house or pit storages, liquid impoundments, static piles, and composting piles. The raw materials storage area includes feed silos, silage bunkers, and bedding materials. The waste containment area includes settling basins, areas within berms, and diversions which separate uncontaminated storm water. Also included in the definition of production area is any egg washing or egg processing facility and any area used in the storage, handling, treatment, or disposal of mortalities.

27. "Runoff" means rainwater or snow melt that comes in contact with manure at an open lot or open manure storage area and, therefore, is defined as manure.

28. "Runoff pond" means an earthen storage pond that is used to collect and store runoff from an open lot or from a manure storage area.

29. "Seepage" means the volume of flow through a manure storage structure.

30. "Sensitive groundwater area" means vulnerable hydrogeologic settings as determined by the department such as glacial outwash deposits or alluvial or aeolian sand deposits that are critical to protecting current or future underground sources of drinking water. Areas designated as sensitive groundwater areas by the department include alluvial or aeolian sand deposits shown on Geologic Map of North Dakota (Clayton, 1980, North Dakota geological survey) and glacial drift aquifers listed in North Dakota Geographic Targeting System for Groundwater Monitoring (Radig, 1997, North Dakota department of health), or most recent editions of these publications, with DRASTIC scores greater than or equal to 100 based on methodology described in DRASTIC: A Standardized System For Evaluating Groundwater Pollution Potential (Aller et al, 1987, United States environmental protection agency).

31. "Small animal feeding operation" means any animal feeding operation that stables or confines less than the numbers of animals specified for a medium animal feeding operation.

32. "Small concentrated animal feeding operation" means a small animal feeding operation designated as a concentrated animal feeding operation under section 33.1-16-03.1-04.

33. "State animal feeding operation permit" means a permit issued by the department under this chapter to an animal feeding operation.

34. "Surface water" means waters of the state that are located on the ground surface, including all streams, lakes, ponds, impounding reservoirs, marshes, watercourses, waterways, and all other bodies or accumulations of water on the surface of the earth, natural or artificial, public or private.

35. "Unconfined glacial drift aquifer" means a glacial drift aquifer that does not have an impervious soil layer which acts to prevent or minimize movement of water into, through, or out of the aquifer.

36. "Water pollution control structure" means a structure built or used for handling, holding, transferring, or treating manure or process wastewater, so as to prevent it from entering the waters of the state. The term also includes berms, ditches, or other structures used to prevent clean water from coming in contact with manure.

37. "Water quality standards" means the water quality standards contained in chapter 33.1-16-02.1.

APPENDIX C – DATA AND TECHNICAL CALCULATIONS

Table 7 – Water Commission Well Data

Location	Use	Depth (ft)	Diameter (inches)	Aquifer
14504920DAA	Domestic	unknown	3.0	unknown
14504936DDC	Domestic	214	5	unknown
14504922CDD	Domestic	238	4	unknown
14404908ABA	Domestic	135	4	unknown

*****Wells closest to facility.

Table 8 – Soil Survey Data

Map Unit	Name Description	Bedrock Depth (feet)	Seasonal Water Table (feet)	Unified Soil Class*	Ksat µm/s	Lagoon Restrictions
I231A	Dovray silty clay, 0-1% slopes	6.5	0	MH	1.3645	Very limited
I461A	Hegne-Enloe silty clays, 0-1% slopes	6.5	0.75	MH	0.9200	Very limited
I492A	Bearden-Lindaas silty clay loams, 0-2% slopes	6.5	2.5	MH	3.4868	Very limited
MH-Elastic Silt						

Table 9 – Soil Boring Information

	B-101	B-102	B-103	B-104	B-105	B-106	B-107	B-108	B-109	B-110	B-111	B-112
Elevation	868.4	868.0	867.8	867.9	869.5	867.8	867.9	869.3	869.0	869.1	867.7	867.6
0 to 1	CL-OL	CL-OL	CL-OL	CH-OH	CL-OL	CH-OH	CH-OH	CL-OL	CL-OL	CL-OL	CH-OH	CH-OH
1 to 2	Cl	CL-OL	Cl	CL	Cl	CH-OH	CL/CH	Cl	CL/CH	CL/CH	CH-OH	CH-OH
2 to 3	CL	CL	Cl	CL	CL	CH-OH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH
3 to 4	CL	CL	Cl	CL	CL	CH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH
4 to 5	CH	CH	Cl	CL	CL	CH	CH	CH	CH	CH	CH	CL/CH
5 to 6	CH	CH	Cl	CL	CL	CH	CH	CH	CH	CH	CH	CL/CH
6 to 7	CH	CH	CL/CH	CL/CH	CL/CH	CH	CH	CH	CH	CH	CH	CL/CH
7 to 8	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
8 to 9	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH

	B-101	B-102	B-103	B-104	B-105	B-106	B-107	B-108	B-109	B-110	B-111	B-112
Elevation	868.4	868.0	867.8	867.9	869.5	867.8	867.9	869.3	869.0	869.1	867.7	867.6
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
31 to 32	CH				CH			CH	CH	CH		
32 to 33	CH				CH			CH	CH	CH		
33 to 34	CH				CH			CH	CH	CH		
34 to 35	CH				CH			CH	CH	CH		
35 to 36	CH				CH			CH	CH	CH		
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-113	B-114	B-115	B-116	B-117	B-118	B-119	B-120	B-121	B-122	B-123	B-124
Elevation	867.7	867.2	866.5	866.3	867.2	868.4	868.3	868.6	869.0	868.3	868.2	867.5
0 to 1	CL-OL	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH
1 to 2	CH	CH-OH	CH-OH	CH-OH	CH-OH	CL/CH	CH-OH	CL/CH	CL/CH	CH	CH	CH-OH
2 to 3	CH	CL/CH	CH-OH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CL/CH
3 to 4	CH	CL/CH	CH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CL/CH
4 to 5	CH	CL/CH	CH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CL/CH
5 to 6	CH	CL/CH	CH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CL/CH
6 to 7	CH	CL/CH	CH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CH
7 to 8	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
8 to 9	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
31 to 32						CH	CH	CH	CH	CH	CH	
32 to 33						CH	CH	CH	CH	CH	CH	
33 to 34						CH	CH	CH	CH	CH	CH	
34 to 35						CH	CH	CH	CH	CH	CH	
35 to 36						CH	CH	CH	CH	CH	CH	
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-125	B-126	B-127	B-128	B-129	B-130	B-131	B-132	B-133	B-134	B-135	B-136
Elevation	868.0	868.8	868.7	869.0	867.3	868.3	868.2	868.5	867.8	867.6	867.8	867.8
0 to 1	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH
1 to 2	CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
2 to 3	CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
3 to 4	CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CL/CH

	B-125	B-126	B-127	B-128	B-129	B-130	B-131	B-132	B-133	B-134	B-135	B-136
Elevation	868.0	868.8	868.7	869.0	867.3	868.3	868.2	868.5	867.8	867.6	867.8	867.8
4 to 5	CH	CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
5 to 6	CH	CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
6 to 7	CH	CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
7 to 8	CH	CH	CH	CH	CL/CH	CH	CH	CH-OH	CH	CH	CH	CH
8 to 9	CH	CH	CH	CH	CL/CH	CH	CH	CH-OH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
31 to 32		CH	CH	CH		CH	CH	CH-OH				
32 to 33		CH	CH	CH		CH	CH	CH-OH				
33 to 34		CH	CH	CH		CH	CH	CH-OH				
34 to 35		CH	CH	CH		CH	CH	CH-OH				
35 to 36		CH	CH	CH		CH	CH	CH-OH				
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-137	B-138	B-139	B-140	B-141	B-142	B-143	B-144	B-145	B-146	B-147	B-148
Elevation	867.4	867.8	867.7	868.2	867.0	867.1	867.9	867.8	866.4	866.8	867.3	867.7
0 to 1	CH-OH	CL-OL	CL-OL	CL-OL	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH
1 to 2	CH	CH	CH	CL-OL	CH	CH	CH	CL/CH	CH-OH	CH-OH	CH	CL/CH
2 to 3	CH	CH	CH	CH	CH	CH	CH	CL/CH	CH	CH-OH	CH	CL/CH
3 to 4	CH	CH	CH	CH	CH	CH	CH	CL/CH	CH	CH	CH	CL/CH
4 to 5	CL/CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CH	CH	CH
5 to 6	CL/CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CH	CH	CH
6 to 7	CH	CH	CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CH	CH	CH
7 to 8	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
8 to 9	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH

	B-137	B-138	B-139	B-140	B-141	B-142	B-143	B-144	B-145	B-146	B-147	B-148
Elevation	867.4	867.8	867.7	868.2	867.0	867.1	867.9	867.8	866.4	866.8	867.3	867.7
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
31 to 32				CH								
32 to 33				CH								
33 to 34				CH								
34 to 35				CH								
35 to 36				CH								
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-149	B-150	B-151	B-152	B-153	B-154	B-155	B-156	B-201	B-202	B-203	B-204
Elevation	868.9	868.8	867.2	866.9	867.9	867.7	868.8	867.3	869.9	870.5	870.2	870.1
0 to 1	OH	OH	OH	OH	OH	OH	OH	OH	CL-OL	CL-OL	CL-OL	CL-OL
1 to 2	OH	OH	OH	OH	CH	OH	OH	CH	CL	CL	CL	CL-OL
2 to 3	CH	CH	OH	CH	CH	CH	CH	CH	CL	CL	CL	CL
3 to 4	CH	CH	OH	CH	CH	CH	CH	CH	CL	CL	CL	CL
4 to 5	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CL	CL
5 to 6	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CL	CL
6 to 7	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CL	CL
7 to 8	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CH	CL
8 to 9	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CH	CL
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
31 to 32	CH	CH					CH					
32 to 33	CH	CH					CH					
33 to 34	CH	CH					CH					
34 to 35	CH	CH					CH					

	B-149	B-150	B-151	B-152	B-153	B-154	B-155	B-156	B-201	B-202	B-203	B-204
Elevation	868.9	868.8	867.2	866.9	867.9	867.7	868.8	867.3	869.9	870.5	870.2	870.1
35 to 36	CH	CH					CH					
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-205	B-206	B-207	B-208	B-209	B-210	B-211	B-212	B-213	B-214	B-301	B-302
Elevation	870.3	870.1	870.2	871.1	870.4	869.7	869.6	870.1	870.3	869.7	869.2	869.5
0 to 1	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL	OH	OH	OH	CL-OL	CL-OL
1 to 2	CL	CL	CL	CL	CL	CL	CL-OL	CH	CH	CH	CL-OL	CL
2 to 3	CL	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CL
3 to 4	CL	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CL
4 to 5	CH	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CH
5 to 6	CH	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CH
6 to 7	CH	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CH
7 to 8	CH	CH	CL	CH	CH	CH	CH	CH	CH	CH	CH	CH
8 to 9	CH	CH	CL	CH	CH	CH	CH	CH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-303	B-304	B-305	B-401	B-501	B-601						
Elevation	870.0	869.5	869.2	868.5	869.2	869.1						
0 to 1	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL						
1 to 2	CL-OL	CL	CL	CH/CL	CL	CL						
2 to 3	CL	CL	CL	CH/CL	CL	CL						
3 to 4	CL	CL	CL	CH/CL	CL	CL						
4 to 5	CL	CL	CL	CH	CL	CH						
5 to 6	CL	CL	CH	CH	CL	CH						
6 to 7	CL	CL	CH	CH	CL	CH						
7 to 8	CH	CH	CH	CH	CH	CH						
8 to 9	CH	CH	CH	CH	CH	CH						
9 to 10	CH	CH	CH	CH	CH	CH						
10 to 11	CH	CH	CH	CH	CH	CH						
11 to 12				CH		CH						
12 to 13				CH		CH						
13 to 14				CH		CH						
14 to 15				CH		CH						
15 to 16				CH		CH						

	B-303	**B-304**	**B-305**	**B-401**	**B-501**	**B-601**						
Elevation	870.0	869.5	869.2	868.5	869.2	869.1						
16 to 17				CH		CH						
17 to 18				CH								
18 to 19				CH								
19 to 20				CH								
20 to 21				CH								
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

APPENDIX D – RESPONSE TO COMMENTS

Response to comments received during the public comment period are listed in Section VI of the final decision package.

Department Response to Public Comments

TO: File
FROM: Division of Water Quality
DATE: September 24, 2025
SUBJECT: Response to Public Comments for Proposed State Animal Feeding Operation Permit NDAFO0908 “Herberg Dairy”

This memorandum is in response to comments received by the North Dakota Department of Environmental Quality, Division of Water Quality (department) regarding the facility proposed by Riverview ND, Limited Liability Partnership (LLP), Herberg Dairy (application received September 16, 2024).

Facility:

The proposed facility, Herberg Dairy, is a proposed concentrated animal feeding operation (CAFO) located seven miles east and five miles south of Hillsboro, ND in Traill County. It is in the North ½ of Section 34, Township 145N, Range 49W, 5th Prime Meridian. When the fact sheet and draft permit were completed, the department issued a public notice that was published in the Hillsboro Banner and posted to the department’s webpage: https://deq.nd.gov/PublicNotice.aspx. This public notice introduced a 45-day public comment period which ran from April 18, 2025, to June 2, 2025. A list of federal, state, and international government offices along with private entities were also notified of the webpage posting. The department maintains a list of mailing addresses to which letters of notification were sent. In addition, the department sent the public notice information to be posted by the U.S. Postal Service located in Hillsboro, ND and the Traill County Auditor’s office.

Public Hearing:

As part of the public comment period, the department held a public hearing. The hearing was held on May 20, 2025, from 5:00 PM to 8:00 PM at the Hillsboro High School Gym, 12 4th Street NE, Hillsboro, ND 58045. Its purpose was to offer an opportunity for interested parties to submit a verbal comment on record as part of the review process of the proposed facility.

Scope of Permit:

State water quality regulations require operators of Animal Feeding Operations (AFOs) to take adequate steps to prevent adverse impacts to waters of the state by obtaining a State Animal Feeding Operation Permit in accordance with North Dakota Administrative Code (NDAC) Ch. 33.1-16-03.1. The requirements developed for a facility are specific to site conditions. The department has the sole authority to address environmental issues, such as protecting water quality (NDAC 33.1-16-02.1) and air quality (NDAC 33.1-15-16) in accordance with North Dakota Century Code (NDCC) Ch. 23.1-01. Addressing zoning, land use, road use, water appropriations, social and economic issues is the responsibility of the local zoning board or other authorities and will not be addressed in this response as they are outside of the department’s authority and outside of the scope of the proposed permit.

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Glossary

AFO	Animal Feeding Operation
BFE	Base Flood Elevation
CAFO	Concentrated Animal Feeding Operation
CFR	Code of Federal Regulations
DRP	Dissolved Reactive Phosphorus
EDC	Economic Development Commission
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
LLP	Limited Liability Partnership
LWCF	Land & Water Conservation Fund
NAVD88	North American Vertical Datum of 1988
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDDEQ	North Dakota Department of Environmental Quality
NDPRD	North Dakota Parks and Recreation Department
NDSU	North Dakota State University
NMP	Nutrient Management Plan
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source Program
NRCS	Natural Resources Conservation Service
O&M	Operations and Maintenance
PI	Phosphorus Index
ppb	parts per billion
ppm	parts per million
SDWA	Safe Drinking Water Act
SOP	Standard Operating Procedure
USDA	U.S. Department of Agriculture
USGS	United States Geological Survey
WQS	Standards of Quality for Waters of the State

Below are summaries of the written and oral comments received during the public comment period. Although there are specific responses to each comment, the document should be read in its entirety with the understanding that a response to one comment may be applicable to additional comments. The department has updated the fact sheet and permit to provide clarification and address comments received during the comment period. Substantive changes are discussed in the responses.

Commenter 1- Jason Lorsung

Comment 1(A)
Concern on how close proposed facility is to large freshwater resource.

Department Response: For the use of this document and the proposed permit as issued under NDAC 33.1-16-03.1, freshwater resources are Waters of the State as defined by North Dakota Century Code (NDCC) 61-28-02:

"all waters within the jurisdiction of this state, including all streams, lakes, ponds, impounding reservoirs, marshes, watercourses, waterways, and all other bodies or accumulations of water on or under the surface of the earth, natural or artificial, public or private, situated wholly or partly within or bordering upon the state, except those private waters that do not combine or effect a junction with natural surface or underground waters just defined."

Surface Water
The department has conducted a comprehensive review of the submission package for a state animal feeding operation (AFO) permit for the proposed facility, Herberg Dairy. The submission package included all documents as required by NDAC 33.1-16-03.1-07 and NDAC 33.1-16-03.1-07(2) lays out state AFO permit submission requirements. This includes but is not limited to site designs, engineered design plans, an operations & maintenance plan (O&M), construction specifications, and a nutrient management plan (NMP). These documents were supported by further reports submitted to the department including floodplain review and a geotechnical analysis. All requirements laid out in the North Dakota Livestock Program Design Manual were met.

After review of the submission package, the department determined that there was no route for manure or other wastewater to leave the facility as a point source. All structures on the proposed facility are up to or exceed the standards required by North Dakota state regulations. These include runoff and leachate containment from all barns and storage pads, impermeable construction under barns, piping and pumping equipment, grading and earthwork to control water flow, and sufficient storage volume to contain manure, runoff, and leachate in exceedance of the 270 days of storage required by state regulations.

Groundwater
Department staff in the Groundwater Management Program conducted an analysis of the site to determine what effect the facility could have on groundwater resources. The following determinations were made:

- The site does not overlie a defined glacial drift aquifer.
- The site does not overlie a sensitive ground water area.

- Soils on site are not sandy loam, loamy sand, sand, or gravel.
- No water supply well at the facility is screened at a depth within 30 feet of the ground surface.
- The production area is not within ¼, ½, or 1 mile from a private, non-community public, or community public water well respectively.
- The production area is not located within a delineated wellhead or source water protection area.

Based on this analysis, the department has determined that the routine operation of this facility will not have an impact on ground water resources. Additional responses to comments address concerns that expand on these items. Please refer to response to *Comment 1(B)* Floodplain*, Comment 8(C)* Nutrient Management Plan*, Comment 9(A)* Application*, Comment 16(A)* Agricultural Stormwater Discharge, *Comment 40(F)* Health Impacts, *Comment 41(B)* Item 1. Design*,* and *Comment 41(E)* Seepage.

The department understands the risk of emergency cases of surface water contamination. The permittee is required to log, record, and report all spills or contamination on site. They are required by state law to mitigate and fully clean up any contamination. All spill cleanup plans are reviewed by the department, and department staff inspect the site as needed to ensure they are carried out entirely. The department is willing and able to enforce state regulations during these events, including fines and penalties.

Finally, the department takes citizen concerns seriously. Concerns or complaints received by the department about permitted facilities are logged and recorded. The department follows up with the producer to address the issue that was brought up. An inspection to review the site is conducted, after which, the facility is provided with a report of the inspection, detailing how the department requires them to address the concern. The department then follows up with the party who summitted the concern or complaint as needed.

Comment 1(B)
Requests for isolation of the manure ponds from the 100-year flood plain.

Department Response: All manure and leachate storage ponds have been isolated from the 100-year flood plain developed by the Federal Emergency Management Agency (FEMA) in the Halstad and Herberg area. This will be accomplished by utilizing grading and earthwork to raise the elevation of the ponds and berms. The existing grade on site varies but is generally at a relative elevation of 867 feet. The top elevation of the berms for Ponds 1 through 5 will be at a relative elevation of 875 feet. Base flood elevation (BFE) has been defined as 868 feet above Mean Sea Level for this area.

Historic flood data in Halstad, MN shows major flooding is defined by the National Oceanic and Atmospheric Administration (NOAA) as a crest of 37.5 feet, or a relative elevation of 864.77 feet (NAVD88). The highest recorded historic crest of the Red River in Halstad, MN, was 40.74 ft (868.01 ft NAVD88) on April 19, 1997. The grade of the berms at the proposed facility are 7 feet above the high-water mark (875 feet relative elevation).

Commenter 2 - Alec Janson

Comment 2(A)
Nobody besides the company asked for this dairy.

Department Response: Thank you for your comment.

Comment 2(B)
Nobody wants a gigantic amount of water stripped from the people of the Red River Valley to supply cows owned by interests with questionable motives.

Department Response: Water quantity is beyond the scope of the proposed permit and outside the department's authority. Further information on water supply, usage, and appropriations can be obtained by contacting the Department of Water Resources.

Comment 2(C)
The proposed facility shouldn't be permitted before the smaller and still controversial dairy starts operation.

Department Response: The department conducts a separate review of each animal feeding operation that applies for a state animal feeding operation permit. NDAC 33.1-16-03.1 does not preclude an entity from obtaining multiple permits.

Comment 2(D)
The company does not have an actual plan in place. There's no logical approach here, only unfettered greed.

Department Response: The department has conducted a thorough review of all plans and design documents that Riverview ND, LLP submitted to the state. A description of plans and specifications required as part of a permitting submission are detailed in the North Dakota Livestock Program Design Manual. These include but are not limited to animal numbers, facility design plans, construction specifications, operation and maintenance plans, standard operating procedures, best management practices, and a nutrient management plan.

Commenter 3 - Joe Shmo

Comment 3(A)
Fargo already has air quality issues with West Fargo's waste facility and NDSU's livestock manure. Strong south winds could affect Fargo Air Quality.

Department Response: The facility is located approximately 30 miles north of Fargo. The North Dalota Department of Environmental Quality, Division of Air Quality has rules for hydrogen sulfide, ammonia, and odor as laid out in the NDAC and the NDCC.

Hydrogen Sulfide:
Hydrogen sulfide (H_2S) is not regulated as a Hazardous Air Pollutant under the federal Clean Air Act. Although there is no federal (Environmental Protection Agency) ambient air quality standard for H_2S or federal odor standard for H_2S, the North Dakota Air Pollution Control Rules have established more stringent requirements for H_2S as follows:

Ambient Air Quality Standards for Hydrogen Sulfide (Health Standards):
The North Dakota Air Pollution Control Rules establish ambient air quality standards for H_2S (NDAC 33.1-15-02 [Table 1]). Maximum H_2S levels allowed in ambient air are established to protect human health and the environment. The ambient air quality standards for H_2S are summarized in the following table:

Maximum Permissible Concentration of H_2S	Averaging Period
10.0 parts per million (ppm) (10,000 parts per billion (ppb))	Maximum instantaneous (ceiling) concentration not to be exceeded
0.20 ppm (200 ppb)	Maximum 1-hour average concentration not to be exceeded more than once per month
0.10 ppm (100 ppb)	Maximum 24-hour average concentration not to be exceeded more than once per year
0.02 ppm (20 ppb)	Maximum arithmetic mean concentration averaged over three consecutive months

Hydrogen Sulfide Odor Standard:
An odor standard of 0.05 ppm (50 ppb) for H_2S is established under NDAC 33.1-15-16.

Ammonia:
Ammonia is known to be emitted from CAFOs. Ammonia is not regulated as a Hazardous Air Pollutant under the federal Clean Air Act and there is no federal ambient air quality standard for ammonia; however, ammonia emissions are evaluated under the Policy for the Control of Hazardous Air Pollutant Emissions in North Dakota (Air Toxics Policy).

As indicated above, the federal Environmental Protection Agency (EPA) has not established allowable ambient levels for ammonia; however, acceptable exposure levels have been developed by state agencies as shown in the following table:

State Agency	Acceptable Exposure Level (ppb*)	Averaging Period
Minnesota Dept. of Health	4,590	Acute (1-hour)
	115	Chronic (annual)
California OEHHA**	4,590	Acute (1-hour)
	200	Chronic (annual)

* Both agencies listed in the table establish acceptable levels for ammonia in units of micrograms per cubic meter. The values have been converted to ppb.)
*Office of Environmental Health Hazard Assessment. (The Minnesota Department of Health acute acceptable exposure level [referred to as a health risk value or HRV] is equivalent to the California OEHHA acute acceptable exposure level [referred to as a reference exposure level or REL]. The Minnesota Department of Health chronic HRV is more stringent than the California OEHHA chronic REL. The department will utilize the more stringent Minnesota values for purposes of determining compliance with the Air Toxics Policy.)

Odor Standard:

There is no standard for odor established at the federal level. Odors from the facility must meet the requirements of NDAC 33.1-15-16 of the North Dakota Air Pollution Control Rules. NDAC 33.1-15-16 establishes that the facility may not discharge into the ambient air any objectionable odorous air contaminant that causes odors that measure seven odor concentration units or higher as measured at specific locations. NDAC 33.1-15-16-01(2) defines an "odor concentration unit" as:

“a volume of odor-free air mixed with an equal volume of odorous air such that the combination would be at the threshold level of the olfactory senses. The intensity of an odor is determined by the ratio of the volume of odor-free air that must be mixed with a standard volume of odorous air so that a department-certified inspector or at least fifty percent of an odor panel can still detect the odor in the diluted mixture.

Note that NDAC 33.1-15-16 does not require non-detectable or "zero" odors. Instead, the odor standard is a state-wide standard which provides a maximum concentration that cannot be exceeded; local zoning requirements may be established to ensure that the location of the facility is acceptable (i.e., "local control" is maintained over such factors as the land use compatibility of the facility at a given location).

Under NDAC 33.1-15-16, any odor reading to determine compliance with the odor standard must be taken at either: a) any point located beyond one-half mile from the facility; or b) within 100 feet of any existing residence, church, school, business, public building, park, or campground. According to NDAC 33.1-15-16-02(3), the odor standard does not apply "while spreading or applying animal manure or other recycled agricultural material to land in accordance with a nutrient management plan approved by the state department of environmental quality".

Comment 3(B)
North Dakota should build wind farms. West Fargo should transition their garbage dump into biomass energy and fuel the entire area without relying on “xcel”. These things should be here. It is the 21st century.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Commenter 4 - Jeff Skalicky

Comment 4(A)
CAFOs are a disaster for the community and the environment. Do your research. If you want to poison water, land and the air, have at it. Just ask Iowa. Feedlots are number 1 in methane destroying our planet. Wake up! Quit putting money in front of our children's future.

Department Response: Thank you for your comment. Please refer to response to *Comment 1(A)* Water Quality, *Comment 2(B)* Water Quantity, Comment 3(A) Air Quality, *Comment 8(C)* Nutrient Management Plan, and *Comment 41(B)* Item 1 Design**.**

Commenter 5 - Sharon Geyer

Comment 5(A)
Blizzards are frequent occurrences in ND causing the deaths of many cattle. If ten percent of the proposed 25,000 dairy herd die, what is the plan for disposing of 2,500 carcasses?

Department Response: Mass mortality events are catastrophic to livestock producers, and the state works to support producers during these times. The design of the proposed facility will help reduce the potential for weather-related mortality events as the animals will be inside the proposed barn and protected from the elements. The producer is responsible for disposing of mortalities related to an infectious disease outbreak within 36 hours in an environmentally acceptable manner. Mortalities not related to an infectious disease outbreak must be disposed of within 36 hours or according to a plan approved by the state veterinarian. Carcass abandonment is not considered an acceptable disposal practice. Appropriate options include rendering, incineration, burial, landfilling, and composting. The site has plans for a building that can be transitioned to composting if the current mortality plan, a rendering service, is unavailable. If needed, a United States Department of Agriculture (USDA) certified carcass composting subject matter expert will be assigned to assist the producer with these efforts. The Department of Environmental Quality works with the producer, the USDA, the state Department of Agriculture, the Natural Resources Conservation Service (NRCS), and the North Dakota State University (NDSU) Ag Extension Agency to develop and carry out plans for mass mortality events.

Commenter 6 - Mark Rohrer

Comment 6(A)
Against this new business moving in because of the threat to the water supply and because of the damage to our pristine environment in North Dakota. The incredibly large volume of that much livestock will have a devastating impact on the area.

Department Response: Thank you for your comment. Please refer to response to *Comment 1(A)* Water Quality, *Comment 2(B)* Water Quantity, *Comment 8(C)* Nutrient Management Plan, *Comment 3(A)* Air Quality, and *Comment 41(B)* Item 1. Design.

Commenter 7 - Anonymous

Comment 7(A)
Is against the dairy farms in Traill and Richland County. They should not be built near Fargo or anywhere else.

Department Response: The zoning for Herberg Dairy is under NDCC 23.1-06-15. The township the facility is located in has not submitted zoning ordinance to the department, therefore the state model zoning ordinance was implemented. Abercrombie Dairy received zoning approval from the zoning authority under the Abercrombie Township zoning ordinance and is outside the scope of this proposed permit.

Comment 7(B)
The proposed facility will impact air and water quality.

Department Response: Thank you for your comment. Please refer to response to *Comment 1(A)* Water Quality and *Comment 3(A)* Air Quality.

Commenter 8 - Vanita Vik-Ohlgren

Comment 8(A)
Factory farming in other states, most notably Iowa, has had negative impacts to rural residents and how much money the state has had to spend to ensure their citizens have drinkable water. The hog industry has ruined many parts of Iowa, and it is a problem for Minnesota, as well. It will be no different with the very large dairies in Traill and Richland counties.

Department Response: Thank you for your comment. Please refer to response to *Comment 1(A)* Water Quality and *Comment 41(B)* Item 1. Design.

Comment 8(B)
Astronomical amounts of water is needed; 20-30 gallons per cow per day. North Dakota may have a change in climate and have less water available. In Fargo, the river stopped flowing for 823 days in 1932. It could happen again. It appears we are moving out of a wet cycle into a dry one. All these large livestock operations will likely be in the eastern part of the state, close to the interstate exchanges, and ironically where our population is most dense, and water requirements are high.

Department Response: Thank you for your comment. Please refer to response to *Comment 2(B)* Water Quantity.

Comment 8(C)
The amount of manure projected to be produced daily is staggering. With homes and the Red River within 2 miles, this is even more concerning. If the manure is applied to fields with drainage tile, then what happens?

Department Response: The proposed facility has been designed to manage the projected annual manure generation. The manure storage ponds on site have been designed to hold more than the department required 270 days of storage. Land application of manure will occur during the spring, summer, and fall months, avoiding application on frozen ground in accordance with the NMP. The NMP identifies the application method as incorporation for liquid manure and broadcast for solids.

Currently, there are no state regulations or specific requirements regarding the land application of manure on drain tiled fields. The NMP requires the submittal of precautions used to prevent manure from reaching waters of the state. The proposed NMP has 12,643 acres of tiled field. If a preferential connection has been established and manure has made its way into the drain tile, the department will require future manure application on that field to halt and additional precautions be taken. Section 7 of the North Dakota Livestock Program Design Manual, as required by NDAC 33-16-03.1-08, provides the authority to ensure the waters of the state are protected.

Under NDAC 33.1-16-03.1-07(2)(k) and NDAC 33.1-16-03.1-08(3), the department requires NMPs for regulated livestock facilities in the state. According to NDAC 33.1-16-03.1-03(18), the definition of a "'nutrient management plan' means a written description of the equipment, methods, and schedules by which:

a. Manure, litter, and process wastewater is beneficially reused in an environmentally safe manner such as being applied to land at appropriate agronomic rates as nutrients or fertilizers; and
b. Water pollution and air pollution, including odors, are controlled sufficiently to protect the environment and public health.

A NMP is upheld by NDAC 33.1-16-03.1-10 - Enforcement and compliance.

The application rate of manure and nutrients will be monitored to ensure nutrients are applied in a manner so as not to impact waters of the state. Soils will be tested annually so that nutrients are applied at agronomic rates. The facility will utilize best management practices to reduce the potential for nutrients to reach waters of the state. These include the use of buffer strips and the use of a toolbar to inject manure directly into the soil.

As stated in the North Dakota Livestock Program Design Manual Section 7.5:

1. The manure application rate shall not exceed the recommendations for nitrogen and phosphorous based on either the North Dakota Phosphorous Index (PI), as developed by the NRCS, or NDSU Extension Service recommendations based on soil testing.
2. The PI allows manure and other sources of nutrients to be applied at rates to meet the nitrogen needs of a crop if the PI rating is low or medium. If the PI is high, it allows manure and other sources of nutrients to be applied at rates to meet the phosphorous removal in the crop biomass. If the PI is very high, it requires that no manure be applied to that field. Manure shall not be applied to fields where the soil test phosphorous exceeds 125 parts per million (ppm) (250 lbs per acre).
3. Manure and other sources of nitrogen must not be applied at rates that exceed:
    a. The recommended nitrogen application rate during the year of application; or
    b. The estimated nitrogen removal in harvested plant biomass for legumes during the year of application.
4. NMPs shall contain a field-specific assessment of the potential for nitrogen and phosphorous transport from the field. The assessment for phosphorous can be done using the phosphorous screening tool and soil tests, or the PI assessment.

There are many benefits to using manure for fertilizer:

1. Increases organic matter in the soil.
2. Slower release of nutrients than commercial fertilizer.
3. Increase soil water-holding capacity and in turn decreases runoff.

Note the “Nutrient Management Plan and Manure Application” section of the fact sheet has been updated to include Revised Universal Soil Loss Equation, Version 2 (RUSLE2) and PI documents. See response to Commenter 42.

The department has the authority to issue a State Animal Feeding Operation Permit under NDCC 61-28-04. Department approval addresses the health and environmental concerns relating to protecting air quality and water quality. Herberg Dairy must meet the setbacks and rules of the department before a permit is granted. The proposed permit has conditions on operation and maintenance, handling mortality, manure application requirements, minimum required records, and notification requirements.

Comment 8(D)
Besides water concerns, air quality will be an issue as waste produces dangerous gases when it is aggregated.

Department Response: Thank you for your comment. Please refer to response to *Comment 3(A)* Air Quality.

Comment 8(E)
If this permit is approved, expect court challenges, which is another concern. This is not "pro North Dakota". It will simply enable industry giants to pollute our air and water, which we all depend on. Note who the proponents are; they are not ordinary citizens...they represent powerful interests. Put the citizens of North Dakota first and vote "No" on this dangerous and reckless permit.

Department Response: Thank you for your comment. Please refer to response to *Comment 1(A)* Water Quality, *Comment 3(A)* Air Quality, *Comment 7(A)* Zoning and *Comment 41(B)* Item 1. Design.

Commenter 9 - Ryan Bryl

Comment 9(A)
Concern over Nelson Drain and its inability to perform in times of high water. It has always been an issue with the amount of Elm River water it diverts east only to spill out and cause all sorts of overland flooding issues that puts more pressure on my dikes. So now my concern is not only the quantity of water but also the quality. I can only use my common sense, and the precedent already set forth by the State by not allowing the acres in the 100yr flood plain to not be considered for manure operations. So, is this out of an abundance of caution to appease the masses or is there really a water quality issue when manure-treated fields are subject to moving water?

Department Response: Thank you for your comment. There is no department policy or state regulation that prohibits the application of manure on acres within the 100-year floodplain. Based on the department's best professional judgement and discussion with Riverview ND, LLP staff, the department requested that fields inside the 100-year floodplain not be included in the NMP. Sufficient acreage outside of a floodplain was provided in the Herberg Dairy NMP.

Overland flooding on fields treated with manure or commercial fertilizer can result in nutrient transfer through erosion or uptake of nutrients. This is mitigated by careful application of manure by applicators, incorporation of manure, use of best management practices, and annual review of manure application, manure nutrient content, and soil tests from applied fields. Applied nutrients, either chemical or manure based, are not to exceed the requirements of the planned crop according to the NMP.

Comment 9(B)
I don't have a concern over the actual location of the Dairy itself, but the 9 sections of land that I have circled on the map. Those sections should be placed as contingent upon a yes vote of a newly reconstructed Nelson Drain when they are considered for manure operations in the permitting process for Riverview. And should then be placed as contingent upon the completion of a reconstructed Nelson Drain in order for manure operations to be performed. If it all goes to plan, this could be on a timeline that works for both Riverview, Traill County

Waterboard, and the Landowners. This is a very progressive project and will be one of the largest dairy operations in the country. It would be a shame to have something as dilapidated as the Nelson Drain pushing diverted Elm River water all over these manure-treated acres. Would a manure permit for the water retention acres that is used for the F-M Diversion be needed?

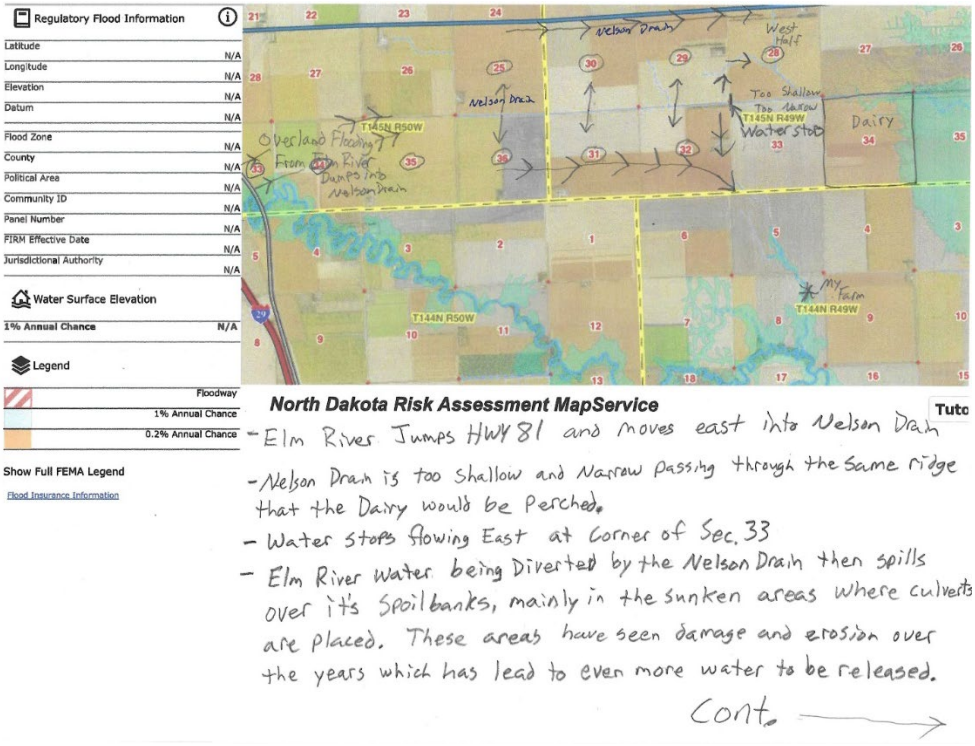


Figure 1 - Part 1

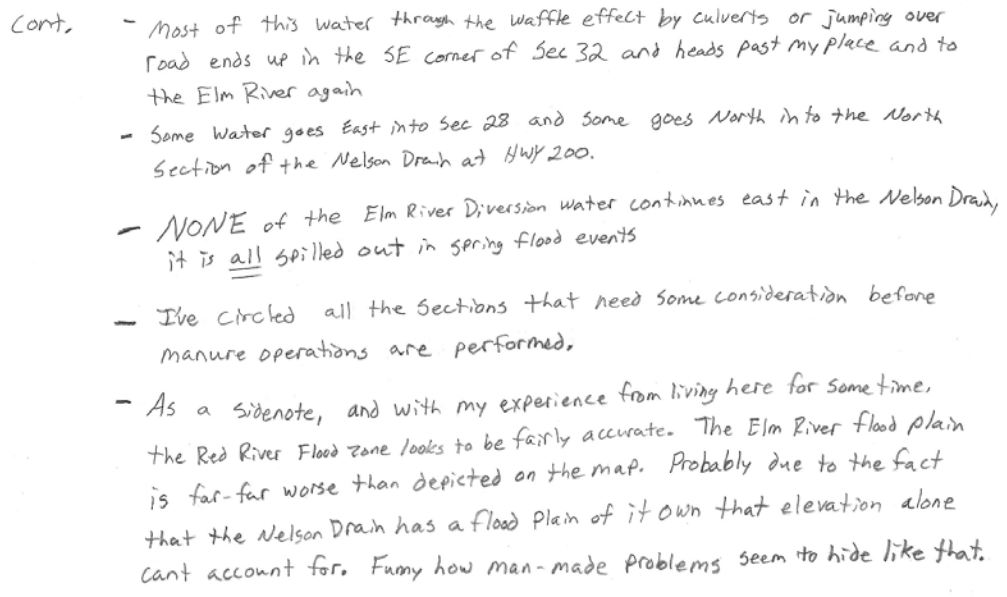


Figure 1 - Part 2

Department Response: The department has reviewed the submitted map of current flooding issues resulting from the “Nelson Drain”. The use of these acres in the NMP will be dependent on how this drain affects local water flow. The planning, maintenance, and upkeep of drains in Traill County is outside of the authority of the department. Annual inspections will be conducted at the facility, including a review of the NMP. If problems arise with application of manure on these fields, the department can request that the acres be removed from the NMP.

Commenter 10 - Kathy Duttenhefner Parks & Recreation

Comment 10(A)
The North Dakota Parks and Recreation Department (NDPRD) has reviewed the above-referenced ND Feeding Operation Permit for the Herberg Dairy facility in Traill County, North Dakota.

NDPRD's scope of authority and expertise covers properties that NDPRD owns, leases, or manages; properties protected under Section 6(f) of the Land and Water Conservation Fund (LWCF); rare plants; and ecological communities established through the Natural Heritage Program.

The project does not appear to affect properties NDPRD owns, leases, or manages positively.

The project does not appear to affect any properties protected under Section 6(f) of the LWCF.

A North Dakota Natural Heritage biological conservation database query determines if any current or historical plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Based on this review, we have no known plant and animal species of concern or significant ecological communities documented within or immediately adjacent to the project site.

We appreciate your commitment to rare plant, animal, and ecological community conservation, management, and inter-agency cooperation.

Department Response: Thank you for your comment.

Commenter 11 - Elizabeth Hams

Comment 11(A)
My primary concerns relate to water consumption and pollution. I believe that a more detailed and comprehensive groundwater analysis (including flow and use) should be conducted and the results made public.

Department Response: Thank you for your comment. A groundwater analysis was performed by the department and is publicly available upon a records request. Please refer to response to *Comment 1(A)* Water Quality and *Comment 2(B)* Water Quantity.

Commenter 12 - Tony Zach

Comment 12(A)
Please find enclosed a red-lined draft permit document for Herberg Dairy. The goal of our comments are to ensure that our permitted quantities directly correlate to the application, but a few notes were added simply as recommendations for clarity of presenting the information. Ultimately, we respect the department's final authority to present the information how they deem appropriate. Below is a summary of our proposed recommendations:

Fact Sheet Document

- Pg. 3 – the total headcount was updated to match the number from the application.
- Pg. 5 – we propose turning Table 2 into Table 2A to highlight the waste production & separation numbers (waste produced in the barn). Table 2B would directly follow Table 2A and highlight the wastewater runoff from the feed pad and stacking pad areas. Together, the two tables would then show the entire waste produced from the site.
- Pg. 5 – some numbers in Table 2 have been updated to directly match our design calculations and forms, and a line item was added to show the separated manure solids, since that volume of manure doesn't end up in the manure storage ponds.
- Pg. 6 – some numbers have been updated in Table 3 to directly match our design calculations. Additionally, we propose adding a note at the bottom of the table to state that our volumes are being derived at the freeboard elevation of the structures.

- Pg. 7 – we propose simplifying Table 4 after most of the information would be relocated to Table 2B. In this new format, Table 2A & 2B would show the waste generated, Table 3 would show the storage provided, and Table 4 would show total waste generated right next to the total storage provided.
- Pg. 7 – two dimensions were updated on the bottom of the page for the size of the holding pond floors to match our design.
- Pg. 10 – the wastewater daily total and annual wastewater generation numbers in Table 5 were updated to match our design calculations.
- Pg. 10 – the total land identified by the applicant was updated for the total number of acres after the last addendum document was submitted.

State Animal Feeding Operation Permit

- Pg. 1 – the total headcount was updated to match the number from the application.

Department Response: The red line draft permit was referenced for the following changes to the fact sheet and State Animal Feeding Operation Permit

Fact Sheet Comments

- Pg. 3 This change was made to the fact sheet.
- Pg. 5-6 Tables 2,3, and 4 have been updated for clarity and accuracy.
- Pg. 5 In Table 3, changes to the runoff and storm event values were not made.
- Pg. 7 This change was made to the fact sheet.
- Pg. 10 These changes were not made, as the proposed change added leachate to the total generation.
- Pg. 10 This change was made to the fact sheet.

State Animal Feeding Operation Permit

- Pg. 1 This change was made to the proposed permit.

Commenter 13 - Justin Quandt

Comment 13(A)

In full support of this project. It will help to further the state along with more opportunities for processing to move to the state which will in turn create jobs and more opportunities for future farmers that would be interested in raising dairy cattle. It will also use more ag products in this state which will help farmers with basis levels as our net export of commodities will be reduced.

Department Response: Thank you for your comment.

Commenter 14 - Melissa Beach

Comment 14(A) Written and Oral

As a resident of Hillsboro, North Dakota, I'm writing in support of the proposed Herberg Dairy by Riverview Dairy southeast of our community. I'm confident in the strength and integrity of North Dakota's environmental oversight. The Department of Environmental Quality's permitting process—covering manure and discharge management, odor control, and runoff protection—ensures that projects like this meet strict environmental standards. My family and I drink water provided by the East Central Rural Water District, and I trust the North Dakota Department of Water Resources to protect our water supply through its review and regulation of large-scale water use. With these systems in place, I support the project and trust in the state's process to do what's best for both the environment and our community.

In addition, I would like to say that there will likely be some misinformation shared tonight, and I do encourage those that are in attendance to check out NDSU extension's research and materials that they have available. I think NDSU extension is a good resource that many of us use locally to learn more about manure, water runoff, etc. So, thank you for the time.

Department Response: Thank you for your comment.

Commenter 15 - Jeremy Strand

Comment 15(A)

I have a financial service business in town, and I also raise cattle. I'm just here to say that we talk in small towns quite often about we need more jobs. We need more industry. We need more things. We need more people. We need more opportunity. We need all these things. What better opportunity do we have than right now? We live in an agricultural community, right? People complain about the beet plant. Think of what that's done for us. I hope that place makes so damn much money all the time. There's a great opportunity for lots of people to be successful. I love it. They're going forever. Riverview is. I hope you guys steamroll and there'll be building another one and another one and another one.

Department Response: Thank you for your comment.

Commenter 16 - Lonnie Leake

Comment 16(A)

I'm here today to testify primarily to show that there have been studies done like the University of Manitoba, which they determined that snow water melt will cause excessive contamination of waterways that feed the Red River and into Lake Winnipeg International crossing the Red River. It's a study by Viranga Weerasinghe (*study entered as Commenter 17*) and others done in 2024. I'll read a little bit from the abstract. It says that manure injection is well documented to reduce rain driven nutrient losses, but the effect on snow melt driven losses is less studied. This talks about how a lot of impetus for the study was to figure

out how much contamination of dissolved reactive phosphorus went into Lake Winnipeg, among others, like nitrates and heavy metals.

I'll cut to the chase here and read some of the summary and the conclusion. Even though the injection of liquid swine manure, this is a swine study, not a dairy cow study, significantly reduce the dissolved reactive phosphorus concentration during the latter part of the snowmelt period than the surface applied treatment of manure. The cumulative dissolved reactive phosphorus load with snow melt and volume weighted concentrations of dissolved reactive phosphorus in the snow melt were not significantly different between the manure application methods. Similarly, cumulative loads and volume weighted concentrations of nitrate and metals were not significantly different. Thus, the snow melt volume was the main governing factor to determine the dissolved reactive phosphate, nitrate and metal loads with snow melt runoff. This is supported by the positive linear relationship between dissolved reactive phosphate load and snowmelt volume compared to the weak linear relationship between the DRP(Dissolved Reactive Phosphorous) load and the DRP concentration. They've done previous studies. The conclusion was that dissolved reactive phosphate or phosphorus, nitrate, heavy metals increase the snowmelt with time, suggesting that the longer the spring snowmelt flooding period, the greater the release to the snowmelt. In general, manure injections [*typically]* reduce snowmelt concentrations. But irrespective of the manure application method, the snowmelt volume was the controlling factor of the phosphate, nitrate, and metal loads. Therefore, reducing dissolved reactive phosphate concentration through manure injection alone may not always result in a reduced load and we are suggesting management practices focus on reducing the duration of the snowmelt flooding period and snowmelt runoff volumes. Well, good luck with that reducing the snowmelt runoff period and the snowmelt volumes. So, on a heavy snow winter with a melt whether it takes time, longer time or shorter time, it's the volume of the snow melt water that's going to flush the phosphate from the manure all into the drainage toward the Red River.

So, my question is, do you really want to contaminate the Red River all the way to Lake Winnipeg? Because there's already several studies have already showed, there's an increasing load of phosphate already creeping through the various watersheds toward the Red River. So, my question is again, do we want to contaminate our own Red River? And our own water supply and that of Canada.

Department Response: Thank you for your comment. Land application sites from a CAFO are not subject to NPDES requirements if the NMP is followed as specified in 40 CFR (Code of Federal Regulations) 122.42(e)(1)(vi)-(ix). Agricultural storm water discharges are exempt from the NPDES as provided in 33 U.S.C. 1362(14). Please refer to response to *Comment 1(A)* Water Quality and *Comment 8(C)* Nutrient Management Plan.

Comment 16(B)
I complement the agronomist, Sarah [Lovas]. She actually was the only one here besides myself and a couple others that put scientific testimony into the recorder [Commenter 27 -

Sarah Hall Lovas]. So, my testimony sort of or maybe distinctly contradicts hers. She said that the injection method would keep any chance of pollution in the soil. Whereas my testimony said that in heavy snow melt years, contaminants would flush out into downstream through ditches and into the Red River and down the Red River.

So, I'll just finish by saying is what is a point source and what isn't a point source? I read a court case that said that you can't go out and spread manure before a thunderstorm if you intentionally know that it'll be flushed off your land. That is a documented court case. The point is that rainfall in this frozen ground or snow melt on frozen ground will pick up the contaminants and flush it into the Red River. You can call it a non-point source if you want. Some people say that's a point source. Where I'm getting at is that there might be litigation to find out what is the actual intent of the injection of the manure to not allow pollution into waterways. I think that there's really no way to mitigate it if it flushes into the river, so if it goes to the river, you got what you got. And contamination is contamination. The Red River is a source of drinking water. There's the Clean Water Act. There's the Safe Drinking Water Act so I'll let you guys' figure that out. Thank you.

Department Response: Thank you for your comment. Please refer to response to *Comment 1(A)* Water Quality, *Comment 8(C*) Nutrient Management Plan, *Comment 16(A)* Agricultural Stormwater Discharges, and *Comment 40(A)* Permit Authority.

Commenter 17 - Weerasinghe, V et. al
Comparison of manure application methods on nutrient and metal loss to snowmelt ()[1]
Referenced by Lonnie Leake in his comments. The abstract and conclusion are entered below.

Comment 17(A) Abstract
Manure injection is well documented to reduce rain-driven nutrient losses, but the effect on snowmelt-driven losses is less studied. This study examined the surface application versus injection of liquid swine manure on phosphorus (P), nitrate-nitrogen (nitrate-N), zinc (Zn), manganese (Mn), iron (Fe), magnesium (Mg), and calcium (Ca) release from soils to snowmelt. Manure was applied in the fall of 2021 to four replicated plots of surface-applied or injected treatments, and boxes were installed to collect snowmelt in each plot, including four unmanured (control) plots. In the spring of 2022, the snowmelt was collected from each box for 10 days, volume was recorded, and analyzed for dissolved reactive P (DRP), nitrate-N, Zn, Mn, Fe, Mg, and Ca concentrations, and pH. The mean daily snowmelt volume and snowmelt depth ranged from 2.9 to 25.2 L, and 2.7 to 23.3 mm, respectively. The mean snowmelt DRP concentrations for manure injected, surface-applied, and control treatments were 0.66 ± 0.07, 0.89 ± 0.07, and 0.65 ± 0.07 mg L 1, respectively. The mean DRP concentration did not vary among the manure application methods for the first 5 days of snowmelt. However, DRP was significantly higher in the manure surface-applied treatment,

[1] Weerasinghe, V., Amarakoon, I., Kumaragamage, D., Casson, N. J., Indraratne, S., & Gao, X. (2024, April 16). *Comparison of manure application methods on nutrient and metal loss to snowmelt*. Geoderma Regional. https://www.sciencedirect.com/science/article/pii/S2352009424000464

compared to both control and manure-injected treatments on days 7 and 8, compared to the control on day 6, and compared to the manure-injected on day 9. The effect of the manure application method on nitrate-N (3.27 to 3.60 mg L 1) and metal concentrations in the snowmelt was not significant. The cumulative loads (mean across application methods and sampling days in kg ha 1) of DRP (0.56), nitrate-N (4.03), and metals [Zn (0.11), Mn (0.01), Fe (0.18), Mg (8.03), Ca (21.70)] mobilized with snowmelt flooding did not significantly vary among the manure application methods. Results suggest that DRP, nitrate, and metal loads were primarily controlled by the snowmelt volume rather than their concentrations. Therefore, land management practices that reduce the volume of snowmelt discharge could be more effective for reducing the P, nitrate-N, and metal loss to snowmelt from manured soils.

Department Response: Please refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, and *Comment 16(A)* Agricultural Stormwater Discharges.

Comment 17(B) Conclusion

Concentrations of DRP, nitrate-N, Zn, Mn, Ca, and Mg increased in the snowmelt with time, suggesting that the longer the spring snowmelt flooding period, the greater their release to snowmelt. In general, manure injection significantly reduced snowmelt DRP concentrations compared to surface application, but not concentrations of nitrate-N and metals. Irrespective of the manure application method, the snowmelt volume was the controlling factor of the DRP, nitrate-N, and metal loads to snowmelt in this study. Therefore, reducing DRP concentration through manure injection alone may not always result in a reduced load, and we suggest management practices focused on reducing the duration of the snowmelt flooding period and snowmelt runoff volumes (i.e., improving infiltration, increasing surface roughness, and proper drainage) to reduce the offsite transport of P, nitrate-N, and metals.

Department Response: Please refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, and *Comment 16(A)* Agricultural Stormwater Discharges.

Commenter 18 - Todd Leake

Comment 18(A)

There will be manure wastewater from Herberg Dairy taken across state lines for disposal. What is the mechanism by which the North Dakota Department of Environmental Quality regulates and or how do you intend to permit such a trans state line transfer of manure wastewater?

Department Response: Manure transfer is regulated under the North Dakota Livestock Program Design Manual Section 7.7.3, which lays out the required records and conditions for the manure transfer. All acres included in the NMP, both in Minnesota and North Dakota, are evaluated and managed in accordance with the NMP. The department provided the

Minnesota Pollution Control Agency (MPCA) with the NMP and a list of fields. No comments were received from the MPCA during the public comment period.

Commenter 19 - Jon Dryburgh

Comment 19(A)
I represent the Hillsboro Public School as the Superintendent Our school is able to handle additional students and the additional business. I just think it's good for our community. It doesn't pose a risk to our children or what we can do as a school district.

Department Response: Thank you for your comment.

Commenter 20 - Levi Reese

Comment 20(A)
I'm a resident of the City of Hillsboro and also the President, the Commission for the City of Hillsboro and the Commission itself has supported the move forward on this project by supporting the expansion of East Central water in their water treatment facility that will be housed next to our water plant for this project. And on a personal note, this will be good for the community of Hillsboro, and I have full support in DEQ and what they're going to do with the regulations as long as they are supported by policy and procedures.

Department Response: Thank you for your comment.

Commenter 21 - Jim Murphy

Comment 21(A)
I'm the executive director with Traill County economic development. I'm here on behalf of myself, our Deputy Director Alyssa Short, and several board members in the room, and I know there's several of them in here and I hope they all have something to say. I'd like to take a few minutes and endorse Riverview Dairy and to encourage you to embrace the partnership and welcome them into Traill County. I'm going to give you some reasons why I feel this way. We give you some reasons, some results from some research into the company that we've done. These are communities that Riverview Dairies is currently operating in, and I'd like to give you some idea of what a business like this may mean monetarily to the region although I did catch that earlier.

After first learning of this opportunity with Riverview, my first instinct was to do some homework and spoke with other mayors and community leaders to find out what kind of business partner Riverview is, what kind of steward they are. I talked to Wynn Noem. Who's the mayor? I will encourage anybody in this room who wants to pick up the phone and call any of these people. You call me, I'll give you their number. Every one of them said, "please call us. We love to talk about Riverview"

Wynn Noem's the mayor of the city of Bryant in South Dakota. Had a fantastic hour-long conversation with a 77-year-old man who watched his community go like this over the years. He said Riverview was a great partner, moved in, built a dairy a couple miles that way and a couple miles that way. Be roughly the same impact as here. He mentioned the increase in sales tax revenue from the added commerce and directly attributes, that directly attributes that to Riverview. Such a great experiment because there was no other business moving in. That was the only business moving in, so he knows exactly where the impact came from. Kevin Waters, the mayor of Morris, MN, assured me that Riverview is a fantastic company and a business with integrity and people with integrity, they're good partners, and you're fortunate to have them interested in your community. And Kerry Kirshbaum many of you might know Kerry. Was the mayor of Gary. She's now the city of Crookston. When they built out the Waukon dairy, she'd welcome any calls. She had nothing but great things to say about this company.

I'm going to encourage anyone with any doubts to visit any of their existing facilities and learn more about how they operate. They will welcome you. Traill County is the heart of agriculture in the Red River Valley, making it the heart of agriculture in the state of North Dakota. North Dakota has lagged behind our neighbors like Minnesota, South Dakota, Iowa and Montana, costing our farmers millions of dollars in potential revenue, and in our communities and businesses, new and existing, the growth they deserve. We have an opportunity to embrace this project and be the premier example for North Dakota's ag economy. Everything we've learned reasons to believe the project will flourish and expand the value-added ag economy in Hillsboro and Traill County. This opportunity is the perfect combination of factors. Our ecosystem is ripe for this development right now. Our finals are embracing this opportunity. Riverview is a great company and has a record to prove it. This is the right time, the right place and the right company with which to work. A partnership between this community and Riverview Dairy will result in years of economic prosperity. Let's make these folks our newest great business to locate here. Let's take the win.

Department Response: Thank you for your comment.

Commenter 22 - John Hinckley

Comment 22(A)

I own the Valley General Store in Halstad. We've been in business for 27 years and been a board member of numerous groups in town and like it's been said many times, we all sit in every meeting, every committee. We said, "What can we do to have somebody come to town? What can we build for a community?" And here this is handed to us. Let's not waste it. This is our opportunity to make the businesses stronger, the community stronger and hopefully grow in the last 10 months. You know, at first there was kind of a lot of ifs in the beginning, but once we've all taken tours of the Waukon dairy, which everybody is welcome to do and would highly recommend it, people are changing their attitude. And I hear nothing but positive and excitement for the next. Next step of what is going to happen? I guess I'm looking at … is this is our opportunity to make our businesses grow, make our communities

grow, people stronger. More people in the area just creates more things going on and we'll have a place for the longevity of my business and every other business in the community. Thank you.

Department Response: Thank you for your comment.

Commenter 23 - Derin Johnson

Comment 23(A)
I'm Derin Johnson, a mayor of the city of Halstad. Got informed about this, last summer and was immediately very excited, with some reservations and I too went on the tour of the dairy and like anything in life, there's risks and benefits that need to be weighed. And I guess I'll leave off the economic part to John, did a great job of that, but risk and benefit of this manure, I really believe the manure is liquid gold that is going to help our soils and help our crops. And the risk part of it is managing the application and the storage and things like that. And after visiting Waukon dairy, I've been very impressed with their risk management staff, their manure handling, their application methods. I really believe it's a risk they're monitoring well. And … we take risks every day, every time we pick up an electric plug into the wall, you got a risk you could screw it up and electrocute yourself or stand in the puddle of water. You manage that risk. You don't live without electricity. I don't think we should live without manure and dairy production in our county. Thank you.

Department Response: Thank you for your comment. Refer to response for *Comment 8(C)* Nutrient Management Plan.

Commenter 24 - Michael Anderson

Comment 24(A)
Hello, I'm a Hillsboro area farmer. I'm vice president for East Central rural water and also a North Dakota State Water commissioner. I appreciate the opportunity to share some of my observations regarding Riverview Dairy as the excitement and anticipation of Riverview Dairy project builds, I've been asked several questions and fielded several concerns regarding area water supply. First, all water resources in the state of North Dakota, surface or subsurface are owned and managed by the state of North Dakota. The managing entity is the North Dakota Department of Water Resources, under the authority of the Governor's office and the State Water Commission. It can be argued that no other resource in the state is as regulated and as controlled as our water resources. Appropriations, testing, quality control planning, both in the immediate and long term, are done by a talented group of professionals who take the state's water resources very seriously. It is a very deliberate and thought-out process to ensure the quality and longevity of our water resources. Departments like planning and development, regulatory appropriation, legal and others all come together under the cabinet level position, Director of the Department of Water Resources and the separate position of the state engineer. The area that Riverview Dairy will be constructing their facility is an East Central Rural Water's territory. East Central will form a water provider

partnership with Riverview, just as we do with other businesses, municipalities and domestic users.

East Central, because they receive federal and state funds, are legally required to consider water service to anyone considering such service. Every water system must model their service on demand, and raw water availability. The infrastructure of a system must be constructed to serve the peak demand. East Central, like other rural water systems, experiences peak demand during spray season, or about 3 months out of the year. Another instance of peak demand is when American Crystal Sugar uses about four times of their contracted amount of water during certain times during the year and East Central always responds. East Central must have this infrastructure in place to meet this demand but only realizes the revenue for these sales for a short period of time. This places a tremendous burden on the entire system throughout the year to maintain this infrastructure. Riverview on the other hand, is requesting service that will be consistent, every day of the year, 24/7 365. The infrastructure will be appropriate to the expected use. It will also allow East Central to improve and upsize existing service to the entire southeast area that East Central serves. This is a very important benefit not only to Riverview but also to our entire system. It will help stabilize our rates for every one of our patrons. One of the questions that often comes up is what will be the availability of water if we experience a 30's style drought? Let me explain our water sources and the planning that goes into the service. One of the main differences now versus then is the known amount of water. In the 30's technology did not exist to determine accurate amounts of subsurface water aquifers, predict rechargeability, or adequately determine surface water efficiency. This area East Central are blessed to have an abundant and diverse set of water sources to provide for our needs. First, East Central is able to draw water from three different and abundant aquifers. The Elk Valley Aquifer is located in the Larimore, Northwood area. East Central currently has appropriations for 810 million gallons of water per year. This only represents 1.8% of total appropriations. The Galesburg Page Aquifer, East Central has appropriations of 680 million gallons. And the Hillsboro Aquifer, which is estimated to contain 52 billion gallons of subsurface water, East Central has applied for 600 million gallons of appropriation. These all sound like very large amounts, but in addition East Central has just nominated for 4.4 cfm out of the Red River Valley Water Supply Project. This is a dedicated pipeline carrying water from the Missouri River to the Red River Valley. This would mean an additional 1 billion gallons of water annually, to this area. The benefit of Riverview area … of Riverview Dairy to our area is going to be numerous. One of the most impactful moments I've experienced in this process was the day of the launch. When the announcement of the dairy was made public in Halstad and Hillsboro, there was quite a buzz. What I witnessed seeing the faces of the people that attended this meeting, these meetings, was optimism and hope.

For many, animal agriculture in this area is new. We are about a generation removed from meaningful livestock production. The value of the potential for manure application to farmland for fertility will help keep our soils productive and alive. The existence of Riverview may allow operations the ability to bring kids home and enter operations and joint family businesses. The opportunity to diversify income potential through crop rotation and custom

work will be very meaningful. I've had the opportunity to meet many people that work with and for Riverview Dairy. I've spoken with people from equipment operators, scale house personnel, management and ownership. Even their attorney is a heck of a nice guy. I've toured many of their facilities and witnessed all their operations or many of their operations, and everything has been first class and very impressive. The people make the business and they have many great people. I would never tell anybody what to do or what to think. Instead, I would encourage you to engage Riverview to learn what they do and how they do it. Their openness, outreach and transparency has been amazing. Riverview is investing in our area, communities, and state and I'm grateful they're here.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Commenter 25 - Jami Hovet

Comment 25(A)
Good afternoon. I'm here on behalf of myself, as well as the Traill County EDC (Economic Development Commission) chair. I since I would mimic a lot of the comments tonight in regards to every meeting we speak about business growth, workforce, families, housing and this one is right in our back door. I don't know why we would try to turn that away. I'm a proud lifelong Traill County resident. And like others mentioned, American Crystal Sugar years ago helped provide for me for a life here, at schools, at community. This is a lifelong thing that we can have and build for our children, build for our families, our area farmers, and so I am in full support. I leave my hands and we as an EDC say that we have trust in the North Dakota DEQ to do the right thing for our community. But we are in full support. Thank you.

Department Response: Thank you for your comment.

Commenter 26 - Neil Breidenbach

Comment 26(A)
Good afternoon. I manage East Central Regional Water. I've been, I've been there since 1971, so I've witnessed a lot in our aquifer and what it's done. And the biggest question I got is, they always ask if we have enough water to handle the dairy. Right now, we got over 100 center pivots just on the Elk Valley Aquifer. That's just one of three aquifers we use. And each aquifer … each center pivot takes about 700 gallons a minute while they're operating. The dairy takes about 700 gallons. So, when they're running their irrigation wells, that's equivalent to 700 dairies, we'd be able to supply with that water. They don't run them year-round, but they run them in the summer when our water usage is the most critical. When we use just about 70% of our water in the summer for rural water. I'd say around 88 to 90, we had a pretty severe drought and if you look at the aquifer at that time, the most it dropped at any time was 4 feet. So, we had pretty close to 50 feet of water left and I believe the reason they dropped is because all the rivers pretty much went empty. Turtle River went empty or

down and Goose River went down. And I believe a lot of the water that we have in these aquifers come from them rivers when they fill up they leach into the aquifers. Geologists don't always agree on everything. I've heard a lot of stories of how it gets here from Devil's Lake. You know, over the years and I don't know if that's so or not. That's a long ways to go, but I do know that we had one of her vice president on the Board of directors. In 1988, he was a professor at the University and he was concerned about the water and he had him calculate out if we were to put a border around all the wells we were drawing out at that time and we pumped the same levels we were pumping in that time. We'd have about 1100 years of water supply just in that area just to supply our customers. So, there's very little risk of our aquifer going empty. It's much more reliable than a river, because when the rivers are empty, we still have a lot of water left in aquifer. There's plenty in there to go. There's 30 water systems in North Dakota, and we're envied by all of them because of this dairy moving in. We have meetings once a month. Every one of them would love to have a dairy in their area. And they make it quite clear what the benefits of it are. Our system is 55 years old and the finances that we make up definitely get pumped right back into replacing our water mains and our pumping stations and our water plants and our wells. So, it's something that I've been waiting for 50 some years and I'm very happy they're here, We're going to do whatever we can to make it work. They're very important to us, just like every customer we have is. The only difference is a lot of our customers, we go a mile and a half to hook up. It takes 30-40 years for to pay it back because of the cost of it. Where this is going to help us just about immediately when they start taking water.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Commenter 27 - Sarah Hall Lovas

Comment 27(A)

I'm an agronomist from Hillsboro, North Dakota. I hold a master's degree in soil science from North Dakota State University and I'm also a certified crop advisor. I have extensive experience working in the immediate area of the proposed Herberg Dairy. I have done actually a lot of agronomic consulting in that area as well as soil sampling and advising of farmers on how to make nutrient applications in that particular area.

I write today an enthusiastic support of the Herberg Dairy and the granting of this permit. From an agronomic perspective, this project offers significant benefits to the agricultural fabric of the Hillsboro, Halstad area. The availability of manure from the dairy presents a valuable opportunity for local farmers to enhance their nutrient management programs and reduce reliance on commercial fertilizers. Importantly, the planned injection of liquid manure into the soil is an agronomically sound practice. The surrounding soils, which in that particular area of the dairy are primarily verticil type soils such as Fargo and Hagne series are well suited to manure applications. Those soils would have low nitrate leaching potential and a high capacity to absorb phosphorus. These conditions make the area uniquely appropriate for this type of nutrient application. Additionally, manure is one of the most

effective tools for building soil organic matter a key component of soil health, a key indicator of soil health. I appreciate Riverview's thorough planning for the nutrient application calculations. I did actually go through a number of their calculations and reviewed the permit paperwork that was available online. Their commitment to securing more than enough acres for manure applications significantly reduces the risk of over application and demonstrates responsible management. Beyond soil benefits, the opportunity to grow silage and alfalfa for the Herberg Dairy represents a valuable diversification for local farmers. These crops offer new markets and provide an agronomic outlet for nutrients while supporting the local feed supply.

Finally, I have been impressed with Riverview Dairy's professionalism and transparency. They have gone out of their way to engage with our community, including organizing visits to their Waukon facility and also holding local information sessions, both in Halstad as well as Hillsboro. They have consistently welcomed questions and provided open and honest answers. Honestly from a personal standpoint, I have contacted different members of Riverview Dairy to have conversations with them about their nutrient planning in a number of different scenarios and had very good interactions to help me understand the process. In short, Riverview operates the kind of responsible and community-oriented operation that any region would be fortunate to host. I feel as support the approval of this permit and the establishment of the Herberg Dairy in our area. If you did have any questions, I would certainly entertain them.

Department Response: Thank you for your comment.

Comment 27(B) Response to Lonnie Leake

Thank you again for your time. I think it's important to clarify my own comments. So, first of all, there are setbacks to rivers and to drainage areas that this dairy absolutely must comply with, which should help manage any off-target movement of any manure. Furthermore, the way that the Fargo clay works out there, it is what is considered to be a highly smectitic clay. There's poor infiltration through the soil. This is why we don't worry quite as much about nitrogen loss or sulfur loss through the soil. Those clays are very fine, and they do readily absorb phosphorus. As I stated, as a matter of fact, in the high pH's and with that type of clay there, the soil chemistry behind that actually shows that phosphorus availability in some of those scenarios can actually become an issue. And I guess I didn't bring my Dr. Lindsay soil chemistry book with, but I can certainly run home and get it if we need that, but it's also important to note that the number one way that we would usually lose any nitrogen is not through infiltration through the soil just because it flows through that tight clay so slowly. Again, if I do have my contact information and you can always ask me questions about what it's been like to manage nutrients out in that neck of the woods to this point in time.

Department Response: Thank you for your comment.

Commenter 28 - Jason Siegert

Comment 28(A)
Jason Siegert, chairman of Traill County Water resource district. I just want to say that they've been absolutely wonderful to work with. They know how to control their water runoff. We've been working with the legal drain alongside them. They are absolutely transparent and just beautiful people to work with. They've been nothing but supportive for us and we've been nothing but supportive for them. I am in solid favor of this permit. Thank you.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Commenter 29 - David Knudsen

Comment 29(A)
I didn't do my little dot on there, so I didn't know, but I'm on the Traill County EDC and I think it's a great opportunity for Traill County. I think farmers are always looking for something else and some of us don't have the land to grow sugar beets and things like that. So, I wish more of these dairies would come up. And I can give my number if they're looking for some more land west of Brookston because I think it'll be a damn good thing for a lot of farmers.

Department Response: Thank you for your comment.

Commenter 30 - Paul Geray

Comment 30(A)
I'm here to speak in favor of this project. I am by no means any environmental expert, but I do listen a lot and I've had nothing but good response from Riverview during what they've been doing. I have not heard anything negative. I look at all the states that this company is in and how they run their operations. Everything I've read on them have been very expert. I went there and saw how they do things and was very impressed. I also serve on the Hillsboro City Commission. I was on Hillsboro Business Association. I am still the vice President of that and the Business Association, and it has nothing to do with this, but I can tell you this much as a business member and a business owner in Hillsboro, this would be real good for our community. So, and also City Commission, you know, I see so many positives. I think I don't know who it was, Jim had made a comment of who it was. These things don't come along every day. Yes, there are scary things about it, things we don't know about maybe, but I also think you know, sometimes you have to take a chance on that this is going to be better. A lot of times use the example of how many people were against the Fargodome. Sure, those are different things, but they were big things. That unknowns, I think. And now we'd never give any of those things up. And it's the same way here. I feel that in 20 years down the road, we're going to say, boy, we're sure glad that the state allowed this to happen because it's been really good for our community and this company has done a good job of environmentally managing their company. Thank you.

Department Response: Thank you for your comment.

Commenter 31 - Matthew Marshall

Comment 31(A)
As residents of Grand Forks, we're writing to voice my support for the proposed Herberg Dairy by Riverview Dairy near Hillsboro.

I have strong confidence in the environmental permitting process managed by the North Dakota Department of Environmental Quality and the North Dakota Department of Water Resources. These agencies play a critical role in ensuring responsible water use, effective manure and discharge management, odor control, and runoff protection. Knowing that these issues are thoroughly reviewed and regulated gives me peace of mind.

Beyond environmental stewardship, we also recognize the significant economic opportunity this project presents for our region. From opportunities for area farmers to increased demand for local goods and services, the Herberg Dairy can bring lasting benefits to rural communities across the area.

We trust the state's permitting process to ensure the project is done right for the environment and for those of us living downstream.

Department Response: Thank you for your comment.

Commenter 32 - Tim Kozojed

Comment 32(A)
As a rural resident of Hillsboro, North Dakota, I'm writing in support of the proposed Herberg Dairy by Riverview Dairy southeast of our community.

I'm confident in the strength and integrity of North Dakota's environmental oversight. The Department of Environmental Quality's permitting process-covering manure and discharge management, odor control, and runoff protection-ensures that projects like this meet strict environmental standards.

My family and I drink water provided by the East Central Rural Water District, and I trust the North Dakota Department of Water Resources to protect our water supply through its review and regulation of large-scale water use.

With these systems in place, I support the project and trust in the state's process to do what's best for both the environment and our community.

Department Response: Thank you for your comment.

Commenter 33 - Jason Lovas

Comment 33(A)
Good afternoon, my name is Jason Lovas and I am a farmer who farms south of Hillsboro, near the proposed location of Riverview's dairy, and I am on the board of directors of the East Central Regional Water District, currently serving as the Treasurer/Secretary. I am here to offer my support in permit approval because of what I see as multiple benefits.

Department Response: Thank you for your comment.

Comment 33(B)
First as a farmer I am excited about the opportunity for me and my neighbors to raise crops specifically for the dairy and I am excited about the added benefits of manure application to our soils. I have spent many hours this past winter studying literature, mostly from other land grant universities in the US, about the positive effects manure application has over and above traditional, commercial fertilizers. The more I study, the more I am looking forward to further enhancing the quality of our local farmland.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Comment 33(C)
Second, as a member of the rural water district, everyone on our board is eager and excited about serving the dairy with their water needs. Riverview would be a large consumer within our district and a concentrated, large water user will go a long way in the continued economic health and sustainability of our system, which will in turn benefit all of our customers. Let's turn an abundant local resource, our local aquifer capacity, into a benefit that everyone in our district can share in.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Comment 33(D)
And lastly as a community member I am excited about the benefits that a large industry brings with the additional workforce, which means more kids in our schools, more people in our churches, and more people participating in local commerce. I'm looking forward to additional value added to our locally produced commodities, which will be turned over locally instead of getting shipped out of state. And lastly, enhanced economic activity which will generate greater tax revenue for our local political subdivisions. Let's keep North Dakota growing today, and into the future for our next generation.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Commenter 34 - Nodak Electric Cooperative: Mylo Einarson

Comment 34(A)
On behalf of Nodak Electric Cooperative, I am writing to express our support for the proposed Herberg Dairy project by Riverview Dairy near Hillsboro, ND.

As the rural electric cooperative serving this area, we recognize the Herberg Dairy as a valuable addition to our service territory, one that will drive significant agricultural development and contribute to the long-term economic vitality of the region. This project represents a major investment in North Dakota's rural economy, bringing high-quality jobs and increased demand for local services and infrastructure.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Comment 34(B)
We have confidence in the environmental permitting processes managed by the North Dakota Department of Environmental Quality and the Department of Water Resources. These agencies are well equipped to ensure that this project meets the state's high standards for environmental responsibility, including water use, discharge management, and odor control.

Department Response: Thank you for your comment.

Comment 34(C)
Nodak Electric supports responsible, growth-oriented development, and we view this project as a model of agricultural innovation and stewardship. We believe the Herberg Dairy will contribute positively to the region's growth and are committed to working alongside all stakeholders to help make it a success.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Commenter 35 - North Dakota Livestock Alliance

Comment 35(A)
The North Dakota Livestock Alliance (NDLA) is writing this letter in support of the Herberg Dairy permit application NDAFO0908v1.0, contingent upon their compliance with the Animal Feeding Operations rules of the ND Department of Environmental Quality (NDDEQ) and the State Water Quality Standards. We also commend Herberg Dairy and Riverview staff for their dialogue with neighbors and local community leaders at multiple community events and their open houses held July 9, 24 and April 3, 25. We also commend Riverview for hosting dozens of tours at their nearby Waukon Dairy to ensure all questions and concerns had by citizens were answered. As stated by several community members during the public comment session held May 20th, 2025, these interactions and hands-on experience on the

dairy farms were integral to the community's comfort with and support for the Herberg Dairy project.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Comment 35(B)
NDLA is confident that the NDDEQ review process successfully protects the environment and natural resources of our great state. The engineer-designed manure storage systems, paired with a nutrient management plan, gives today's farmers the extremely beneficial use of manure while ensuring the land, water and communities are sustained for generations to come. The natural nutrients contained in manure are valuable fertilizer for crops and the organic matter is crucial to improving soil health. There is another important reason NDLA supports this application. The addition of dairy cattle will dramatically increase North Dakota's ability to attract new milk processing capacity into our rapidly shrinking infrastructure, in turn, supporting existing ND dairy farm families and their future generations. These cattle will also utilize locally produced feeds and support area farmers.

Department Response: Thank you for your comment.

Comment 35(C)
The following comment addresses a statement made during the public comment session held May 20, 2025. The statement regarded concerns about manure applied to frozen or snow-covered ground causing runoff into waterways. NDLA would like it on this permit application's record that the ND DEQ's rules as seen in the Design Manual, 7.6 – 4 states 'Manure shall not be applied to frozen, snow-covered or saturated soils if there is a likelihood of runoff'. NDLA feels the above regulation addresses those previously stated concerns and furthers the efforts to protect the quality of ND's water resources.

Department Response: Thank you for your comment.

Commenter 36 - David Kwiecien

Comment 36(A)
I just wanted to express that if the dairy farm of 20,000+ cows is allowed to set up south of Fargo. I will be moving from Fargo, along with several other groups.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Commenter 37 - LeAnne Wilcox

Comment 37(A)

Do not approve this environmental permit. It is estimated that more than 105 million gallons of untreated fecal-infused wastewater annually will be result of this plan. The company requesting does not have a good nutrient management plan and manure waste will surely find its way to the Red River and contaminate the water. Also, not all treatment plants in area have technology to handle these contaminants. Water quality for animals, plant life, humans will be affected. I do not want to see large-scale dairy in North Dakota. I implore you to reject these requests.

Department Response: Thank you for your comment. Please refer to response to *Comment 1(A)* Water Quality, and *Comment 8(C)* Nutrient Management Plan.

The Safe Drinking Water Act (SDWA) protects public health by protecting and regulating drinking water and its sources. The SDWA sets national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water. Municipal (community) water systems are required to meet drinking water standards per the SDWA.

Commenter 38 - Adam C. Hasbargen

Comment 38(A)
Whereas I support farmers and jobs, I do not support anything to do with the factory dairy industry firstly as it necessarily requires the murder and rape of cows. On behalf of cows, and their pain and suffering, I ask this permit be denied. Calcium is required for the human body, but it does not need to come from cows -- there are ethical sources of calcium that we can utilize.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Comment 38(B)
In addition, aside from the best reason to deny this permit, the next is the amount of water and waste that cows require and generate. As a person who lives and relies on the Red River, I must advocate for the river and demand this permit also be denied for the sake of our water.

Department Response: Thank you for your comment. Please refer to response to *Comment 1(A)* Water Quality, *Comment 2(B)* Water Quantity, and *Comment 8(C)* Nutrient Management Plan.

Commenter 39 - Nancy Johnson

Comment 39(A)
The North Dakota Soybean Growers Association (NDSGA) appreciates the opportunity

to comment on the Herberg Dairy application. NDSGA understands the permit is contingent upon the Dairy's compliance with the Animal Feeding Operations rules of the ND Department of Environmental Quality (NDDEQ) and the State Water Quality Standards.

The NDSGA is supportive of projects such as the Herberg Dairy because of the potential to add economic contributions to rural North Dakota. For instance, a study was recently completed in northwestern Minnesota, looking at the economic contribution of dairy cattle to the counties just across the border from Traill County, proposed home of the dairy. The study, completed by the Agricultural Utilization Research Institute, projects that there will be $3,786 per head in cow-related labor for this type of operation. With an estimated 25,000 head, this labor income alone is $9,465,000.

Department Response: Thank you for your comment. This is beyond the scope of the proposed permit and outside the department's authority.

Comment 39(B)
The NDDEQ review process is designed to protect the environment and natural resources of our state. The engineer-designed manure storage systems, paired with a nutrient management plan, gives today's farmers the beneficial use of manure while ensuring the land, water and communities are sustained for the future. The nutrients contained in manure are valuable fertilizer for crops and the organic matter is crucial to improving soil health. Also, these cattle will use locally produced feeds that support area farmers.

Department Response: Thank you for your comment.

Commenter 40 – Dakota Resource Council, Manitoba Eco-Network, Save Lake Winnipeg Project, Green Party of Manitoba, Food & Water Watch, and the Environmental Law & Policy Center[2]

The document submitted by the Dakota Resource Council has been summarized. The cover letter and introduction are included below, followed by specific comments and their respective department responses. All in text citations included are located in the original document, located in Decision Package Part VII.

"Dakota Resource Council, Manitoba Eco-Network, Save Lake Winnipeg Project, Green Party of Manitoba, Food & Water Watch, and the Environmental Law & Policy Center ("Commenters") submit the following comments on the proposed Animal Feeding Operation Permit for Riverview ND, LLP's Herberg Dairy ("Permit") that North Dakota Department of Environmental Quality ("DEQ") noticed for

[2] The department received an email on June 5, 2025 from Dani Replogle, Staff Attorney for Food & Water Watch and Food & Water Action identifying an error in this comment submission. The email stated, "…*there is an error on the first page of comments mistakenly listing the Green Party of Manitoba as a signatory. The Green Part of Manitoba did not formally sign on.*" As this was received after the public comment period had ended, the department could not include the corrected submission in the record.

public comment on April 18, 2025. The proposed Permit does not comply with DEQ's legal obligations under federal or state law. Commenters urge DEQ to reject Riverview's application because the proposed operation poses intolerable threats to public health and environmental quality."

I. Introduction

"Riverview—an out-of-state company with a history of worker and environmental abuses[1]—proposes to operate a 25,500[3]-cow mega-dairy in Traill County, North Dakota. A dairy of this size is unprecedented in the state for good reason; such facilities generate enormous amounts of waste that threaten our air, water, and the health of our communities. Approving the Herberg Dairy application would mean DEQ was authorizing Riverview to handle the same amount of feces and urine that a city with a population of approximately 900,000 humans generates, all without any of the water treatment used by modern municipal sewage plants. [2] Mega-dairies like the Herberg proposal also require incredible amounts of water to operate, draining aquifers and concentrating pollutants in groundwater. Despite the attention to detail needed to safely operate a dairy of this size, Riverview's application contains numerous errors that undermine the operation's professed ability to avoid discharging pollutants. Further, for the reasons laid out below, the minimal requirements contained in DEQ's proposed permit for the Herberg facility are insufficient to protect surrounding and downstream communities.

Given the likelihood of adverse impacts to human health and the environment, we urge the Department of Environmental Quality to deny the permit application. Barring this, additional permit conditions—including but not limited to intensive monitoring, contingency plans, strict adherence to best nutrient management practices, and enforcement of same—must be added to the permit. Additionally, DEQ must require that Riverview obtain a National Pollutant Discharge Elimination System (NPDES) permit because the size and proximity of the facility to vulnerable surface and groundwater all but ensure Herberg Dairy will discharge pollutants in a manner that degrades water quality. "

Comment 40(A) II. Legal Background

North Dakota state law obligates the Department of Environmental Quality (DEQ) to (1) "act in the public interest to protect, maintain, and improve the quality of waters in the state;" (2) "to require necessary and reasonable treatment of sewage, industrial, or other wastes;" and (3) to cooperate with the federal government in accomplishing these goals. [3] DEQ's regulations emphasize that the agency's primary concern in administering the state's water quality program is "to maintain or improve, or both, the quality of the waters of the state and to maintain and protect existing uses." [4] Importantly, the legislature defined waters of the state to include "all [] bodies or accumulations of water on or under the surface of the earth, natural or artificial, public or private, situated wholly or partly within or bordering upon the state, except those private waters which do not combine or effect a junction with natural surface or underground waters." [5]

[3] The proposed permit is for 25,000 head of dairy cattle. This was reviewed based on Comment 12.

In keeping with these goals, state law authorizes DEQ to prevent, control, and abate water pollution, including by conducting studies and investigations into the causes of water pollution. [6] As such, DEQ has the power to require any source of pollution to "install, use, and maintain monitoring equipment or methods" to detect and characterize discharges of pollutants to waters of the state. [7] Additionally, DEQ can require polluting facilities to report monitoring data to the state. [8] If DEQ determines an industrial facility poses a threat to water quality, the agency may also require modifications in waste disposal systems. [9] Under no circumstances is any entity permitted to store or discharge waste in a manner that causes or contributes to any exceedance of a water quality standard, "unless affirmatively demonstrated, after full satisfaction of the intergovernmental coordination and public participation provisions of the continuing planning process, that a change in quality is necessary to accommodate important social or economic development in the area in which the waters are located." [10]

"Classifications and standards are established for the protection of public health and environmental resources and for the enjoyment of these waters, to ensure the propagation and well-being of resident fish, wildlife, and all biota associated with, or dependent upon, these waters; and to safeguard social, economical, and industrial development." ND Admin. Code 33.1-16-02.1-02. Thus, "[a]ll known and reasonable methods to control and prevent pollution of the waters of this state are required, including improvement in quality of these waters, when feasible." Id. In allowing the lowering of existing quality, the department shall assure that existing uses are fully protected and that the highest statutory and regulatory requirements for all point sources and cost-effective and reasonable best management practices for nonpoint sources are achieved." Id.

Recognizing the particular pollution threats created by Animal Feeding Operations (AFOs), DEQ established an entire regulatory chapter governing AFO permitting. [11] These regulations incorporate and rely on the North Dakota Livestock Program Design Manual [12] ("the Livestock Manual") as a basis for many of the design and operation standards that apply to permitted AFOs. The Livestock Manual "establishes guidelines for use by [DEQ] in the review and permitting process" for AFOs. [13] The purpose of AFO permitting is to "maintain beneficial uses of and prevent degradation of quality of the waters of the state." [14] DEQ is only authorized to issue an AFO permit upon a determination that the facility "will not cause or likely cause pollution of waters of the state."

[15] AFOs must be "located, designed, built, maintained, and operated to limit or prevent pollution of or the discharge of pollutants into waters of the state. [16] All manure storage structures "must be designed and maintained to withstand natural forces, to prevent impacts to waters of the state, and minimize seepage." [17] Earthen storage structures must have "a properly designed and constructed liner to minimize seepage, unless the department has determined a liner is not necessary based on site conditions." [18] Additionally, AFOs must develop and implement a nutrient management plan ("NMP") that specifies how each facility will land apply manure, litter, or process wastewater. [19] NMPs must include, inter alia,

"adequate information to demonstrate that manure or process wastewater, or both, will be applied at agronomic rates" that do not exceed plant utilization rates for nitrogen or DEQ-approved rates for phosphorus. [20] To satisfy this requirement, the Livestock Manual calls for each NMP to contain a "[c]omplete nutrient budget for nitrogen and phosphorus for the rotation or crop sequence that considers all potential sources of these nutrients." [21] NMPs must also specify "[r]ecommended nitrogen and phosphorus rates, timing, [and] method of application and incorporation." [22]

Importantly, DEQ must implement its AFO regulatory program in accordance with the federal Clean Water Act. The Clean Water Act establishes a cooperative federalism framework under which the U.S. Environmental Protection Agency delegates aspects of National Pollution Discharge Elimination System ("NPDES") permitting authority to state governments. DEQ has been delegated such authority and must therefore "take all action necessary or appropriate to secure to this state the benefits of that act and similar federal acts." [23] To comply with the Clean Water Act and maintain authorization to operate North Dakota's NPDES permitting program, DEQ must ensure all point sources that discharge pollution to a water of the United States obtain and comply with a NPDES permit. [24] Concentrated Animal Feeding Operations (AFOs that meet minimum size thresholds that the Herberg Dairy easily surpasses) are expressly designated as point sources. [25] Permits must meet minimum federal requirements established through the effluent limitations guidelines for CAFOs found at 40 C.F.R. part 412 as well as 40 C.F.R. §§ 122.23, 122.41, 122.42(e) and 122.44. Among other things, these regulations mandate that all permits include representative monitoring capable of ensuring the permitted CAFO complies with the terms of its permit. [26]

Federal requirements are merely a floor; DEQ is authorized to—and in some situations must—issue permits that are more protective and to include additional terms and conditions in permits. [27]

Department Response: Currently concentrated animal feeding operations (CAFO)'s permitted in North Dakota are permitted under State rules NDAC 33.1-16-03.1. The department has the authority to issue a State Animal Feeding Operation Permit under NDCC 61-28-04. Department approval addresses the health and environmental concerns relating to protecting air quality and water quality. The submitted application and supporting documentation show that the proposed facility is not a point source subject to a NPDES permit. Land application sites from a CAFO are not subject to NPDES requirements if the NMP is followed as specified in 40 CFR 122.42(e)(1)(vi)-(ix). Agricultural storm water discharges are exempt from the NPDES as provided in 33 U.S.C. 1362(14). Refer to response to *Comment 8(C)* Nutrient Management Plan and *Comment 16(A)* Agricultural Stormwater Discharges.

Comment 40(B) III. Factual Background

The proposed location for Herberg Dairy has significant environmental, cultural, recreational, and economic value. The area is also highly vulnerable to water pollution impacts due to its proximity to important surface and groundwater resources that serve U.S. and Canadian

residents. These waters—and the residents they serve—deserve maximum protection from pollution impacts.

Department Response: Cultural and economic value are outside of the scope of this permit. Refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, *Comment 40(A)* Permit Authority, and *Comment 41(B)* Item 1. Design.

Comment 40(C) A. CAFOs Generate and Discharge Harmful Pollutants.
Manure "is a primary source of nitrogen and phosphorus to surface and groundwater." [28] But, CAFO waste is not just nutrients; it also contains a hazardous cocktail of bacteria, pathogens, sediments, pesticides, pharmaceuticals, salts, metals and ions such as magnesium, sodium, potassium, and chloride.[29] CAFOs also handle a variety of other potential pollutants including process wastewater, hair and feathers, bedding materials, mortalities, cleaning products, and other chemicals.[30] When discharged to waters, these pollutants pose serious threats to human health and to ecosystems.

Department Response: See response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, *Comment 40(A)* II. Legal Background, and *Comment 40(F)* Health Impacts.

Comment 40(D) *1. Pollutants*
Among the many CAFO pollutants, nutrients are of primary concern because of their prevalence, potential for harm, and the ease with which they enter waterways. A lactating dairy cow producing 90 pounds of milk per day excretes approximately 1 pound of nitrogen in their manure daily. [31] Using this number, Herberg Dairy's proposed herd will produce nearly 8 million pounds of nitrogen annually. Phosphorus pollution is similarly problematic. A lactating dairy cow producing 90 pounds of milk per day excretes approximately 0.11 pounds of phosphorus daily. [32] This means the proposed Herberg herd will produce more than 850,000 pounds of phosphorus annually.

Department Response: See response to *Comment 8(C)* Nutrient Management Plan.

Comment 40(E) *Pollutants Cont.*
Though naturally occurring in the environment, nutrients pose unique risks to animal and plant life when excessive quantities are added to ecosystems. High concentrations of nitrogen and phosphorus in water create hypoxic dead zones where fish and other aquatic species cannot survive. [33] Further, heavy nutrient loads create algal blooms that can be toxic to humans and pets that come into contact with impacted waters. [34] Contact with the cyanotoxins in some blooms can cause nausea, vomiting, headache, diarrhea, skin/eye irritation, fever, muscle and joint pain, respiratory irritation, neurological problems, and allergic reactions. [35] The economic cost of a single major harmful algal bloom can climb to tens of thousands of dollars, and the cumulative cost of the U.S.'s algae problem may be as high as 100 billion dollars annually. [36] Low dissolved oxygen and nutrients are among the leading causes of water quality impairments in North Dakota. [37]

Department Response: The department agrees that nutrients continue to show environmental impacts to waters of the State. Here are some of the findings from the department: Harmful Algal Blooms (HABs) according to the Watershed Management Program, Division of Water Quality within the department show all 2024 reported and listed outbreaks are from lakes or reservoirs. Here is a link to the department's webpage on HABs https://storymaps.arcgis.com/stories/c875847d52864881a96cc591421cd1bc

The department has reviewed the North Dakota 2020-2022 Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads. The Red River of the North was not listed as impaired for nutrients at, upstream, or downstream of the proposed facility location. The facility is located near the confluence of the Elm River and the Red River of the North. The Elm River is not listed as impaired for nutrients from its confluence with the North Branch Elm River downstream to its confluence with Red River of the North. The Integrated Report can be found on the department's webpage: https://deq.nd.gov/WQ/3_Watershed_Mgmt/2_TMDLs/TMDLs_IR.aspx

The proposed facility is regulated by state rule which places requirements to protect the environment and human health. Please refer to response to *Comment 8(C)* Nutrient Management Plan and *Comment 41(B)* Item 1. Design.

Comment 40(F) ***Pollutants Cont.***
Bacteria in the environment convert nitrogen from manure into nitrates, another hazardous pollutant. Ingesting water contaminated with nitrates is associated with dangerous human health conditions like colorectal cancer, thyroid disease, birth defects, premature births, and methemoglobinemia (a potentially fatal condition commonly known as "blue baby syndrome"). [38] Neighboring states with high concentrations of industrial agriculture facilities like the proposed Herberg Dairy are now dealing with nitrate crises that endanger human health and cost the public millions of dollars. [39] Importantly, the health risks associated with high nitrate levels are often compounded by the synergistic effects of pesticides, like those used in cattle ear tags or on nearby crop fields whose rows are devoted to growing livestock feed inputs like corn. [40] For instance, a 2022 study of drinking water in rural Nebraska found that high levels of both nitrate and atrazine (a carcinogenic pesticide used widely on livestock feed crops in the U.S.) in drinking water were correlated with increased likelihood of birth defects. [41]

CAFO waste is also laden with fecal coliform bacteria and other pathogens. [42] Zoonotic pathogens commonly found in manure include E. coli, Campylobacter, Salmonella, Listeria, Cryptosporidium parva, and Giardia, all of which can cause acute gastrointestinal distress, fever, and other dangerous symptoms in humans who drink or have recreational contact with contaminated water. [43]

CAFOs use a slew of antibiotics, hormones, and other pharmaceuticals to deal with these pathogens and keep animals alive in such concentrated and stressful environments. These

products end up in CAFO wastes and ultimately make their way into nearby surface waters and domestic wells.[44] Last year approximately 11.1 million kilograms of antibiotics were sold for use in animal agriculture in the United States. Somewhere between 40 and 90 percent of the antibiotic dose administered to an animal is subsequently excreted as waste that ultimately enter the environment. For example, only 25 percent of a tetracycline [45] dose is absorbed by the animal. Tetracyclines—the most commonly sold antibiotic in 2023 46—cause chromosomal aberrations that inhibit plant growth, induce DNA breakage, and change the enzymatic activities of earthworms, zebra fish, Daphnia, algae, mussels. [47] Tetracycline is also capable of increasing cyanobacteria content of algal blooms more than two-fold. [48]

While the individual risks presented by each drug used on CAFOs are too numerous to detail here, [49] hormones commonly used in dairy CAFOs are another major source of concern. [50] Estrogen pollution has been linked to increased incidences of breast cancer in women and prostrate cancer in men. [51] Pharmaceuticals used on feedlots are also commonly associated with endocrine disruption and reproductive disorders in fish and other aquatic wildlife. [52] One study that specifically examined the impacts of CAFO effluent on fathead minnows found that "[w]ild fish collected below a feedlot exhibited altered reproductive biology." [53]

The widespread use of antibiotics for non-therapeutic purposes in livestock animals also drives selective pressure for antibiotic-resistant bacteria, increasing health burdens for impacted humans and animals. [54] According to the Food & Drug Administration, resistance against many of the most commonly used livestock antibiotics have exploded since 2013. [55] Researchers studying water pollution from a CAFO-dense area in California found "significant potential risk of groundwater contamination with antibiotic-resistant bacteria derived from CAFOs even if the subsurface environment is not suitable to transmit pathogenic bacteria." [56] Those researchers concluded the paper by highlighting the importance of "continuous and effective groundwater monitoring" to safeguard public health.[57]

Finally, salts, heavy metals, semimetals, and other trace elements added to feed and eventually expelled by livestock also impact water quality. [58] CAFO waste is known to contain many of the same elements found in sewage sludge, including "arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc." [59] Following a 2009 petition for rulemaking that chronicled reports of residual arsenic in meat and poultry food products, [60] the Food and Drug Administration withdrew its approvals of feed additives with arsenic. However, other elements which are not agronomically useful or taken up by crops remain in feed and wastes, resulting in accumulation and metal-contaminated runoff. [61] In North Carolina, for example, excessive accumulations of zinc and copper in areas with high concentrations of industrial animal agriculture have degraded soil quality to toxic levels. [62] Excessive salt in CAFO waste also impacts soil quality and can actually restrict crop establishment and growth. [63] In this manner, allowing land application of CAFO waste that has not been treated or even tested for metals and other trace elements directly undermines plant growth and contributes to overapplication of manure, fertilizer, and soil amendments that further reduce water quality.

Department Response:
Nitrates: Lab results for all North Dakota municipal (community) water systems that have been sampled for nitrate-nitrite for 2023 through quarter three of 2024, indicate that all North Dakota municipalities are in compliance with EPA's Safe Drinking Water Act's nitrate-nitrite Maximum Contaminant Level (MCL). EPA's MCL for nitrate set to protect against blue-baby syndrome is 10 mg/l.

Zoonotic Pathogens: According to the U.S. Center of Disease Control, pathogens *E. coli, Campylobacter, Salmonella, Listeria, Cryptosporidium parva*, and *Giardia* are not spread through the air; a person must come into contact with the animal or feces. Manure handling according to response to *Comment 8(C)* Nutrient Management Plan helps ensure that manure stays in the fields.

NDAC 33.1-16-02.1 Standards of Quality for Waters of the State (WQS) has a criterion for *E. coli. E. coli* is used as a surrogate parameter for other pathogens in the environment. The water quality *E. coli* standard is:

"*Not to exceed 126 organisms per 100 ml as a geometric mean of representative samples collected during any 30-day consecutive period, nor shall more than 10 percent of samples collected during any 30-day consecutive period individually exceed 409 organisms per 100 ml. For assessment purposes, the 30-day consecutive period shall follow the calendar month. This standard shall apply only during the recreation season May 1 to September 30*."

According to the Center for Disease Control (CDC), Methicillin-resistant Staphylococcus aureus (MRSA) is spread by skin-to-skin contact, shared equipment or supplies, and places that involve crowding with an infected source; MRSA is not spread through the air.

Antibiotics: The North Dakota Board of Animal Health administers the rules for disease. Antibiotics are administered under the supervision of a licensed veterinarian. The Food and Drug Administration (FDA) administers rules on the use of antibiotics in livestock feed. The department understands that tetracycline is a broad-spectrum antibiotic and is used in a variety of products, including for the treatment of acne. This is beyond the scope of the proposed permit and outside the department's authority.

The department has reviewed numerous studies presented (Appendix A). The applicability of these studies to the proposed site can be affected by facility design, operations and maintenance, applicable state and local rules in addition to site specific conditions such as geology and meteorology. The design of the studies and how they are conducted can affect how the results can be compared to other situations. State regulations have been developed through a public process to address many environmental and health issues discussed in the various studies, such as required setback from residences, statewide odor standard, and nuisance hydrogen sulfide standard. It has not been shown that these protections are inadequate nor that applicable health standards are likely to be exceeded.

Salts, Heavy Metals, Semimetals, and Other Trace Elements:
The WQS have maximum limits for salts, metals, and trace elements, which include but are not limited to sodium, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc.

The WQS provide the fundamental benchmarks by which the quality of all surface waters are measured, and are used to determine impairment. To ensure that waters of the state are meeting the WQS, the department has established monitoring programs to collect and analyze water quality data. The department develops integrated reports on the status of waters, the degree to which designated beneficial uses are supported, and identifies impairments. Refer to response to *Comment 40(E)* Impaired Waters and *Comment 40(X)* Ambient Monitoring.

Comment 40(G) ***2. Discharge Pathways***
CAFOs discharge pollutants to waterways through a variety of pathways. Discharges from production areas occur when liquid waste storage structures, or "lagoons," overflow or breach, allowing their contents to run off into adjacent surface waters or seep into groundwater. [64] Lagoons also discharge to groundwater when they lack adequate liners. [65] The Ninth Circuit Court of Appeals recently acknowledged that even lagoons that purportedly meet permeability standards like the Livestock Manual's 1/16 inch per day seepage limit are "designed to leak." [66] CAFOs also discharge wastewater from their production areas when operations are so large that they cannot possibly manage all contaminated run-on water. Additionally, CAFOs often stockpile silage in massive mounds and manure in uncovered windrows, both of which produce leachate that seeps into groundwater and contaminates runoff from production areas. [67] Runoff and spillage containing CAFO waste discharge to surface waters through ditches and canals; manure and wastewater handling infrastructure such as pipes, pumps, and storage facilities; leaking equipment; and ventilation systems. [68]

Department Response: Refer to response to *Comment 41(B)* Item 1. Design and *Comment 41(E)* Seepage.

Comment 40(H) ***Discharge Pathways Cont.***
Land application areas pose an even greater risk of discharges. As EPA recently concluded, nutrient management plans are "insufficient" to protect water quality because they are based on "USDA standards, which focus on maximizing crop growth, rather than on preventing excess nutrient runoff." [69] The California State Water Resource Control Board has agreed, stating that land application at agronomic rates "is responsible for the vast majority of dairies' nitrogen impacts to groundwater. . . forc[ing] [the State] to take a hard look at what [it] now recognizes has been an inadequate approach for regulating dairy waste discharges." [70] Because groundwater can act as a conduit to surface waters, pollution to groundwater has the potential to impact surface water quality as well. [71] Under the Clean Water Act, a CAFO is liable for discharges of "pollutants that reach navigable waters after traveling through

groundwater if [those] discharge[s] [are] the functional equivalent of a direct discharge from the point source into navigable waters." [72]

Certain land application practices commonly employed by CAFOs create elevated discharge risks. For instance, application of CAFO waste to saturated or frozen fields leads to contaminated runoff reaching waterways. [73] Given "the minimal settling and breaking down of the waste during [frozen and/or snow-covered] conditions, and the inability to predict or control snowmelt and rainfall," Michigan regulators have concluded that "there are no practices that can ensure the runoff from fields with surface-applied waste on frozen or snow-covered ground will not be polluted." [74] Pressurized irrigation systems and other land application methods also cause discharges due to faulty equipment, imprecise application, or aerial deposition of volatilized pollutants. [75] Additionally, many land application areas have subsurface drainage systems, such as tile drains, or abut ditches that act as conduits to surface waters.

Pollution risks from all CAFO areas are exacerbated when CAFOs handle waste in liquid or slurry form, [76] as Riverview proposes to do at Herberg Dairy. [77] According to a soil scientist with USDA's Natural Resources Conservation Service, liquid waste "behaves like water." [78] Because of this, dairy CAFO pollutants easily move through the environment and discharge to state waters where they degrade water quality, threaten public health and ecosystems, and cost surrounding communities millions of dollars. [79]

The EPA estimates that approximately 75 percent of all CAFOs discharge pollutants to water. [80] The proposed Herberg Dairy is likely to fall into this category due to its size and proximity to surface and ground waters. CAFOs are specifically designed to maximize production and reduce operator costs by departing from the traditional way of raising animals on the land. Because the amounts of manure and other pollutants generated "frequently exceed the assimilative capacity of land," CAFO-dense watersheds often suffer severe water quality impacts. [81] Decades of inadequate regulation have allowed CAFOs to construct, design, operate, and maintain their facilities such that they discharge significant amounts of waste into state and federal waters, externalizing their pollution costs onto the environment and the public at large. [82] Consequently, this industry is causing severe water quality deterioration that impacts the environment and threatens public health.

Department Response: Refer to response to *Comment 1(A)* Water Quality and *Comment 8(C)* Nutrient Management Plan.

Comment 40(I) B. Riverview Proposes to Operate Its Mega-Dairy in an Invaluable and Vulnerable Area.

Riverview proposes to site this CAFO of unprecedented size just 1.5 miles west of the Red River of the North, an international waterway of high drinking water and recreational value that drains into Lake Winnipeg in Canada. [83] The Red River is a class I stream: [84] "The quality of the waters in this class shall be suitable for the propagation or protection, or both, of resident fish species and other aquatic biota and for swimming, boating, and other water

recreation. The quality of the waters shall be suitable for irrigation, stock watering, and wildlife without injurious effects. After treatment consisting of coagulation, settling, filtration, and chlorination, or equivalent treatment processes, the water quality shall meet the bacteriological, physical, and chemical requirements of the department for municipal or domestic use." [85]

The Red River is "home to a variety of important fish species, including channel catfish, walleye, and bigmouth buffalo." [86] A multinational coalition of tribal and state governments have been working to restore a stable lake sturgeon population to the Red River Basin for decades. [87] In 2022, these efforts were rewarded with the first confirmed natural sturgeon spawning observed in the basin for over 100 years. [88] This hard won success is threatened by agricultural pollution like manure runoff that contributes to low dissolved oxygen levels, high turbidity, and sedimentation in the River, poor water quality conditions that endanger sturgeon and other fish, as well as other wildlife in the ecosystem. [89]

According to the International Red River Watershed Board's most recent progress report, monitoring conducted at the U.S.-Canadian border shows 46 percent of water quality samples exceed international objectives for total dissolved solids and 6 percent exceed objectives for chloride. [90] While no samples exceeded the objective for E. coli, the sample with the highest recorded concentration was at the maximum limit. [91] Sampling also demonstrates that the Red River is already exceeding nutrient concentration and loading goals. [92] Similarly, the Report notes concentrations of metals and pesticides, including atrazine, in excess of alert levels. [93] As discussed above, each of these pollutants is present in CAFO waste.

The Red River ultimately deposits much of its pollutant load into Lake Winnipeg, one of the largest lakes in the world. Together, Minnesota and North Dakota already contribute approximately 2,600 tons of phosphorus to Lake Winnipeg each year. [94] In combination with warmer weather, this phosphorus loading has increased the frequency and severity of algal blooms in Lake Winnipeg, disrupting recreation and endangering the health of all animals that use the Lake, including humans. [95]

Failure to regulate Herberg Dairy in a manner that prevents water pollution will harm human health, wildlife, and North Dakota's outdoor recreational economy. Further, any surface water pollution from Herberg Dairy will add to the cost of cleaning up Red River water for cities downstream that rely fully or partially on the River as a drinking water source, such as Grand Forks and Grafton. The Racoon River in Iowa is an example of how CAFOs have affected municipal water supplies.

"Twenty years ago, in 1991, Des Moines Water Works was forced to build one of the world's largest — and most expensive — nitrate removal systems. This was necessary to treat the unsafe levels of nitrates entering the Raccoon River from factory farms and industrial agriculture fertilizer use upstream. Less than two decades later, the system was overwhelmed by the ever-increasing levels of nitrates flowing into the river from the proliferating factory farm operations in the watershed. As a

result, in 2017, Des Moines Water Works had to expand this nitrate removal system. Ratepayers — not the polluting agribusinesses upstream — have borne these costs." [96]

As proposed, the Herberg Dairy poses unacceptable risks to waters of the state, and the recreational, economic, aesthetic, and spiritual values those waters inherently provide. Because DEQ cannot reasonably conclude the Herberg Dairy "will not cause or likely cause pollution of waters of the state," Riverview's application must be denied. [97]

Department Response: Reference response to *Comment 8(C)* Nutrient Management Plan and *Comment 40(E)* Red River, and Comment 40(Z) Inspections.

Comment 40(J) IV. The Proposed Permit is Legally and Practically Inadequate to Protect Water Quality and Human Health.

To protect water quality, human health, and the environment, DEQ must require that Riverview obtain a permit for the Herberg Dairy that fully complies with federal and state law requirements. At minimum, this means DEQ must (1) require Riverview to obtain a NPDES permit; (2) correct errors and fill in missing information in the Herberg Dairy NMP; (3) provide accurate baseline data to facilitate monitoring of pollution impacts; and (4) include representative monitoring requirements that facilitate enforcement of the Herberg Dairy's permit conditions. Failure to correct these errors and omissions renders any permit issued to the Herberg Dairy legally inadequate and leaves the public—and DEQ—in the dark about the impacts this mega- dairy will have on the environment.

Department Response: Please refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, *Comment 16(A)* Agricultural Discharges, *Comment 40(A)* Permit Authority, and *Comment 40(X)* Ambient Monitoring.

Comment 40(K) A. Herberg Dairy Cannot Operate Without A NPDES Permit.

Due to its design, location, and sheer size, Herberg Dairy will discharge pollutants to waters of the state if the facility is allowed to operate in the manner proposed by Riverview's application and adopted by DEQ's draft permit. DEQ must therefore insist that Riverview obtain an NPDES permit to remain in compliance with federal law. [98] In the past, EPA proposed to establish a rebuttable presumption that CAFO lagoons discharge to surface water via groundwater by suggesting a requirement that CAFOs either conduct groundwater pollution monitoring or rebut the presumption of discharge by providing a hydrologist's report that no such connection exists. [99] Along the same lines, DEQ should presume Herberg Dairy will discharge because there is simply no way that a single CAFO can more than double the number of dairy cows in the state without discharging to a water of the state, particularly when the operation is within two miles of a major surface water prone to flooding, on top of shallow interconnected groundwater, and does not plan to employ any advanced wastewater treatment prior to disseminating manure for land application on fields with direct conduits to surface waters.

Department Response: Refer to response to *Comment 1(A)* Water Quality, *Comment 40(J),* and *Comment 41(B)* Item. 1 Design.

Comment 40(L) ***1. Land application discharges***
As discussed in Section III.A.2, operating a CAFO designed in the manner proposed by the Herberg Dairy application entails well-documented discharge risks, particularly where the CAFO or fields where CAFO waste will be land applied have direct conduits to surface waters. Traill County, the location of the proposed Herberg Dairy, has extensive tile drainage that already discharges effluent with pollution levels that exceed state and federal water quality standards. [100] Some portion of liquid dairy waste—including dissolved nutrients and contaminants —applied to tile-drained fields will flow into the subsurface drainage system, and ultimately into surface waters when there are rain events. [101] Indeed, according to a 2014 study conducted by researchers at North Dakota State University, [102] nitrate concentrations of effluent leaving monitored tile drains in Traill County reached a high of 20.8 mg/L in 2013.[103] Further, surface water quality monitoring in Richland County conducted pursuant to the study led researchers to conclude it was "obvious that the high [pollutant] concentration of the tile water is impacting the concentrations in the receiving stream."[104] Overall, the study demonstrates that significant surface water pollution loading occurs via tile drainage in Traill County.[105]

Pollution originating from the Herberg Dairy is certain to be discharged by tile drain networks. As clearly indicated by materials submitted with Riverview's permit application, at least 50 sites comprising approximately 12,000 acres proposed for land application of manure from Herberg Dairy are tile drained. [106] Virtually all of these fields are in the Red River Basin, ensuring pollutants transported from fields to surface waters will end up in the Red River.

Department Response: Reference response to Comment 8(C) Nutrient Management Plan and *Comment 40(E)* Red River.

Comment 40(M) ***2. Production area discharges***
If permitted, Herberg Dairy's production area would also discharge to surface water, threatening water quality. As discussed, pollutants discharged to surface waters through interconnected groundwater in a manner that is "functional[ly] equivalent to a direct discharge" must be permitted by a valid NPDES permit. [107] The conditions at the proposed Herberg Dairy site combined with the design of the Dairy's lagoons and mortality storage structure ensure such functionally equivalent discharges will occur. To protect water quality, DEQ must require Riverview to obtain a NPDES permit authorizing and monitoring such discharges.

Department Response: Reference response to *Comment 40(J)* NPDES Permit, *Comment 40(Z)* Inspections, and *Comment 1(A)* Water Quality.

Comment 40(N) ***Production area discharges Cont.***

Groundwater in the Red River Basin is hydraulically connected to local surface waters.[108] The Geotechnical Report submitted with Riverview's application notes that groundwater at the project site "could be quite near the ground surface during periods of significant precipitation."[109] Further, the Report states that the "surface level in the nearby Red River could be expected to affect the subsurface water levels present at the site."[110] This observation denotes interconnection between the Red River and groundwater underlying the proposed Dairy.

Department Response:

Reference response to *Comment 1(A*) Water Quality and *Comment 41(B)* Item 1. Design. Due to the surface geology of the site, there is no detectable water table. The site lies above lean to fat clays that extend 31-36 feet deep according to soil borings. This clay layer minimizes the lateral movement of water, and prevents the development of a water table. There is no aquifer under the site as recognized by the Department of Water Resources.

Comment 40(O) *Production area discharges Cont.*
If groundwater beneath Herberg Dairy feeds into the Red River, seepage from the Dairy's five lagoons amounting to millions of gallons per year may be discharged to the River and nearby tributaries.[111] Despite incontrovertible evidence that earthen and clay lined lagoons designed to the 1/16 inch per day seepage rate allow pollutants to discharge into groundwater,[112] and its own consultant's acknowledgment that groundwater is likely present near the surface of the Herberg site, Riverview has proposed to store liquid waste from the Herberg Dairy in five clay lined lagoons.[113] Moreover, Riverview is proposing to construct the clay liner using non- optimal on-site soils that are prone to shrinkage and freeze-thaw movement,[114] a factor known to increase the risk of cracking. Despite the obvious risk of subsurface discharge under these conditions, DEQ has not only required no certification that the Herberg site is not hydraulically connected to surface water, it has ignored evidence to the contrary. Thus, DEQ's proposed permit is insufficient to prevent discharges to waters of the state from Herberg Dairy's proposed manure management practices.

Department Response: Surface water is incidental at the site as there is not a water table (as defined by DWR). Surface geology at the site consists of heavy clays. Reference response to *Comment 1(A*) Water Quality and *Comment 41(B)* Item 1. Design.

Comment 40(P) *Production area discharges Cont.*
Contaminated leachate from mortality storage can also enter surface waters by traveling through hydrologically connected groundwater. The average mortality rate for dairy herds is between 6 and 8 percent.[115] Riverview proposes to store what will inevitably amount to thousands of mortalities per year on "impervious" concrete barriers for up to 72 hours prior to shipping the dead animals off-site using a rendering service.[116] According to the North Dakota State University Extension, this plan raises several concerns.

First, North Dakota law requires disposal or shipment to a rendering facility within 36 hours of a death to prevent the spread of any infectious or contagious disease. [117] The Herberg materials do not address any plan for meeting this obligation, which is particularly concerning given the avian bird flu (H5N1) has been detected in dairy cows in Minnesota as well as South Dakota. [118] This flu strain has been confirmed to spread from dairy cows to humans, further increasing the risks associated with any discharge of this pathogen. [119]

Department Response: Section 6.4 of the North Dakota Livestock Program Design Manual states the following,

"Livestock mortality shall be disposed of in a manner acceptable to the Board of Animal Health and in accordance with NDCC Section 36-14-19."

NDCC 36-14-19 is as follows.

36-14-19. Disposition of carcass of animal dying from contagious or infectious disease.
Any animal which is found dead must be presumed to have died from a contagious or infectious disease until the contrary is shown unless another cause of death is apparent. The owner or person in charge of any domestic animal or nontraditional livestock which dies within this state from or on account of any contagious or infectious disease shall dispose of the carcass of such animal as follows:

1. If the animal died of anthrax, as determined by a licensed veterinarian, the carcass must be completely burned at the place where it died if possible. If the carcass must be moved, it may not be dragged over the ground but must be moved only on a suitable conveyor and all body openings in the carcass must be plugged with cotton saturated with a strong antiseptic solution.

2. If the carcass is of a hog which died from hog cholera or swine erysipelas, the same, with hide intact, must be burned within thirty-six hours or given to a licensed rendering plant within such time.

3. If the carcass is of an animal which has died of a disease other than is specified in subsections 1 and 2, or from any other cause, it must be burned, buried, composted, or given to a licensed rendering plant within thirty-six hours, or must be disposed of by a method approved by the state veterinarian. If the carcass is buried, it must be buried not less than four feet [1.22 meters] below the surface of the ground and covered with dirt to that depth. No carcass may be disposed of along any public highway or along any stream, lake, or river nor be buried near or adjoining any such place.

The State Veterinarian has approved Herberg Dairy's proposed disposal plan according to NDCC 36-14-19(3). This approval document is attached in Appendix B.

See response to *Comment 5(A)* Mass Mortality Event to address infectious disease comment.

Comment 40(Q) ***Production area discharges Cont.***
Second, FDA regulations and concerns around mad cow disease have made rendering services for bovine carcasses "harder and more expensive" and "[i]n many areas, the numbers of rendering facilities are limited and in many cases are declining due to increased costs and biosecurity risks associated with transporting mortalities." [120] The Herberg application and supporting materials are silent as to whether there are any rendering services near the dairy that even take bovine carcasses, and if so, whether such services are willing and able to take on Herberg's mortalities.

Department Response: The department has verified with the business providing rendering services and confirmed they were willing and able to take mortalities from the site.

Comment 40(R) ***Production area discharges Cont.***
Riverview's fallback plan is to compost the Herberg mortalities on-site in a "roofed building with concrete sides and floor." [121] However, this plan also has significant holes. Because this concrete building is not included in any of the maps or schematics provided in support of Riverview's application, neither the public nor DEQ has any means of confirming whether it is large enough to store and safely compost the number of anticipated mortalities or how the building will contain or safely manage any liquid bi-products or leachate. [122] Without additional information, neither Riverview's application materials nor DEQ's proposed permit are sufficient to prevent discharges from the Herberg Dairy's mortality management.

Department Response: The submitted design plans identify a building to compost mortalities on site if needed. This building is located north of the separation building, with outside dimensions of 16 feet by 44 feet. This provides adequate storage for mortality management. All leachate from this building drains north to Leachate Storage Pond 5. Refer to response to *Comment 40(Z)* Inspection.

Comment 40(S) ***3. Flood-related discharges***

Extreme precipitation events, flooding, and increasingly high stream flows will also lead to discharges of waste from Herberg Dairy to waterways. The proposed sites for the Herberg Dairy and land application of waste generated at that site are extremely prone to flooding. [123] According to data collected by the U.S. National Oceanic and Atmospheric Administration, flooding on April 26, 2022 reached a crest over 46 feet high in Grand Forks, ND, just north of where the Herberg Dairy would be located. [124] Obviously, any CAFO waste that comes into contact with flood waters is subject to discharge into a water of the state.

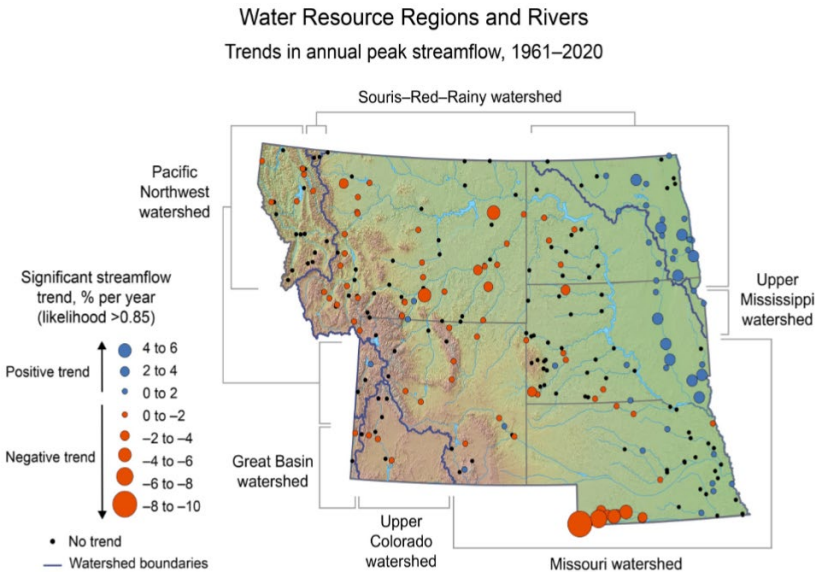


Image 1. Streamflow map showing peak flow on the Red River in the vicinity of Herberg Dairy is expected to increase by 2 to 6 percent. Source: Fifth National Climate Assessment

Incredibly, a portion of the Dairy that DEQ is proposing to permit is located squarely within a floodplain. Riverview submitted a floodplain evaluation as part of its application for the Herberg Dairy that shows the lowest point of the CAFO will be elevated two feet above the highest recorded flood elevation. [125] While historic flood data is certainly relevant information that DEQ must consider in evaluating Riverview's application, the agency must also consider and account for increased flood risk from more extreme precipitation events due to climate change. The Fifth National Climate Assessment states with high confidence that extreme precipitation events, high streamflow, and flooding in this area will only increase over the coming years. [126]

Department Response: The department uses NOAA Atlas 14 Volume 8 for site analysis. Review response to *Comment 1(B)* Floodplain.

Comment 40(T) ***Flood-related discharges Cont.***
The part of the CAFO Riverview has proposed to locate in the floodplain includes portions of the CAFO's manure storage lagoons.[127] As discussed above, the clay liners Riverview has proposed for its lagoons will not prevent pollutants from seeping into the surrounding subsurface. During flood conditions when soils are saturated, these pollutants will travel downgradient through the soil substrate and ultimately into the Red River. [128] It is unclear whether the Herberg Dairy will be able to contain all the liquid waste generated, including contaminated run-on from increasingly intense precipitation and floods, because it is not apparent in any of the application or permit materials that projections that included consideration of climate change were considered. [129]

Fields proposed for land application of the Herberg Dairy waste are also likely to discharge during floods and extreme precipitation events. While Riverview apparently removed some

land application fields that were partially located in floodplains, several other fields marked as being partially located within a floodplain remain in the Dairy's NMP. [130] Again, it is not clear that these flood risk demarcations account for increased risks from climate change. Additionally, Commenters specifically request that DEQ require Riverview to find a replacement for Field 3, which is in an area with a history of persistent flooding that causes discharges to Traill County Drain No. 28.

Department Response: Please reference response to *Comment 9(A)* Field Review and *Comment 41(B)* Item 1. Design. Field 3 has been reviewed and removed from the NMP.

Comment 40(U) B. The Permit Relies on Faulty Nutrient Management Planning
Nutrient management plans are required to ensure permittees and the public understand the agronomic rates at which CAFOs are legally permitted to land apply waste. Because nutrient management plans are designed to maximize crop yields rather than protect water quality, they are an imperfect tool for preventing excess nitrogen and phosphorus—let alone other CAFO pollutants—from contaminating surface and groundwater. As such, CAFO waste should be required to undergo treatment designed to remove and reduce pollutants to acceptable levels before land application. Nevertheless, correcting omissions and errors in the Herberg Dairy's nutrient management plan is a legal requirement and will help to protect water quality, even if DEQ neglects to require pollution treatment before waste is sprayed on fields. The Herberg NMP is missing critical information that makes it impossible to even determine whether the even this inadequate regulatory requirement is being met.

As laid out in further detail in the attached report of agronomist Caroline D'Huyvetter, [131] there are significant gaps in the Herberg NMP, including:

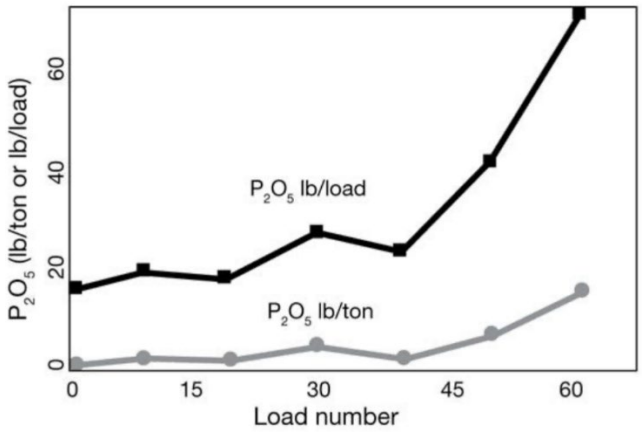
- No information about rates, timing, method of application, or incorporation;
- Incomplete/unclear information about crop rotations;
- Failure to clarify what nutrient calculations were used to come up with a nutrient budget (and if the correct one had been used, the calculations would have come out far differently);
- Failure to Quantify all nitrogen and phosphorus sources;
- Incomplete erosion calculations.

These are not peripheral issues. Without this basic information, the DEQ cannot meaningfully assess whether the NMP will prevent nutrient and pathogen loss.

Department Response: Please refer to specific response to Caroline D'Huyvetter, *Comment 42(A)*Comment 42(A) and *Comment 8(C)* Nutrient Management Plan.

Comment 40(V) The Permit Relies… Cont.
Additionally, DEQ should include sampling requirements—and all critical procedures for controlling pollutants—in the permit. Calculations for agronomic rates of manure application depend on having accurate information on concentration and amounts of waste material. It is critical to know how the manure nutrient sample was obtained. If there were not multiple level

samples nor agitation of the sampled lagoon, the phosphorus content would be underestimated. If the waste is not agitated, there will likely be manure consistency and nutrient stratification. The chart below, reprinted from Les Lanyon, Penn State, illustrates how manure analysis can vary within a storage without adequate agitation. Note how the waste in the last fifteen loads spread from this storage has two to three times more phosphorus than in the first forty-five loads spread. Given the importance of this information to the intended functioning of the NMP, these procedures should be included in the permit—not merely referenced in the Livestock Manual.



Department Response: The department reviewed manure nutrient testing from other Riverview operated dairies. The location and sampling protocols were determined to be sufficient and representative. Manure nutrient testing and application are part of the permit under required record keeping. Field soil sampling is a backstop to ensure the NMP is being followed.

Comment 40(W) C. The Permit Leaves the Public in the Dark about Likely Impacts. Permits are only as useful as they are enforceable. The requirements and effluent limits purportedly imposed by the proposed Herberg Dairy permit are meaningless unless the public knows (1) what baseline environmental conditions exist before the Dairy begins operations and (2) how those environmental conditions change after the Dairy begins operations. The permit proposed by DEQ to regulate Riverview's Herberg Dairy does not contain adequate provisions to provide the public with either of these crucial pieces of information. As such, the proposed permit is unlawful because it does not comply with the Clean Water Act and does not provide DEQ with the information it needs to ensure Herberg Dairy will not cause or contribute to exceedances of state water quality standards. [132]

Department Response: Ambient surface water quality data is logged and available through the United States Geological Survey (USGS) and the NDDEQ websites. The review of field data before and during operation is required to obtain a permit. The proposed facility is not designed to discharge. The proposed permit is not an NDPDES permit and therefore does not include any effluent limitations. State Animal Feeding Operation Permits, fact sheets,

sampling data, and other records are available upon open records request which can be requested at https://deq.nd.gov/OpenRecords.aspx.

Comment 40(X) *1. Inadequate baseline data*

While the water quality data cited in Section III.B clearly shows the Red River is impaired by the same pollutants that will be generated by Herberg Dairy if DEQ approves Riverview's permit application, DEQ lacks crucial baseline data that would be necessary to detect and monitor any pollution impacts caused by the Dairy. Recent water quality data for reaches of the Red River directly up- and downstream from the proposed Herberg Dairy site are virtually nonexistent.[133] Likewise, DEQ has provided no baseline water quality data for the Elm River, a tributary to the Red River that runs approximately 2.5 miles south of the proposed Dairy.[134] Without recent baseline data measuring existing concentrations of pollutants of concern in these potentially impacted waters, DEQ has no way of knowing whether the Herberg Dairy is contributing to water quality impairments[135] and therefore no way to intervene to protect those waters, as is required by North Dakota and Federal law.

To evaluate the Dairy's effect on surface water pollution on the Red River and potentially impacted tributaries, both at the project site and applied fields, up-to-date baseline measurements of basic chemistries, heavy metals, hormones, pesticides and biologics should be done pre- project, followed by consistent monitoring. Measurements immediately upstream from the bulk of the field applications will assign appropriate contributions by the dairy; monitoring closely downstream close to the project will diminish the effect of dilution on the dairy's contribution to pollution. Baseline studies of biota such as invertebrates and fish should be part of the pre- project evaluation, and regular monitoring must be conducted throughout the life of the Dairy to ensure wildlife is adequately protected.

Department Response: The department manages an ambient water quality network across North Dakota. This project collects samples for general chemistry (e.g. total suspended solids and total dissolved solids), trace elements (e.g. aluminum and Lead), nutrients (e.g. total nitrogen and total phosphorus), and biological (e.g. Escherichia coli or *E. coli*). The department works with the USGS to fulfill the required needs of the department's ambient network, which also samples and manages their own network of ambient data. Between the department and the USGS, significant ambient water quality data is available. This includes station ID 05064500 (Red River of the North at Halstad, MN) with seven hundred twenty-seven (727) sample events since July 8, 1961, station ID 05062130 (Red River of the North near Georgetown, MN) with thirty-nine (39) sample events since October 10/2019, and station ID 05082500 (Red River of the North at Grand Forks, ND) with one thousand two hundred seventy-five (1275) sample events since June 22, 1949. These sites are located both upstream and downstream of the proposed facility. The department also collects fish and macroinvertebrate samples at station ID 05082500 on an annual basis. Additionally, the North Dakota Department of Agriculture conducts annual monitoring in surface waters across the state to assess levels of pesticides and pesticide degradates. Information about the Pesticide Water Quality Program and the annual pesticide monitoring reports can be found at: https://www.ndda.nd.gov/divisions/pesticide-fertilizer-division/pesticide-water-quality-

program https://www.ndda.nd.gov/divisions/pesticide-fertilizer-division/pesticide-water-quality-program. Refer to response to *Comment 40(W)* Field Data.

Comment 40(Y) *Inadequate baseline data Cont.*
DEQ must also ensure adequate baseline soil data prior to allowing land application of CAFO waste on any given field. To calculate the nutrient assimilation capacity of a field, there must be measurement of baseline nutrient concentrations, soil type, and previous nutrient application. Soil tests conducted within the past year appear to be missing for many of the proposed land application fields. [136] [136] [Fields with soil tests that are prior to 2024 include:35 fields with soil tests from fall 2023 (field numbers 7, 8, 16, 17, 29, 31, 70, 74, 76, 77, 78, 80, 81, 85, 86, 87, 90, 91, 92, 137, 138, 139, 140, 143, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, and 159) and 11 fields with soil tests from fall 2022 (field numbers 69, 71, 72, 73, 75, 79, 82, 83, 84, 93, and 95). Soil tests are apparently missing for 5 fields (field numbers 187, 192, 196, 198, and 129).]

Department Response: North Dakota Livestock Program Design Manual 7.3.7 *"Results of field specific soil, plant, water, manure or organic by-product sample analysis. Nutrient planning shall be based on current field specific soil and manure test results and developed in accordance with NDSU Extension Service guidance. Soil and manure tests are considered current if they are no older than three years for livestock facilities that require a Nutrient Management Plan or one year for CAFOs;"*

The department received the application for the Herberg Dairy on September 17, 2024. Department staff confirmed that soil tests from all fields listed in Comment 40(Y) were received and reviewed. Fields with soil tests from 2022 were resampled by the facility. Updated soil sample information is available through an open records request (https://deq.nd.gov/OpenRecords.aspx).

Comment 40(Z) 2. *No monitoring or reporting*
Permits issued pursuant to the Clean Water Act "fundamentally rel[y] on self- monitoring" because "[e]ffective self-monitoring reveals permit violations, thereby promoting enforcement of the [law]." [137] Accordingly, EPA's NPDES permit writers' manual makes clear that "[m]onitoring is performed to determine compliance with effluent limitations established in NPDES permits." [138] Once collected, monitoring data must be reported to the permitting entity, making it publicly available via a records request or government website. [139] Without representative monitoring and reporting requirements, regulators and the public are left in the dark as to whether permitted CAFOs are actually complying with applicable effluent limitations and whether particular CAFOs are causing or contributing to violations of North Dakota's water quality standards. Critically, mere assumptions that implementing technologies and practices will result in permit compliance are impermissible. [140]

In FWW v. EPA, the Ninth Circuit Court of Appeals clarified what constituted adequate monitoring in a CAFO NPDES permit. In that case, the Court held Idaho's NPDES general

permit for CAFOs did not satisfy the Clean Water Act's requirement. In doing so, the Court made the flaws in Idaho's permit plain: (1) "[w]ithout a requirement that CAFOs monitor waste containment structures for underground discharges, there is no way to ensure that production areas comply with the Permit's zero-discharge requirements," and (2) "[t]he Permit has no monitoring provisions for dry weather discharges from land-application areas." [141] The rationale underpinning the Court's holding was simple– "NPDES permits must contain monitoring provisions sufficient to ensure compliance with the terms of a permit." [142] Thus, although the Court's opinion did not explicitly touch on every conceivable production area or land application discharge activity, a NPDES CAFO permit that leaves any effluent limitation unmonitored is unlawful.

Despite the plain requirements of the Clean Water Act outlined above, the proposed Herberg permit does not contain monitoring and reporting conditions sufficient to ensure compliance with or facilitate enforcement of the Permit's production area or land application area effluent limits. First, the permit does not contain any requirements to monitor subsurface discharges from manure lagoons to ensure compliance with the prohibition on discharges from those lagoons. [143] Second, the permit does not contain any assurance that land application activities will be monitored to ensure compliance with the requirement that manure "be applied in a manner so it will not be washed into waters of the state." [144] And finally, the permit does not contain reporting requirements sufficient to facilitate enforcement against Riverview if the Herberg Dairy violates either of these permit conditions.

Department Response: Due to the size of the proposed facility, the department will conduct annual inspections. These facilities are inspected to ensure permit compliance is maintained, i.e., the facility is maintaining livestock numbers in accordance with the permit; the facility is spreading manure in accordance with the NMP; the facility is maintaining its manure management system; the facility is handling its mortality properly; and odor readings, along with observation of nuisances (such as flies), are conducted. As stated in the submitted O&M plan, facility staff will follow an inspection plan which includes daily and weekly time frames. Reports from the facility inspections are available for department review.

Refer to response to *Comment 1(A)* Water Quality and *Comment 40(J)* NPDES Permit.

Comment 40(AA) ***No monitoring or reporting Cont.***
To remedy these deficiencies, the permit must be revised to include monitoring for both production area and land application area discharges. DEQ can remedy the lack of subsurface discharge monitoring for lagoons and other waste storage structures in one of two ways. First, DEQ could require a series of groundwater monitoring wells. Siting one well up-gradient from the production area and other wells down-gradient from the production area allows regulators and the public to compare data and determine whether the production area is contributing to elevated pollutant levels down-gradient. Second, DEQ could require that Riverview to install synthetic liners with leak detection in their lagoons. Either option will allow

the Herberg Dairy operator to make regular informed reports to DEQ about whether it has discharged waste in violation of its permit.

Department Response: Reference response to *Comment 1(A)* Water Quality and *Comment 41(B)* Item 1. Design.

Comment 40(BB) ***No monitoring or reporting Cont.***
With respect to field monitoring, nearly half (over 12,000) of the NMP's available acres are tile drained. Riverview should, at minimum, be required obtain contractual confirmation from those land applying the Dairy's waste that the applicators will comply with the CAFO's NMP and visually inspect tile drains, ditches, and down-gradient field edges immediately after land application. Further, any permit issued to Herberg Dairy should require that Riverview obtain confirmation that manure applicators will report any discharges that result from land applying the Dairy's waste to DEQ so the agency can conduct water quality testing to ensure the CAFO's manure management strategy is not indirectly contributing to degradation of state waters. The Minnesota Pollution Control Agency recently adopted similar requirements in the Minnesota NPDES General Permit for feedlots in that state. [145]

Department Response: Please refer to response to *Comment 8(C)* Nutrient Management Plan and *Comment 40(DD)* Spill Reporting.

Comment 40(CC) ***No monitoring or reporting Cont.***
Because the Herberg Dairy's NMP relies on many acres of land application fields in Minnesota, DEQ should ensure Herberg's permit provides protections that are at least equivalent to those provided by Minnesota's feedlot regulations. Riverview should not be able to evade environmental regulation in either North Dakota or Minnesota by locating its facility in one state and shipping its waste across the border to another.

Department Response: See response to *Comment 18(A)* Cross State Manure Transfer.

Comment 40(DD) ***No monitoring or reporting Cont.***
Finally, the proposed permit lacks any instruction about sampling discharges to waters of the state when they are discovered. The Livestock Manual also lacks instructions about sampling discharges for pollution content or volume of the discharge. Shockingly, the Livestock Manual even states that discharges to state waters can go unreported if the CAFO operator deems—with no training or qualification—that the discharge will not cause harm to human health or the environment. This is a blatant dereliction of DEQ's duties to administer the NPDES program in accordance with the Clean Water Act. Discharging facilities must notify DEQ so the agency— not the regulated CAFO—can determine an appropriate course of action. Without publicly reported monitoring data, North Dakotans are deprived of their right to participate in the enforcement of the Clean Water Act and DEQ is deprived of valuable data that should be used to initiate enforcement and inform future permit conditions. [146] As such, it is critical that DEQ revise the proposed permit to include representative

discharge monitoring, sampling, and reporting provisions sufficient to ensure Herberg Dairy is complying with each of the permit's requirements.

Department Response:

Section 9.4 of the North Dakota Livestock Program Design Manual states:.

9.4. Department Notification of Unplanned Release of Manure

If manure is released where it could directly reach surface or ground water and exceed established action levels, or if the release could endanger human health or the environment, the department shall be notified as soon as possible but within 24 hours. Notification shall be made by calling 701-328-5210 during normal working hours or by calling the Division of Emergency Services at 1-800-773-3259 during non-working hours (including weekends and holidays).

Notification to the department shall include: date, time, location, volume of manure released and actions taken to contain, utilize or properly dispose of the manure. A written report with the above information shall also be submitted to the department within five days of the release, along with a description of the actions taken to prevent a similar release in the future.

An unplanned release of manure may require an assessment to determine if the release could endanger human health or the environment. Contact the department, the local health unit or the county emergency manager for assistance. If the volume of manure released will not directly impact waters of the state and does not pose an immediate danger to human health or the environment, the department does not need to be notified; however, records must be kept of the release.

Should a manure release occur, the department will work with the facility to contain, sample, and properly dispose of the manure. Department sampling protocols for surface water are found in the Quality Assurance Program Plan NDPDES Version 1.2. During annual inspections, records of any manure releases must be available.

Comment 40(EE) V. DEQ Must Require Additional Treatments and Practices to Protect Water Quality.

DEQ should deny Riverview's Herberg Dairy application because a mega-dairy operated by an out-of-state corporation on the edge of the Red River will harm water quality, family farmers, and surrounding communities and ecosystems. However, if DEQ ultimately decides to approve Riverview's Herberg application, the agency must still "require necessary and reasonable treatment of sewage, industrial, or other wastes."[147] If approved as proposed, waste from the Herberg Dairy will pose unacceptable threats to water quality. DEQ could mitigate these threats, at least in part, by adding available, necessary, and reasonable treatment requirements to the final Herberg Dairy permit.

These include:

- *Impose reduced spring application rates.* At present, fields with low or medium phosphorus risk assessments are permitted to apply CAFO waste to fields based on the

nitrogen needs of the crop on the receiving field. Given the elevated likelihood of heavy precipitation events during the spring and water quality problems stemming from phosphorus loading in the Red River watershed, DEQ should limit all fields to the phosphorus-based application rates during springtime.

- *Prohibit land applying waste to frozen, snow covered, and saturated fields, as well as within 24 hours of forecasted rain.* At present, the Livestock Manual allows land application of waste to frozen, snow covered or saturated soils "if there is a likelihood of runoff."[148] However, application of waste to frozen, snow covered, or saturated soils inherently creates a likelihood of runoff. [149] To make this rule less confusing and facilitate enforcement, DEQ should simply prohibit land application of CAFO waste under these soil conditions.
- *Require incorporation of land applied waste within 12 hours of application*. Incorporating land applied CAFO waste shortly after application can significantly reduce runoff losses of soluble phosphorus. [150] Incorporation also reduces ammonia volatilization, protection both air and water quality. [151] To further reduce phosphorus loading to the Red River, DEQ should require Riverview to amend its NMP to require incorporation of land applied waste within 12 hours of application.
- *Require advanced treatment to treat pollutants before land application*. Merely storing CAFO waste in anaerobic lagoons is an outdated treatment technology. More effective options are available and in use at other CAFOs. DEQ should consider modifying the Herberg permit to mandate more advanced treatment, such as the Super Soils treatment. [152]

Department Response: Refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, *Comment 40(A)* Permit Authority, and *Comment 41(B) Item 1.* Design.

Comment 40(FF) VI. Conclusion

For all the reasons stated herein, DEQ should reject Riverview's attempt to site a polluting mega-dairy in North Dakota. Failing that, Commenters request that DEQ correct errors, provide missing information, and impose the additional pollution controls stated herein on Riverview as is necessary to protect North Dakota's waters.

Department Response: Thank you for your comment. Please refer to response to *Comment 40(A)* Permit Authority.

Commenter 41 – David J. Erickson, CPG PE

The document submitted by the Dakota Resource Council has been summarized where appropriate. The introduction is included below, followed by specific comments and their respective department responses.

Overview of Proposed Herberg Dairy and Environmental Concerns

The proposed Herberg Dairy (Dairy) in Section 34, T-145N, R-48W of Traill County North Dakota is a 25,000 head of cattle dairy operation in an area previously used for agricultural crop cultivation. The Dairy plans to apply 232,866,763 gallons of manure waste over 32,448 acres of formerly cropped fields. Simply 7,168 gallons of manure will be applied on every acre of property, every year with no attention to the actual agronomic rates that the land can sustain.

Comment 41(A)

Much has been learned in the last 15 years about the impacts to human health and the environment from CAFO operations across the US. By granting this permit, the state of North Dakota is permitting pollution of thousands of acres around the proposed Herberg Dairy. The permit allows the contamination of the aquifer under and downgradient of the proposed dairy, and permits the contamination of area soil, ground water and surface water bodies with more than 232,866,763 gallons of manure, feces, and wastewater every year. This manure will add 8,648,211 pounds of nitrate and 4,312,239 pounds of phosphorus to the watershed every year. Figure 1 shows areas where manure will be applied in the watershed. Obviously, human health and environmental impacts will occur in this watershed.

Department Response: Refer to response to comments *Comment 1(A) Water Quality* and *Comment 8(C)* Nutrient Management Plan.

Comment 41(B)

After investigating approximately thirty existing CAFOs across the US (Washington, California, Georgia, New York, Wisconsin, and Oregon), several characteristics remain consistent:

1. CAFO lagoons seep and leak contaminants into soil, ground water and surface water.
2. Composting and silage areas produce large quantities of leachate that result in ground water contamination and contaminated runoff.
3. The application of manure is imprecise and poorly planned resulting in ground water and surface water impacts in nearby seeps, wetlands, springs, and lakes.
4. Application fields are not monitored resulting in the accumulation of nutrients and leaching to ground water and surface water, and runoff events that directly contaminate surface water.
5. The 232,866,763 gallons of manure waste managed annually by the Dairy will result in spills on the facility and on nearby roads, will result in rancid manure odors over a large area, and will result in a substantial increase in the number of nuisance flies and insects in the area.
6. While the facility describes measures to “reduce” odor, area residents will be impacted in a very negative manner by the sheer volume of manure, the volume of anaerobic manure sludge in the lagoon, the application of over 233,000,000 gallons of manure waste on nearby fields, and the sheer mass of flies and insects from the manure.
7. “Emergency” applications are commonplace with CAFOs because lagoon capacity does not account for frequent extreme weather events.

Department Response:

Item 1. Riverview ND, LLP has provided design plans and construction specifications that detail how components have been engineered to prevent runoff or seepage from occurring beyond the specifications allowed by regulation.

The design plans, design calculations, and specifications prepared by a registered professional engineer conform to the guidelines set forth by the American Society for Testing and Materials (ASTM). ASTM standards are developed by committees of relevant industry professionals who meet regularly in an open and transparent process to deliver standards, test methods, specifications, guides, and practices. According to the North Dakota Livestock Program Design Manual, Section 5.3 Earthen Storage Ponds, as required by NDAC 33.1-16-03.1-08, the ASTM is an accepted source of standards regarding earthen structures. Section 5.3.4 Constructed Clay Liners provides the details used in constructing a pond using clay. Required conditions for constructed clay liners use test method ASTM D-2487. Once the clay pond is constructed section 5.3.5 provides the requirements for testing the clay liner by ASTM methods. Department staff will be present during concrete and pond liner testing to verify proper methodology.

Item 2. Facility stormwater has been designed to be contained in constructed ponds at multiple locations for the proposed facility. Stacking areas shall be constructed to prevent runoff or contact stormwater from entering surface waters or from leaching into ground water.

Item 3. Please refer to response to *Comment 40(Z)* Inspection, *Comment 8(C)* Nutrient Management Plan, and *Comment 41(B)* Item 1. Design.

Item 4. Please refer to response to *Comment 40(Z)* Inspection, *Comment 8(C)* Nutrient Management Plan, and *Comment 41(B)* Item 1. Design.

Item 5. NDAC 33.1-15-16-02(2) makes it unlawful to “discharge into the ambient air any objectionable odorous air contaminant that causes odors that measure seven odor concentration units or higher” as measured at a prescribed location. However, “[a] person is exempt from this section while spreading or applying animal manure or other recycled agricultural material to land in accordance with a nutrient management plan approved by the department.” NDAC 33.1-15-16-02(3). If odors in violation of the standards prescribed in this rule are found, an enforcement action can be taken to address those odors. The proposed facility has designed all manure ponds and the silage leachate pond to have synthetic covers. which reduces vector concerns. The facility’s operation and maintenance plan shall include an emergency action for spills, discharges or failure of a collection, storage, treatment, or transfer component and defined in NDAC 33.1-16-03.1-03(21).

Item 6. The facility design places floating synthetic liners on all five wastewater ponds along with impervious concrete pads for easy clean-up which will reduce vector issues. Please refer to response to *Comment 8(C)* Nutrient Management Plan, Comment 40(F) Health Impacts, and *Comment 41(B)* Item 5. Odor

Item 7. Please refer to response to *Comment 1(A)* Water Quality, *Comment 40(Z)* Inspection and *Comment 41(B)* Item 1. Design.

Comment 41(C)

I have investigated at least 30 CAFOs in the last 10 years and all facilities have had active releases of manure that impacted human health or the environment. These investigations included over one hundred lagoons, thousands of application fields, many compost, silage and feed storage areas, and have included leaking underground piping, and overapplication and catastrophic leaks and releases. Since these facilities have no independent inspectors and only rely on self-reporting, many of the activities go unregulated and unreported.



Figure 1. Herberg Dairy Manure Application Area.

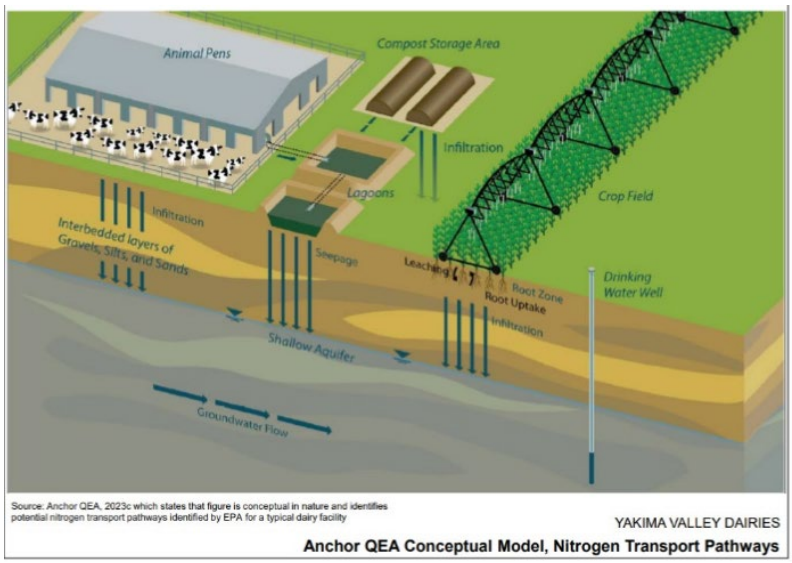


Figure 2. Conceptual Dairy Contamination Model

The Region 10 EPA has accepted a conceptual model for dairy operations that describes contaminant sources from day-to-day operation of a dairy CAFO. The EPA has been studying the Dairy contamination issues in Yakima, Washington for 12 years and has sampled and documented these contaminant transport pathways (Lower Yakima Valley Groundwater | US EPA). Currently the US Department of Justice is intervening because the Yakima Dairy Owners missed most of the Administrative Order deadlines and have not complied with many of the requirements; therefore, contamination from the dairies continues to impact the drinking water aquifer and nearby residents. Data on the website shows large areas of contaminated drinking water aquifer directly impacting area residents.

As shown below in a graphical representation of the conceptual model, seepage and release of contamination is possible from all aspects of the operation, mainly because of the large volume of waste generated from feces, urine, waste milk, animal mortalities and storm water runoff. All these waste sources seep to ground water then move downgradient to the nearest receptor or runoff into surface water in the watershed. Those receptors are either domestic water supply wells or surface water bodies. In Yakima, these specific dairies have contaminated over 7 square miles (4600+ acres) of the aquifer and contaminated more than 300 residential wells.

Even locations with low permeable (clayey) soil cause impacts to both ground water and surface water, especially when applied according to the proposed Nutrient Management Plan. Application before a precipitation event or late season applications cause direct runoff of manure to surface water. Seepage into ground water results in long-term discharge of nutrients to surface water. Over application or imprecise applications result in both ground water and surface water contamination.

Department Response: The geology in the Lower Yakima Valley consists of Ellensburg Formation and Columbia River Basalt Group covered by surficial alluvial deposits.

The Ellensburg Formation undifferentiated consists of pebble conglomerate, sand, and mud flows. The upper part of the formation is basaltic and with coarse brown sand, and andesitic with beds of fine ash.

The Columbia River Basalt Group is the youngest, smallest and one of the best-preserved continental flood basalt provinces. Flood basalts are the result of a giant volcanic eruption or series of eruptions that covers large stretches of land with basalt lava. The area was covered with numerous lava flows. The lava flows originated to the southeast of the area and flowed northwest. The area is in an active tectonic uplifting as it is in an active area of tectonic plates and volcanic activity. The area had glacial catastrophic flooding activity which occur in the valley area. The catastrophic flooding left behind soils that consist of gravelly clay loam, fine sandy loams, gravelly silt loam, stratified fine sandy loam to silt loam, stratified loamy fine sand to silt loam, and gravelly very fine sandy loams.

The Lower Yakima geological area is permeable to water movement. The Red River Valley geology restricts water movement to groundwater due to the silts and clays greatly reducing permeability in the area.

Please refer to response to *Comment 1(A)* Water Quality, *Comment 40(F)* Nitrates, *Comment 40(Z)* Inspection, *Comment 8(C)* Nutrient Management Plan, and *Comment 41(B)* Item 1. Design.

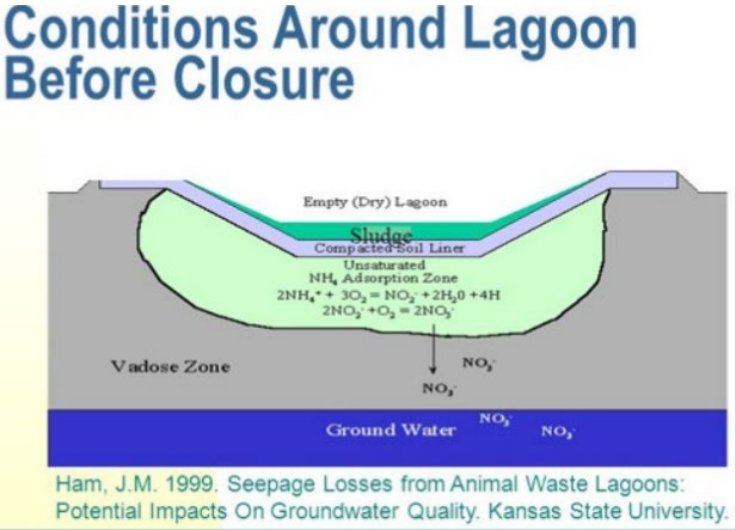
Comment 41(D)
Dairies have specific contaminants with unique and problematic fate and transport characteristics. While most of the lagoon's contaminant seepage occurs in the ammonium form (NH_4), through oxidation and microbes it quickly converts to nitrate (NO_3). These compounds have vastly different sorption characteristics. While ammonium sorbs strongly to soil, nitrate moves quickly in soil moisture and ground water with no adsorption. Simply, large ground water plumes above human health standard form quickly and migrate rapidly in the drinking water aquifer. The ammonium acts as a continual source as it nitrifies into nitrate in the soil.

Department Response: Please refer to response to *Comment 1(A)* Water Quality, *Comment 40(F)* Nitrates, and *Comment 41(C)* Yakima Valley.

Comment 41(E) Lagoons
The proposed lagoons at the Herberg Dairy are 17 to 22 feet deep and constructed according to the North Dakota Livestock Program Design Manual (NDLPDM) with an allowable seepage rate of 1/16 inch per day. If the lagoon is constructed as designed, the lagoon conservatively leaks 1/16 inch per day, which is equal to 22 inches per year or approximately equal to a permeability of 1.84 X 10-6 cm/sec. At 17 to 22 feet deep, the bottom of the lagoon is most likely in contact with ground water; however, the borings completed as part of the design of the facility failed to monitor ground water depth; clearly a

violation of design criteria. Of more concern, the twenty-two inches of seepage per year (equivalent to 42,593,017 gallons per year) will seep from the lagoons and contaminate the water table, assuming the lagoon meets the verbal construction standard in the permit with no construction oversight or regulatory inspections.

CAFO lagoons have been studied for years; however, many studies failed to look at the complete picture. The figure below shows an early study where Dr. Ham did not find a specific leak but concluded that the resulting large nitrate ground water plume was from lagoon seepage.



I have personally studied thousands of lagoons and, simply, earthen lagoons leak and seep. Most of my career since 1988 has been spent remediating seepage from lagoons and this facility, as proposed, will definitely result in contamination of the aquifer and surface water. At the Herberg site, the ground water contamination will eventually seep into surface water causing long-term chronic impacts to surface water quality.

My direct experience with earthen lagoons starting in 1988 provides me with the knowledge that construction of a lagoon with a permeability less than 1.8 X10-6 cm/sec requires strict construction quality control and quality assurance and an experienced liner contractor. Dairy contractors are usually focused on agricultural construction and do not specialize in lagoon construction.

Even at the unrealistic seepage rates proposed in the permit (0.0015 to 0.002 inches per day), these two lagoons will leak an average of 43,000,000 gallons per year of high strength wastewater into the aquifer, by design.

Even though this is a clear violation of the Clean Water Act, the State of North Dakota is allowing this contamination to occur, even approving of this release of contaminants (see lagoon seepage estimates in permit application).

Department Response: The department requires the use of laboratory calculated permeability results when determining lagoon suitability. The average overall hydraulic conductivity across the site was 1.55E-08 cm/s. When using Darcy's Law to estimate seepage on a gallons per acre per year basis, the result was 681,238 gallons/acre/year over the five ponds. This seepage is predicted to be further reduced by at least half an order of magnitude by the effects of manure sealing (NRCS D210–VI–AWMFH, Amend. 31, August 2009, Appendix 10D), which calculates to about 215,426 gallons/acre/year. Calculations and equations used are shown below.

Table 1 Estimated Seepage Rates

Pond	Hydraulic Conductivity K (cm/sec)	Hydraulic Gradient (unitless)	Flow Rate (gal/ac/day)	Seepage Velocity (in/day)	Initial Seepage (gal/year)
1 (12.69 ac)	1.84E-08	10.8	2,317	0.006718	10,733,997
2 (12.69 ac)	1.17E-08	10.8	1,471	0.004260	6,814,093
3 (12.71 ac)	1.32E-08	10.8	1,664	0.004825	7,722,248
4 (12.71 ac)	1.66E-08	10.8	2,100	0.006056	9,745,579
5 (11.71 ac)	1.83E-08	8.3	1,773	0.005123	7,577,099
62.52 ac total	1.55E-08			Total	42,593,017
Seepage after manure sealing: 13,469,095 gallons/year					

Eq. 1 Darcy's Law $Q = k \cdot \mathrm{i} \cdot A$

Where:
Q = Flow rate in Gallons/Acre/Day
i = Hydraulic Gradient (h+D)/D
A = Area in sq ft.

Eq. 2 Seepage Equation $\mathrm{V} = \frac{K(h+D)}{D} = K \cdot \mathrm{i}$

Where:
V = Seepage in (in/day) (note: state limit 1/16 in/day)
K = Hydraulic Conductivity of liner material (cm/sec)
D = Thickness of liner (ft)
h = head or depth of liquid (ft)

Concerning the distance between a water table and the finished bottom of the pond, a geotechnical report containing details of soil borings was submitted in the application. This report did not encounter a water table. The site overlies 31-36 feet of lean and heavy clays, preventing the formation of a water table. Section 5.3.1 of the North Dakota Livestock Program Design Manual requires a minimum of 2 feet separation between the finished bottom of the earthen storage pond and the seasonal high-water table, which is met by the submitted design.

The manure and wastewater storage ponds are required to have moisture and density testing done during construction to ensure the construction specifications are achieved. This is shown in the North Dakota Livestock Program Design Manual under section 5.3.5 Testing of Constructed Clay Liners. Department Staff engineers will visit the site and inspect during construction.

Please refer to response to *Comment 1(A)* Water Quality and *Comment 41(B)* Item 1. Design.

Comment 41(F)

Dairy wastewater is extremely high in nutrients and bacteria (see Table 1) but also contains antibiotics and hormones from treating the cows and pesticides and herbicides from the feed. Table 2 contains a list of various compounds detected in ground water near the dairies in Yakima Washington. These compounds were detected in the drinking water aquifer used by area residents. Similar constituents can be expected at the Herberg Dairy.

Table 1. Contaminant Concentrations in CAFO Wastewater

pH	TDS	Chloride	Ammonia	TKN	Phosphorus	Calcium	Potassium
s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
7.6	3100	230	330	1600	358	122	80

TKN = Total Kjeldahl Nitrogen

Table 2. Contaminants Found in CAFO Lagoons and Drinking Water Wells, Yakima Washington

Nutrients & Minerals	Antibiotics
Nitrate Nitrite Ammonia TKN Chloride	Tylosin Enthromycin Lincomycin Sulfamethazine Tiamulin Virginiamycin Monensin Chlortetracycline Tetracycline
Hormones	Pesticides & Herbicides
Estradiol Androsterone Testosterone 7-a-estradiol Androstadienedione 17- β-trenbolone Epitestosterone	Atrazine Alachlor DEHP DEET Bentazon

Department Response: The department monitors surficial aquifers throughout the State that have an elevated risk of contamination. The department's 2021 Agricultural Chemical Detections Summary Report shows 129 total wells were sampled across 15 aquifers. Pesticides were detected in 8 of 129 wells sampled, with one well having two different pesticide analytes detected. All detected pesticide detections were below the Prevention Action Levels established for specific pesticides. Consequently, the regulatory portion of the Pesticide State Management Plan was not engaged. The nitrate Maximum Contaminant Level was not exceeded in any of the 129 wells sampled.

Please refer to response to comments *Comment 1(A)* Water Quality, *Comment 40(F)* Human Health, *Comment 40(X)* Ambient Monitoring, and *Comment 41(C)* Yakima Valley.

Comment 41(G)

Application Fields

Application of manure waste to crop fields is much more difficult than depicted in the permit and requires more monitoring to apply correctly. “Agronomic Rates” refers to application of the amount of nutrients that the crop will use for maximum growth for one crop. Unfortunately, overapplication and leaching commonly occurs for the following reasons:

1. The dairies’ application method is imprecise.
2. The lagoon sample is often collected without agitation, so the result is a minimum nutrient measurement while the application is at a much higher nutrient content.
3. The excess nutrient applied to the crop seeps below the root zone with precipitation and is lost to ground water.
4. Phosphorous is always overapplied due to ammonium off gassing and the resulting nitrogen loss in the anerobic lagoon process.
5. Storm water transports nitrogen, phosphorous and bacteria to the nearest surface water
6. Sixty-seven of the fields have drain tile installed. Drain tile is used to drain high ground water from the field into nearby surface water. These structures are a direct conduit for waste applications to enter surface water.

In addition, the odor from the application process is overwhelming and rancid for days after the application regardless of the application method. Nearby residents will have to contend with rancid odors, spills, and releases on the roadways from hauling, additional manure truck traffic and routine misapplication by farm personnel.

The permit does refer to Fall applications. Unfortunately, when there is no crop growth in the Fall, thus there is also no plant uptake of nutrients. Fall applications are one of the leading causes of ground water contamination since the nutrients have all winter to migrate through the soil to ground water with no mechanism to remove the nutrient from the soil. Since these nutrients sit at the soil surface, these late season applications are also the leading cause of surface water contamination. Late season rain and snow runoff transports these contaminants to surface water with little attenuation.

At other facilities where the activities described in the permit have resulted in ground water contamination and in the states where they recognize the impacts of CAFO operation, soil sampling at 1’, 2’ and 3’ is required prior to each application. A complete nutrient budget is required to prevent leaching contaminants. Also, soil moisture probes are placed in the field to monitor precipitation events and soil wetting fronts that move the nitrate to ground water. The contaminants will migrate in the ground water and seep into surface water.

Department Response: The proposed NMP utilizes best management practices such as set-back distances and injection of liquid manure which can greatly reduce the risk of nutrient runoff. Winters have a freeze-thaw cycle, in which the frozen depth can reach below 5 feet in

the Red River Valley. This freezing process can hold nutrients from moving until a thaw cycle takes place.

Please refer to response to *Comment 3(A)* Air Quality, *Comment 8(C)* Nutrient Management Plan and *Comment 16(A)* Agricultural Stormwater Discharge, *Comment 40(Z)* Inspection, and *Comment 40(F)* Human Health.

Comment 41(H)
This permit has no provisions for any meaningful monitoring. Year after year of application at agronomic rates with no monitoring is proven to build up nutrients throughout the soil column resulting in tons of nitrate moving through the soil column down to ground water and long-term contamination of the water table aquifer.

Continued applications at these rates also result in phosphorous accumulation in the topsoil, which leads directly to runoff of phosphorous laden sediments into surface water.

The application methods proposed by the dairy are both imprecise and lack the required monitoring to control runoff or infiltration.

Department Response: Please refer to response to *Comment 1(A)* Water Quality, *Comment 40(Z)* Inspection, *Comment 8(C)* Nutrient Management Plan, and *Comment 41(B)* Item 1. Design.

Comment 41(I)
Detailed cross sections from a dairy in Wisconsin are included in Attachment A. This dairy had a concrete lined lagoon, concrete lined feed storage area and the correct acreage for application. By adding nutrients at the calculated crop uptake every year, ground water contamination from the fields was evident in the monitoring wells. In addition, algal blooms in Pentenwell Lake coincide with the dairy operation. As is shown in the cross sections, nitrate contamination seeps to ground water from application fields and from the lagoons, travels along the ground water flow path and enters the lake. This is a direct example of impacts from the dairy operation contaminating downgradient receptors such as residential wells and surface water. While less permeable soils result in slower contaminant transport, the end results are exactly the same, contamination of ground water and surface water.

In many areas of the country, where dairies have operated in the exact manner proposed at Herberg, drinking water is contaminated above drinking water standards and the remedy is now both difficult, time consuming and extremely expensive. This permit application is leading directly to that scenario in Herberg.

Department Response: The department agrees that water, nutrients, etc. can move freely vertically and horizontally in this region of Wisconsin as the subsurface is sand and gravel which is very permeable. However, the geology in the region of the Red River Valley where

the dairy is proposed restricts water movement to groundwater due to the silts and clays, greatly reducing permeability in the area.

Please refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, *Comment 40(Z)* Inspection, *Comment 41(B)* Item 1. Design, and *Comment 41(C)* Yakima Valley.

Comment 41(J)
This permit should require a detailed nutrient management plan with field instruments to monitor leaching of nutrients, detailed calculation of the preapplication nutrient concentrations and post crop sampling to track the performance of the plan. Applications at crop requirement concentrations year after year without sampling and accounting for the existing nutrients causes excess leaching of nutrients to ground water and widespread contamination of the aquifer.

Department Response: Please refer to *Comment 40(Z)* Inspection and *Comment 8(C)* Nutrient Management Plan.

Comment 41(K) *Ground Water*
Based on studies of dairy operations across the country and direct experience investigating and characterizing the contamination from these operations, current construction standards and the regulations in the State of North Dakota are not strict enough to prevent the facility from contaminating ground water.

The lagoons are allowed to seep and, given the depth (head pressure) of this lagoon, there will be significant discharge of high strength animal waste to the drinking water aquifer. The current standard for waste lagoons near a drinking water aquifer is a double synthetic liner with leak detection. Earthen liners are both allowed to seep and designed to seep and are not protective of human health or the environment.

Department Response: Refer to response to *Comment 1(A)* Water Quality, *Comment 41(E)* Seepage, and *Comment 41(B)* Item 1. Design.

Comment 41(L)
In addition to the lagoons, the application fields are a major source of ground water contamination. The nutrient management plan does not account for existing nutrients in the field but allows for full strength applications every year. It also does not account for the build up and conversion of organic nitrogen to nitrate. The repeated application of manure waste results in high organic nitrogen transformation to nitrate every year and is not accounted for in the nutrient budget.

Fall applications are also a major source of contamination, since no plant uptake occurs between fall and spring, but winter precipitation continues to flush nutrients into ground

water. This is a major source of impacts to ground water and has been deemed to be waste disposal by a Federal Court in Washington State.

Lagoon seepage and application fields are identified as a major source of groundwater contamination. This permit does not adopt policies to eliminate those sources. As a result, if the Herberg Dairy is allowed to operate, extensive ground water contamination will cause residential wells to become contaminated and surface water to be degraded in a large area.

Department Response: Refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, *Comment 16(A)* Agricultural Stormwater Discharge, and *Comment 41(E)* Seepage.

Comment 41(M) *Surface Water*
Dairy contamination of surface water occurs in several ways:
1. Storm water runoff from the facility enters surface water.
2. Overspray or overapplication on the fields.
3. Stormwater runoff from precipitation events transports manure waste to surface water.
4. Seepage and infiltration of nutrients to ground water is transported to surface water.
5. Seepage into field drains is transmitted directly to surface water with little attenuation.
6. Flood events mobilize contaminants from the field into surface water bodies.

All six transport mechanisms result in degradation of surface water quality with contaminants listed in Table 1 and 2. The manure waste and nutrients cause long-term impacts such as algal blooms and remobilization of nutrients each time a runoff event results in turbid conditions.

Several types of bacteria are also readily transported through runoff events including E-coli. These bacteria can cause acute effects in humans and other animals that are in contact with the surface water.

Department Response: Refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, *Comment 40(F)* Health Impacts, and *Comment 41(E)* Seepage, *Comment 16(A)* Agricultural Discharge.

Comment 41(N) *Summary*
The current permit application for the Herberg Dairy fails to protect North Dakota's surface water and ground water due to insufficient requirements for manure application volumes, locations, timing, and methods. This facility directly threatens the Red River, and Elm Creek. Through the North Dakota Century Code 61-28-04 and Administrative Code Chapter 33.1-16-02-1. The overall goal of these regulations is to maintain surface water quality for "beneficial uses and prevent degradation of quality of the waters of the State."

If permitted according to the submittals, this site will result in violations of the Clean Water Act with contamination of both surface water and ground water in the watershed. These

impacts will continue for many decades and will be exceedingly difficult to remediate once they occur.

The operation of the dairy in the manner proposed has been documented to cause degradation of both surface water and ground water at many facilities across the US.

To be specific, the application fields noted in the plan border the Elm River and the Red River. Acute and immediate impacts to water quality will result from application of manure in the volume and locations described in the permit.

Given changing weather patterns, these nearby fields will discharge soil and manure to the area surface water both because of runoff and flooding of the fields.

Even if the 232,866,763 gallons of waste were applied perfectly, the application rate is based on the faulty assumption that all nutrients are used by the crop every crop year. A substantial portion of these nutrients will seep into the ground, enter ground water, contaminate the aquifer, and eventually discharge to surface water. This problem creates long-term contamination issues and chronic impacts to surface water resources.

The addition of this proposed dairy to the watershed will negatively impact the area and community both immediately and impacts will continue to increase over time.

1. The addition of traffic, manure odors and flies will be immediate.
2. The impact on surface water will increase over time. If the State had required a reasonable surface water and ground water monitoring system, which is absent from the application requirements, the impacts could be tracked, documented, and immediately stopped as impacts are detected.
3. Ground water contamination will first be noticed in taste and odor from residential wells, then sampling will reveal ground water is unsafe for consumption because of dairy related contamination.

These impacts are not imaginary or undocumented. They are actively present in Yakima Washington, Whatcom County, Washington, Wisconsin, California, and Hawaii and documented by environmental investigations completed at CAFO operations.

Department Response: Refer to response to *Comment 1(A)* Water Quality, *Comment 8(C)* Nutrient Management Plan, *Comment 40(F)* Health Impacts, *Comment 40(X)* Ambient Monitoring, *Comment 41(C)* Yakima Valley, and *Comment 41(E)* Seepage, *Comment 3(A)* Air Quality. Traffic is beyond the scope of the proposed permit and outside the department's authority.

Commenter 42 – Caroline D'Huyvetter, Nutrient Management TSP #18-22299

Comment 42(A)

After review of the Nutrient Management Plan written for Herberg Dairy, several items were found lacking. The current plan that was reviewed, submission date February 21, 2025, contains the following errors and omissions as required under North Dakota Administrative Code –Chapter 33.1-16-01, Chapter 33.1-16-03.1 as well as the North Dakota Livestock Program Design Manual – Section 7.

Missing Items from North Dakota Livestock Program Design Manual Section 7.3
Item 4: "Fields where manure will be applied during frozen conditions shall be identified;"

- Although manure is not planned to be applied on frozen soil, fields should be identified in case of an emergency.

Department Response:

Item 4: Herberg dairy is not permitted to apply on frozen ground. If an emergency was to occur, the department would review the field location and condition at that time.

Comment 42(B)

Item 5: "Current and/or planned plant production sequence or crop rotation. Also include alternative crops that may be planted;"

- Throughout the plan three different crop rotations are shown, a corn grain-soybean rotation, a corn silage-soybean-alfalfa-sugar beet-wheat rotation, and a corn silage-wheat-oats-alfalfa rotation. These varying rotations have different nutrient requirements and it should be made clear which is the planned rotation going forward.

Department Response: The submitted NMP consists of a grain corn-soybean rotation. Alternative crops were identified as follows: sugar beets, silage corn, wheat, oats, and alfalfa. The NMP is a living document allowing for changes in crop rotation due to changes in market.

Comment 42(C)

Item 6: "Complete nutrient budget for nitrogen and phosphorous for the rotation or crop sequence that considers all potential sources of these nutrients;"

- There was no attempt to make a complete nutrient budget for an entire rotation to ensure that the land base available to the CAFO can utilize all the nutrients produced. There was no mention of second year nitrogen manure credits, legume nitrogen credits, or purchased commercial fertilizer.
- An attempt was made on page 218 to quantify a single year of nutrient requirements, but nitrogen needs for sugar beets was grossly overestimated according to NDSU Extension publication SF882: North Dakota Fertilizer Recommendation Tables (Revised October 2023). Also on page 218 there's no reference to what publication they used to make the nutrient removal estimations. In a previous submission, they did make reference to an outdated NDSU publication, which has been retired.

Department Response: A complete nutrient budget using the corn-soybean rotation is on pages 211-217 of the addendum submitted May 21, 2025. The NMP utilized NRCS SD CPA-63 (2017), a tool used for manure application[4]. Second year nitrogen manure credits and legume nitrogen credits are built into this tool.

Crop distribution was reviewed by the department on an annual basis. This decision was made based on the large NMP with many different producers following their own crop rotations. It is outside the scope of the permit to require these producers to follow the same crop rotation. An agronomist from Riverview ND, LLP identified what percentage of fields would be planted for each crop (silage corn, soybeans, etc.) each year. This percentage was used by the department to cross-check provided nutrient uptake estimations.

The nutrient requirement estimation on page 218 utilized NDSU Extension publication SF882 (2010), including the 208 lbs N/ acre uptake rate for soybeans. The department recognizes that this document version has been retired. The department has updated its internal NMP review tools to use the current 2023 version of SF882 in response to this comment. The nutrient balance was reevaluated. This includes a recommended nutrient uptake of 100 to 130 lbs N/acre for sugar beets. SF882 states,

"Fertilizer application and soil management in general should also be guided by common sense and individual grower history of crop nutrient use and resulting successful crop production. These table values are not intended to be used as a basis for law and regulation."

Annual inspections by department staff and review of field soil tests and manure application records provide feedback to ensure manure is applied in accordance with the NMP.

The department's reevaluated NMP review came to the same conclusion as previously determined; there are sufficient acres present in the NMP so that all nutrients will be accounted for.

Comment 42(D)

Item 8: "Quantify all nitrogen and phosphorus sources;"
There was no mention of second year nitrogen manure credits, legume nitrogen credits, or purchased commercial fertilizer.

Department Response: Please refer to response to Comment 42(C).

Comment 42(E)

[4] https://efotg.sc.egov.usda.gov/api/CPSFile/46734/___

Item 9: “Recommended nitrogen and phosphorous rates, timing, method of application and incorporation;”

- The plan made no mention of planned rates, timing, method of application, or incorporation (Reference: Pages 211-217).

Department Response: The NMP identified injection and broadcasting with incorporation within 1-5 days as the method of application for liquid and solid manure respectively on page 242 of the initial submission. Application timing is from spring to fall depending on weather and the crop being planted that year. Pages 211-217 of the May 21, 2025 addendum show a planned application rate for N, P_2O_5, and K_2O for each field. This rate is only for the corn-soybean crop rotation. The department will use recommended application rates for the alternative crops from SF882 (2023).

Comment 42(F)

Item 10: “The form of manure (liquid or solid) and the expected frequency of land application. Maximum application rates of manure, litter, and process wastewater for each year, for each crop identified in the NMP with rates expressed in chemical form and pounds per acre for each field used for land application.”

- The plan made no mention of planned rates, timing, method of application, or incorporation

Department Response: Reference response to *Comment 42(A) Item 9*.

Comment 42(G)

Item 13: “A field-specific assessment of the potential for nitrogen and phosphorous transport from the field to surface waters.”

- Erosion calculations were made with the corn grain-soybean rotation, calculations should be made using the planned rotation.
- Additionally, there were also no wind erosion calculations provided. The area proposed for this CAFO is prone to very high wind erosion as seen in this publication from the University of Minnesota Extension (https://extension.umn.edu/soil-management-and-health/reduce-wind-erosion-long-term-profitability).

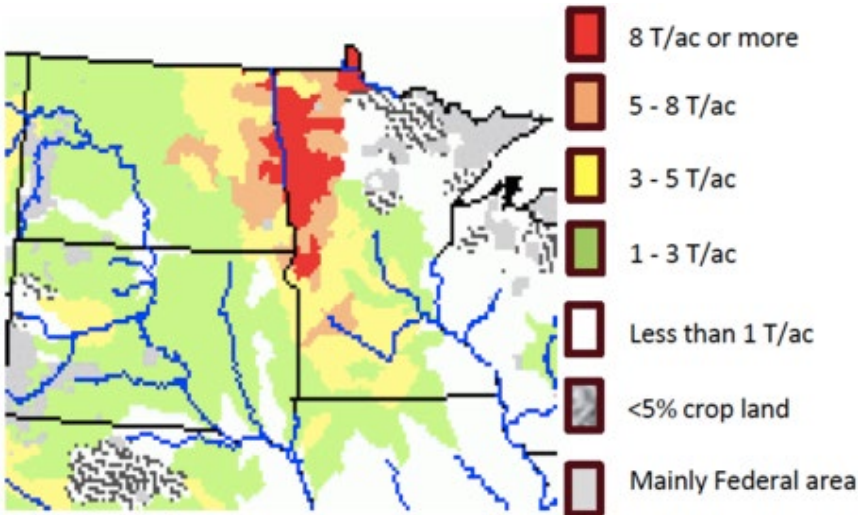


Figure 4: Average annual soil erosion by wind for cropland in Minnesota and North and South Dakota.

Department Response: All fields were reviewed for erosion and nutrient transport through the use of Natural Resource Conservation Services RUSLE2 Profile Erosion Calculation spreadsheet. The department concurred with the Dakota Resource Council's concerns about other crops in the rotation and requested updated RUSLE2 results and updated Phosphorus Index reviews for the crop rotation of corn grain-soybeans and the alternative crops of spring wheat, sugar beet, and alfalfa. The department reviewed the RUSLE2 and Phosphorus Index updates and determined that the nutrient management plan met all requirements.

NDAC 33.1-16-03.1 and the North Dakota Livestock Program Design Manual do not lay out requirements regarding wind erosion. This is beyond the scope of the proposed permit and outside the department's authority.

Public Comments

Public Notice Comments List

Submission Reference Number: 43TE-YPPQ-KXXW

Public Notice Type: Public Notice - Draft Permit

Public Notice Duration: 04/18/2025 **to** 06/02/2025

Public Notice Created By: Strommen, Rachel A.

Number of Public Comments Received: 27

Comment Date	Commenter Name	Comments	Has attachments?
04/21/2025	Alec Janson	Who asked for this, besides the company? Who wants a gigantic amount of water stripped from the people of the Red River Valley to supply cows owned by interests with questionable motives? Why on earth should we permit this before the smaller (and still controversial) dairy starts operation? And why should we permit this before the company has an actual plan in place? There's no logical approach here, only unfettered greed.	No
04/21/2025	Jason Lorsung	I, and I'm sure many downstream from this proposed dairy, would appreciate if operations were located further away from what is a fairly large freshwater resource. At a minimum, requiring isolation of the manure ponds from the 100-year flood plain would go a long way in inspiring public confidence in projects like this.	No
04/22/2025	Joe Shmo	Fargo already smells like shit with West Fargo's waste facility being within the city and NDSU's cow shit. Do we really need to catch the shit smell from a strong Southwind? Furthermore, there's so much wind around here. Why aren't we building wind farms. Also, West Fargo	No

		could transition their garbage dump into biomass energy and fuel the entire damn area without relying on xcel. Why aren't these things around here? It's the 21st century FFS!	
04/23/2025	Lady lives in Fargo	Is against the dairy farms in Traill and Richland. Should not be built by Fargo or anywhere in North Dakota. Will impact air and water quality. Entered by Brady Espe	No
04/23/2025	Mark Rohrer	I am against this new business moving in because of the threat to the water supply and because of the damage to our pristine environment in North Dakota. The incredibly large volume of that much livestock will have a devastating impact on the area.	No
04/23/2025	Sharon Geyer	Blizzards are frequent occurrences in ND causing the deaths of many cattle. If ten percent of the proposed 25,000 dairy herd die, what is the plan for disposing of 2,500 carcasses?	No
04/23/2025	Jeff Skalicky	Absolutely not!! CAFOs are a disaster for the community and the environment. Do your research. If you wanna poison water, land and the air, have at it. Just ask Iowa. Feedlots are number 1 in methane destroying our planet. Wake up! Quit putting money in front of our children's future.	No
04/28/2025	Vanita Vik-Ohlgren	I've paid a lot of attention to factory farming in other states, most notably Iowa and the issues the state has had with negative impacts to rural residents and how much money the state has had to spend to ensure their citizens have drinkable water. The hog industry has ruined many parts of Iowa, and it is a problem for Minnesota, as well. It will be no different with the very large dairies in Traill and Richland counties. I have many concerns. The first is the astronomical amounts of water needed; 20-30 gallons per cow per day. We have been blessed with many wet years in North Dakota, but it hasn't always been that way. In Fargo, the river stopped flowing for 823 days in 1932. It could happen again. It appears we are moving out of a wet cycle into a dry one. All these large livestock operations will likely be in the eastern part of the state, close to the interstate exchanges, and ironically where our population is most dense, and water requirements are high. My second concern is waste. The amount of manure projected to be produced	No

		daily is staggering. With homes and the Red River within 2 miles, this is even more concerning. If the manure is applied to fields with drainage tile, then what happens? Besides water concerns, air quality will be an issue as waste produces dangerous gases when it is aggregated. Review what happened in adjacent states and the impacts and expenses the citizen taxpayers deal with as a result. If this permit is approved, expect court challenges, which is another concern. This is not "pro North Dakota". It will simply enable industry giants to pollute our air and water, which we all depend on. Note who the proponents are; they are not ordinary citizens...they represent powerful interests. Put the citizens of North Dakota first and vote "No" on this dangerous and reckless permit. Thank you.	
05/05/2025	Ryan Bryl	Hello, My name is Ryan Bryl and my family and I live about a mile south of the proposed site in Elm River 8. I write this letter today over concern I have with the decrepit Nelson Drain and its inability to perform in times of high water. It has always been an issue for us with the amount of Elm River water it diverts east only to spill out and cause all sorts of overland flooding issues that puts more pressure on my dikes. So now my concern is not only the quantity of water but also the quality. I can only use my common sense and the precedent already set forth by the State by not allowing the acres in the 100yr flood plain to not be considered for manure operations. So, Is this out of an abundance of caution to appease the masses or is there really a water quality issue when manure-treated fields are subject to moving water? I don't have a concern over the actual location of the Dairy itself but the 9 sections of land that I have circled on the map. I think those sections should be placed as contingent upon a yes vote of a newly reconstructed Nelson Drain when they are considered for manure operations in the permitting process for Riverview. And should then be placed as contingent upon the completion of a reconstructed Nelson Drain in order for manure operations to be performed. If it all goes to plan, this could be on a timeline that works for both Riverview, Traill County Waterboard, and the Landowners. This is a very progressive project and will be one of the largest dairy operations in the country. It	DEQ1.pdf DEQ2.pdf

		would be a shame to have something as dilapidated as the Nelson Drain pushing diverted Elm River water all over these manure-treated acres. Ask yourself this, do you think you would issue a manure permit for the water retention acres that is used for the F-M Diversion? My guess is you would get a few raised eyebrows. We need to make sure we are putting our best foot forward on this one, we are setting another precedent today for future CAFO considerations. Lets make it the right one!	
05/09/2025	Elizabeth Hams	My primary concerns relate to water consumption and pollution. I believe that a more detailed and comprehensive groundwater analysis (including flow and use) should be conducted and the results made public.	No
05/09/2025	Kathy Duttenhefner Parks & Recreation		NDDEQ_NDPDES_NDFAo0908_Herberg_Dairy_Traill_KD_Responce_Letter_DL6.2.2025.pdf
05/12/2025	Tony Zach	Hi Cameron, Thanks for taking the time to chat with me last week about the Herberg Dairy draft permit. Attached to this email are my comments/suggestions – don't hesitate to reach out to me if you have any questions or if you have better ideas to show all info. Thanks!	HED - Draft Permit Comments.pdf HED-Draft Permit Redlines-050525.pdf
05/16/2025	Justin Quandt	I, Justin Quandt, a farmer in Oakes, ND am in full support of this project. I feel it will only help to further the state along with more opportunities for processing to move to the state which will in turn create jobs and more opportunities for future farmers that would be interested in raising dairy cattle. It will also use more ag products in this state which will help farmers with basis levels as our net export of commodities will be reduced.	No
05/20/2025	Tim Kozojed	In support. Please see attached letter.	NDAFO0908_TimKozojed_20250520.pdf

05/20/2025	Matthew Marshall	Supporting the project	13571c9d-901d-4251-ba16-32fc7287cbf8.jpg
05/20/2025	Melissa Beach	As a resident of Hillsboro, North Dakota, I'm writing in support of the proposed Herberg Dairy by Riverview Dairy southeast of our community. I'm confident in the strength and integrity of North Dakota's environmental oversight. The Department of Environmental Quality's permitting process—covering manure and discharge management, odor control, and runoff protection—ensures that projects like this meet strict environmental standards. My family and I drink water provided by the East Central Rural Water District, and I trust the North Dakota Department of Water Resources to protect our water supply through its review and regulation of large-scale water use. With these systems in place, I support the project and trust in the state's process to do what's best for both the environment and our community.	Melissa Beach - Riverview support letter.pdf
05/21/2025	Tim Kozojed	North Dakota Department of Environmental Quality, As a rural resident of Hillsboro, North Dakota, I'm writing in support of the proposed Herberg Dairy by Riverview Dairy southeast of our community. I'm confident in the strength and integrity of North Dakota's environmental oversight. The Department of Environmental Quality's permitting process-covering manure and discharge management, odor control, and runoff protection-ensures that projects like this meet strict environmental standards. My family and I drink water provided by the East Central Rural Water District, and I trust the North Dakota Department of Water Resources	1044_001.pdf

		to protect our water supply through its review and regulation of large-scale water use. With these systems in place, I support the project and trust in the state's process to do what's best for both the environment and our community.	
05/21/2025	Jason Lovas		Riverview public comment.doc
05/23/2025	North Dakota Livestock Alliance		Herberg Public Comment 5-2025.pdf
05/23/2025	Mylo Einarson	Cass County Electric Cooperative is in support of the application.	Letter of Support - Herberg Dairy.pdf
05/29/2025	David Kwiecien	Good afternoon, I just wanted to express that if the dairy farm of 20,000+ cows is allowed to set up south of Fargo. I will be moving from Fargo, along with several other groups. Thank you. David Kwiecien	PublicComment_20250528.pdf
06/02/2025	Dakota Resource Council	I Sam Wagner would like to confirm the endorsement of these comments as submitted by Dakota Resource Council as there are multiple names on the document. If there are any questions please feel free to contact myself or our organization.	2025.6.2_HERBERG DAIRY COMMENTS - FINAL.pdf
06/02/2025	Dani Replogle	I hereby submit the attached comments on behalf of Dakota Resource Council, Save Lake Winnipeg Project, Manitoba Eco-Network, Food & Water Watch, and the Environmental Law & Policy Center.	Exhibit 7.pdf Exhibit 6.pdf Exhibit 5.pdf Exhibit 1.pdf Exhibit 3.pdf 2025.6.2_HERBERG DAIRY COMMENTS - FINAL.pdf Exhibit 8.pdf Exhibit 4.pdf Exhibit 2.pdf Exhibit 9.pdf

06/02/2025	Nancy Johnson	Re: Herberg Dairy permit application NDAFO0908v1.0 The North Dakota Soybean Growers Association (NDSGA) appreciates the opportunity to comment on the Herberg Dairy application. NDSGA understands the permit is contingent upon the Dairy's compliance with the Animal Feeding Operations rules of the ND Department of Environmental Quality (NDDEQ) and the State Water Quality Standards. Additional comments in attachment.	2025 06 02 Herberg Dairy Comments.pdf
06/02/2025	Adam C. Hasbargen	Whereas I support farmers and jobs, I do not support anything to do with the factory dairy industry firstly as it necessarily requires the murder and rape of cows. On behalf of cows, and their pain and suffering, I ask this permit be denied. Calcium is required for the human body, but it does not need to come from cows -- there are ethical sources of calcium that we can utilize. In addition, aside from the best reason to deny this permit, the next is the amount of water and waste that cows require and generate. As a person who lives and relies on the Red River, I must advocate for the river and demand this permit also be denied for the sake of our water. Thank you for your time. Adam C. Hasbargen Moorhead, MN	No
06/02/2025	LeAnne Wilcox	Do not approve this environmental permit. It is estimated that more than 105 Million galls of untreated fecal-infused wastewater annually will be result of this plan. The company requesting does not have a good nutrient management plan and manure waste will surely find its way to the Red River and contaminate the water. Also, not all treatment plants in area have technology to handle these contaminants. Water quality for animals, plant life, humans will be affected. I do not want to see large-scale dairy in North Dakota. I implore you to reject these requests.	No

North Dakota Department of Environmental Quality
Public Hearing for: Herberg Dairy
ND State Animal Feeding Operation Permit NDAFO0908

May 20, 2022

Hearing Officer: Mary Haroldson

Transcribed by Cameron Gilley

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Marty Haroldson: [00:00]

OK. Please note that the hearing is being recorded for the purpose of creating a record.

Let the record show that it is 5:10 PM on the 20th day of May 2025.This is the time and place as scheduled, May 20th, 2025, at 5:00 PM at the Hillsboro High School in Hillsboro, North Dakota. For the aforementioned hearing on the proposed state animal feeding operation permit for a concentrated animal feeding operation, the North Dakota Department of Environmental Quality received an application for the Herberg Dairy. The application indicates the facility will have a total of 25,000 dairy cattle. These dairy cattle will consist of 21,250 milking dairy cows with an average weight of 1250 lbs. and 3,750 dairy or dry dairy cows with an average weight of 1250 lbs. Manure will be stored in geosynthetic covered wastewater ponds. Manure will be applied by injection at agronomic rates in accordance with their nutrient management plan.

After the department review of the design submitted with the request for permit application, a notice of public comment period on the state animal feeding operation permit was issued and posted on the department's web page, as well as printed in the Hillsboro Banner, Hillsboro, North Dakota, on April 18th, 2025. The notice also posted at the Hillsboro Post Office and Traill County Auditor's office. The public notice does identify the purpose of the public notice … of the public hearing. Tentative determinations made by the department were to obtain additional information regarding the proposed permit and where written comments could be directed. It is important to note that all comments received by the close of the comment period on June 2nd, 2025, whether written or recorded during the scheduled public hearing, will be considered prior to making a final determination on the proposed permit.

Upon completion of the of the Department of Environmental Quality's review of all written and oral comments, a recommendation will be provided to the Department of Environmental Quality director for final determination. We estimate the process may take up to 30 days, but as long as 90 days to complete from the close of the comment period. The time of … the time to complete a review of the comments may take longer or be shorter depending upon the number and complexity of the comments.

The following is the procedure we will follow in this hearing today. I will shortly open the hearing for testimony. At which time anyone interested in presenting testimony on the proposed permit will be allowed to speak. Anyone

presenting testimony should state their name, address and organization they represent, if any.

Also, everyone presenting testimony and everyone in attendance is required to sign into the attendance sheet for the record, located at the … at this time at the entrance of the gymnasium. Please indicate on the attendance sheet whether you are giving testimony. Remember that this is not a legislative hearing, adjudicative hearing, or a court hearing. The purpose of this hearing is to obtain input such as additional data or viewpoints from interested parties, especially from those who have not had or will not have an opportunity to submit written testimony. Both written and oral testimony will be considered equally. It is not necessary to repeat comments submitted in writing.

I would like to emphasize that this hearing is not a question-and-answer session. However, if there is a clarification needed in regard to the proposed permit, we will be listening to your testimony and will be happy to try and provide clarification after the public testimony portion of the hearing is completed. Also remember that the proposed permit only relates to the health and environmental impacts associated with permitting an animal feeding operation. It does not relate to social and economic impacts or compatible land use. Therefore, we ask that you limit your comments to those concerns relating to the proposed permit to ensure that all interested parties have an opportunity to provide comments for the record.

Address your comments to the Hearing Officer and speak clearly into the microphone located at the podium. The purpose of this hearing is to obtain additional viewpoints to allow the person testifying to be heard clearly. Please refrain from cheering, booing, applauding or talking while we are taking testimony. Based on the number of people who have indicated on the sign sheet that wish to testify, I will limit each person to 5 minutes to testify until everyone who wishes has had an opportunity to speak. At that time, you may add additional testimony if you wish. Are there any questions concerning the hearing procedure to be followed today? Seeing there are no questions, the hearing is now open for testimony. From the sign-in sheet, we will ... we have randomly selected someone to begin. I will call by name as we go through the list. The person testifying will go up to the podium and I will also let you know that … who will be next so that we can prepare as well. We have selected Jerry Strand … I'm sorry, Jeremy Strand to be up first and then … then it'll be Lonnie Leake on deck.

Jeremy Strand: [06:27]

Good evening. My name is Jeremy Strand, and I'm from Mayville, Portland, ND. I have a financial service business in town, and I also raise cattle. So I’m here on behalf of myself and I'm just here to say that we talk in small towns quite often about we

need more jobs. We need more industry. We need more things. We talked about we need all kinds of things. We need more people. We need more opportunity. We need all these things. What better opportunity do we have than right now? We live in an agricultural community, right? Let's go get 'em. I mean absolutely go get them. I'm so excited about this. I mean, I want to cry, I'm so excited, and I have nothing to do with it! Nothing. But this is what you want. People complain about the beet plant. Think of what that's done for us. I hope that place makes so damn much money all the time. I can't even. I'm just delighted, elated. That there will be someone to say we don't want those jobs, not those jobs, those people. But come on, get real. Wake up. Get in this century. There's a great opportunity for lots of people to be successful. I love it. They're going forever. River is, I know it's Riverview obviously, but I hope you guys steamroll and there'll be building another one and another one and another one. Good for you. Thank you.

Marty Haroldson [08:12]

So we have Lonnie Leake. Right. We'll circle back around just in case Lonnie wants to testify later. Next, we'll have a Melissa Beach. That was Lonnie, go ahead. Melissa Beach will be next.

Lonnie Leake: [08:36]

Good evening. My name is Lonnie Leake. I live at 1075 24th St. Northeast at Emerado, North Dakota, and I'm here today to testify primarily to show that there have been studies done like the University of Manitoba, which they determined that snow water melt will cause excessive contamination of waterways that feed the Red River. And into Lake Winnipeg International crossing … of the Red River. So it's a study by [*Viranga Weerasinghe*][1] and others done in 2024. I'll read a little bit from the abstract. It says that manure injection is well documented to reduce rain driven nutrient losses. But the effect on snowfall ... snow melt sorry, driven losses is less studied. So, this talks about how the study was … a lot of impetus for the study was to figure out how much contamination of dissolved reactive phosphorus went into Lake Winnipeg, among others, like nitrates and heavy metals.

So, I'll cut to the chase here and read some of the … some of the summary and the conclusion. Excuse me. Even … even though the injection of liquid swine manure… and this is a swine study, not a dairy cow study, significantly reduce the dissolved reactive phosphorus concentration during the latter part of the snowmelt period than the surface applied treatment of manure. The cumulative dissolved

[1] Weerasinghe, V., Amarakoon, I., Kumaragamage, D., Casson, N. J., Indraratne, S., & Gao, X. (2024, April 16). *Comparison of manure application methods on nutrient and metal loss to snowmelt*. Geoderma Regional. https://www.sciencedirect.com/science/article/pii/S2352009424000464

reactive phosphorus load with snow melt and volume weighted concentrations of dissolved reactive phosphorus in the snow melt were not significantly different between the manure application methods. Similarly, cumulative loads and volume weighted concentrations of nitrate and metals were not significantly different. Thus, the snow melt volume was the main governing factor to determine the dissolved reactive phosphate, nitrate and metal loads with snow melt runoff. This is supported by the positive linear relationship between dissolved reactive phosphate load and snowmelt volume compared to the weak linear relationship between the DRP(Dissolved Reactive Phosphorous) load and the DRP concentration. They've done previous studies. The conclusion was that dissolved reactive phosphate or phosphorus, nitrate, heavy metals increase the snowmelt with time, suggesting that the longer the spring snowmelt flooding period, the greater the release to the snowmelt. In general, manure injections [*typically]* reduce snowmelt concentrations. But irrespective of the manure application method, the snowmelt volume was controlling … the snowmelt volume was the controlling factor of the phosphate, nitrate, and metal loads. Therefore, reducing dissolved reactive phosphate concentration through manure injection alone may not always result in a reduced load and we are suggesting management practices focus on reducing the duration of the snowmelt flooding period and snowmelt runoff volumes. Well, good luck with that reducing the snowmelt runoff period and the snowmelt volumes. So, on a heavy snow winter with a melt whether it takes time, longer time or shorter time, it's the volume of the snow melt water that's going to flush the phosphate from the manure all into the drainage toward the Red River.

So, my question is, do you really want to contaminate the Red River all the way to Lake Winnipeg? Because there's already Sparrow studies have already showed, there's an increasing load of phosphate already creeping through the various watersheds toward the Red River. So, my question is again, do we want to contaminate our own Red River? And our own water supply and that of Can. (Canada) of a neighboring friendly foreign country. Thank you.

Marty Haroldson: [13:45]

Thank you. After Melissa Beach. Sounds good. Thank you. And then on, after Melissa will be a Todd Leake.

Melissa Beach: [14:01]

Good evening. My name is Melissa Beach. I live at 603 5th Ave. SE here in Hillsboro. I'm here as a resident of Hillsboro and in support of the application from Riverview Dairy for the Herberg Dairy. I just wanted to state that I'm confident in the strength and the integrity of North Dakota's environmental oversight, that the DEQ is permitting process ensures that projects like this meet strict environmental

standards. Beyond that, my family and I drink water provided by essential rural water and I trust that they too, with the Department of Water Resources will protect the water supply through the review and regulation of large-scale water use. With these systems in place, I do support the project and trust in the state process to do what's best for both the environment and our community. In addition, I would like to say that there will likely be some misinformation shared tonight, and I do encourage those that are in attendance to check out NDSU extension's research and materials that they have available. I think NDSU extension is a good resource that many of us use locally to learn more about manure, water runoff, etc. So, thank you for the time.

Marty Haroldson: [15:11]

Thank you. Up next is Todd Leake. And after that, we'll have a Jon Dryburgh.

Todd Leake: [15:22]

My name is Todd Leake. I live at 2370 110th Ave. NE in Moreno, North Dakota. I'm here representing DRC, Dakota Resource Council, and I am chair of the North Dakota chapter of the Sierra Club. My question for the North Dakota Department of DEQ considering this permit is that I understand there will be manure water, wastewater from the CAFO, from the Riverview CAFO, Herberg Dairy, taken across state lines for disposal. What is the mechanism by which the North Dakota Department of Environmental Quality regulates and or how do you intend to permit such a trans state line transfer of manure water that is basically generated in North Dakota. Thank you.

Marty Haroldson: [16:23]

Thank you, Todd. After Jon will be Levi Reese.

Jon Dryburgh: [16:35]

So, if I'm out of order by saying this, I apologize. I'm not commenting on the … I'm commenting more on just what we can do, so I just want everybody to hear this from me that. The school is. My name is Jon Dryburgh. I represent the Hillsboro Public School. I'm the Superintendent here and my address is 706 4th Ave. NE Hillsboro. I just want you to know that our school is able to handle additional students and the additional business. I just think it's good for our community, it doesn't pose…. it doesn't pose a risk to our, our children or what we can do as a, as a school district. So, I just want that on record. Thank you.

Marty Haroldson: [17:31]

Levi, as Levi Reese makes his way, after Levi will be Jim Murphy.

Levi Reese: [17:39]

Levi Reese at 701 1st Ave. NE in Hillsboro. I'm a resident of the City of Hillsboro and also the President, the Commission for the City of Hillsboro and the

Commission itself has supported the move forward on this project by supporting the expansion of East Central water in their water treatment facility that will be housed next to our water facility … water plant for this project. And on a personal note, this will be good for the community of Hillsboro, and I have full support in DEQ and what they're going to do with the regulations as long as they are supported by policy and procedures.

Marty Haroldson: [18:30]

After Jim Murphy will be John is it? Is it Hinckley? We good?

Unknown, Multiple: [18:41]

Hello. Can we get some kind of sound?

The microphones aren't working. We can't even hear you.

Marty Haroldson: [18:52]

This is … this is recorded just for your comments. It's not for you know, having this platform to … for everybody here. I'm … I'm sorry that everybody can't hear. I don't know if everybody wants to get closer to try to hear what everybody's got to say, but this is for just obtaining … recording your verbal comments on the permit.

Unknown: [19:14]

(unintelligible)

Marty Haroldson: [19:15]

This is just for recording purposes. It doesn't.

Jim Murphy: [19:16]

There's no amplification,

Marty Haroldson: [19:17]

Okay we'll get going.

Jim Murphy: [19:21]

There is when I talk! Hi, I'm Jim Murphy. I'm the executive director with Traill County economic development. I'm here on behalf of myself, our Deputy Director Alyssa Short, and several board members in the room, and I know there's several of them in here and I hope they all have something to say. As many of you know I'm from … originally from Larimore, but now I live here, and I live at 215 B Street in Cummings. And you could address to get ahold of me at 102 1st Ave. SW in Hillsboro. But I am from Larimore, hence the poor hygiene and the limited vocabulary so, bear with me. I'd like to take a few minutes and endorse Riverview Dairy and to encourage you to embrace the partnership and welcome them into Traill County. I'm going to give you some reasons why I feel this way. We give you some reasons, some results from some research into the company that we've done. These are communities that Riverview Dairies is currently operating in, and I'd like to give you

some idea of what a business like this may mean monetarily to the region although I did catch that earlier.

First a wee bit of background, you guys got to bear with me for a couple minutes. Everyone, close your eyes. Please do this. Please do this. Close your eyes and think of where this community would be without a little set of buildings about 2.4 miles north of us. Yeah, I mean American Crystal Sugar, would there be a grocery store? Would there be a pharmacy? As Jeremy said earlier, where would our schools be without … without the jobs that an economic engine like Crystal Sugar brings. Open your eyes otherwise, you'd trip when you get up here to talk. I'm certain when a certain group of farmers and businesspeople started that little set of buildings 2.4 miles north of here, there's a lot of people that may say there's a lot of people say this can't be done. This shouldn't be done. And it should have. And it was. And it's … and it's great. And it's one of the best things that this state's ever embraced. My best friend is from Larimore farms up by Gilby (Gilby, ND), Danny. And every time we drive by that … that plant, he looks and says, "Why didn't we think of that? Why don't we have that where we are?" I could run more parallels with Crystal Sugar here, but I'm sure in 1972 there were a bunch of citizens against virtually everything that railed about how it would never work, and my family and I moved here in 99. Bob Doherty. Probably a bunch of people. You know him? I was installing our phones and my wife asked and what's that plants odor? And he said it best, he says, "It's the smell of money." After first learning of this opportunity with Riverview, my first instinct was to do some homework and spoke with other mayors and community leaders to find out what kind of business partner Riverview is, what kind of steward they are. I talked to Wynn Noem. Who's the mayor? I will encourage anybody in this room who wants to pick up the phone and call any of these people. You call me, I'll give you their number. Every one of them said, "please call us. We love to talk about Riverview"

Wynn Noem's the mayor of the city of Bryant in South Dakota. Had a fantastic hour-long conversation with a 77-year-old man who watched his community go like this over the years. He said Riverview was a great partner, moved in, built a dairy a couple miles that way and a couple miles that way. Be roughly the same impact as here. He mentioned the increase in sales tax revenue from the added commerce and directly attributes, that directly attributes that to Riverview. Such a great experiment because there was no other business moving in. That was the only business moving in, so he knows exactly where the impact came from.

Kevin Waters, the mayor of Morris, MN, assured me that Riverview is a fantastic company and a business with integrity and people with integrity, they're good partners, and you're fortunate to have them interested in your community.

And Kerry Kirshbaum many of you might know Kerry. Was the mayor of Gary. She's now the city of Crookston. When they built out the Waukon dairy, she'd welcome any calls. She had nothing but great things to say about this company.

I'm hearing that … I'm also going to encourage anyone that thinks these guys sitting back here, we would double down on this. I'm going to encourage anyone with any doubts to visit any of their existing facilities and learn more about how they operate. They will welcome you. Find some information about the kind of impact the industry has had from employee study, so North Dakota doesn't have a whole lot of information to do with dairy or a … this is the agricultural utilization research arm of the state of Minnesota, a man named Harold Stankowski in Crookston provided me the study. Again, call me again, I'll give it to you. I'll ask Harold first because you know what? What I'm supposed to do, you know? Basically, every cow in this study, every cow, every individual cow was worth about $25,959 to the community per year. Times 25,000 times 50 or 60 years. Everybody pull out your calculator and do that math because I know being from Larimore, I can't do that without my hands and toes.

Marty Haroldson: [24:56]

Jim, are you getting closer?

Jim Murphy: [24:58]

I'm done after this. I'm going to rock this world. Traill County is the heart of agriculture in the Red River Valley, making it the heart of agriculture in the state of North Dakota. North Dakota has lagged behind our neighbors like Minnesota, South Dakota, Iowa and Montana, costing our farmers millions of dollars in potential revenue, and in our communities and businesses, new and existing, the growth they deserve. We have an opportunity to embrace this project and be the premier example for North Dakota's ag economy. Everything we've learned reasons to believe the project will flourish and expand the value-added ag economy in Hillsboro and Traill County. This opportunity is the perfect combination of factors. Our ecosystem is ripe for this development right now. Our finals are embracing this opportunity. Riverview is a great company and has a record to prove it. This is the right time, the right place and the right company with which to work. A partnership between this community and Riverview Dairy will result in years of economic prosperity. Let's make these folks our newest great business to locate here. Let's take the win.

Marty Haroldson: [26:08]

Thank you. John Hinckley. And after John would be, is it Derin Johnson?

John Hinckley: [26:20]

My name is John Hinckley. I am a resident of Minnesota … Halstad, Minnesota and at 320 Highway 75 S is my business. I own the Valley general store in Halstad. We've been in business for 27 years and been a board member of numerous groups in town and like it's been said many times, we all sit in every meeting, every committee. We said, "What can we do to have somebody come to town? What can we build for a community?" And here this is handed to us. Let's not waste it. This is our opportunity to make the businesses stronger, the community stronger and hopefully grow in the last 10 months. When this was all presented to us has been a whirlwind of just highs and lows and mostly highs is like what can we do. What other businesses can we provide, things like that. There's a whole list of … arm long that we can think of that are opportunities for everybody to take a chance. Maybe it'll bring more people to do that. In the 10 year … 10 months we've been talking about this visit with probably, about 100 people a day in my store. And as they're coming through, I have not heard one bad thing about it. You know, at first there was kind of a lot of ifs in the beginning, but once we've all taken tours of the Waukon dairy, which everybody is welcome to do and would highly recommend it, people are changing their attitude. And I hear nothing but positive and excitement for the next. Next step of what is going to happen? I guess I'm looking at … is this is our opportunity to make our businesses grow, make our communities grow, people stronger. More people in the area just creates more things going on and we'll have a place for the longevity of my business and every other business in the community. Thank you.

Marty Haroldson: [28:26]

Thank you. After Derin, it would be Michael Anderson.

Derin Johnson: [28:37]

I'm Derin Johnson, a mayor of the city of Halstad. Got informed about this, last summer and was immediately very excited, with some reservations and I too went on the tour of the dairy and like anything in life, there's risks and benefits that need to be weighed. And I guess I'll leave off the economic part to John, did a great job of that, but risk and benefit of this manure, I really believe the manure is liquid gold that is going to help our soils and help our crops. And the risk part of it is managing the application and the storage and things like that. And after visiting Waukon dairy, I've been very impressed with their risk management staff, their manure handling, their application methods. I really believe it's a risk they're monitoring well. And … we take risks every day, every time we pick up an electric plug into the wall, you got a risk you could screw it up and electrocute yourself or stand in the puddle of water. You manage that risk. You don't live without electricity. I don't think we should live without manure and dairy production in our county. Thank you.

Marty Haroldson: [29:59]

Next is Michael Anderson, and then it'll be Jami Hovet.

Michael Anderson: [30:09]

Hello, I'm Michael Anderson, Hillsboro area farmer. I'm vice president for East Central rural water and also a North Dakota State Water commissioner. I appreciate the opportunity to share some of my observations regarding Riverview Dairy as the excitement and anticipation of Riverview Dairy project builds, I've been asked several questions and fielded several concerns regarding area water supply. First, all water resources in the state of North Dakota, surface or subsurface are owned and managed by the state of North Dakota. The managing entity is the North Dakota Department of Water Resources, under the authority of the Governor's office and the State Water Commission. It can be argued that no other resource in the state is as regulated and as controlled as our water resources. Appropriations, testing, quality control planning, both in the immediate and long term, are done by a talented group of professionals who take the state's water resources very seriously. It is a very deliberate and thought-out process to ensure the quality and longevity of our water resources. Departments like planning and development, regulatory appropriation, legal and others all come together under the cabinet level position, Director of the Department of Water Resources and the separate position of the state engineer. The area that Riverview Dairy will be constructing their facility is an East Central Rural Water's territory. East Central will form a water provider partnership with Riverview, just as we do with other businesses, municipalities and domestic users.

East Central, because they receive federal and state funds, are legally required to consider water service to anyone considering such service. Every water system must model their service on demand, and raw water availability. The infrastructure of a system must be constructed to serve the peak demand. East Central, like other rural water systems, experiences peak demand during spray season, or about 3 months out of the year. Another instance of peak demand is when American Crystal Sugar uses about four times of their contracted amount of water during certain times during the year and East Central always responds. East Central must have this infrastructure in place to meet this demand but only realizes the revenue for these sales for a short period of time. This places a tremendous burden on the entire system throughout the year to maintain this infrastructure. Riverview on the other hand, is requesting service that will be consistent, every day of the year, 24/7 365. The infrastructure will be appropriate to the expected use. It will also allow East Central to improve and upsize existing service to the entire southeast area that East Central serves.

This is a very important benefit not only to Riverview but also to our entire system. It will help stabilize our rates for every one of our patrons. One of the questions that often comes up is what will be the availability of water if we experience a 30's style drought? Let me explain our water sources and the planning that goes into the service. One of the main differences now versus then is the known amount of water. In the 30's technology did not exist to determine accurate amounts of subsurface water aquifers, predict rechargeability, or adequately determine surface water efficiency. This area East Central are blessed to have an abundant and diverse set of water sources to provide for our needs. First, East Central is able to draw water from three different and abundant aquifers. The Elk Valley Aquifer is located in the Larimore, Northwood area. East Central currently has appropriations for 810 million gallons of water per year. This only represents 1.8% of total appropriations. The Galesburg Page Aquifer, East Central has appropriations of 680 million gallons. And the Hillsboro Aquifer, which is estimated to contain 52 billion gallons of subsurface water, East Central has applied for 600 million gallons of appropriation. These all sound like very large amounts, but in addition East Central has just nominated for 4.4 cfm out of the Red River Valley Water Supply Project. This is a dedicated pipeline carrying water from the Missouri River to the Red River Valley. This would mean an additional 1 billion gallons of water annually, to this area. The benefit of Riverview area … of Riverview Dairy to our area is going to be numerous. One of the most impactful moments I've experienced in this process was the day of the launch. When the announcement of the dairy was made public in Halstad and Hillsboro, there was quite a buzz. What I witnessed seeing the faces of the people that attended this meeting, these meetings, was optimism and hope.

For many, animal agriculture in this area is new. We are about a generation removed from meaningful livestock production. The value of the pretend … the value of the potential for manure application to farmland for fertility will help keep our soils productive and alive. The existence of Riverview may allow operations the ability to bring kids home and enter operations and joint family businesses. The opportunity to diversify income potential through crop rotation and custom work will be very meaningful. I've had the opportunity to meet many people that work with and for Riverview Dairy. I've spoken with people from equipment operators, scale house personnel, management and ownership. Even their attorney is a heck of a nice guy. I've turned many of their facilities and witnessed all their operations or many of their operations,

Marty Haroldson:

Say, Michael.

Michael Anderson:

and everything has been first class and very impressive. The people make the business and they have many great people. I would never tell anybody what to do or what to think. Instead, I would encourage you to engage Riverview to learn what they do and how they do it. Their openness, outreach and transparency has been amazing. Riverview is investing in our area, communities, and state and I'm grateful they're here.

Marty Haroldson: [36:58]

Thank you. James up after … after Jami, Neil Breen … Breidenbach.

Jami Hovet: [37:07]

Good afternoon. My name is Jami Hovet. I live in Cummings, ND. I'm here on behalf of myself, as well as the Traill County EDC (Economic Development Commission) chair. I since I would mimic a lot of the comments tonight in regards to every meeting we speak about business growth, workforce, families, housing and this one is right in our back door. I don't know why we would try to turn that away. I'm a proud lifelong Traill County resident. And like others mentioned, American Crystal Sugar years ago helped provide for me for a life here, at schools, at community. This is a lifelong thing that we can have and build for our children, build for our families, our area farmers, and so I am in full support. I leave my hands and we as an EDC say that we have trust in the North Dakota DEQ to do the right thing for our community. But we are in full support. Thank you.

Marty Haroldson: [38:12]

After Neil, it'll be Sarah Lovas?

Neil Breidenbach: [38:16]

Good afternoon. I manage East Central Regional Water. Neil Breidenbach. I've been, I've been there since 1971, so I've witnessed a lot in our aquifer and what it's done. And the biggest question I got is, they always ask if we have enough water to handle the dairy. Right now, we got over 100 center pivots just on the Elk Valley Aquifer. That's just one of three aquifers we use. And each aquifer … each center pivot takes about 700 gallons a minute while they're operating. The dairy takes about 700 gallons. So, when they're running their irrigation wells, that's equivalent to 700 dairies, we'd be able to supply with that water. They don't run them year-round, but they run them in the summer when our water usage is the most critical. When we use just about …. probably 70% of our water is used in the summer for rural water. I'd say around 88 to 90, we had a pretty severe drought and if you look at the aquifer at that time, the most it dropped at any time was 4 feet. So, we had pretty close to 50 feet of water left and I believe the reason they dropped is because all the rivers pretty much went empty. Turtle River went empty or down and Goose River went down. And I believe a lot of the water that we have in these actors … aquifers come

from them rivers when they fill up they leach into the aquifers. Geologists don't always agree on everything. I've heard a lot of stories of how it gets here from Devil's Lake. You know, over the years and I don't know if that's so or not. That's a long ways to go, but I do know that we had a … one of her vice president on the Board of directors. In 1988, he was a professor at the University and he was concerned about the water and he had him calculate out if we were to put a border around all the wells we were drawing out at that time and we pumped the same levels we were pumping in that time. We'd have about 1100 years of water supply just in that area just to supply our customers. So, there's very little risk of … of our aquifer going empty. It's much more reliable than a river, because when the rivers are empty, we still have a lot of water left in aquifer. There's … there's plenty in there to go. We also are … there's 30 water systems in North Dakota, and we're envied by all of them because of this dairy moving in. Every one of them… We have meetings once a month. Every one of them would love to have a dairy in their area. And they make it quite clear that the benefits of it are … Our system is 55 years old and the finance or the monies that we make up definitely get pumped right back into replacing our water mains and our pumping stations and our water plants and our wells. So, it's a. Something that I've been waiting for 50 some years and I'm very happy they're here and. You know, we're going to do whatever we can to make it work. They're very important to us, just like every customer we have is. The only difference is a lot of our customers, we go a mile and a half to hook up. It takes 30-40 years for to pay them… pay it back because of the cost of it. Where this is going to help us just about immediately when they start taking water. So thank you for listening.

Marty Haroldson: [42:03]

Thank you, Sarah. After Sarah, we'll open it up if there's anybody else that would like to testify.

Sarah Hall Lovas: [42:08]

Alright, my name is Sarah Hall Lovas and I'm an agronomist from Hillsboro, North Dakota. I hold a master's degree in soil science from North Dakota State University and I'm also a certified crop advisor. I have an extensive experience working in the immediate area of the proposed Herberg Dairy. I have done actually a lot of agronomic consulting in that area as well as soil sampling and advising of farmers on how to make nutrient applications in that particular area.

I write today an enthusiastic support of the Herberg Dairy and the granting of this permit. From an agronomic perspective, this project offers significant benefits to the agriculture … agricultural fabric of the Hillsboro, Halstad area. The availability of manure from the dairy presents a valuable opportunity for local farmers to

enhance their nutrient management programs and reduce reliance on commercial fertilizers. Importantly, the planned injection of liquid manure into the soil is an agronomically sound practice. The surrounding soils, which in that particular area of the dairy are primarily verticil type soils such as Fargo and Hagne series are well suited to manure applications. Those soils would have low nitrate leaching potential and a high capacity to absorb phosphorus. These conditions make the area uniquely appropriate for this type of nutrient application. Additionally, manure is one of the most effective tools for building soil organic matter a key component of soil health, a key indicator of soil health. I appreciate Riverview's thorough planning for the nutrient application calculations. I did actually go through a number of their calculations and reviewed the permit paperwork that was available online. Their commitment to securing more than enough acres for manure applications significantly reduces the risk of over application and demonstrates responsible management. Beyond soil benefits, the opportunity to grow silage and alfalfa for the Herberg Dairy represents a valuable diversification for local farmers. These crops offer new markets and provide an agronomic outlet for nutrients while supporting the local feed supply.

Finally, I have been impressed with Riverview Dairy's professionalism and transparency. They have gone out of their way to engage with our community, including organizing visits to their Waukon facility and also holding local information sessions, both in Halstad as well as Hillsboro. They have consistently welcomed questions and provided open and honest answers. Honestly from a personal standpoint, I have contacted different members of Riverview Dairy to have conversations with them about their nutrient planning in a number of different scenarios and had very good interactions to help me understand the process. In short, Riverview operates the kind of responsible and community-oriented operation that any region would be fortunate to host. I feel as support the approval of this permit and the establishment of the Herberg Dairy in our area. If you did have any questions, I would certainly entertain them.

Marty Haroldson: [45:31]

So right now, we'll open it up. That … that was the rest of the list is if there's anybody else that would like to testify or add to their testimony, please raise your hand.

Jason Siegert: [45:41]

Jason Siegert, chairman of Traill County Water resource district. I just want to say that they've been absolutely wonderful to work with. They know how to control their water runoff. We've been working with the legal drain alongside them. They are absolutely transparent and just beautiful people to work with. They've been

nothing but supportive for us and we've been nothing but supportive for them. I am in solid favor of this permit. Thank you.

Marty Haroldson: [46:11]

Is there anybody else that would like to testify?

David Knudsen: [46:17]

My name is David Knudsen. I'm from Buxton, ND, 1463 50th Ave. NE. I didn't do my little dot on there, so I didn't know, but I'm on the Traill County EDC and I think it's a great opportunity for Traill County. I think farmers are always looking for something else and some of us don't have the land to grow sugar beets and things like that. So, I wish more of these dairies would come up. And I can give my number if they're looking for some more land west of Brookston because I think it'll be a damn good thing for a lot of farmers. So. And just I think it's going to be awesome. So.

Marty Haroldson: [46:58]

Thank you. Anybody else that would like to testify or add to their testimony?

Paul Geray: [47:12]

My name is Paul Geray. I live at 113 2nd St. SE in Hillsboro. I'm here to speak in favor of this project. I am by no means any environmental expert, but I do … I do listen a lot and I haven't … I've had nothing but good response from Riverview during what they've been doing. I have not heard anything negative. I look at all the states that this company is in and how they run their operations. Everything I've read on them have been very expert. I went there and saw how they do things and was very impressed. I also serve on the Hillsboro City Commission. I serve as … I was on Hillsboro Business Association. I am still the vice President of that and the Business Association, and it has nothing to do with this, but I can tell you this much as a business member and a business owner in Hillsboro, this is … this would be real good for our community. So, and also City Commission, you know, I see so many positives. I think I don't know who it was, Jim had made a comment of who it was. These things don't come along every day. Yes, there are scary things about it, things we don't know about maybe, but I also think you know, sometimes you have to take a chance on that this is going to be better. A lot of times use the example of how many people were against the Fargodome. Way back in the day when it was built, how many people were against the heck? Sure, those are different things, but they were big things. That unknowns, I think. And now we'd never give any of those things up. And it's the same way here. I feel that in 20 years down the road, we're going to say, boy, we're sure glad that the state allowed this to happen because it's been really good for our community and this company has done a good job of environmentally managing their company. Thank you.

Marty Haroldson: [48:55]

Again opening it up. Anybody else for testimony?

Lonnie Leake: [49:15]

Lonnie Leake from Emerado, again. I complement the agronomist, Sarah. I forgot her last name, that she actually was the only one here besides myself and a couple others that put scientific testimony into the recorder. So, my testimony sort of or maybe distinctly contradicts hers. She said that the injection method would keep the … any chance of pollution in the soil. Whereas my testimony said that in heavy snow melt years, contaminants would flush out into downstream through ditches and into the Red River and down the Red River.

So, I'll just finish by saying is that. What is a point source and what isn't a point source? What's a point source? Or what is a nonpoint source in pollution? Well, you. I read a court case that said that you can't go out and spread manure before a thunderstorm if you intentionally know that it'll be flushed off your land. That is a documented court case. I forget the name of the case. I can find it. The point is that … that rainfall in this frozen ground or snow melt on frozen ground will pick up the contaminants and flush it into the Red River. You can call it a non-point source if you want. Some people say that's a point source. So where I'm getting at is that there might be litigation to find out what is the actual intent of the injection of the manure to not allow pollution into waterways. I think that there's really no way to mitigate it if it flushes into the river, so if it goes to the river you got what you got. And contamination is contamination. The Red River is a source of drinking water. There's the Clean Water Act. There's the Safe Drinking Water Act so I'll let you guys figure that out. Thank you.

Marty Haroldson: [51:47]

Anybody else for testimony on the permit? Or Draft fact… on the factsheet.

Sarah Hall Lovas: [52:00]

Thank you again for your time. I think it's important to clarify my own comments. So, first of all, there are setbacks to rivers and to drainage areas that this dairy absolutely must comply with, which should help manage any off … any off-target movement of, of any manure? Furthermore, the way that the Fargo clay works out there, it is what is considered to be a highly smectitic clay. There's poor infiltration through the soil. This is why we don't worry quite as much about nitrogen loss or sulfur loss through the soil. Those clays are very fine, and they do readily absorb phosphorus. As I stated, as a matter of fact, in the high pH's and with that type of clay there, the soil chemistry behind that actually shows that phosphorus availability in some of those scenarios can actually become an issue. And I guess I didn't bring my Dr. Lindsay soil chemistry book with, but I can certainly run home and get it if we need that, but … but I it's … it's also important to note that the number one way that

we would usually lose any nitrogen is not through infiltration through the soil just because it flows through that tight clay so slowly. Again, if I do have my contact information and you can always ask me questions about what it's been like to manage nutrients out in that neck of the woods to this point in time.

Marty Haroldson: [53:49]

Another shot at anybody else want to testify about the permit, fact sheet? All right, not seeing any, we will officially close the hearing.

RECEIVED
MAY 20 2025
DIV OF WQ

Tim Kozojed
309 162nd AVE SE
Hillsboro, North Dakota 58045

May 20, 2025

North Dakota Department of Environmental Quality
918 E. Divide Ave, 4th Floor
Bismarck, ND 58501

North Dakota Department of Environmental Quality,

As a rural resident of Hillsboro, North Dakota, I'm writing in support of the proposed Herberg Dairy by Riverview Dairy southeast of our community.

I'm confident in the strength and integrity of North Dakota's environmental oversight. The Department of Environmental Quality's permitting process—covering manure and discharge management, odor control, and runoff protection—ensures that projects like this meet strict environmental standards.

My family and I drink water provided by the East Central Rural Water District, and I trust the North Dakota Department of Water Resources to protect our water supply through its review and regulation of large-scale water use.

With these systems in place, I support the project and trust in the state's process to do what's best for both the environment and our community.

Sincerely,

Tim Kozojed
Hillsboro, ND

North Dakota Soybean Growers Association
4852 Rocking Horse Circle South, Fargo, ND 58104
(701) 566-9300 | www.ndsoygrowers.com

June 2, 2025

Division of Water Quality
ND Department of Environmental Quality
4201 Normandy St, 3rd Floor
Bismarck, ND 58503-1324

Via Electronic Submission

Re: Herberg Dairy permit application NDAFO0908v1.0

The North Dakota Soybean Growers Association (NDSGA) appreciates the opportunity to comment on the Herberg Dairy application. NDSGA understands the permit is contingent upon the Dairy's compliance with the Animal Feeding Operations rules of the ND Department of Environmental Quality (NDDEQ) and the State Water Quality Standards.

The NDSGA is supportive of projects such as the Herberg Dairy because of the potential to add economic contributions to rural North Dakota. For instance, a study was recently completed in northwestern Minnesota, looking at the economic contribution of dairy cattle to the counties just across the border from Traill County, proposed home of the dairy. The study, completed by the Agricultural Utilization Research Institute, projects that there will be $3,786 per head in cow-related labor for this type of operation. With an estimated 25,000 head, this labor income alone is $9,465,000.

The NDDEQ review process is designed to protect the environment and natural resources of our state. The engineer-designed manure storage systems, paired with a nutrient management plan, gives today's farmers the beneficial use of manure while ensuring the land, water and communities are sustained for the future. The nutrients contained in manure are valuable fertilizer for crops and the organic matter is crucial to improving soil health. Also, these cattle will use locally produced feeds that support area farmers.

Thank you for your time and consideration.

Sincerely,

Justin Sherlock
NDSGA President

Matt Marshall
3201 Desert Star Lane
Grand Forks, North Dakota 58201

May 20, 2025

North Dakota Department of Environmental Quality
918 E. Divide Ave, 4th Floor
Bismarck, ND 58501

To whom it may concern,

As residents of Grand Forks, we're writing to voice my support for the proposed Herberg Dairy by Riverview Dairy near Hillsboro.

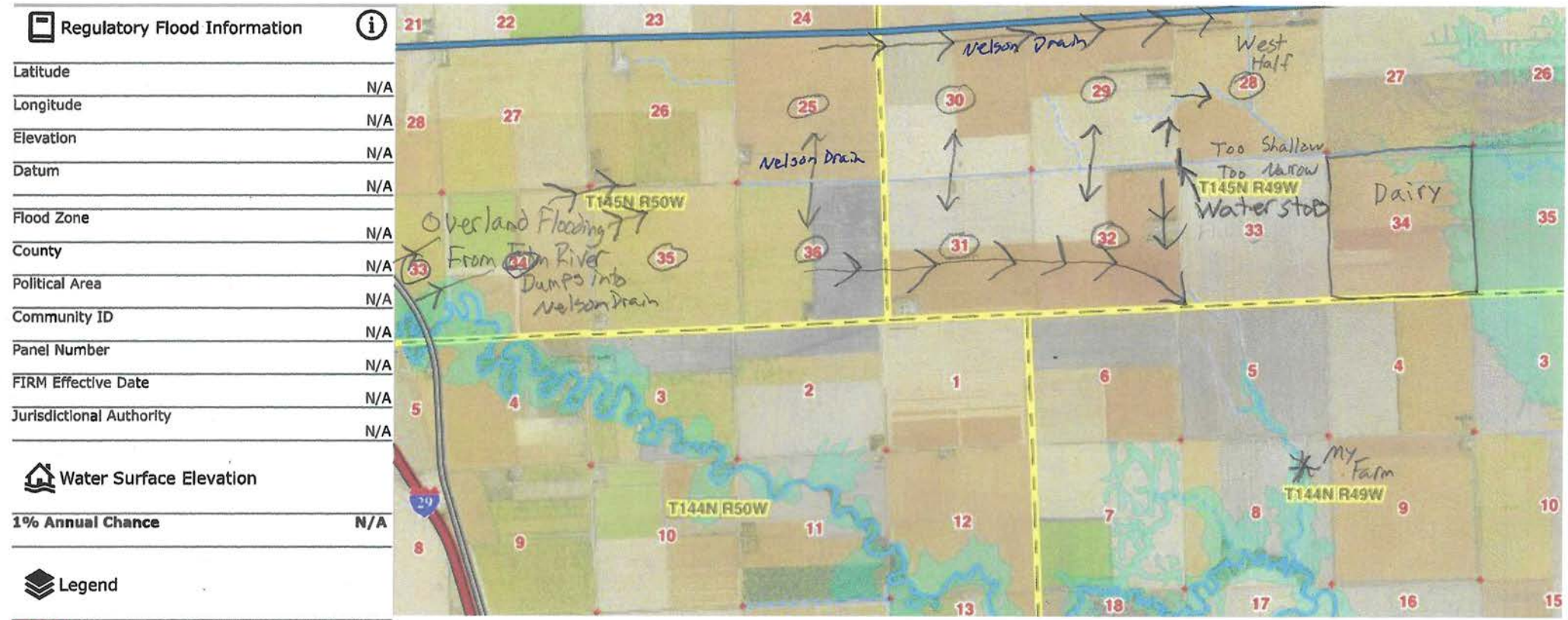
I have strong confidence in the environmental permitting process managed by the North Dakota Department of Environmental Quality and the North Dakota Department of Water Resources. These agencies play a critical role in ensuring responsible water use, effective manure and discharge management, odor control, and runoff protection. Knowing that these issues are thoroughly reviewed and regulated gives me peace of mind.

Beyond environmental stewardship, we also recognize the significant economic opportunity this project presents for our region. From opportunities for area farmers to increased demand for local goods and services, the Herberg Dairy can bring lasting benefits to rural communities across the area.

We trust the state's permitting process to ensure the project is done right for the environment and for those of us living downstream.

Sincerely,

Matt Marshall
Grand Forks, ND



North Dakota Risk Assessment MapService

Tuto

- Elm River Jumps HWY 81 and moves east into Nelson Drain
- Nelson Drain is too shallow and Narrow passing through the same ridge that the Dairy would be perched.
- Water stops flowing East at Corner of Sec. 33
- Elm River water being Diverted by the Nelson Drain then spills over it's Spoilbanks, mainly in the sunken areas where culverts are placed. These areas have seen damage and erosion over the years which has lead to even more water to be released.

Cont. →

Cont.

- Most of this water through the waffle effect by culverts or jumping over road ends up in the SE corner of Sec 32 and heads past my place and to the Elm River again
- Some water goes East into Sec 28 and some goes North into the North Section of the Nelson Drain at HWY 200.

- NONE of the Elm River Diversion water continues east in the Nelson Drain, it is <u>all</u> spilled out in spring flood events

- I've circled all the Sections that need some consideration before manure operations are performed.

- As a sidenote, and with my experience from living here for some time, the Red River Flood zone looks to be fairly accurate. The Elm River flood plain is far-far worse than depicted on the map. Probably due to the fact that the Nelson Drain has a flood plain of it own that elevation alone cant account for. Funny how man-made problems seem to hide like that.

From:	Tony Zach
To:	Gilley, Cameron
Cc:	Steve Westerbuhr; Nicholas Maaske; Caleb Dickes; jordan.nieland@riverviewllp.com; cassidy.watzke@riverviewllp.com; Ben Hernandez
Subject:	HED - Draft Permit Comments
Date:	Monday, May 5, 2025 3:11:24 PM
Attachments:	HED-Draft Permit Redlines-050525.pdf

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Hi Cameron,

Thanks for taking the time to chat with me last week about the Herberg Dairy draft permit. Attached to this email are my comments/suggestions – don't hesitate to reach out to me if you have any questions or if you have better ideas to show all info.

Thanks!

Tony Zach, PE
Project Engineer
C: (402) 672-8504 | O: (402) 783-2100
15460 NW 48th Street | Raymond, NE 68428



SETTJE
Agri-Services & Engineering, Inc.

15460 NW 48th St. | Raymond, NE 68428
P 402. 783. 2100 F 402. 783. 2104

May 5, 2025

Cameron Gilley
North Dakota DEQ
4201 Normandy Street
Bismarck, ND 58503-1324

Reference: State Permit Application
Herberg Dairy
Section 34, T-145-N, R-49-W
Traill County, North Dakota

Dear Mr. Gilley,

Please find enclosed a red-lined draft permit document for Herberg Dairy. The goal of our comments is to ensure that our permitted quantities directly correlate to the application, but a few notes were added simply as recommendations for clarity of presenting the information. Ultimately, we respect the Department's final authority to present the information how they deem appropriate. Below is a summary of our proposed recommendations:

Fact Sheet Document

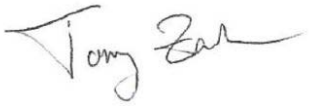
- Pg. 3 – the total headcount was updated to match the number from the application.
- Pg. 5 – we propose turning Table 2 into Table 2A to highlight the waste production & separation numbers (waste produced in the barn). Table 2B would directly follow Table 2A and highlight the wastewater runoff from the feed pad and stacking pad areas. Together, the two tables would then show the entire waste produced from the site.
- Pg. 5 – some numbers in Table 2 have been updated to directly match our design calculations and forms, and a line item was added to show the separated manure solids, since that volume of manure doesn't end up in the manure storage ponds.
- Pg. 6 – some numbers have been updated in Table 3 to directly match our design calculations. Additionally, we propose adding a note at the bottom of the table to state that our volumes are being derived at the freeboard elevation of the structures.
- Pg. 7 – we propose simplifying Table 4 after most of the information would be relocated to Table 2B. In this new format, Table 2A & 2B would show the waste generated, Table 3 would show the storage provided, and Table 4 would show total waste generated right next to the total storage provided.
- Pg. 7 – two dimensions were updated on the bottom of the page for the size of the holding pond floors to match our design.
- Pg. 10 – the wastewater daily total and annual wastewater generation numbers in Table 5 were updated to match our design calculations.
- Pg. 10 – the total land identified by the applicant was updated for the total number of acres after the last addendum document was submitted.

State Animal Feeding Operation Permit

- Pg. 1 – the total headcount was updated to match the number from the application.

Please contact me with any questions or feedback regarding these comments and thank you for your consideration.

Sincerely,



Tony Zach

FACT SHEET FOR STATE AFO PERMIT NDAFO-0908

Herberg Dairy
Herberg, ND

DATE OF THIS FACT SHEET – April 14, 2025

INTRODUCTION

The North Dakota Department of Environmental Quality (department) has been designated the state water pollution control agency for all purposes of the Federal Water Pollution Control Act, as amended [33 U.S.C. 1251, et seq.], and is hereby authorized to take all action necessary or appropriate to secure to this state the benefits of the act and similar federal acts. The department's authority and obligations for the control of pollution from animal feeding operations in the North Dakota Administrative Code (NDAC) chapter 33.1-16-03.1 which was promulgated pursuant to the North Dakota Century Code (NDCC) chapter 61-28. The State of North Dakota is delegated primacy of the Animal Feeding Operation program by EPA. The Rules and Regulations for the Control of Pollution from Certain Livestock Enterprises were first issued in 1972 and updated in 1989, 2005, and 2018.

The following rules or regulations apply to feedlot operations permits:

- Operations requiring a permit (NDAC Section 33.1-16-03.1-05),
- Authority for issuing Feedlot Permits (NDAC Section 33.1-16-03.1-01),
  The Department of Environmental Quality has been authorized to provide and administer this chapter relating to the control of pollution from animal feeding operations under the provisions of North Dakota Century Code Section 61-28-04.
- Procedures the department follows for issuing Feedlot permits (NDAC Chapter 33.1-16-03.1),
- Standards of Quality for Waters of the State (NDAC Chapter 33.1-16-02.1)

According to the NDAC section 33.1-16-03.1-13, if the department determines a significant degree of public interest exists regarding new or expanding facilities, it shall issue a public notice requesting comment on applications for both individual permits and general state animal feeding operation permits. The department shall provide a period of not less than thirty days during which time interested persons may submit comments.

For more information regarding preparing and submitting comments about the fact sheet and permit, please see **APPENDIX A – PUBLIC INVOLVEMENT INFORMATION**. Following the public comment period, the department may make changes to the draft permit. The department will summarize the responses to comments and changes to the permit in **APPENDIX D – RESPONSE TO COMMENTS.**

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BACKGROUND INFORMATION

Table 1 – General Facility Information

Applicant:	Riverview ND, LLP
Facility Name and Address:	Herberg Dairy 172nd Ave. SE and 5th St. SE Hillsboro, ND 58045
Permit Number:	NDAFO-0908
Permit Type:	CAFO
Hydrologic Code:	09020107 Elm-Marsh

FACILITY DESCRIPTION

Herberg Dairy is located seven miles east and five miles south of Hillsboro, in Traill County. The planned facility sits in the North ½ of Section 34, Township 145 North, Range 49 West, 5th Prime Meridian. The coordinates are Latitude 47.331465° N, Longitude -96.878340° W.

25,000

An application was received by the department on September 16, 2024, which indicated a maximum of 25,500 dairy cattle at the proposed facility. These dairy cattle would consist of 21,250 milking dairy cows with an average weight of 1,250 lbs. and 3,750 dry dairy cows with an average weight of 1,250 lbs. Livestock would be living in a free-stall barn. The facility would have four manure storage ponds, one feed pad leachate wastewater pond, and three stormwater storage basins. The manure storage and wastewater ponds have been designed to contain all generated manure and wastewater as well as precipitation from a 25-year, 24-hour rainfall event.

GROUNDWATER AND SURFACE WATER

Geology:

> This facility is located in the Red River Valley section of the Central Lowland physiographic province. This is a flat-lying area composed of thick sequences of sediments deposited from glaciers that overlie bedrock formations of sandstone and shale. The surficial, glacial deposits consist predominantly of relatively impermeable, clay-rich, till and lake sediments. Permeable sand and gravel beds were deposited along an ancient shoreline of glacial Lake Agassiz forming the Galesburg aquifer. (U.S. Geological Survey, *Geological Map of North Dakota*, 1980) (John P. Bluemle, *Geology and Ground Water Resources of Traill County Part 1 - Geology, 1967*, p. 6, 49).

Topography:

> The local area is gently sloping with local relief less than 25 feet (John P. Bluemle, *Geology and Ground Water Resources of Traill County Part 1 - Geology*, 1967, p. 6).

Slope:

> The slope is 0.4 percent (%) in the proposed facility area. Slope is used to estimate runoff flow calculations when precipitation can contact areas containing manure.

Runoff:

All manure produced on the proposed facility would be contained in the barn or working areas until it can be processed through the solid separation process. The solids separation process consists of a mechanical rotary screw press that produces dewatered manure solids and a liquid manure portion. The solids would be stored on the manure stacking pad and the pad runoff would enter the leachate wastewater pond. The separated manure solids would be repurposed as packed bedding in the barn. Wastewater from the 28-acre feed storage pad would be routed to the leachate wastewater pond.

Elevation:

According to the United States Geological Survey Quadrangle maps, this facility is at an approximate elevation of 873 feet.

Site Drainage:

The proposed site is located on a field section with natural drainage into a road ditch and then an unnamed seasonal creek to the east. The creek then flows east to the Red River. During storm events, the three stormwater basins would catch rainwater from the barn roof.

Water Bodies:

The North Branch of Elm River is approximately 2.5 mile south of the proposed site, and the Red River is approximately 1.5 miles east of the proposed site.

Soils:

The primary soils at the site, as indicated by National Resource Conservation Service (NRCS) web soil survey, include Dovary silty clay, Hegne-Enloe silty clays, and Bearden-Lindaas silty clay loams. These soils consist mostly of elastic silt (MH) materials. The seasonal water table is 0 to 2.5 feet deep. (See Appendix C, Table 8)

Aquifers:

The facility does not overly a surficial aquifer. The nearest surficial aquifer is the Hillsboro aquifer, which is located 8 miles to the west.

Public Wells:

There are no irrigation wells, municipal wells, observation wells, or monitoring wells located within two miles of the site (Appendix C, Table 7).

Private Wells:

There are four domestic wells identified in the area, each being roughly two miles from the proposed site. Wells in the general area range from 135 feet to 238 feet deep (Appendix C, Table 7).

MANURE HANDLING AND DISPOSAL

Facility Operation:

The facility would incorporate a free-stall barn, milking parlor, holding pen, shop, and separator building. This facility would develop its own heifers including milking and dry cows which would both be on-site for 365 days a year.

Manure Handling:

ADD LINE
**TOTAL ANNUAL SEPARATED MANURE SOLIDS: 1,149,750 CU. FT.

Manure handling would be conducted according to the submitted Operations and Maintenance (O&M) Plan. Manure would be generated in the free stall barn, holding pen, and parlor facilities. These structures are proposed to be cleaned daily. Manure would be collected from the barn to the day pit located in the separator building by vacuum trucks. Manure from the holding pen and the parlor gravity drains into the wastewater tank adjacent to the holding pen and pumps into the day pit. The day pit would route manure through screw press solid separators to reduce solids. The liquid portion is pumped to Manure Pond 1 which can flow into Manure Ponds 2 through 4. All manure and wastewater storage ponds would have a synthetic cover to reduce odors. The solids portion is collected in the separator building and then hauled to the manure stacking pad. These solids would be used as bedding in the free stalls. The liquid manure would be land applied according to the nutrient management plan (NMP).

Expected Manure Quantities:

AFTER SEPARATION
27,381,108 - slight update to match calcs and forms
9,368,358 - slight update to match calcs and forms

The amount of manure generated estimated to be produced at the facility is detailed in the table below.

Table 2 A **Manure Quantities from Design Plans**

	Amount	Type	Average Weight (*lbs*)	Manure Production (*ft³/day/head*)
Livestock Information	21,250	Dairy Cow, Milking	1,250	2.1
	3,750	Dairy Cow, Dry	1,250	2.1
			ft³/year	*Mgal/year*
Total Annual Manure Generation			18,012,750	134.7
Total Annual Wastewater Generation			9,368,339	70.1
Total Volume Needed for Manure Storage			27,381,089	204.8

**Manure generation values sourced from USDA Ag Waste Management Field Handbook, Part 651, Ch. 4 Agricultural Waste Characteristics*

** SEPARATED SOLIDS TO BE REUSED AS BEDDING OR LAND APPLIED

Mortality Disposal:

Mortality shall be disposed of in accordance with NDCC section 36-14-19, in a manner acceptable to the North Dakota Board of Animal Health, and so they will not impact waters of the state. The facility plans to ship all mortalities off-site every 72 hours using a rendering service. Prior to shipment off-site, the dairy would store mortalities in a roofed building with concrete sides and floor. The building is designed to allow conversion to a

TABLE 2B - FEEDPAD AND STACKING PAD RUNOFF (PLACE TABLE ABOVE MORTALITY DISPOSAL)

COMBINED FEEDPAD AND STACKING PAD AREA: 46.8 ACRES
25-YR 24-HR STORM RUNOFF (PRECIP EVENT = 4.77 IN; PRECIP RUNOFF = 4.53 IN): 770,177 CU. FT.
EVAPORATION: 0 CU. FT.
ALLOWABLE SOLIDS VOLUME: 42,577 CU. FT.
ANNUAL FEEDPAD & STACKING PAD RUNOFF (23.96 IN/YR): 4,070,421 CU. FT.
TOTAL VOLUME NEEDED FOR FEEDPAD AND STACKING PAD RUNOFF: 4,883,175 CU. FT.

composting building if a rendering service becomes unavailable.

ODOR CONTROL

Potential Sources:

A source of potential odors appears to be the wastewater ponds, solids stacking area, and feed storage area. Odors from the barns and ponds would be minimized with good house-keeping practices. All manure storage ponds would be covered with synthetic covers to control odors. The barns would utilize a cross-ventilated design to ensure properly ventilated animal housing for odor mitigation. Land application may present a source of short-term odor events. However, land application is exempt from state odor restrictions (NDAC Section 33.1-15-16-02(3)). State zoning regulates the nature, scope, and location of this operation. There are 15 residences/farms within two miles of the site. All measurements are approximate based on aerial maps.

House 1.43 miles S	House 1.0 miles N	House 1.79 miles ENE
House 1.72 miles S	House 1.14 miles N	House 1.97 miles ENE
House 1.00 miles W	House 2.02 miles N	House 1.89 miles ENE
House 1.14 miles WNW	House 1.48 miles NE	House 1.80 miles ESE
House 1.67 miles NW	House 1.37 miles NE	House 1.36 miles SE

CONSTRUCTION SPECIFICATIONS

Manure and Wastewater Storage Structures:

The storage structures on site would be constructed according to the design plans. The following tables show the dimensions of the ponds and the evaluation of design capacity.

Table 3 – Manure and Wastewater Storage Structures

	Manure Storage Pond 1	Manure Storage Pond 2	Manure Storage Pond 3	Manure Storage Pond 4	Leachate Storage Pond 5
	2025	2025	2025	2025	2025
	Cell 1	Cell 2	Cell 3	Cell 4	Cell 1
Structure's Dimensions (*ft*)	1000 by 600	1000 by 600	560 by 1075	560 by 1075	1400 by 415
Top Liquid Area (ft^2)	552,900	552,900	553,850	553,850	510,000
Bottom Surface Area (ft^2)	290,625	290,625	284,750	284,750	279,400
* Design Volume (ft^3)	8,098,573	8,098,573	8,049,374	8,049,374	5,667,762
* Storage Depth (*ft*)	21	21	21	21	16
Total Depth (*ft*)	24	24	24	24	20
* Total Volume Capacity	37,963,656 ft^3 or 284 *Mgal*				

*VOLUME CALCULATED AT POND FREEBOARD ELEVATION

CLOUDED INFO MOVE TO TABLE 2B

Table 4 – Required Storage Volume

Facility Information	Feed Pad and Pond Precipitation		Volume
Feed and Stacking Pad Area	25-Year, 24-Hour Storm Event	4.77 in	Runoff: 770,177
	25-Year, 24-Hour Runoff	4.53 in	
46.8 *acres*	Unpumpable Solids Buildup		minimal*
Combined Pond Area	Annual Evaporation (34 in)		0**
	Total Wastewater Generated Annually		31,451,529
68.53 *acres*	Total Storage Volume Available		37,963,656

The facility has the capacity to store the wastewater and manure produced on the facility, as well as runoff from a 25-year, 24-hour storm event.

*Pump-out ports installed

**Covered ponds prevent evaporation

Both manure storage ponds and the feed pad wastewater storage pond were designed to hold up to 415 days of manure and runoff generation as well as a 25-year, 24-hour storm event. This is more conservative than the NDDEQ requirements of 270 days of storage of manure generation and a 25-year, 24-hour storm event.

Soil Summary:

The proposed location is determined to be suitable based on soil survey and ground water survey information. The borings indicate that the Unified Soil Classification for the subsoil at the site is generally heavy clay material (CH) to a relative (~) depth of ~31 to ~36 feet below the pond floor. The bottom of the proposed manure storage ponds would be at a relative elevation of ~16 feet below surface grade (Appendix C, Table 9).

Clay Liner Construction Testing:

A two-foot clay liner is required in both the manure storage ponds and wastewater pond due to the required depths of standing liquid manure and runoff according to the North Dakota Livestock Program Design Manual (Design Manual). Clay material onsite is suitable for the construction of the clay liner and would be installed in 6-inch lifts. Each lift would be compacted using controlled travel compaction equipment so that fill area would be uniformly compacted to 95% Standard Proctor Density (American Society for Testing and Materials (ASTM) D-698). Moisture content during compaction shall be maintained between 1% dry of optimum to 3% wet of optimum. For both ponds, permeability falls well below 1/16-inch per day (0.0015 and 0.002 inch/day), a standard in the Design Manual Section 5.3.5. During construction, compaction and moisture testing to ASTM standards would be conducted on the clay liner.

Manure Storage Structure Considerations:

The facility has incorporated four manure storage ponds into the design. Two manure storage pond floors would each be 100(775 x 375)0 feet, and the other two would each be 560(850 x 335)75 feet. Each pond would have a 5:1 internal embankment slope. The influent pipe from the separating building would enter Pond #1 onto a concrete

chute/splash pad. The chute would run from the pipe outlet down and extending onto the pond floor. It would be 6 inches thick, 12 feet across, and be reinforced with #4 rebar. Each pond would have a linear low-density polyethylene cover in place. Each pond has been designed to be pumped out completely. Each pond would have a concrete manhole for pump out access. The manholes would extend down below the grade of the floor of the pond, and each would have a 30" Standard Dimension Ratio 26 PVC pipe extending out to the pond floor. This design would enable all sludge and wastewater to be pumped out as described in the Operations & Management Plan.

Each pond would have a liquid level gauge. The liquid level gauges would be constructed of pressure-treated wood, steel, PVC, fiberglass, or concrete. They would be permanently installed to be easily visible, with clearly marked divisions marking depth.

Concrete & Rebar:

The splash pad concrete and rebar specifications follow the guidelines of the American Concrete Institute's (ACI) publication "Building Code Requirements for Structural Concrete", ACI 318. Concrete would be air entrained ranging from 5% to 8%. The compressive strength of the concrete for the base slab and footings would be 4,000 psi.

Earth Fill:

The facility would be constructed as the design plans indicate. Vegetation and organic material would be stripped and removed from the footprint of the embankment. Appropriate topsoil would be used as cover material on the outside slopes of the embankment. The embankment would be seeded to a shallow rooted perennial grass and vegetation would be maintained. The embankment would be constructed out of existing soils located on site. These soils would contain no frozen material, ice, snow, sod, brush, roots, other perishable materials, rocks, or debris larger than two inches in diameter.

Groundwater Monitoring Plan:

The area of interest (AOI) does not lie above any surficial aquifers or sensitive groundwater areas. A search of the NRCS' web soil survey indicates that the soil within the AOI is primarily heavy clay. There are no drinking water wells within one mile of the site. It was determined by the department that monitoring wells are not recommended due to these factors.

Operation and Maintenance Plan:

The operation and maintenance plan would be as submitted. This includes the following: Settling areas would be required to be cleaned and repaired as needed to maintain original condition. Ponds must be pumped when wastewater reaches maximum capacity indicated by each individual pond marker. Earth work and concrete must be inspected annually and repaired to original design grades and specifications. Drains and diversions must be mowed and maintained when soil is dry and firm. Sediment buildup or erosion in drainage ways must be cleaned and re-graded to original condition. According to the

nutrient management plan, accumulated manure would be removed annually, and land applied.

NUTRIENT MANAGEMENT PLAN AND MANURE APPLICATION

General Conditions:

Managing and applying manure to ensure surface waters are not impacted and minimize nuisance concerns for nearby residents is a requirement. Factors to consider when choosing methods of manure management and application include but are not limited to: the volume of manure, the topography, location of surface and ground water sources, and distance from neighboring residents.

Application Rates:

Liquid manure and wastewater would be pumped from the ponds and injected into fields with a knifing system in spring and/or fall. Manure application on fields would be at appropriate agronomic rates. This rate is dependent on crop variety grown, crop yield goals, and soil test results. Manure shall be land applied at a rate not to exceed nitrogen levels recommended for the crop of the following production year.

Separated manure solids would be spread onto fields with a manure spreader at agronomic rates. Solid manure would be applied in spring and/or fall.

Record Keeping:

The facility is required make the following records available to the department for review upon request for a minimum of 5 years from the date they are created:

- Document routine visual inspections of the production area and containment structures.
- How, when, and where the manure, litter, or process wastewater was reused or disposed.
- Weather conditions at the time and 24 hours prior to manure application.
- Mortalities management and practices used.
- The date, time, and estimated volume of any overflow outside of the containment area.
- Annual nutrient sampling of: manure, litter and/or process wastewater and soil samples where manure has been applied that year.
- An explanation of how the manure application rates were determined with calculations of the planned and actual total nitrogen and phosphorus to be applied to each field.
- The crops grown and crop yields for all fields where manure was applied.
- If manure, litter, or process wastewater is transferred to other persons or entities; the recipient’s name and address, approximate amount transferred, and the date of the transfer should be documented.
- Any actions taken to correct deficiencies.

Land Application of Manure:

The endpoint for all manure and manure solids produced at the proposed facility is to be land applied on local fields. The table below details the quantity of manure and nutrients estimated to be produced on the facility.

Table 5 – Expected Manure Nutrient Generation*

Facility Source	Manure/Wastewater (*gal/day*)	Nitrogen (*lbs/day*)	P_2O_5 (*lbs/day*)	K_2O (*lbs/day*)
Dairy Cows, Milking	258,294	5682	2144	5682
Dairy Cows, Dry	45,581	1003	378	1003
Flush Water	19,2002	4224	1593	4224
Wastewater Daily Total		Nutrient Daily Total (*lbs/day*)		
644,586 gal/yr		10,909	4,116	10,909
Annual Wastewater Generation		Nutrient Annual Generation (*lbs/yr*)		
235,273,792 gal/yr		4,505,832	1,699,928	4,505,832
Total Per Year after 30% N storage loss, 2% N application loss, and 80% P availability		3,091,001	1,359,942	4,505,832

**Manure nutrient values sourced from manure nutrient test submitted from Riverview, Morris Dairy: 22 lbs N/1000 gal, 8.3 lbs P_2O_5/1000 gal, 22 lbs K_2O/1000 gal*

When estimating land needed for manure application, if the nutrient management plan's phosphorus risk assessment indicates a medium to low risk of movement of phosphorus, facilities are allowed to apply at agronomic nitrogen rates in accordance with the phosphorus index. If the nutrient management plan's phosphorus risk assessment indicates a high potential for movement or if soil test show phosphorus levels in the high range, the facility is required to apply the manure at agronomic phosphorus rates.

Table 6 – Agronomic Application Rates and Crop Nutrient Uptake

Crops Grown	Planned Acres	Crop Ratio	Projected Yield	Nitrogen* uptake/unit	N rate lbs/acre	Total N lbs	P_2O_5 Rate lbs/acre	Total P_2O_5 lbs
Corn, Silage	16,622	55%	20.5 ton/acre	10.4 lbs/ton	213	3,543,714	73	1,219,856
Soybeans	2,418	8%	40 bu/acre	2.5 lbs/bu**	100	241,768	28	67,308
Alfalfa	6,044	20%	2.8 ton/acre	0 lbs/ton	0	0	34	205,962
Wheat	3,022	7%	54.7 bu/acre	2.5 lbs/bu	137	413,272	38	115,716
Sugar Beets	2,115	10%	28 ton/acre	6.5 lbs/ton	182	385,016	79	167,038
Total	30,221	100%				4,583,770		1,775,880

**NDSU Ag Extension publication SF-822 (revised), (May 2007), Tables 2, 9, 23, and 26.*
*** "Nutrient Removal Values for Major Agronomic Crops in Missouri" by Manjula V. Nathan and Yichang Sun, and David Dunn, (2006) Table. 2*

Amount of land needed for spreading on nitrogen basis: 20,379 acres.
Amount of land needed for spreading on phosphorous basis: 23,143 acres.
Amount of land identified by applicant for land application: 30,221 acres.

30,175.6 acres
*Per 01-19-25 NMP addendum

The department realizes that the nitrogen in manure is not all available to the crop the first year and therefore the manure would typically be applied at rates higher than the rates listed above. However, the organic nitrogen becomes available the following year(s) so the manure cannot be applied at the same rate in subsequent years. These figures are used to estimate the total acres that would be needed over several years of application using proper rotation of cropland and/or calculating nitrogen that is carried over to the following years. Table 6 above, details how all generated nutrients might be taken up by crops on the reported application acres.

Disclaimer:

This design review is intended to assess a livestock facility's ability to contain, divert, store, and properly apply manure and/or runoff water to meet department requirements, to prevent detrimental impacts the quality of waters of the state, and to minimize the potential for odor concerns from livestock facilities. It does not include an assessment of the structural integrity of livestock facilities or manure handling structures such as those made of concrete, metal, wood, plastic, or other material.

PERMIT ISSUANCE PROCEDURES

PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause. This includes the establishment of limitations or prohibitions based on changes to Water Quality Standards, the development and approval of waste load allocation plans, the development or revision to water quality management plans. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

PROPOSED PERMIT ISSUANCE

This proposed permit application meets all statutory requirements for the department to authorize a State Animal Feeding Operation Permit. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the State of North Dakota. The department proposes to issue this permit for a term of five (5) years.

APPENDIX A – PUBLIC INVOLVEMENT INFORMATION

The department proposes to issue a permit to **Herberg Dairy**. This fact sheet describes the facility and the department's rationale for requiring permit conditions.

The department will place a Public Notice of Draft on April 18, 2025 in the **Hillsboro** Banner to inform the public and to invite comment on the proposed draft North Dakota State Animal Feeding Operation Permit and fact sheet.

The Notice-

- Indicates where copies of the draft Permit and Fact Sheet are available for public evaluation.
- Offers to provide assistance to accommodate special needs.
- Urges individuals to submit their comments before the end of the comment period.
- Informs the public that if there is significant interest, a public hearing will be scheduled.

You may obtain further information from the department by telephone at (701) 328-5210, or by writing to the address listed below.

North Dakota Department of Environmental Quality
Division of Water Quality
4201 Normandy Street
Bismarck, ND 58503

The primary author of this permit and fact sheet is Cameron Gilley.

North Dakota Department of Environmental Quality Public Notice
Issue of an AFO Permit

Public Notice Date: 4/18/2025 Public Notice Number: ND-2025-013

Purpose of Public Notice
The Department intends to take public comment to ensure the following Animal Feeding Operations (AFO) Permit follows the authority of the Section 61-28-04 of the North Dakota Century Code.

Permit Information
Site Name: Herberg Dairy
Application Date: 9/17/2024 Application Number: NDAFO0908
Applicant Name: Riverview ND, LLP
Mailing Address: 26406 470th Ave Morris MN 56267
Telephone Number: (320) 392-5609

Proposed Permit Expiration Date: 4/30/2030

Facility Description
The application is for a dairy facility that would be located seven miles east and five miles south of Hillsboro, ND in Traill County. The planned facility site is the North ½ of Section 34, Township 145N, Range 49W. The application indicates the facility would have a maximum of 21,250 milking dairy cows with an average weight of 1,250 lbs. and 3,750 dry dairy cows with an average weight of 1,250 lbs.

Meeting Purpose and Location

A public hearing will be held to discuss the Department's review of the proposed facilities. This opportunity for oral comment on the application will be provided at the location described below. The Department is seeking input in the review process of the proposed livestock facility.

The public hearing will be held **May 20, 2025** from 5:00 p.m. to 8 p.m. at the following location:

Hillsboro High School Gym
12 4th street NE
Hillsboro, ND 58045

Tentative Determinations
The submitted application and supporting documentation have been reviewed by the Department. They assure that State Water Quality Standards will be protected, and the system will be constructed and can be operated in compliance with the North Dakota state requirements for storage and handling of manure and wastewater for an Animal Feeding Operation.

Information Requests and Public Comments
Copies of the application, draft permit, and related documents are available for review. Comments or requests should be directed to the ND Department of Environmental Quality,

Division of Water Quality, 918 East Divide Ave, Bismarck ND 58501-1947 or by calling 701.328.5210.

All comments received by **June 2, 2025,** will be considered prior to finalizing the permit. The Department will issue the final permit within sixty (60) days of this notice.

The NDDEQ will consider every request for reasonable accommodation to provide an accessible meeting facility or other accommodation for people with disabilities, language interpretation for people with limited English proficiency (LEP), and translations of written material necessary to access programs and information. Language assistance services are available free of charge to you.

To request accommodations, contact NDDEQ Non-discrimination Coordinator at 701-328-5210 or deqEJ@nd.gov. TTY users may use Relay North Dakota at 711 or 1-800-366-6888.

APPENDIX B – DEFINITIONS

DEFINITIONS Standard Permit (BP 2019.09.23)

1. "Animal feeding operation" means a lot or facility, other than an aquatic animal production facility, where the following conditions are met:
   a. Animals, other than aquatic animals, have been, are, or will be stabled or confined and fed or maintained for a total of forty-five days or more in any twelve-month period; and
   b. Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.
2. "Bedding material" means an absorbent substance applied to dirt or concrete flooring systems, including wood shavings, wood chips, sawdust, shredded paper, cardboard, hay, straw, hulls, sand, and other similar, locally available materials.
3. "Best management practices" means schedules of activities, prohibitions of practices, conservation practices, maintenance procedures, and other management strategies to prevent or reduce the pollution of waters of the state. Best management practices also include treatment requirements, operating procedures, and practices to control production area and land application area runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
4. "Concentrated animal feeding operation" means an animal feeding operation that is defined as a large, medium, or small concentrated animal feeding operation or any animal feeding operation designated as a concentrated animal feeding operation under section 33.1-16-03.1-04. For purposes of determining animal numbers, two or more feeding operations under common ownership are considered to be a single animal feeding operation if they adjoin each other or if they use a common area or system for the disposal

of wastes.

5. "Earthen storage pond" or "pond" means a topographic depression either below or above ground level, manmade excavation, or diked area formed primarily of earthen materials, although it may be lined with man-made materials or other seepage control materials, and used to store manure, process wastewater and runoff from the production area of a facility.

6. "Engineer" means a professional engineer registered to practice in the state of North Dakota.

7. "Facility" is an animal feeding operation.

8. "General permit" means a general state animal feeding operation permit. This is a permit issued to cover multiple facilities of the same or similar type, without requiring each facility to be covered under an individual permit.

9. "Large concentrated animal feeding operation" means any animal feeding operation that stables or confines as many as or more than the numbers of animals, not including unweaned young, specified in any of the following categories:

    a. Seven hundred mature dairy cows, whether milked or dry;

    b. One thousand veal calves;

    c. One thousand cattle other than mature dairy cows or veal calves. "Cattle" includes, but is not limited to, heifers, steers, bulls, and cow/calf pairs;

    d. Two thousand five hundred swine, each weighing 55 pounds or more;

    e. Ten thousand swine, each weighing less than 55 pounds;

    f. Five hundred horses;

    g. Ten thousand sheep or lambs;

    h. Fifty-five thousand turkeys;

    i. Thirty thousand laying hens or broilers, if the animal feeding operation uses a liquid manure handling system;

    j. One hundred twenty-five thousand chickens (other than laying hens), if the animal feeding operation uses other than a liquid manure handling system;

    k. Eighty-two thousand laying hens, if the animal feeding operation uses other than a liquid manure handling system;

    l. Thirty thousand ducks, if the animal feeding operation uses other than a liquid manure handling system; or

    m. Five thousand ducks, if the animal feeding operation uses a liquid manure handling system.

10. "Litter" means a mixture of fecal material, urine, animal bedding material, and sometimes waste feed.

11. "Manure" means fecal material and urine, animal-housing wash water, bedding material, litter, compost, rainwater, or snow melt that comes in contact with fecal material and urine, and raw or other materials commingled with fecal material and urine or set aside for

disposal.

12. "Manure handling system" means all of the water pollution control structures used at the production area of a facility.

13. "Manure storage pond" means an earthen storage pond that stores liquid manure and process wastewater from indoor confined animal feeding operations.

14. "Manure storage structure" means any water pollution control structure used to contain or store manure or process wastewater. It includes earthen manure storage ponds; runoff ponds; concrete, metal, plastic, or other tanks; and stacking facilities.

15. "Medium animal feeding operation" means any animal feeding operation that stables or confines the numbers of animals, not including unweaned young, specified within any of the following ranges:

    a. Two hundred to six hundred ninety-nine mature dairy cows, whether milked or dry;

    b. Three hundred to nine hundred ninety-nine veal calves;

    c. Three hundred to nine hundred ninety-nine cattle other than mature dairy cows or veal calves. "Cattle" includes, but is not limited to, heifers, steers, bulls, and cow/calf pairs;

    d. Seven hundred fifty to two thousand four hundred ninety-nine swine, each weighing 55 pounds or more;

    e. Three thousand to nine thousand nine hundred ninety-nine swine, each weighing less than 55 pounds;

    f. One hundred fifty to four hundred ninety-nine horses;

    g. Three thousand to nine thousand nine hundred ninety-nine sheep or lambs;

    h. Sixteen thousand five hundred to fifty-four thousand nine hundred ninety-nine turkeys;

    i. Nine thousand to twenty-nine thousand nine hundred ninety-nine laying hens or broilers, if the animal feeding operation uses a liquid manure handling system;

    j. Thirty-seven thousand five hundred to one hundred twenty-four thousand nine hundred ninety-nine chickens (other than laying hens), if the animal feeding operation uses other than a liquid manure handling system;

    k. Twenty-five thousand to eighty-one thousand nine hundred ninety-nine laying hens, if the animal feeding operation uses other than a liquid manure handling system;

    l. Ten thousand to twenty-nine thousand nine hundred ninety-nine ducks, if the animal feeding operation uses other than a liquid manure handling system; or

    m. One thousand five hundred to four thousand nine hundred ninety-nine ducks, if the animal feeding operation uses a liquid manure handling system.

16. "Medium concentrated animal feeding operation" means a medium animal feeding operation that meets either one of the following conditions:

    a. Pollutants are discharged into waters of the state through a manmade ditch, flushing system, or other similar manmade device; or

b. Pollutants are discharged directly into waters of the state which originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

17. "North Dakota Livestock Program Design Manual" means the guidelines established for use by the department in the review and permitting process for animal feeding operations.

18. "Nutrient management plan" means a written description of the equipment, methods and schedules by which:

a. Manure, litter, and process wastewater is beneficially reused in an environmentally safe manner such as being applied to land at appropriate agronomic rates as nutrients or fertilizers; and

b. Water pollution and air pollution, including odors, are controlled sufficiently to protect the environment and public health.

19. "Open lot" means livestock pens, feeding or holding areas at the production area of an animal feeding operation which are outside and not under roof, and where rain can fall directly on the lot area.

20. "Open manure storage structure" means an earthen pond or storage tank for holding liquid manure which is not covered so rainfall can fall directly into the pond or tank.

21. "Operation and maintenance plan" means a written description of the equipment, methods, and schedules for:

a. Inspection, monitoring, operation, and maintenance of the animal feeding operation, including manure storage structures, water pollution control structures, and the production area; and

b. Controlling water pollution and air pollution, including odors sufficient to protect the environment and public health. It includes emergency response actions for spills, discharges or failure of a collection, storage, treatment, or transfer component.

22. "Operator" means an individual or group of individuals, partnership, corporation, joint venture, or any other entity owning or controlling, in whole or in part, one or more animal feeding operations.

23. "Overflow" means the discharge of manure or process wastewater resulting from the filling of wastewater or manure storage structures beyond the point at which no more manure, process wastewater, or storm water can be contained by the structure.

24. "Pollutant" means "wastes" as defined in North Dakota Century Code section 61-28-02, including dredged spoil, solid waste, incinerator residue, garbage, sewage, sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

25. "Process wastewater" means water directly or indirectly used in the operation of the animal feeding operation for any or all of the following: spillage or overflow from animal or poultry watering systems; washing, cleaning, or flushing pens, barns, manure pits, or other animal feeding operation facilities; direct contact swimming, washing, or spray cooling of animals; or dust control. Process wastewater also includes any water which comes into contact

with any raw materials, products, or byproducts, including manure, litter, feed, milk, eggs, or bedding material.

26. "Production area" means those areas of an animal feeding operation used for animal confinement, manure storage, raw materials storage, and waste containment. The animal confinement area includes open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milking rooms, milking centers, cattle yards, barnyards, medication pens, walkers, animal walkways, and stables. The manure storage area includes lagoons, runoff ponds, storage sheds, stockpiles, under-house or pit storages, liquid impoundments, static piles, and composting piles. The raw materials storage area includes feed silos, silage bunkers, and bedding materials. The waste containment area includes settling basins, areas within berms, and diversions which separate uncontaminated storm water. Also included in the definition of production area is any egg washing or egg processing facility and any area used in the storage, handling, treatment, or disposal of mortalities.

27. "Runoff" means rainwater or snow melt that comes in contact with manure at an open lot or open manure storage area and, therefore, is defined as manure.

28. "Runoff pond" means an earthen storage pond that is used to collect and store runoff from an open lot or from a manure storage area.

29. "Seepage" means the volume of flow through a manure storage structure.

30. "Sensitive groundwater area" means vulnerable hydrogeologic settings as determined by the department such as glacial outwash deposits or alluvial or aeolian sand deposits that are critical to protecting current or future underground sources of drinking water. Areas designated as sensitive groundwater areas by the department include alluvial or aeolian sand deposits shown on Geologic Map of North Dakota (Clayton, 1980, North Dakota geological survey) and glacial drift aquifers listed in North Dakota Geographic Targeting System for Groundwater Monitoring (Radig, 1997, North Dakota department of health), or most recent editions of these publications, with DRASTIC scores greater than or equal to 100 based on methodology described in DRASTIC: A Standardized System For Evaluating Groundwater Pollution Potential (Aller et al, 1987, United States environmental protection agency).

31. "Small animal feeding operation" means any animal feeding operation that stables or confines less than the numbers of animals specified for a medium animal feeding operation.

32. "Small concentrated animal feeding operation" means a small animal feeding operation designated as a concentrated animal feeding operation under section 33.1-16-03.1-04.

33. "State animal feeding operation permit" means a permit issued by the department under this chapter to an animal feeding operation.

34. "Surface water" means waters of the state that are located on the ground surface, including all streams, lakes, ponds, impounding reservoirs, marshes, watercourses, waterways, and all other bodies or accumulations of water on the surface of the earth, natural or artificial, public or private.

35. "Unconfined glacial drift aquifer" means a glacial drift aquifer that does not have an impervious soil layer which acts to prevent or minimize movement of water into, through, or out of the aquifer.

36. “Water pollution control structure” means a structure built or used for handling, holding, transferring, or treating manure or process wastewater, so as to prevent it from entering the waters of the state. The term also includes berms, ditches, or other structures used to prevent clean water from coming in contact with manure.

37. “Water quality standards” means the water quality standards contained in chapter 33.1-16-02.1.

APPENDIX C – DATA AND TECHNICAL CALCULATIONS

Table 7 – Water Commission Well Data

Location	Use	Depth (ft)	Diameter (inches)	Aquifer
14504920DAA	Domestic	unknown	3.0	unknown
14504936DDC	Domestic	214	5	unknown
14504922CDD	Domestic	238	4	unknown
14404908ABA	Domestic	135	4	unknown

*Wells closest to facility.

Table 8 – Soil Survey Data

Map Unit	Name Description	Bedrock Depth (feet)	Seasonal Water Table (feet)	Unified Soil Class*	Ksat µm/s	Lagoon Restrictions
I231A	Dovray silty clay, 0-1% slopes	6.5	0	MH	1.3645	Very limited
I461A	Hegne-Enloe silty clays, 0-1% slopes	6.5	0.75	MH	0.9200	Very limited
I492A	Bearden-Lindaas silty clay loams, 0-2% slopes	6.5	2.5	MH	3.4868	Very limited
MH-Elastic Silt						

Table 9 – Soil Boring Information

	B-101	B-102	B-103	B-104	B-105	B-106	B-107	B-108	B-109	B-110	B-111	B-112
Elevation	868.4	868.0	867.8	867.9	869.5	867.8	867.9	869.3	869.0	869.1	867.7	867.6
0 to 1	CL-OL	CL-OL	CL-OL	CH-OH	CL-OL	CH-OH	CH-OH	CL-OL	CL-OL	CL-OL	CH-OH	CH-OH
1 to 2	Cl	CL-OL	Cl	CL	Cl	CH-OH	CL/CH	Cl	CL/CH	CL/CH	CH-OH	CH-OH
2 to 3	CL	CL	Cl	CL	CL	CH-OH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH
3 to 4	CL	CL	Cl	CL	CL	CH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH
4 to 5	CH	CH	Cl	CL	CL	CH	CH	CH	CH	CH	CH	CL/CH
5 to 6	CH	CH	Cl	CL	CL	CH	CH	CH	CH	CH	CH	CL/CH
6 to 7	CH	CH	CL/CH	CL/CH	CL/CH	CH	CH	CH	CH	CH	CH	CL/CH
7 to 8	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
8 to 9	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH

	B-101	B-102	B-103	B-104	B-105	B-106	B-107	B-108	B-109	B-110	B-111	B-112
Elevation	868.4	868.0	867.8	867.9	869.5	867.8	867.9	869.3	869.0	869.1	867.7	867.6
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
31 to 32	CH				CH			CH	CH	CH		
32 to 33	CH				CH			CH	CH	CH		
33 to 34	CH				CH			CH	CH	CH		
34 to 35	CH				CH			CH	CH	CH		
35 to 36	CH				CH			CH	CH	CH		
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-113	B-114	B-115	B-116	B-117	B-118	B-119	B-120	B-121	B-122	B-123	B-124
Elevation	867.7	867.2	866.5	866.3	867.2	868.4	868.3	868.6	869.0	868.3	868.2	867.5
0 to 1	CL-OL	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH
1 to 2	CH	CH-OH	CH-OH	CH-OH	CH-OH	CL/CH	CH-OH	CL/CH	CL/CH	CH	CH	CH-OH
2 to 3	CH	CL/CH	CH-OH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CL/CH
3 to 4	CH	CL/CH	CH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CL/CH
4 to 5	CH	CL/CH	CH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CL/CH
5 to 6	CH	CL/CH	CH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CL/CH
6 to 7	CH	CL/CH	CH	Cl/CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CH	CH
7 to 8	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
8 to 9	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
31 to 32						CH	CH	CH	CH	CH	CH	
32 to 33						CH	CH	CH	CH	CH	CH	
33 to 34						CH	CH	CH	CH	CH	CH	
34 to 35						CH	CH	CH	CH	CH	CH	
35 to 36						CH	CH	CH	CH	CH	CH	
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-125	B-126	B-127	B-128	B-129	B-130	B-131	B-132	B-133	B-134	B-135	B-136
Elevation	868.0	868.8	868.7	869.0	867.3	868.3	868.2	868.5	867.8	867.6	867.8	867.8
0 to 1	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH
1 to 2	CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
2 to 3	CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
3 to 4	CH	CH	CL/CH	CL	CL/CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
4 to 5	CH	CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
5 to 6	CH	CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
6 to 7	CH	CH	CL/CH	CH	CL/CH	CH	CH	CL/CH	CH	CH	CL/CH	CL/CH
7 to 8	CH	CH	CH	CH	CL/CH	CH	CH	CH-OH	CH	CH	CH	CH
8 to 9	CH	CH	CH	CH	CL/CH	CH	CH	CH-OH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH-OH	CH	CH	CH	CH
31 to 32		CH	CH	CH		CH	CH	CH-OH				
32 to 33		CH	CH	CH		CH	CH	CH-OH				
33 to 34		CH	CH	CH		CH	CH	CH-OH				
34 to 35		CH	CH	CH		CH	CH	CH-OH				
35 to 36		CH	CH	CH		CH	CH	CH-OH				
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-137	B-138	B-139	B-140	B-141	B-142	B-143	B-144	B-145	B-146	B-147	B-148
Elevation	867.4	867.8	867.7	868.2	867.0	867.1	867.9	867.8	866.4	866.8	867.3	867.7
0 to 1	CH-OH	CL-OL	CL-OL	CL-OL	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH	CH-OH
1 to 2	CH	CH	CH	CL-OL	CH	CH	CH	CL/CH	CH-OH	CH-OH	CH	CL/CH
2 to 3	CH	CH	CH	CH	CH	CH	CH	CL/CH	CH	CH-OH	CH	CL/CH
3 to 4	CH	CH	CH	CH	CH	CH	CH	CL/CH	CH	CH	CH	CL/CH
4 to 5	CL/CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CH	CH	CH
5 to 6	CL/CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CH	CH	CH
6 to 7	CH	CH	CH	CL/CH	CH	CL/CH	CH	CL/CH	CH	CH	CH	CH
7 to 8	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
8 to 9	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH

	B-137	B-138	B-139	B-140	B-141	B-142	B-143	B-144	B-145	B-146	B-147	B-148
Elevation	867.4	867.8	867.7	868.2	867.0	867.1	867.9	867.8	866.4	866.8	867.3	867.7
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
31 to 32				CH								
32 to 33				CH								
33 to 34				CH								
34 to 35				CH								
35 to 36				CH								
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-149	B-150	B-151	B-152	B-153	B-154	B-155	B-156	B-201	B-202	B-203	B-204
Elevation	868.9	868.8	867.2	866.9	867.9	867.7	868.8	867.3	869.9	870.5	870.2	870.1
0 to 1	OH	OH	OH	OH	OH	OH	OH	OH	CL-OL	CL-OL	CL-OL	CL-OL
1 to 2	OH	OH	OH	OH	CH	OH	OH	CH	CL	CL	CL	CL-OL
2 to 3	CH	CH	OH	CH	CH	CH	CH	CH	CL	CL	CL	CL
3 to 4	CH	CH	OH	CH	CH	CH	CH	CH	CL	CL	CL	CL
4 to 5	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CL	CL
5 to 6	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CL	CL
6 to 7	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CL	CL
7 to 8	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CH	CL
8 to 9	CH	CH	CH	CH	CH	CH	CH	CH	CH	CL	CH	CL
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH

	B-149	B-150	B-151	B-152	B-153	B-154	B-155	B-156	B-201	B-202	B-203	B-204
Elevation	868.9	868.8	867.2	866.9	867.9	867.7	868.8	867.3	869.9	870.5	870.2	870.1
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
31 to 32	CH	CH					CH					
32 to 33	CH	CH					CH					
33 to 34	CH	CH					CH					
34 to 35	CH	CH					CH					
35 to 36	CH	CH					CH					
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-205	B-206	B-207	B-208	B-209	B-210	B-211	B-212	B-213	B-214	B-301	B-302
Elevation	870.3	870.1	870.2	871.1	870.4	869.7	869.6	870.1	870.3	869.7	869.2	869.5
0 to 1	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL	OH	OH	OH	CL-OL	CL-OL
1 to 2	CL	CL	CL	CL	CL	CL	CL-OL	CH	CH	CH	CL-OL	CL
2 to 3	CL	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CL
3 to 4	CL	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CL
4 to 5	CH	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CH
5 to 6	CH	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CH
6 to 7	CH	CL	CL	CL	CL	CL	CL	CH	CH	CH	CL	CH
7 to 8	CH	CH	CL	CH	CH	CH	CH	CH	CH	CH	CH	CH
8 to 9	CH	CH	CL	CH	CH	CH	CH	CH	CH	CH	CH	CH
9 to 10	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
10 to 11	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
11 to 12	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
12 to 13	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
13 to 14	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
14 to 15	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
15 to 16	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
16 to 17	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
17 to 18	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
18 to 19	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
19 to 20	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
20 to 21	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
21 to 22	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
22 to 23	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
23 to 24	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
24 to 25	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
25 to 26	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
26 to 27	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
27 to 28	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
28 to 29	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
29 to 30	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
30 to 31	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

	B-303	B-304	B-305	B-401	B-501	B-601						
Elevation	870.0	869.5	869.2	868.5	869.2	869.1						
0 to 1	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL	CL-OL						
1 to 2	CL-OL	CL	CL	CH/CL	CL	CL						
2 to 3	CL	CL	CL	CH/CL	CL	CL						
3 to 4	CL	CL	CL	CH/CL	CL	CL						
4 to 5	CL	CL	CL	CH	CL	CH						
5 to 6	CL	CL	CH	CH	CL	CH						

	B-303	**B-304**	**B-305**	**B-401**	**B-501**	**B-601**						
Elevation	870.0	869.5	869.2	868.5	869.2	869.1						
6 to 7	CL	CL	CH	CH	CL	CH						
7 to 8	CH	CH	CH	CH	CH	CH						
8 to 9	CH	CH	CH	CH	CH	CH						
9 to 10	CH	CH	CH	CH	CH	CH						
10 to 11	CH	CH	CH	CH	CH	CH						
11 to 12				CH		CH						
12 to 13				CH		CH						
13 to 14				CH		CH						
14 to 15				CH		CH						
15 to 16				CH		CH						
16 to 17				CH		CH						
17 to 18				CH								
18 to 19				CH								
19 to 20				CH								
20 to 21				CH								
OL-organic lean clay, CL- clay of low plasticity, CH- clay of high plasticity, SP-poorly graded sand, SC-clayey sand.												

APPENDIX D – RESPONSE TO COMMENTS

Comments received during the public comment period will be addressed and placed here.

Effective Date: Date of Signature
Expiration Date: April 30, 2030

STATE ANIMAL FEEDING OPERATION PERMIT

NDAFO-0908

In compliance with North Dakota Administrative Code (NDAC) 33.1-16-03.1 of the North Dakota Department of Environmental Quality rules as promulgated under Chapters 61-28 and 23.1-06 of North Dakota Century Code (NDCC), authorization of the **Herberg Dairy** facility located in the North ½ of Section 34, Township 145 N, Range 49 W, in Traill County, North Dakota is granted provided the following conditions are met:

1) The application indicated the facility is a CAFO that will hous 25,000 **dairy cattle. The dairy cattle consist of 21,250 milking dairy cows with an average weight of 1,250 lbs. and 3,750 dry dairy cows with an average weight of 1,250 lbs.** The department must be notified in writing if there is an expansion in the number of livestock, change in ownership of the facility, significant changes in the physical operation of the facility or if the lot area where livestock are concentrated is expanded. Changes may require an update to the permit or issuance of a new permit.

2) Operation and Maintenance plans and standard operating procedures must be followed as submitted to the department. Changes to the Operation and Maintenance plan must be reviewed by the department prior to being implemented. There must be regular and adequate maintenance and upkeep to prevent degradation of the structures, to ensure the system continues to operate as designed, to ensure the storage pond does not overflow, and to ensure manure or wastewater does not discharge into waters of the state. Operation and maintenance plans shall include:

   a. Weekly inspections of all storm water diversion devices, runoff diversion structures and devices channeling runoff to the manure storage structure;
   b. Daily inspection of water lines, including drinking water or cooling water lines; and
   c. Weekly inspections of the manure storage structures noting the level of liquid in the structure as indicated by the depth marker. (North Dakota Livestock Program Design manual, section 6)

3) The operator shall notify the department within thirty days of construction completion of the manure storage or water pollution control structures. The operator shall provide certification from the engineer or the designer that construction of manure storage and water pollution control structures was completed according to designs provided with the application or the department-approved changes. (NDAC 33.1-16-03.1-07(5))

4) Mortality shall be disposed of in accordance with NDCC section 36-14-19, in a manner acceptable to the North Dakota Board of Animal Health, and so they will not impact waters of the state. The facility plans to ship all mortalities off-site every 72 hours using a rendering service. Prior to shipment off-site, the dairy will store mortalities in a roofed building with concrete sides and floor. The building is designed to allow conversion to a composting building if a rendering service becomes unavailable.

5) Land application of manure shall be in accordance with the nutrient management plan. Manure shall be applied in a manner so it will not be washed into waters of the state. When applying manure within ½ mile of an occupied residence, building, or public area where people may be present; it is recommended that the operator review and follow the guidelines of the North Dakota Livestock Program Design Manual, 7.6, section 4 and incorporate the manure within 8 hours of land application.

6) The following records pertaining to nutrient management shall be maintained for a minimum of 5 years:

   a. The crops grown and expected realistic crop yields;
   b. The date(s) manure, litter or process wastewater is applied to each field;
   c. Weather conditions during application, 24 hours prior and following application;
   d. Test methods used to sample and analyze manure, litter, wastewater and soil;
   e. Results from annual testing of manure, litter, and process wastewater, and annual soil sample results for land where manure was applied that year;
   f. An explanation of how the application rates were determined in accordance with standards established by the department;

g. Calculations showing nutrients applied to each field, including other nutrient sources;
h. Total amount of nutrients actually applied to each field, including documentation of calculations for the total amount applied, and;
i. Method used to apply the manure, litter or process wastewater; inspection of manure application equipment including method, frequency, dates and repairs made if leaks were found; and setbacks, vegetated buffers or other alternative practices used when land applying manure near surface water or potential conduits to surface water. (North Dakota Livestock Program Design Manual, 7.7, section 2)

7) If manure is transferred to other persons or entities not associated with the facility, the following conditions shall apply:
   a. Owners/operators shall provide the recipient of the manure, litter or process wastewater with the most current nutrient analysis prior to transfer;
   b. The analysis provided shall be consistent with the requirements of section 7.4 in design manual, and;
   c. The owners/operators of the CAFO shall retain records for five years after the transfer date documenting the recipient's name and address, the approximate amount of manure transferred, and the date the manure was transferred. (North Dakota Livestock Program Design Manual, 7.7, section 3)

8) All open manure storage structures shall maintain a depth marker which clearly indicates the minimum capacity necessary to contain the runoff and direct precipitation from a 25-year, 24-hour rainfall event.

9) Any deficiency discovered during an inspection shall be corrected as soon as possible. Chemicals or other contaminants handled on site shall not be disposed of in a structure used for storage or treatment of manure, process wastewater or stormwater unless it is specifically designed for that purpose. The operator of a livestock facility should maintain a rain gauge at the production area and record measurable rainfall events. (North Dakota Livestock Program Design manual, 6.2)

10) The owner/operator of a CAFO shall make the following records available to the department for review upon request:

   a. Records documenting the visual inspections;
   b. Weekly records of the depth of the manure and process wastewater in the liquid manure storage structure as indicated by the depth gauge in storage structure; records documenting any actions taken to correct deficiencies;
   c. Deficiencies not corrected within 30 days must be accompanied by an explanation of the factors preventing immediate correction;
   d. Records of management and practices used;
   e. Record documenting current design of any manure storage structures, including solids accumulation volume, design treatment volume, total design volume and the approximate number of days of storage capacity;
   f. Records of the date, time and estimated volume of any overflow; and records documenting the land application of manure. (North Dakota Livestock Program Design Manual, 6.5)

11) This permit shall in no way authorize the discharge of any objectionable odorous air contaminant which is in excess of the limits established in NDAC Chapter 33.1-15-16 of the North Dakota Air Pollution Control Rules. If the department determines odors from the facility exceed limits, steps shall be taken, within a reasonable time, to control and reduce odors from the facility site. This may include requiring the installation of a cover on the ponds or other odor control measures.

12) There must be regular and adequate maintenance and upkeep to prevent degradation of the structures, to ensure the system continues to operate as designed, to ensure the containment system does not overflow, and to ensure manure or wastewater does not discharge into waters of the state.

13) The department must be notified if there is a change in address or other contact information for the facility.

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The above conditions are considered part of the proper operation of the facility. If any of the above conditions are not met, the department must be notified in writing, within five (5) days. Any noncompliance with the permit conditions or with state requirements must be reported to the department as soon as possible after the facility becomes aware of the noncompliance condition. Failure to meet these requirements may result in monetary penalties and/or revocation of this permit.

Construction may begin upon signature of this permit by the department. The permit is based on construction being completed as per the design plans reviewed by the department. If any structural changes are made that are different than these design plans, the department must be notified in writing and prior approval obtained, before making these changes.

Authorized department personnel shall be permitted access to the facility to determine compliance with department rules and regulations. Department inspections will abide by all security measures implemented by the owner or operator to protect the health and safety of the workers and animals at the facility.

The owner/operator of this facility shall comply with all State and Federal environmental laws and rules, and shall also comply with all local building, fire, zoning and other applicable ordinances, codes, and rules.

Notice of Completion and results of testing completed on the clay liner or the manure storage structures shall be received by the department within 30 days of completion of construction.

I certify that I have read and understand the above information and agree to operate the facility in a manner that will meet all the conditions listed herein.

OWNER/OPERATOR CONSENT	FOR THE NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
By _____ (signature)	By _____
By _____ (print name here)	By Marty Haroldson, Director Water Quality Division
Date _____	Date _____

DRAFT

North Dakota
Livestock Alliance

701.712.1488
amber@ndlivestock.org
ndlivestock.org

ND Livestock Alliance
PO Box 369
Bismarck, ND 58502

ND Department of Environmental Quality
Attn: Water Quality Division
918 East Divide Ave.
Bismarck, ND 58501-1947

Date: May 23, 2025

Submitted to the NDDEQ Division of Water Quality,

The North Dakota Livestock Alliance (NDLA) is writing this letter in support of the Herberg Dairy permit application NDAFO0908v1.0, contingent upon their compliance with the Animal Feeding Operations rules of the ND Department of Environmental Quality (NDDEQ) and the State Water Quality Standards. We also commend Herberg Dairy and Riverview staff for their dialogue with neighbors and local community leaders at multiple community events and their open houses held July 9, 24 and April 3, 25. We also commend Riverview for hosting dozens of tours at their nearby Waukon Dairy to ensure all questions and concerns had by citizens were answered. As stated by several community members during the public comment session held May 20th, 2025, these interactions and hands-on experience on the dairy farms were integral to the community's comfort with and support for the Herberg Dairy project.

NDLA is confident that the NDDEQ review process successfully protects the environment and natural resources of our great state. The engineer-designed manure storage systems, paired with a nutrient management plan, gives today's farmers the extremely beneficial use of manure while ensuring the land, water and communities are sustained for generations to come. The natural nutrients contained in manure are valuable fertilizer for crops and the organic matter is crucial to improving soil health. There is another important reason NDLA supports this application. The addition of dairy cattle will dramatically increase North Dakota's ability to attract new milk processing capacity into our rapidly shrinking infrastructure, in turn, supporting existing ND dairy farm families and their future generations. These cattle will also utilize locally produced feeds and support area farmers.

The following comment addresses a statement made during the public comment session held May 20, 2025. The statement regarded concerns about manure applied to frozen or snow-covered ground causing runoff into waterways. NDLA would like it on this permit application's record that the ND DEQ's rules as seen in the Design Manual, 7.6 – 4 states 'Manure shall not be applied to frozen, snow-covered or saturated soils if there is a likelihood of runoff'. NDLA feels the above regulation addresses those previously stated concerns and furthers the efforts to protect the quality of ND's water resources.

North Dakota
Livestock Alliance

701.712.1488
amber@ndlivestock.org
ndlivestock.org

ND Livestock Alliance
PO Box 369
Bismarck, ND 58502

The NDLA Governing Board of Directors includes the ND Pork Council, ND Corn Utilization Council, ND Farmers Union, Midwest Dairy – ND Division, Agtegra Cooperative, ND Corn Growers Association and the ND Ethanol Council. NDLA also has an extensive membership of groups and individual farmer members. This group was formed to unite all of North Dakota agriculture with the common vision to strengthen rural communities, farm and ranch businesses and natural resources through animal agriculture.

Respectfully Submitted,

Amber Wood

Amber Wood
Executive Director

Nodak ELECTRIC COOPERATIVE

A Touchstone Energy® Cooperative

4000 32ND AVENUE SOUTH • BOX 13000 • GRAND FORKS, ND 58208-3000 (701) 746-4461 • ND 1-800-732-4373

Nodak Electric Cooperative, Inc.
4000 32nd Avenue South
Grand Forks, ND 58201

May 21, 2025

North Dakota Department of Environmental Quality
918 E. Divide Ave, 4th Floor
Bismarck, ND 58501

To Whom It May Concern,

On behalf of Nodak Electric Cooperative, I am writing to express our support for the proposed Herberg Dairy project by Riverview Dairy near Hillsboro, ND.

As the rural electric cooperative serving this area, we recognize the Herberg Dairy as a valuable addition to our service territory, one that will drive significant agricultural development and contribute to the long-term economic vitality of the region. This project represents a major investment in North Dakota's rural economy, bringing high-quality jobs and increased demand for local services and infrastructure.

We have confidence in the environmental permitting processes managed by the North Dakota Department of Environmental Quality and the Department of Water Resources. These agencies are well equipped to ensure that this project meets the state's high standards for environmental responsibility, including water use, discharge management, and odor control.

Nodak Electric supports responsible, growth-oriented development, and we view this project as a model of agricultural innovation and stewardship. We believe the Herberg Dairy will contribute positively to the region's growth and are committed to working alongside all stakeholders to help make it a success.

Sincerely,

Mylo Einarson

President and CEO
Nodak Electric Cooperative, Inc.
Grand Forks, ND

Melissa Beach
603 5th Ave SE
Hillsboro, North Dakota 58045

May 20, 2025

North Dakota Department of Environmental Quality
918 E. Divide Ave, 4th Floor
Bismarck, ND 58501

North Dakota Department of Environmental Quality,

As a resident of Hillsboro, North Dakota, I'm writing in support of the proposed Herberg Dairy by Riverview Dairy southeast of our community.

I'm confident in the strength and integrity of North Dakota's environmental oversight. The Department of Environmental Quality's permitting process—covering manure and discharge management, odor control, and runoff protection—ensures that projects like this meet strict environmental standards.

My family and I drink water provided by the East Central Rural Water District, and I trust the North Dakota Department of Water Resources to protect our water supply through its review and regulation of large-scale water use.

With these systems in place, I support the project and trust in the state's process to do what's best for both the environment and our community.

Sincerely,



Melissa Beach
Hillsboro, ND

RECEIVED
MAY 20 2025
DIV OF WQ

Tim Kozojed
309 162nd AVE SE
Hillsboro, North Dakota 58045

May 20, 2025

North Dakota Department of Environmental Quality
918 E. Divide Ave, 4th Floor
Bismarck, ND 58501

North Dakota Department of Environmental Quality,

As a rural resident of Hillsboro, North Dakota, I'm writing in support of the proposed Herberg Dairy by Riverview Dairy southeast of our community.

I'm confident in the strength and integrity of North Dakota's environmental oversight. The Department of Environmental Quality's permitting process—covering manure and discharge management, odor control, and runoff protection—ensures that projects like this meet strict environmental standards.

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With these systems in place, I support the project and trust in the state's process to do what's best for both the environment and our community.

Sincerely,

Tim Kozojed
Hillsboro, ND

NORTH Dakota | Parks & Recreation
Be Legendary.™

May 9, 2025

Rachel Strommen
NDDEQ
Division of Water Quality
4201 Normandy Street
Bismarck, ND 58503-1324

Re: NDPDES Permit Application No. NDAFO0908 Herberg Dairy, Traill County

Dear Rachel,

The North Dakota Parks and Recreation Department (NDPRD) has reviewed the above-referenced ND Feeding Operation Permit for the Herberg Dairy facility in Traill County, North Dakota.

NDPRD's scope of authority and expertise covers properties that NDPRD owns, leases, or manages; properties protected under Section 6(f) of the Land and Water Conservation Fund (LWCF); rare plants; and ecological communities established through the Natural Heritage Program.

The project does not appear to affect properties NDPRD owns, leases, or manages positively.

The project does not appear to affect any properties protected under Section 6(f) of the LWCF.

A North Dakota Natural Heritage biological conservation database query determines if any current or historical plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Based on this review, we have no known plant and animal species of concern or significant ecological communities documented within or immediately adjacent to the project site.

We appreciate your commitment to rare plant, animal, and ecological community conservation, management, and inter-agency cooperation. For additional information, please contact Kathy Duttenhefner at 701-328-5370, 701-220-3377 (cell), or kgduttenhefner@nd.gov.

Thank you for the opportunity to comment on the proposed project.

Sincerely,
Kathy Duttenhefner
Kathy Duttenhefner, Chief Natural Resources Division

604 E Boulevard Ave Dept. 750 | Bismarck, ND 58505
PHONE: 701-328-5357 | FAX: 701-328-5363 | EMAIL: parkrec@nd.gov | WEBSITE: www.parkrec.nd.gov

Waldron Feld, Sarah

From: Skjod, Jennifer L.
Sent: Thursday, May 29, 2025 8:44 AM
To: Waldron Feld, Sarah
Subject: FW: Dairy Farm Near Fargo

I think these go to you?

Thanks much,
Jennifer

-----Original Message-----
From: vikingstudieskwiecien@gmail.com <vikingstudieskwiecien@gmail.com>
Sent: Wednesday, May 28, 2025 2:40 PM
To: DEQ, DEQ <deq@nd.gov>
Subject: Dairy Farm Near Fargo

[You don't often get email from vikingstudieskwiecien@gmail.com. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

***** CAUTION: This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Good afternoon,

I just wanted to express that if the dairy farm of 20,000+ cows is allowed to set up south of Fargo. I will be moving from Fargo, along with several other groups. Thank you.

David Kwiecien

Good afternoon, my name is Jason Lovas and I am a farmer who farms south of Hillsboro, near the proposed location of Riverview's dairy, and I am on the board of directors of the East Central Regional Water District, currently serving as the Treasurer/Secretary. I am here to offer my support in permit approval because of what I see as multiple benefits.

First as a farmer I am excited about the opportunity for me and my neighbors to raise crops specifically for the dairy and I am excited about the added benefits of manure application to our soils. I have spent many hours this past winter studying literature, mostly from other land grant universities in the US, about the positive effects manure application has over and above traditional, commercial fertilizers. The more I study, the more I am looking forward to further enhancing the quality of our local farmland.

Second, as a member of the rural water district, everyone on our board is eager and excited about serving the dairy with their water needs. Riverview would be a large consumer within our district and a concentrated, large water user will go a long way in the continued economic health and sustainability of our system, which will in turn benefit all of our customers. Let's turn an abundant local resource, our local aquifer capacity, into a benefit that everyone in our district can share in.

And lastly as a community member I am excited about the benefits that a large industry brings with the additional workforce, which means more kids in our schools, more people in our churches, and more people participating in local commerce. I'm looking forward to additional value added to our locally produced commodities, which will be turned over locally instead of getting shipped out of state. And lastly, enhanced economic activity which will generate greater tax revenue for our local political subdivisions. Let's keep North Dakota growing today, and into the future for our next generation.



June 2, 2025

North Dakota Department of Environmental Quality
Division of Water Quality
918 East Divide Ave.,
Bismarck, ND 58501-1947

Re: Comments on Proposed Permit for Riverview's Herberg Dairy Animal Feeding Operation

To whom it may concern,

Dakota Resource Council, Manitoba Eco-Network, Save Lake Winnipeg Project, Green Party of Manitoba, Food & Water Watch, and the Environmental Law & Policy Center ("Commenters") submit the following comments on the proposed Animal Feeding Operation Permit for Riverview ND, LLP's Herberg Dairy ("Permit") that North Dakota Department of Environmental Quality ("DEQ") noticed for public comment on April 18, 2025. The proposed Permit does not comply with DEQ's legal obligations under federal or state law. Commenters urge DEQ to reject Riverview's application because the proposed operation poses intolerable threats to public health and environmental quality.

I. Introduction

Riverview—an out-of-state company with a history of worker and environmental abuses[1]—proposes to operate a 25,500-cow mega-dairy in Traill County, North Dakota. A dairy of this size is unprecedented in the state for good reason; such facilities generate enormous amounts of waste that threaten our air, water, and the health of our communities. Approving the Herberg Dairy application would mean DEQ was authorizing Riverview to handle the same amount of feces and urine that a city with a population of approximately 900,000 humans generates, all without any of the water treatment used by modern municipal sewage plants.[2] Mega-dairies like the Herberg proposal also require incredible amounts of water to operate, draining aquifers and concentrating pollutants in groundwater. Despite the attention to detail needed to safely operate a dairy of this size, Riverview's application contains numerous errors that undermine the operation's professed ability to avoid discharging pollutants. Further, for the reasons laid out below, the minimal requirements contained in DEQ's proposed permit for the Herberg facility are insufficient to protect surrounding and downstream communities.

Given the likelihood of adverse impacts to human health and the environment, we urge the Department of Environmental Quality to deny the permit application. Barring this, additional permit conditions—including but not limited to intensive monitoring, contingency plans, strict adherence to best nutrient management practices, and enforcement of same—must be added to the permit. Additionally, DEQ must require that Riverview obtain a National Pollutant Discharge Elimination System (NPDES) permit because the size and proximity of the facility to vulnerable surface and groundwater all but ensure Herberg Dairy will discharge pollutants in a manner that degrades water quality.

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[1] Debbie Weingarten & Tony Davis, High Country News, *A Mega-Dairy is Transforming Arizona's Aquifer and Farming Lifestyles: Minnesota's Riverview Dairy has Deep Pockets and Long Straws* (Aug. 1, 2021), https://www.hcn.org/issues/53-8/agriculture-a-mega-dairy-is-transforming-arizonas-aquifer-and-farming-lifestyles/.

[2] Michael Van Amburgh & Karl Czymmek, *Series: Phosphorus and the Environment, 2. Setting the Record Straight: Comparing Bodily Waste Between Dairy Cows and People*, Cornell University Field CropsBlog (June 21, 2017), https://blogs.cornell.edu/whatscroppingup/2017/06/21/series-phosphorus-and-the-environment-2-setting-the-record-straight-comparing-bodily-waste-between-dairy-cows-and-people.

II. Legal Background

North Dakota state law obligates the Division of Environmental Quality (DEQ) to (1) "act in the public interest to protect, maintain, and improve the quality of waters in the state;" (2) "to require necessary and reasonable treatment of sewage, industrial, or other wastes;" and (3) to cooperate with the federal government in accomplishing these goals.[3] DEQ's regulations emphasize that the agency's primary concern in administering the state's water quality program is "to maintain or improve, or both, the quality of the waters of the state and to maintain and protect existing uses."[4] Importantly, the legislature defined waters of the state to include "all [] bodies or accumulations of water on or under the surface of the earth, natural or artificial, public or private, situated wholly or partly within or bordering upon the state, except those private waters which do not combine or effect a junction with natural surface or underground waters."[5]

In keeping with these goals, state law authorizes DEQ to prevent, control, and abate water pollution, including by conducting studies and investigations into the causes of water pollution.[6] As such, DEQ has the power to require any source of pollution to "install, use, and maintain monitoring equipment or methods" to detect and characterize discharges of pollutants to waters of the state.[7] Additionally, DEQ can require polluting facilities to report monitoring data to the state.[8] If DEQ determines an industrial facility poses a threat to water quality, the agency may also require modifications in waste disposal systems.[9] Under no circumstances is any entity permitted to store or discharge waste in a manner that causes or contributes to any exceedance of a water quality standard, "unless affirmatively demonstrated, after full satisfaction of the intergovernmental coordination and public participation provisions of the continuing planning process, that a change in quality is necessary to accommodate important social or economic development in the area in which the waters are located."[10]

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[3] ND Cent. Code §§ 61-28-01, 61-28-04.
[4] ND Admin. Code 33.1-16-02.1.
[5] ND Cent. Code § 61-28-02.
[6] ND Cent. Code § 61-28-04.
[7] *Id.* § 61-28-04(10); ND Admin. Code 33.1-16-03.1-07(3).
[8] ND Cent. Code § 61-28-04(10), (26).
[9] *Id.* § 61-28-04(7).
[10] *Id.* § 61-28-06; *see also* ND Admin. Code 33.1-16-02.1-02.

"Classifications and standards are established for the protection of public health and environmental resources and for the enjoyment of these waters, to ensure the propagation and well-being of resident fish, wildlife, and all biota associated with, or dependent upon, these waters; and to safeguard social, economical, and industrial development." ND Admin. Code 33.1-16-02.1-02. Thus, "[a]ll known and reasonable methods to control and prevent pollution of the waters of this state are required, including improvement in quality of these waters, when feasible." *Id.* In allowing the lowering of existing quality, the department shall assure that existing uses are fully protected and that the highest statutory and regulatory requirements for all point sources and cost-effective and reasonable best management practices for nonpoint sources are achieved." *Id.*

Recognizing the particular pollution threats created by Animal Feeding Operations (AFOs), DEQ established an entire regulatory chapter governing AFO permitting.[11] These regulations incorporate and rely on the *North Dakota Livestock Program Design Manual*[12] ("the Livestock Manual") as a basis for many of the design and operation standards that apply to permitted AFOs. The Livestock Manual "establishes guidelines for use by [DEQ] in the review and permitting process" for AFOs.[13] The purpose of AFO permitting is to "maintain beneficial uses of and prevent degradation of quality of the waters of the state."[14] DEQ is only authorized to issue an AFO permit upon a determination that the facility "will not cause or likely cause pollution of waters of the state."[15]

AFOs must be "located, designed, built, maintained, and operated to limit or prevent pollution of or the discharge of pollutants into waters of the state.[16] All manure storage structures "must be designed and maintained to withstand natural forces, to prevent impacts to waters of the state, and minimize seepage."[17] Earthen storage structures must have "a properly designed and constructed liner to minimize seepage, unless the department has determined a liner is not

[11] ND Admin. Code 33.1-16-03.1-02.
[12] ND DEP'T OF ENVTL. QUALITY, NORTH DAKOTA LIVESTOCK PROGRAM DESIGN MANUAL (last revised Dec. 3, 2021) ("Livestock Manual").
[13] *Id.* at 5.
[14] ND Admin. Code 33.1-16-03.1-02.
[15] *Id.* § 33.1-16-03.1-07.
[16] *Id.* § 33.1-16-03.1-08(1).
[17] *Id.* § 33.1-16-03.1-08(5)(c).

necessary based on site conditions."[18] Additionally, AFOs must develop and implement a nutrient management plan ("NMP") that specifies how each facility will land apply manure, litter, or process wastewater.[19] NMPs must include, *inter alia*, "adequate information to demonstrate that manure or process wastewater, or both, will be applied at agronomic rates" that do not exceed plant utilization rates for nitrogen or DEQ-approved rates for phosphorus.[20] To satisfy this requirement, the Livestock Manual calls for each NMP to contain a "[c]omplete nutrient budget for nitrogen and phosphorus for the rotation or crop sequence that considers all potential sources of these nutrients."[21] NMPs must also specify "[r]ecommended nitrogen and phosphorus rates, timing, [and] method of application and incorporation."[22]

Importantly, DEQ must implement its AFO regulatory program in accordance with the federal Clean Water Act. The Clean Water Act establishes a cooperative federalism framework under which the U.S. Environmental Protection Agency delegates aspects of National Pollution Discharge Elimination System ("NPDES") permitting authority to state governments. DEQ has been delegated such authority and must therefore "take all action necessary or appropriate to secure to this state the benefits of that act and similar federal acts."[23] To comply with the Clean Water Act and maintain authorization to operate North Dakota's NPDES permitting program, DEQ must ensure all point sources that discharge pollution to a water of the United States obtain and comply with a NPDES permit.[24] Concentrated Animal Feeding Operations (AFOs that meet minimum size thresholds that the Herberg Dairy easily surpasses) are expressly designated as point sources.[25] Permits must meet minimum federal requirements established through the effluent limitations guidelines for CAFOs found at 40 C.F.R. part 412 as well as 40 C.F.R. §§ 122.23, 122.41, 122.42(e) and 122.44. Among other things, these regulations mandate that all permits include representative monitoring capable of ensuring the permitted CAFO complies with the terms of its permit.[26]

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[18] *Id.* § 33.1-16-03.1-08(5)(d).
[19] *Id.* § 33.1-16-03.1-08(2).
[20] *Id.*
[21] Livestock Manual at 51.
[22] *Id.*
[23] N.D. Cent. Code § 61-28-04(15).
[24] 33 U.S.C. §§ 1311, 1342, 1362.
[25] *Id.* § 1362(14); 40 C.F.R. § 122.23(b).
[26] 33 U.S.C. §§ 1318(a), 1342(a)(2); 40 C.F.R. § 122.44(i).

Federal requirements are merely a floor; DEQ is authorized to—and in some situations must—issue permits that are more protective and to include additional terms and conditions in permits.[27]

III. Factual Background

The proposed location for Herberg Dairy has significant environmental, cultural, recreational, and economic value. The area is also highly vulnerable to water pollution impacts due to its proximity to important surface and groundwater resources that serve U.S. and Canadian residents. These waters—and the residents they serve—deserve maximum protection from pollution impacts.

A. CAFOs Generate and Discharge Harmful Pollutants.

Manure "is a primary source of nitrogen and phosphorus to surface and groundwater."[28] But, CAFO waste is not just nutrients; it also contains a hazardous cocktail of bacteria, pathogens, sediments, pesticides, pharmaceuticals, salts, metals and ions such as magnesium, sodium, potassium, and chloride.[29] CAFOs also handle a variety of other potential pollutants including process wastewater, hair and feathers, bedding materials, mortalities, cleaning products, and other chemicals.[30] When discharged to waters, these pollutants pose serious threats to human health and to ecosystems.

1. Pollutants

Among the many CAFO pollutants, nutrients are of primary concern because of their prevalence, potential for harm, and the ease with which they enter waterways. A lactating dairy cow producing 90 pounds of milk per day excretes approximately 1 pound of nitrogen in their

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[27] 40 C.F.R. §§ 122.4, 123.25.
[28] U.S. EPA, *Estimated Animal Agriculture Nitrogen and Phosphorus from Manure*, https://www.epa.gov/nutrient-policy-data/estimated-animal-agriculture-nitrogen-and-phosphorus-manure.
[29] 68 Fed. Reg. 7,176, 7,181 (Feb. 12, 2003); JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115(2) ENV'T HEALTH PERSPS. 308 (Feb. 2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817674/.
[30] EPA, RISK ASSESSMENT EVALUATION FOR CONCENTRATED ANIMAL FEEDING OPERATIONS, EPA/600/R-04/042, at 63, 72-73 (May 2004), https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=NRMRL&dirEntryId=85107 (hereinafter, "EPA CAFO RISK ASSESSMENT"); EPA, MANAGING MANURE NUTRIENTS AT CONCENTRATED ANIMAL FEEDING OPERATIONS at 2-1-–2-4 (Dec. 2004), https://www.epa.gov/sites/default/files/2015-08/documents/cafo_manure_guidance.pdf (hereinafter, "EPA, MANAGING CAFO MANURE").

manure daily.[31] Using this number, Herberg Dairy's proposed herd will produce nearly 8 million pounds of nitrogen annually. Phosphorus pollution is similarly problematic. A lactating dairy cow producing 90 pounds of milk per day excretes approximately 0.11 pounds of phosphorus daily.[32] This means the proposed Herberg herd will produce more than 850,000 pounds of phosphorus annually.

Though naturally occurring in the environment, nutrients pose unique risks to animal and plant life when excessive quantities are added to ecosystems. High concentrations of nitrogen and phosphorus in water create hypoxic dead zones where fish and other aquatic species cannot survive.[33] Further, heavy nutrient loads create algal blooms that can be toxic to humans and pets that come into contact with impacted waters.[34] Contact with the cyanotoxins in some blooms can cause nausea, vomiting, headache, diarrhea, skin/eye irritation, fever, muscle and joint pain, respiratory irritation, neurological problems, and allergic reactions.[35] The economic cost of a single major harmful algal bloom can climb to tens of thousands of dollars, and the cumulative cost of the U.S.'s algae problem may be as high as 100 billion dollars annually.[36] Low dissolved

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[31] Dr. Chanhee Lee, Ohio State Univ., *Nutrient Losses from Dairy Operations and their Environmental Issues* (Jan. 2016), https://dairy.osu.edu/newsletter/buckeye-dairy-news/january-2016/nutrient-losses-dairy-operations-and-their-environmental; STATE OF CALIFORNIA STATE WATER RESOURCES CONTROL BOARD, DRAFT ORDER 2024-00XX, IN THE MATTER OF REVIEW OF WASTE DISCHARGE REQUIREMENTS GENERAL ORDER NO 05-2013-0122 FOR MILK COW DAIRIES IN THE CENTRAL VALLEY REGION at 8-10 (Oct. 1, 2024) ("CA Dairy Order"); SCOTT BRADFORD, U.S. ENV'T PROT. AGENCY, TRANSPORT AND FATE OF NUTRIENTS AND INDICATOR MICROORGANISMS AT A DAIRY LAGOON WATER APPLICATION SITE: AN ASSESSMENT OF NUTRIENT MANAGEMENT PLANS, 66 (2011); Michael A. Mallin & & Lawrence B. Cahoon, *Industrialized Animal Production—A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems*, 24 POPULATION AND ENV'T 369, 377 (2003); U.S. ENVTL. PROT. AGENCY, DRAFT INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2022 5-12, https://perma.cc/UX33-BZLQ (discussing deposition of volatilized nitrous oxide); *see also* THOMAS HARTER ET AL., NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS, ASSESSING POTENTIAL IMPACTS OF LIVESTOCK MANAGEMENT ON GROUNDWATER 4-7 (2014) (charting studies that documented leaching from CAFO corrals and feedlot surfaces, manure lagoons, and land application areas).

[32] *Id.*

[33] EPA, *The Effects: Environment*, https://www.epa.gov/nutrientpollution/effects-environment.

[34] NDEE, *supra* n.15 at 15; GAO, *supra* n.2 at 9, 24-25, 72 (2008); 68 Fed. Reg. 7,176, 7,235; JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115(2) ENV'T HEALTH PERSPS. 308, 309 (Feb. 2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817674/; U.S. Office for Harmful Algal Blooms, *HAB Impacts on Wildlife*, https://hab.whoi.edu/impacts/impacts-wildlife/ (last accessed May 30, 2025).

[35] Anne Schechinger, ENVIRONMENTAL WORKING GROUP, *Animal Feeding Operations Harm the Environment, Climate and Public Health* (March 19, 2024), https://www.ewg.org/research/animal-feeding-operations-harm-environment-climate-and-public-health.

[36] National Centers for Coastal Ocean Science, *Assessing Environmental and Economic Impacts*, https://coastalscience.noaa.gov/science-areas/habs/assessing-environmental-and-economic-impacts (accessed May 31, 2025).

oxygen and nutrients are among the leading causes of water quality impairments in North Dakota.[37]

Bacteria in the environment convert nitrogen from manure into nitrates, another hazardous pollutant. Ingesting water contaminated with nitrates is associated with dangerous human health conditions like colorectal cancer, thyroid disease, birth defects, premature births, and methemoglobinemia (a potentially fatal condition commonly known as "blue baby syndrome").[38] Neighboring states with high concentrations of industrial agriculture facilities like the proposed Herberg Dairy are now dealing with nitrate crises that endanger human health and cost the public millions of dollars.[39] Importantly, the health risks associated with high nitrate levels are often compounded by the synergistic effects of pesticides, like those used in cattle ear tags or on nearby crop fields whose rows are devoted to growing livestock feed inputs like corn.[40] For instance, a 2022 study of drinking water in rural Nebraska found that high levels of both nitrate and atrazine (a carcinogenic pesticide used widely on livestock feed crops in the U.S.) in drinking water were correlated with increased likelihood of birth defects.[41]

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[37] DEQ, NORTH DAKOTA 2020-2022 INTEGRATED SECTION 305(B) WATER QUALITY ASSESSMENT REPORT AND SECTION 303(D) LIST OF WATERS NEEDING TOTAL MAXIMUM DAILY LOADS, https://deq.nd.gov/publications/WQ/3_WM/TMDL/1_IntegratedReports/2020_2022_Final_ND_Integrated_Report_20230824.pdf.

[38] Mary Ward et al., *Drinking Water Nitrate and Human Health: An Updated Review*, 15(7) Int. J. Res. Public Health 22 (2018); JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115(2) ENV'T HEALTH PERSPS. 308, 310 (Feb. 2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817674/; Roberto Picetti et al., *Nitrate and Nitrite Contamination in Drinking Water and Cancer Risk: A Systematic Review with Meta-Analysis*, 210 ENVT'L RES. 112988 (July 2022), https://www.sciencedirect.com/science/article/pii/S0013935122003152.

[39] MINNESOTA CENTER FOR ENVIRONMENTAL ADVOCACY ET AL., PETITION FOR EMERGENCY ACTION PURSUANT TO THE SAFE DRINKING WATER ACT, 42 U.S.C. § 300I, TO PROTECT THE CITIZENS OF THE KARST REGION OF MINNESOTA 18-20 (2023); IOWA ENVIRONMENTAL COUNCIL ET AL., PETITION FOR EMERGENCY ACTION PURSUANT TO THE SAFE DRINKING WATER ACT, 42 U.S.C. § 300I, TO PROTECT THE CITIZENS OF THE KARST REGION OF IOWA 21-26 (2024).

[40] USDA, *2022 Census of Agriculture State Profile– Nebraska*, https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Nebraska/cp99031.pdf.

[41] Balkissa S. Ouattara et al., *Investigation of a Possible Relationship between Anthropogenic and Geogenic Water Contaminants and Birth Defects Occurrence in Rural Nebraska*, 14 Water (2022), https://www.mdpi.com/2073-4441/14/15/2289; *see also* Louise Boyle, INDEPENDENT, *US Meat Industry Using 235m Pounds of Pesticides a Year, threatening Thousands of At-Risk Species, Study Finds*, https://www.independent.co.uk/climate-change/news/pesticides-factory-farm-wildlife-food-chain-vegan-b2017811.html#comments-area (Feb. 22, 2022).

CAFO waste is also laden with fecal coliform bacteria and other pathogens.[42] Zoonotic pathogens commonly found in manure include *E. coli*, *Campylobacter*, *Salmonella*, *Listeria*, *Cryptosporidium parva,* and *Giardia*, all of which can cause acute gastrointestinal distress, fever, and other dangerous symptoms in humans who drink or have recreational contact with contaminated water.[43]

CAFOs use a slew of antibiotics, hormones, and other pharmaceuticals to deal with these pathogens and keep animals alive in such concentrated and stressful environments. These products end up in CAFO wastes and ultimately make their way into nearby surface waters and domestic wells.[44] Last year approximately 11.1 million kilograms of antibiotics were sold for use in animal agriculture in the United States. Somewhere between 40 and 90 percent of the antibiotic dose administered to an animal is subsequently excreted as waste that ultimately enter the environment. For example, only 25 percent of a tetracycline[45] dose is absorbed by the animal. Tetracyclines—the most commonly sold antibiotic in 2023[46]—cause chromosomal aberrations that inhibit plant growth, induce DNA breakage, and change the enzymatic activities of earthworms, zebra fish, Daphnia, algae, mussels.[47] Tetracycline is also capable of increasing cyanobacteria content of algal blooms more than two-fold.[48]

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[42] 68 Fed. Reg. 7,176, 7,186; Xunde Li et al., *Fecal Indicator and Pathogenic Bacteria and Their Antibiotic Resistance in Alluvial Groundwater of an Irrigated Agricultural Region with Dairies*, 44 J. ENVTL. QUALITY 1435, 1435 (2015).

[43] Tucker Burch et al., *Fate of Manure-Borne Pathogens during Anaerobic Digestion and Solids Separation*, 47(2) J. ENVTL. QUALITY 336, 336 (2018); 68 Fed. Reg. 7,176, 7,263.

[44] 68 Fed. Reg. 7,236; Laura M. Bexfield et al., *Hormones and Pharmaceuticals in Groundwater Used as a Source of Drinking Water Across the United States*, 53 Envtl. Sci. & Tech 2950, 2950-51, 2958 (2019); *see also* SCOTT A. BRADFORD ET AL., U.S. DEP'T AGRIC. (2008), REUSE OF CONCENTRATED ANIMAL FEEDING OPERATION WASTEWATER ON AGRICULTURAL LANDS, https://www.ars.usda.gov/arsuserfiles/20360500/pdf_pubs/P2194.pdf (estimating that land application of CAFO waste may be responsible for more than 90 percent of total estrogen present in the environment).

[45] Tetracycline is a pharmaceutical commonly used to treat dairy cows for infections like mastitis, but also for non-therapeutic purposes like growth promotion.

[46] Bailee Henderson, FOOD SAFETY MAGAZINE, *Sales of Medically Important Antibiotics for Use in Food-Producing Animals Decreased Slightly in 2023*, https://www.food-safety.com/articles/9833-sales-of-medically-important-antibiotics-for-use-in-food-producing-animals-decreased-slightly-in-2023 (accessed May 29, 2025).

[47] Yernar Amangelsin et al., *The Impact of Tetracycline Pollution on the Aquatic Environment and Removal Strategies*, 12 ANTIBIOTICS 15, https://pmc.ncbi.nlm.nih.gov/articles/PMC10044355/.

[48] *Id.*

While the individual risks presented by each drug used on CAFOs are too numerous to detail here,[49] hormones commonly used in dairy CAFOs are another major source of concern.[50] Estrogen pollution has been linked to increased incidences of breast cancer in women and prostrate cancer in men.[51] Pharmaceuticals used on feedlots are also commonly associated with endocrine disruption and reproductive disorders in fish and other aquatic wildlife.[52] One study that specifically examined the impacts of CAFO effluent on fathead minnows found that "[w]ild fish collected below a feedlot exhibited altered reproductive biology."[53]

The widespread use of antibiotics for non-therapeutic purposes in livestock animals also drives selective pressure for antibiotic-resistant bacteria, increasing health burdens for impacted humans and animals.[54] According to the Food & Drug Administration, resistance against many of the most commonly used livestock antibiotics have exploded since 2013.[55] Researchers studying water pollution from a CAFO-dense area in California found "significant potential risk of groundwater contamination with antibiotic-resistant bacteria derived from CAFOs even if the subsurface environment is not suitable to transmit pathogenic bacteria."[56] Those researchers concluded the paper by highlighting the importance of "continuous and effective groundwater monitoring" to safeguard public health.[57]

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[49] *See generally* Manvendra Patel et al., *Pharmaceuticals of Emerging Concern in Aquatic Systems: Chemistry, Occurrence, Effects, and Removal Methods*, 119 CHEM. REVIEW 3510 (2019), https://pubs.acs.org/doi/10.1021/acs.chemrev.8b00299 for a list of pharmaceuticals that have been researched and their impacts on aquatic species.

[50] Diana Yates, U. Illinois, *Team Determines How Estrogens Persist in Dairy Farm Wastewater* (June 5, 2012), https://news.illinois.edu/team-determines-how-estrogens-persist-in-dairy-farm-wastewater/.

[51] Muhammad Adeel et al., *Environmental Impacts of Estrogens on Human, Animal and Plant Life: A Critical Review*, 99 ENV'T INT'L 107 (2017), https://pdf.sciencedirectassets.com/271763/1-s2.0-S0160412016X00104/1-s2.0-S0160412016304494/main.pdf.

[52] Edward F. Orlando et al., *Endocrine-Disrupting Effects of Cattle Feedlot Effluent on an Aquatic Sentinel Species, the Fathead Minnow*, 112(3) ENVTL. HEALTH PERSPECTIVES 353, 356 (2004); Joan A Casey et al., *Industrial Food Animal Production and Community Health*, 2 CURRENT ENVTL. HEALTH REP. 259, 266 (Sept. 2015).

[53] *Id.* at 356.

[54] Ya He et al., *Antibiotic Resistance Genes from Livestock Waste: Occurrence, Dissemination, and Treatment*, 3(4) Clean Water 1 (2020), https://www.nature.com/articles/s41545-020-0051-0.

[55] FDA, *The National Antimicrobial Resistance Monitoring System*, https://www.fda.gov/animal-veterinary/antimicrobial-resistance/national-antimicrobial-resistance-monitoring-system (updated Jan. 8, 2025) (documenting spikes in resistance to, *inter alia*, Ciprofloxacin, Quinupristin, and dalfopristin).

[56] Xunde Li, et al., *Fecal Indicator and Pathogenic Bacteria and Their Antibiotic Resistance in Alluvial Groundwater of an Irrigated Agricultural Region with Dairies*, 44 J. OF ENV'T QUALITY 1435, 1445 (2015); Fabienne Wichmann, *Diverse Antibiotic Resistance Genes in Dairy Cow Manure*, https://doi.org/10.1128/mbio.01017-13 (2014).

[57] *Id.*

Finally, salts, heavy metals, semimetals, and other trace elements added to feed and eventually expelled by livestock also impact water quality.[58] CAFO waste is known to contain many of the same elements found in sewage sludge, including "arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc."[59] Following a 2009 petition for rulemaking that chronicled reports of residual arsenic in meat and poultry food products,[60] the Food and Drug Administration withdrew its approvals of feed additives with arsenic. However, other elements which are not agronomically useful or taken up by crops remain in feed and wastes, resulting in accumulation and metal-contaminated runoff.[61] In North Carolina, for example, excessive accumulations of zinc and copper in areas with high concentrations of industrial animal agriculture have degraded soil quality to toxic levels.[62] Excessive salt in CAFO waste also impacts soil quality and can actually restrict crop establishment and growth.[63] In this manner, allowing land application of CAFO waste that has not been treated or even tested for metals and other trace elements directly undermines plant growth and contributes to overapplication of manure, fertilizer, and soil amendments that further reduce water quality.

2. Discharge Pathways

CAFOs discharge pollutants to waterways through a variety of pathways. Discharges from production areas occur when liquid waste storage structures, or "lagoons," overflow or breach, allowing their contents to run off into adjacent surface waters or seep into groundwater.[64]

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[58] *Id.*; SCOTT BRADFORD, U.S. ENV'T PROT. AGENCY, TRANSPORT AND FATE OF NUTRIENTS AND INDICATOR MICROORGANISMS AT A DAIRY LAGOON WATER APPLICATION SITE: AN ASSESSMENT OF NUTRIENT MANAGEMENT PLANS, 1, 12, 66 (2011); Xueping Liu, et al., *Arsenic pollution of agricultural soils by concentrated animal feeding operations (CAFOs)*, 119 CHEMOSPHERE 273 (2015).

[59] EPA, *What Environmental and Human Health Impacts Are Potentially Caused by CAFOs?*, https://www3.epa.gov/npdes/pubs/cafo_ch5.pdf at 44-45; JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115(2) ENV'T HEALTH PERSPS. 308, 308 (Feb. 2007).

[60] CENTER FOR FOOD SAFETY & INSTITUTE FOR AGRICULTURE AND TRADE POLICY, CITIZEN PETITION TO THE FOOD AND DRUG ADMINISTRATION (Dec. 8, 2009), https://www.centerforfoodsafety.org/files/arsenic-petition-12-8-09-final_67875.pdf.

[61] EPA, WHAT ENVIRONMENTAL AND HUMAN HEALTH IMPACTS ARE POTENTIALLY CAUSED BY CAFOS? 44-45, https://www3.epa.gov/npdes/pubs/cafo_ch5.pdf.

[62] Steph Kulesza et al., *Mitigating Zinc and Copper Toxicity in North Carolina Soils* (March 27, 2024) https://content.ces.ncsu.edu/mitigating-zinc-and-copper-toxicity-in-north-carolina-soils.

[63] SCOTT BRADFORD, U.S. ENV'T PROT. AGENCY, TRANSPORT AND FATE OF NUTRIENTS AND INDICATOR MICROORGANISMS AT A DAIRY LAGOON WATER APPLICATION SITE: AN ASSESSMENT OF NUTRIENT MANAGEMENT PLANS, 14-15 (2011).

[64] Steve Wing et al., *The Potential Impact of Flooding on Confined Animal Feeding Operations in Eastern North Carolina*, 110 ENVTL. HEALTH PERSPECTIVES 387, 390-91 (2002); Ryan McCarthy, Meat + Poultry, *Commissioners in Nebraska Contact JBS over Wastewater Lagoon Concerns* (Feb. 15, 2024),

Lagoons also discharge to groundwater when they lack adequate liners.[65] The Ninth Circuit Court of Appeals recently acknowledged that even lagoons that purportedly meet permeability standards like the Livestock Manual's 1/16 inch per day seepage limit are "designed to leak."[66] CAFOs also discharge wastewater from their production areas when operations are so large that they cannot possibly manage all contaminated run-on water. Additionally, CAFOs often stockpile silage in massive mounds and manure in uncovered windrows, both of which produce leachate that seeps into groundwater and contaminates runoff from production areas.[67] Runoff and spillage containing CAFO waste discharge to surface waters through ditches and canals; manure and wastewater handling infrastructure such as pipes, pumps, and storage facilities; leaking equipment; and ventilation systems.[68]

Land application areas pose an even greater risk of discharges. As EPA recently concluded, nutrient management plans are "insufficient" to protect water quality because they are based on "USDA standards, which focus on maximizing crop growth, *rather than on*

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https://www.meatpoultry.com/articles/29768-commissioners-in-nebraska-contact-jbs-over-wastewater-lagoon-concerns; Greg Stanley, *Seventeen Manure Pits Reportedly Overflow at Large Feedlots in Southern Minnesota* (June 26, 2024), https://www.startribune.com/manure-pits-reportedly-overflow-at-16-large-feedlots-in-southern-minnesota/600376074.

[65] Noah Rudko et al., *Development of a Point-Source Model to Improve Simulations of Manure Lagoon Interactions with the Environment*, J. ENVTL. MGMT. 5-6 (2023) (The groundwater monitoring wells downgradient of the lagoon had elevated concentrations of each of the sampled water quality parameters, indicating that the lagoon was the only factor driving elevated ammonia-N concentrations in the downgradient wells."); WASH. STATE DEP'T OF ECOLOGY, MANURE AND GROUNDWATER QUALITY: LITERATURE REVIEW 27, 28, 67 (June 2016) (collecting studies).

[66] *Food & Water Watch*, 20 F.4th at 509; Livestock Manual at 30; *see also* Xunde Li, et al., *Fecal Indicator and Pathogenic Bacteria and Their Antibiotic Resistance in Alluvial Groundwater of an Irrigated Agricultural Region with Dairies*, 44 J. OF ENV'T QUALITY 1435, 1435 (2015) ("Our findings indicate that there is significant potential risk of groundwater contamination with antibiotic-resistant bacteria derived from CAFOs even if the subsurface environment is not suitable to transmit pathogenic bacteria").

[67] Livestock and Poultry Environmental Learning Center, *Silage Runoff Characteristics* (Mar. 5, 2019), https://lpelc.org/silage-runoff-characterization/ ("Silage leachate is a high strength waste which contributes to surface and groundwater contamination of various pollutants from runoff, direct leaching through concrete storage structures, and infiltration of runoff.").

[68] 68 Fed. Reg. at 7,181; EPA, MANAGING CAFO MANURE at 2-25-–2-26 (discussing voluntary controls to minimize spills and leaks from storage structures), 4-2 (noting that certain CAFOs must have "reception pits…, diversions, sediment basins, and underground outlets"); 4-15 (describing irrigation systems for applying CAFO waste), 7-2 (discussing "unplanned discharges" from pumps and pipes), O-10 (explaining that fields with subsurface (tile) drainage "creat[e] a surface water pollution hazard from direct tile discharge"); EPA, RISK ASSESSMENT EVALUATION FOR CONCENTRATED ANIMAL FEEDING OPERATIONS, EPA/600/R-04/042, at 52, 72-73 (May 2004), https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=NRMRL&dirEntryId=85107; *Nat'l Pork Producers Council v. U.S. E.P.A.*, 635 F.3d 738, 748 (5th Cir. 2011) (agreeing with EPA's position that "litter discharged through confinement house ventilation fans" would be a Clean Water Act violation).

preventing excess nutrient runoff."[69] The California State Water Resource Control Board has agreed, stating that land application at agronomic rates "is responsible for the vast majority of dairies' nitrogen impacts to groundwater. . . forc[ing] [the State] to take a hard look at what [it] now recognizes has been an inadequate approach for regulating dairy waste discharges."[70] Because groundwater can act as a conduit to surface waters, pollution to groundwater has the potential to impact surface water quality as well.[71] Under the Clean Water Act, a CAFO is liable for discharges of "pollutants that reach navigable waters after traveling through groundwater if [those] discharge[s] [are] the functional equivalent of a direct discharge from the point source into navigable waters."[72]

Certain land application practices commonly employed by CAFOs create elevated discharge risks. For instance, application of CAFO waste to saturated or frozen fields leads to contaminated runoff reaching waterways.[73] Given "the minimal settling and breaking down of the waste during [frozen and/or snow-covered] conditions, and the inability to predict or control snowmelt and rainfall," Michigan regulators have concluded that "there are no practices that can ensure the runoff from fields with surface-applied waste on frozen or snow-covered ground will not be polluted."[74] Pressurized irrigation systems and other land application methods also cause discharges due to faulty equipment, imprecise application, or aerial deposition of volatilized

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[69] EPA, *Confined Animal Feeding Operations: A Primer on the Federal Program*, 18 (Dec. 2021) (emphases added). Evidence also suggests that CAFOs are regularly out of compliance with their NMPs. *See, e.g.*, Ben Chugg et al., Stanford Univ., *Detecting Environmental Violations with Satellite Imagery in Near Real Time: Land Application under the Clean Water Act*, https://dho.stanford.edu/wp-content/uploads/LandApp.pdf (finding substantial infractions of the prohibition on winter manure applications and repeated applications in excess of reporting); Environmental Integrity Project, *84% of MD Poultry Operations Failed Water Pollution Control Inspections from 2017-2020* (Oct. 28, 2021), https://environmentalintegrity.org/news/md-poultry-operations-fail-water-pollution-control-inspections/ ("[M]ore than half of the poultry farms for which records were available in 2019 reported to the state that they spread manure on their crops in amounts greater than allowed under their nutrient management plans.").

[70] California State Water Resources Control Board, *In the Matter of Review of Waste Discharge Requirements General Order No R5-2013-0122 For Milk Cow Dairies in the Central Valley Region Issued by the California Regional Water Quality Control Board, Central Valley Region* 6 (Oct. 1, 2024).

[71] DAVID J. ERICKSON CPG PE, RESPONSE TO RIVERVIEW, LLP APPLICATION FOR THE HERBERG DAIRY 3, 7-9, & Attachment A ("Erickson Report") (attached as Exhibit 1)

[72] *Cnty. of Maui v. Hawaii Wildlife Fund*, 590 U.S. 165, 185 (2020).

[73] EPA, NPDES PERMIT WRITERS' MANUAL FOR CONCENTRATED ANIMAL FEEDING OPERATIONS, Appendix G at G-14 (Feb. 2012), https://www.epa.gov/sites/default/files/2015-10/documents/cafo_permitmanual_entire.pdf (citing research finding a 1,480 percent increase in soluble P concentrations and 576 percent increases in ammonia-nitrogen concentrations following winter application of dairy manure).

[74] MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, WATER BUREAU, TECHNICAL STANDARD FOR THE SURFACE APPLICATION OF CONCENTRATED ANIMAL FEEDING OPERATIONS WASTE ON FROZEN OR SNOW-COVERED GROUND WITHOUT INCORPORATION OR INJECTION (Apr. 19, 2005) (emphasis added).

pollutants.[75] Additionally, many land application areas have subsurface drainage systems, such as tile drains, or abut ditches that act as conduits to surface waters.

Pollution risks from all CAFO areas are exacerbated when CAFOs handle waste in liquid or slurry form,[76] as Riverview proposes to do at Herberg Dairy.[77] According to a soil scientist with USDA's Natural Resources Conservation Service, liquid waste "behaves like water."[78] Because of this, dairy CAFO pollutants easily move through the environment and discharge to state waters where they degrade water quality, threaten public health and ecosystems, and cost surrounding communities millions of dollars.[79]

The EPA estimates that approximately 75 percent of all CAFOs discharge pollutants to water.[80] The proposed Herberg Dairy is likely to fall into this category due to its size and

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[75] *See* WISCONSIN MANURE IRRIGATION WORKGROUP, CONSIDERATIONS FOR THE USE OF MANURE IRRIGATION PRACTICES 3, 39-42 (2016) (discussing potential for surface water discharge); JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115(2) ENV'T HEALTH PERSPS. 308, 308-09 (Feb. 2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817674/; *Parris v. 3M Co.*, 595 F. Supp. 3d 1288, 1322 (N.D. Ga. 2022) (collecting cases in which "land application systems, spray head sprinklers, and trucks constitute point sources when used to spread treated wastewater and manure on land"); *Cmty. Ass'n for Restoration of the Env't v. Henry Bosma Dairy*, 65 F. Supp. 2d 1129, 1147 (E.D. Wash. 1999) (noting a "verified discharge of animal wastes from a spray gun"); FOOD & WATER WATCH ET AL., PETITION TO REVISE THE CLEAN WATER ACT REGULATIONS FOR CONCENTRATED ANIMAL FEEDING OPERATIONS 52-53 (2017), https://www.foodandwaterwatch.org/wp-content/uploads/2021/06/citizens_cafo_cwa_petition.pdf; Horacio A. Aguirre-Villegas & Rebecca A. Larson, *Evaluating Greenhouse Gas Emissions from Dairy Manure Management Practices Using Survey Data and Lifecycle Tools*, 143 J. CLEANER PRODUCTION 169, 169 (2017).

[76] EPA, Chapter 8 of Development Document for the Final Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations, 8-1 (Dec. 2002), available at: https://www3.epa.gov/npdes/pubs/cafo_proposed_dev_doc_ch8.pdf ("Reduced water use or handling of wastes in a dry or drier form lowers the risk of pollutants entering surface waters.").

[77] SETTJE AGRI-SERVICES & ENGINEERING, INC., CALCULATIONS 9-10 (Feb. 21, 2025) (consultant report prepared in support of Riverview's Herberg Dairy application containing specifications for four liquid manure storage structures and one leachate pond) (attached as Exhibit 2).

[78] David Green, *Frank Gibbs: Liquid Manure Is Too Wet*, STATE LINE OBSERVER (2006) ("The problem is simple. We're watering manure down to where it behaves like water. Let me repeat that. We're watering manure down to where it behaves like water. You don't need to be a rocket scientist to understand that.").

[79] Joan A. Casey et al., *Industrial Food Animal Production and Community Health*, 2 CURRENT ENVTL. HEALTH REPORTS 259 (2015) (literature review concluding that communities living near industrial food animal production suffered heightened risk of respiratory illness, MRSA, Q fever, and adverse stress and mood conditions); Robert Martin et al., Johns Hopkins Center for a Livable Future, Re: The Ulupono Initiative's Proposal for Hawai'i Dairy Farms on the Island of Kaua'i (Feb. 5, 2018), https://friendsofmahaulepu.org/wp-content/uploads/2018/05/Johns-Hopkins-CLF-letter-to-HI-DOH.pdf (letter describing concerns stemming from a much smaller dairy than the proposed Herberg Dairy); Kat Ruane et al., *The Devastating Toll of Factory Farm Pollution in Iowa*, https://www.foodandwaterwatch.org/2025/01/29/iowa-factory-farm-water-pollution/ (Jan. 29, 2025) (describing Des Moines Water Works' ratepayer funded, multimillion dollar reverse osmosis treatment plant that it must operate to reduce nitrate concentrations below Safe Drinking Water Act standards).

[80] 73 Fed. Reg. 70,418, 70,469 (Nov. 20, 2008) (explaining that only about 25 percent of CAFOs are not designed to discharge).

proximity to surface and ground waters. CAFOs are specifically designed to maximize production and reduce operator costs by departing from the traditional way of raising animals on the land. Because the amounts of manure and other pollutants generated "frequently exceed the assimilative capacity of land," CAFO-dense watersheds often suffer severe water quality impacts.[81] Decades of inadequate regulation have allowed CAFOs to construct, design, operate, and maintain their facilities such that they discharge significant amounts of waste into state and federal waters, externalizing their pollution costs onto the environment and the public at large.[82] Consequently, this industry is causing severe water quality deterioration that impacts the environment and threatens public health.

B. Riverview Proposes to Operate Its Mega-Dairy in an Invaluable and Vulnerable Area.

Riverview proposes to site this CAFO of unprecedented size just 1.5 miles west of the Red River of the North, an international waterway of high drinking water and recreational value that drains into Lake Winnipeg in Canada.[83] The Red River is a class I stream:[84] "The quality of the waters in this class shall be suitable for the propagation or protection, or both, of resident fish species and other aquatic biota and for swimming, boating, and other water recreation. The quality of the waters shall be suitable for irrigation, stock watering, and wildlife without injurious effects. After treatment consisting of coagulation, settling, filtration, and chlorination, or equivalent treatment processes, the water quality shall meet the bacteriological, physical, and chemical requirements of the department for municipal or domestic use."[85]

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[81] *See e.g.,* American Public Health Association, *Precautionary Moratorium on New and Expanding Concentrated Feeding Operations* (Nov. 5, 2019), https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2020/01/13/precautionary-moratorium-on-new-and-expanding-concentrated-animal-feeding-operations ("Over the last several decades, food animal production in the United States has shifted from an extensive system of small and medium-sized farms to one characterized primarily by large-scale industrial operations that concentrate large numbers of animals in small geographic areas."); CARRIE HRIBAR, NAT'L ASSOC. OF LOC. BDS. OF HEALTH, UNDERSTANDING CONCENTRATED ANIMAL FEEDING OPERATIONS AND THEIR IMPACT ON COMMUNITIES, 10–11 (Mark Schultz, ed. 2010); Doug Gurian-Sherman, UNION OF CONCERNED SCIENTISTS, CAFOS UNCOVERED: THE UNTOLD COST OF CONFINED ANIMAL FEEDING OPERATIONS 10 (Apr. 2008), https://www.ucsusa.org/sites/default/files/2019-10/cafos-uncovered-full-report.pdf.

[82] *See generally* FOOD & WATER WATCH ET AL., PETITION TO REVISE THE CLEAN WATER ACT REGULATIONS FOR CONCENTRATED ANIMAL FEEDING OPERATIONS (2017), https://www.foodandwaterwatch.org/wp-content/uploads/2021/06/citizens_cafo_cwa_petition.pdf.

[83] MINNESOTA POLLUTION CONTROL AGENCY, THE RED RIVER OF THE NORTH: EVALUATING THE HEALTH OF THE RIVER 1, 3 (Feb. 2019), https://www.pca.state.mn.us/sites/default/files/wq-swm1-05.pdf.

[84] N.D. Admin. Code 33.1016-02.1, App'x I.

[85] *Id.* § 33.1-16-02.1-09(a).

The Red River is "home to a variety of important fish species, including channel catfish, walleye, and bigmouth buffalo."[86] A multinational coalition of tribal and state governments have been working to restore a stable lake sturgeon population to the Red River Basin for decades.[87] In 2022, these efforts were rewarded with the first confirmed natural sturgeon spawning observed in the basin for over 100 years.[88] This hard won success is threatened by agricultural pollution like manure runoff that contributes to low dissolved oxygen levels, high turbidity, and sedimentation in the River, poor water quality conditions that endanger sturgeon and other fish, as well as other wildlife in the ecosystem.[89]

According to the International Red River Watershed Board's most recent progress report, monitoring conducted at the U.S.-Canadian border shows 46 percent of water quality samples exceed international objectives for total dissolved solids and 6 percent exceed objectives for chloride.[90] While no samples exceeded the objective for *E. coli*, the sample with the highest recorded concentration was at the maximum limit.[91] Sampling also demonstrates that the Red River is already exceeding nutrient concentration and loading goals.[92] Similarly, the Report notes concentrations of metals and pesticides, including atrazine, in excess of alert levels.[93] As discussed above, each of these pollutants is present in CAFO waste.

The Red River ultimately deposits much of its pollutant load into Lake Winnipeg, one of the largest lakes in the world. Together, Minnesota and North Dakota already contribute

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[86] International Joint Commission, *Red River*, https://www.ijc.org/en/watersheds/red-river; *see also* MINNESOTA DEP'T OF NATURAL RESOURCES ET AL., RED RIVER OF THE NORTH FISHERIES MANAGEMENT PLAN 6 (2017-2027), https://files.dnr.state.mn.us/fisheries/rivers/red-river/red-river_mp.pdf ("There are 87 fish species representing 20 families known to inhabit rivers and streams in the Red basin.").
[87] JAMISON WENDEL, MINNESOTA DEP'T OF NATURAL RESOURCE, RESTORATION OF EXTIRPATED LAKE STURGEON (ACIPENSER FULVESCENS) IN THE RED RIVER WATERSHED—PHASE TWO (2019-2029), https://files.dnr.state.mn.us/fisheries/rivers/red-river/sturgeon-phase-2.pdf?v=2025.01.24-05.00.19.
[88] Minnesota Dep't of Natural Resources, *Red River of the North Sturgeon Restoration*, https://www.dnr.state.mn.us/fisheries/red-river-sturgeon.html (last accessed June 1, 2025).
[89] MINNESOTA DEP'T OF NATURAL RESOURCES ET AL., RED RIVER OF THE NORTH FISHERIES MANAGEMENT PLAN 6, 19 (2017-2027), https://files.dnr.state.mn.us/fisheries/rivers/red-river/red-river_mp.pdf?v=2025.01.24-05.00.19; *see also* Minnesota Dep't of Natural Resources, *Red River of the North State Water Trail*, https://www.dnr.state.mn.us/watertrails/redriver/index.html (describing other wildlife that rely on the Red River, including but not limited to beavers, bears, moose, and a variety of bird species).
[90] INTERNATIONAL RED RIVER WATERSHED BOARD, 24TH ANNUAL PROGRESS REPORT 13 (Oct. 2023), https://www.ijc.org/sites/default/files/IRRWB%2024th%20%20Annual%20Progress%20Report%20%20-%20Final%20-%20%20NF%20-%20Dec%2020%2C%202023%20-IBYML%20.pdf
[91] *Id.*
[92] *Id.* at 14.
[93] Id. at 14-15.

approximately 2,600 tons of phosphorus to Lake Winnipeg each year.[94] In combination with warmer weather, this phosphorus loading has increased the frequency and severity of algal blooms in Lake Winnipeg, disrupting recreation and endangering the health of all animals that use the Lake, including humans.[95]

Failure to regulate Herberg Dairy in a manner that prevents water pollution will harm human health, wildlife, and North Dakota's outdoor recreational economy. Further, any surface water pollution from Herberg Dairy will add to the cost of cleaning up Red River water for cities downstream that rely fully or partially on the River as a drinking water source, such as Grand Forks and Grafton. The Racoon River in Iowa is an example of how CAFOs have affected municipal water supplies.

> "Twenty years ago, in 1991, Des Moines Water Works was forced to build one of the world's largest — and most expensive — nitrate removal systems. This was necessary to treat the unsafe levels of nitrates entering the Raccoon River from factory farms and industrial agriculture fertilizer use upstream. Less than two decades later, the system was overwhelmed by the ever-increasing levels of nitrates flowing into the river from the proliferating factory farm operations in the watershed. As a result, in 2017, Des Moines Water Works had to expand this nitrate removal system. Ratepayers — not the polluting agribusinesses upstream — have borne these costs."[96]

As proposed, the Herberg Dairy poses unacceptable risks to waters of the state, and the recreational, economic, aesthetic, and spiritual values those waters inherently provide. Because DEQ cannot reasonably conclude the Herberg Dairy "will not cause *or likely cause* pollution of waters of the state," Riverview's application must be denied.[97]

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[94] MINNESOTA POLLUTION CONTROL AGENCY, THE RED RIVER OF THE NORTH: EVALUATING THE HEALTH OF THE RIVER 3 (Feb. 2019), https://www.pca.state.mn.us/sites/default/files/wq-swm1-05.pdf.
[95] Lake Winnipeg Foundation, *Algal Blooms on Lake Winnipeg*, https://lakewinnipegfoundation.org/about-lake-winnipeg (last accessed June 1, 2025).
[96] Jessie Thomas-Blate, *Profit vs the People: The Clean Water Fight Over the Raccoon River* (Aug. 31, 2021), https://www.americanrivers.org/2021/08/profit-vs-the-people-the-clean-water-fight-over-the-raccoon-river/.
[97] ND Admin. Code 33.1-16-03.1-07 (emphasis added).

IV. The Proposed Permit is Legally and Practically Inadequate to Protect Water Quality and Human Health.

To protect water quality, human health, and the environment, DEQ must require that Riverview obtain a permit for the Herberg Dairy that fully complies with federal and state law requirements. At minimum, this means DEQ must (1) require Riverview to obtain a NPDES permit; (2) correct errors and fill in missing information in the Herberg Dairy NMP; (3) provide accurate baseline data to facilitate monitoring of pollution impacts; and (4) include representative monitoring requirements that facilitate enforcement of the Herberg Dairy's permit conditions. Failure to correct these errors and omissions renders any permit issued to the Herberg Dairy legally inadequate and leaves the public—and DEQ—in the dark about the impacts this mega-dairy will have on the environment.

A. Herberg Dairy Cannot Operate Without A NPDES Permit.

Due to its design, location, and sheer size, Herberg Dairy will discharge pollutants to waters of the state if the facility is allowed to operate in the manner proposed by Riverview's application and adopted by DEQ's draft permit. DEQ must therefore insist that Riverview obtain an NPDES permit to remain in compliance with federal law.[98] In the past, EPA proposed to establish a rebuttable presumption that CAFO lagoons discharge to surface water via groundwater by suggesting a requirement that CAFOs either conduct groundwater pollution monitoring or rebut the presumption of discharge by providing a hydrologist's report that no such connection exists.[99] Along the same lines, DEQ should presume Herberg Dairy will discharge because there is simply no way th*f*at a single CAFO can more than double the number of dairy cows in the state without discharging to a water of the state, particularly when the operation is within two miles of a major surface water prone to flooding, on top of shallow interconnected groundwater, and does not plan to employ any advanced wastewater treatment prior to disseminating manure for land application on fields with direct conduits to surface waters.

[98] 33 U.S.C. §§ 1311(a), 1342.
[99] National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 3040 (Jan. 12, 2001).

1. Land application discharges

As discussed in Section III.A.2, operating a CAFO designed in the manner proposed by the Herberg Dairy application entails well-documented discharge risks, particularly where the CAFO or fields where CAFO waste will be land applied have direct conduits to surface waters. Traill County, the location of the proposed Herberg Dairy, has extensive tile drainage that already discharges effluent with pollution levels that exceed state and federal water quality standards.[100] Some portion of liquid dairy waste—including dissolved nutrients and contaminants —applied to tile-drained fields will flow into the subsurface drainage system, and ultimately into surface waters when there are rain events.[101] Indeed, according to a 2014 study conducted by researchers at North Dakota State University,[102] nitrate concentrations of effluent leaving monitored tile drains in Traill County reached a high of 20.8 mg/L in 2013.[103] Further, surface water quality monitoring in Richland County conducted pursuant to the study led researchers to conclude it was "obvious that the high [pollutant] concentration of the tile water is impacting the concentrations in the receiving stream."[104] Overall, the study demonstrates that significant surface water pollution loading occurs via tile drainage in Traill County.[105]

Pollution originating from the Herberg Dairy is certain to be discharged by tile drain networks. As clearly indicated by materials submitted with Riverview's permit application, at

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[100] *See generally* ROXANNE JOHNSON, ND STATE U., RED RIVER VALLEY TILE DRAINAGE WATER QUALITY ASSESSMENT: PHASE I FINAL REPORT (Oct. 2010), https://www.ndsu.edu/agriculture/sites/default/files/2025-05/Phase%20I%20RRV%20Tile%20WQ%20Report.pdf (study of tile drains in Cass and Traill Counties showing wastewater discharged exceeded standards for, *inter alia*, nitrate, chloride, and heavy metals).

[101] Humaira Dadfar et al., *Development of a method for estimating the likelihood of crack flow in Canadian agricultural solid at the landscape scale,* Canadian Journal of Soil Science (2010); Ehsan Ghane, MICHIGAN STATE UNIVERSITY EXTENSION, *Agricultural Drainage,* (revised April 2022), https://www.canr.msu.edu/agriculture/uploads/files/agriculturaldrainage-2-2-18-web.pdf; James J. Hoorman & Martin J. Shipitalo, *Subsurface Drainage and Liquid Manure*, 61 JOURNAL OF SOIL AND WATER CONSERVATION 94A to 97A (2006); Tayfun Korucu et al., *Rye cover crop increases earthworm populations and reduces losses of broadcast, fall-applied fertilizers in surface runoff,* 180 SOIL & TILLAGE RESEARCH 99-106 (2018).

[102] *See generally* DR. THOMAS SCHERER & ROXANNE JOHNSON VONDRACHEK, ND STATE U., RED RIVER VALLEY TILE DRAINAGE WATER QUALITY ASSESSMENT PHASE II FINAL REPORT PART 2: RESULTS (Oct. 2014), https://www.ndsu.edu/agriculture/sites/default/files/2025-05/Phase%20II%20RRV%20Tile%20WQ%20Report-Part%202%20Results.pdf (study of North Dakota tile drains, including in Cass and Traill Counties showing wastewater discharged exceeded standards for, *inter alia*, nitrate, chloride, and heavy metals); *id.* at 4 (documenting monitoring of 154.8 acres of tile drained fields in Traill County).

[103] *Id.* at 14.

[104] *Id.* at 20-21.

[105] *Id.* at 22 (estimating that tile drains in Traill County discharged 10,919 lbs/acre of total dissolved solids and 17 lbs/acre of nitrate annually), 27 (noting that tile drains can discharge over 20 tons of minerals to receiving streams during heavy precipitation events).

least 50 sites comprising approximately 12,000 acres proposed for land application of manure from Herberg Dairy are tile drained.[106] Virtually all of these fields are in the Red River Basin, ensuring pollutants transported from fields to surface waters will end up in the Red River.

2. Production area discharges

If permitted, Herberg Dairy's production area would also discharge to surface water, threatening water quality. As discussed, pollutants discharged to surface waters through interconnected groundwater in a manner that is "functional[ly] equivalent to a direct discharge" must be permitted by a valid NPDES permit.[107] The conditions at the proposed Herberg Dairy site combined with the design of the Dairy's lagoons and mortality storage structure ensure such functionally equivalent discharges will occur. To protect water quality, DEQ must require Riverview to obtain a NPDES permit authorizing and monitoring such discharges.

Groundwater in the Red River Basin is hydraulically connected to local surface waters.[108] The Geotechnical Report submitted with Riverview's application notes that groundwater at the project site "could be quite near the ground surface during periods of significant precipitation."[109] Further, the Report states that the "surface level in the nearby Red River could be expected to affect the subsurface water levels present at the site."[110] This observation denotes interconnection between the Red River and groundwater underlying the proposed Dairy.

If groundwater beneath Herberg Dairy feeds into the Red River, seepage from the Dairy's five lagoons amounting to millions of gallons per year may be discharged to the River and nearby tributaries.[111] Despite incontrovertible evidence that earthen and clay lined lagoons designed to the 1/16 inch per day seepage rate allow pollutants to discharge into groundwater,[112]

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[106] *See generally* Herberg Dairy Manure Application Fields (attached as Exhibit 3); *see also* Erickson Report at 6-7 (counting 67 tile drained fields and noting other risk factors likely to lead to discharges from land application areas).
[107] *Cnty. of Maui v. Hawaii Wildlife Fund*, 590 U.S. 165, 185 (2020).
[108] *See* THOMAS H.C. REPPE, U.S. GEOLOGICAL SURVEY, GROUND-WATER AVAILABILITY FROM SURFICIAL AQUIFERS IN THE RED RIVER OF THE NORTH BASIN, MINNESOTA 1 (2005), https://pubs.usgs.gov/sir/2005/5204/pdf/SIR20055204.pdf (discussing interconnectivity between groundwater and aquifers on the Minnesota side of the Basin).
[109] SETTJE AGRI-SERVICE ENGINEERING, INC., GEOTECHNICAL REPORT 4 (Nov. 21, 2024) ("Geotechnical Report") (attached as Exhibit 4).
[110] *Id.*
[111] Erickson Report at 4 (estimating that annual seepage from Herberg's lagoons would equal more than 42 million gallons per year).
[112] *Id.* at 4-5; *see also supra* n.66 and accompanying text.

and its own consultant's acknowledgment that groundwater is likely present near the surface of the Herberg site, Riverview has proposed to store liquid waste from the Herberg Dairy in five clay lined lagoons.[113] Moreover, Riverview is proposing to construct the clay liner using non-optimal on-site soils that are prone to shrinkage and freeze-thaw movement,[114] a factor known to increase the risk of cracking. Despite the obvious risk of subsurface discharge under these conditions, DEQ has not only required no certification that the Herberg site is not hydraulically connected to surface water, it has ignored evidence to the contrary. Thus, DEQ's proposed permit is insufficient to prevent discharges to waters of the state from Herberg Dairy's proposed manure management practices.

Contaminated leachate from mortality storage can also enter surface waters by traveling through hydrologically connected groundwater. The average mortality rate for dairy herds is between 6 and 8 percent.[115] Riverview proposes to store what will inevitably amount to thousands of mortalities per year on "impervious" concrete barriers for up to 72 hours prior to shipping the dead animals off-site using a rendering service.[116] According to the North Dakota State University Extension, this plan raises several concerns.

First, North Dakota law requires disposal or shipment to a rendering facility within 36 hours of a death to prevent the spread of any infectious or contagious disease.[117] The Herberg materials do not address any plan for meeting this obligation, which is particularly concerning given the avian bird flu (H5N1) has been detected in dairy cows in Minnesota as well as South Dakota.[118] This flu strain has been confirmed to spread from dairy cows to humans, further increasing the risks associated with any discharge of this pathogen.[119]

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[113] Geotechnical Report at 1.
[114] *Id.* at 4, 6; Fact Sheet at 7.
[115] Jim Dickrell, *Veterinarians Address Rising Mortality Levels in Dairy Herds* (April 1, 2021), https://www.bovinevetonline.com/news/education/veterinarians-address-rising-mortality-levels-dairy-herds.
[116] RIVERVIEW ND, LLP, APPLICATION TO OBTAIN A STATE PERMIT ASSOCIATED WITH ANIMAL FEEDING OPERATIONS 1 (Feb. 21, 2025) (attached as Exhibit 5).
[117] NDSU EXTENSION, ANIMAL CARCASS DISPOSAL OPTIONS (Feb. 2023), https://www.ndsu.edu/agriculture/sites/default/files/2023-03/nm1422.pdf.
[118] American Veterinary Medical Association, *Avian Influenza Virus Type A (H5N1) in U.S. Dairy Cattle* (May 27, 2025), https://www.avma.org/resources-tools/animal-health-and-welfare/animal-health/avian-influenza/avian-influenza-virus-type-h5n1-us-dairy-cattle.
[119] U.S. Center for Disease Control, *Current Situation: Bird Flu in Dairy Cows* (May 27, 2025), https://www.cdc.gov/bird-flu/situation-summary/mammals.html.

Second, FDA regulations and concerns around mad cow disease have made rendering services for bovine carcasses "harder and more expensive" and "[i]n many areas, the numbers of rendering facilities are limited and in many cases are declining due to increased costs and biosecurity risks associated with transporting mortalities."[120] The Herberg application and supporting materials are silent as to whether there are any rendering services near the dairy that even take bovine carcasses, and if so, whether such services are willing and able to take on Herberg's mortalities.

Riverview's fallback plan is to compost the Herberg mortalities on-site in a "roofed building with concrete sides and floor."[121] However, this plan also has significant holes. Because this concrete building is not included in any of the maps or schematics provided in support of Riverview's application, neither the public nor DEQ has any means of confirming whether it is large enough to store and safely compost the number of anticipated mortalities or how the building will contain or safely manage any liquid bi-products or leachate.[122] Without additional information, neither Riverview's application materials nor DEQ's proposed permit are sufficient to prevent discharges from the Herberg Dairy's mortality management.

3. Flood-related discharges

Extreme precipitation events, flooding, and increasingly high stream flows will also lead to discharges of waste from Herberg Dairy to waterways. The proposed sites for the Herberg Dairy and land application of waste generated at that site are extremely prone to flooding.[123] According to data collected by the U.S. National Oceanic and Atmospheric Administration, flooding on April 26, 2022 reached a crest over 46 feet high in Grand Forks, ND, just north of

[120] N.D. STATE U. EXTENSION, ANIMAL CARCASS DISPOSAL OPTIONS (Feb. 2023), https://www.ndsu.edu/agriculture/sites/default/files/2023-03/nm1422.pdf.
[121] SETTJE AGRI-SERVICES & ENGINEERING, INC., OPERATIONS & MAINTENANCE PLAN 3 (Sept. 16, 2024) (attached as Exhibit 6).
[122] *See* N.D. STATE U. EXTENSION, ANIMAL CARCASS DISPOSAL OPTIONS 3-4 (Feb. 2023), https://www.ndsu.edu/agriculture/sites/default/files/2023-03/nm1422.pdf ("[A] proper composting site is important to prevent surface water runoff to the compost site and runoff of leachate from the compost site, as well as leaching of raw or finished compost nutrients to groundwater.").
[123] *See* N.D. State U., *Why Is the Red River of the North So Vulnerable to Flooding?*, https://www.ndsu.edu/fargo_geology/whyflood.htm (noting that the Red River enters flood stage at least once per year, with several "truly devastating" floods over the past few decades).

where the Herberg Dairy would be located.[124] Obviously, any CAFO waste that comes into contact with flood waters is subject to discharge into a water of the state.

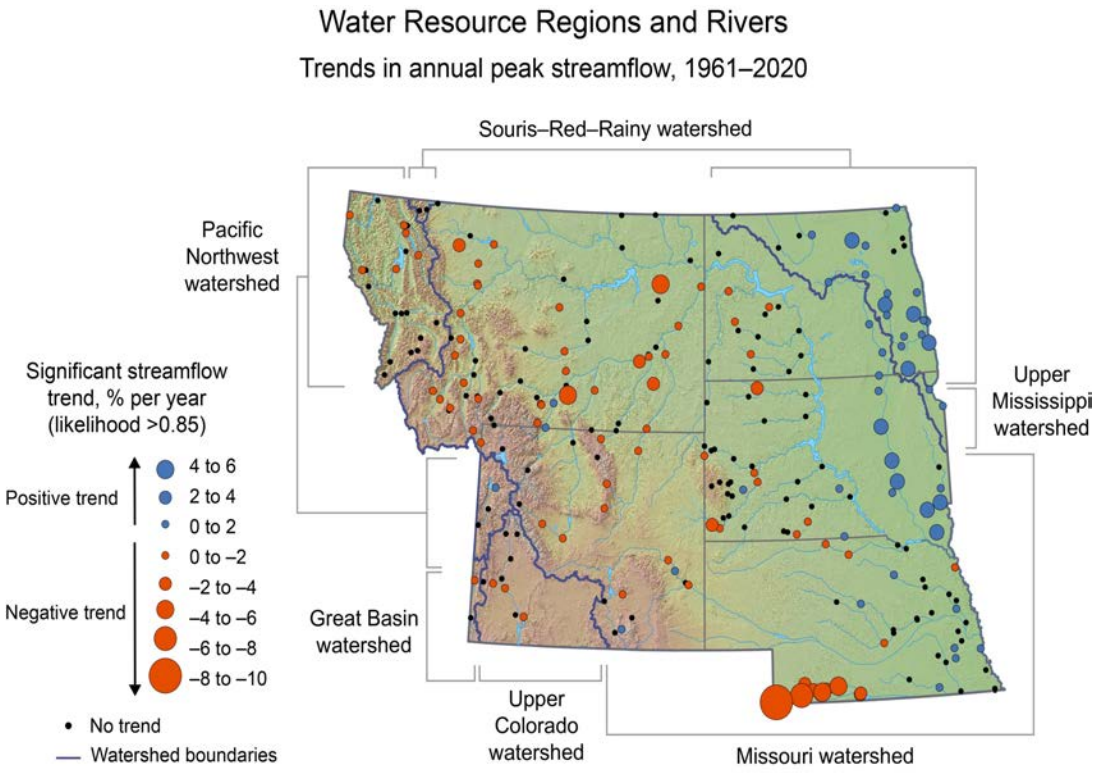


Image 1. Streamflow map showing peak flow on the Red River in the vicinity of Herberg Dairy is expected to increase by 2 to 6 percent. Source: Fifth National Climate Assessment

Incredibly, a portion of the Dairy that DEQ is proposing to permit is located squarely within a floodplain. Riverview submitted a floodplain evaluation as part of its application for the Herberg Dairy that shows the lowest point of the CAFO will be elevated two feet above the highest recorded flood elevation.[125] While historic flood data is certainly relevant information that DEQ must consider in evaluating Riverview's application, the agency must also consider and account for increased flood risk from more extreme precipitation events due to climate change. The Fifth National Climate Assessment states with high confidence that extreme

[124] National Water Prediction Service, *Red River of the North at Grand Forks*, https://water.noaa.gov/gauges/egfm5 (last accessed May 31, 2025).
[125] ENVIRONMENTAL SCIENTIFIC, FLOODPLAIN EVALUATION—HERBERG DAIRY 3 (Feb. 20, 2025) ("Floodplain Evaluation") (attached as Exhibit 7).

precipitation events, high streamflow, and flooding in this area will only increase over the coming years.[126]

The part of the CAFO Riverview has proposed to locate in the floodplain includes portions of the CAFO's manure storage lagoons.[127] As discussed above, the clay liners Riverview has proposed for its lagoons will not prevent pollutants from seeping into the surrounding subsurface. During flood conditions when soils are saturated, these pollutants will travel downgradient through the soil substrate and ultimately into the Red River.[128] It is unclear whether the Herberg Dairy will be able to contain all the liquid waste generated, including contaminated run-on from increasingly intense precipitation and floods, because it is not apparent in any of the application or permit materials that projections that included consideration of climate change were considered.[129]

Fields proposed for land application of the Herberg Dairy waste are also likely to discharge during floods and extreme precipitation events. While Riverview apparently removed some land application fields that were partially located in floodplains, several other fields marked as being partially located within a floodplain remain in the Dairy's NMP.[130] Again, it is not clear that these flood risk demarcations account for increased risks from climate change. Additionally, Commenters specifically request that DEQ require Riverview to find a replacement for Field 3, which is in an area with a history of persistent flooding that causes discharges to Traill County Drain No. 28.

B. The Permit Relies on Faulty Nutrient Management Planning.

Nutrient management plans are required to ensure permittees and the public understand the agronomic rates at which CAFOs are legally permitted to land apply waste. Because nutrient management plans are designed to maximize crop yields rather than protect water quality, they

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[126] Fifth National Climate Assessment, *Ch. 25 Northern Great Plains*, https://nca2023.globalchange.gov/chapter/25/ (last accessed June 1, 2025).
[127] Floodplain Evaluation, Fig. 2.
[128] Erickson Report at 3.
[129] *See, e.g.,* Floodplain Evaluation (no mention of climate change or anticipated increases in precipitation or flooding beyond historic conditions).
[130] *Compare* Herberg Dairy Manure Application Fields *with* AGRI-SERVICES & ENGINEERING, INC., MANURE MANAGEMENT PLAN 15-20 (attached as Exhibit 8).

are an imperfect tool for preventing excess nitrogen and phosphorus—let alone other CAFO pollutants—from contaminating surface and groundwater. As such, CAFO waste should be required to undergo treatment designed to remove and reduce pollutants to acceptable levels *before* land application. Nevertheless, correcting omissions and errors in the Herberg Dairy's nutrient management plan is a legal requirement and will help to protect water quality, even if DEQ neglects to require pollution treatment before waste is sprayed on fields. The Herberg NMP is missing critical information that makes it impossible to even determine whether the even this inadequate regulatory requirement is being met.

As laid out in further detail in the attached report of agronomist Caroline D'Huyvetter,[131] there are significant gaps in the Herberg NMP, including:

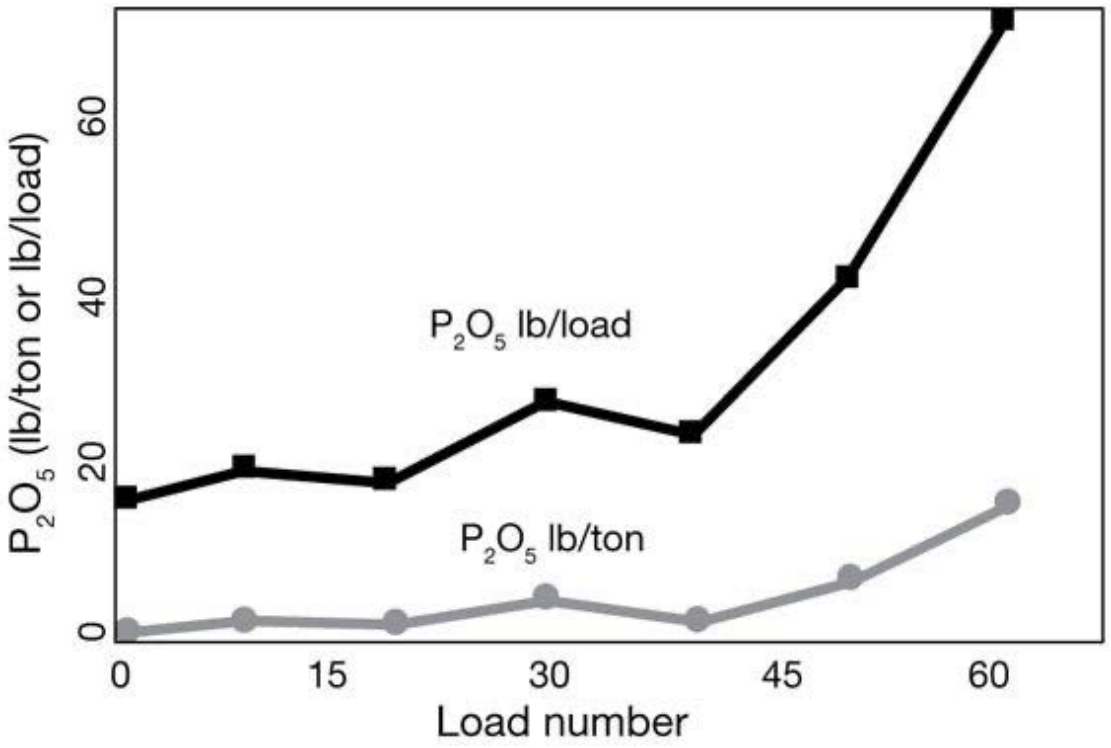
- No information about rates, timing, method of application, or incorporation;
- Incomplete/unclear information about crop rotations;
- Failure to clarify what nutrient calculations were used to come up with a nutrient budget (and if the correct one had been used, the calculations would have come out far differently);
- Failure to Quantify all nitrogen and phosphorus sources;
- Incomplete erosion calculations.

These are not peripheral issues. Without this basic information, the DEQ cannot meaningfully assess whether the NMP will prevent nutrient and pathogen loss.

Additionally, DEQ should include sampling requirements—and all critical procedures for controlling pollutants—in the permit. Calculations for agronomic rates of manure application depend on having accurate information on concentration and amounts of waste material. It is critical to know how the manure nutrient sample was obtained. If there were not multiple level samples nor agitation of the sampled lagoon, the phosphorus content would be underestimated. If the waste is not agitated, there will likely be manure consistency and nutrient stratification. The chart below, reprinted from Les Lanyon, Penn State, illustrates how manure analysis can vary within a storage without adequate agitation. Note how the waste in the last fifteen loads spread from this storage has two to three times more phosphorus than in the first forty-five loads spread.

[131] REPORT OF CAROLINE D'HUYVETTER, NUTRIENT MANAGEMENT TSP #18-22299 (attached as Exhibit 9).

Given the importance of this information to the intended functioning of the NMP, these procedures should be included in the permit—not merely referenced in the Livestock Manual.



C. The Permit Leaves the Public in the Dark about Likely Impacts.

Permits are only as useful as they are enforceable. The requirements and effluent limits purportedly imposed by the proposed Herberg Dairy permit are meaningless unless the public knows (1) what baseline environmental conditions exist before the Dairy begins operations and (2) how those environmental conditions change after the Dairy begins operations. The permit proposed by DEQ to regulate Riverview's Herberg Dairy does not contain adequate provisions to provide the public with either of these crucial pieces of information. As such, the proposed permit is unlawful because it does not comply with the Clean Water Act and does not provide DEQ with the information it needs to ensure Herberg Dairy will not cause or contribute to exceedances of state water quality standards.[132]

[132] *See* 33 U.S.C. §§ 1318(a), 1342(a)(2); 40 C.F.R. § 122.44(i) (permits must include monitoring requirements sufficient to provide regulators and the public with representative data indicating whether a facility is complying with its permit, including provisions prohibiting point sources from causing or contributing to water quality standard violations).

1. Inadequate baseline data

While the water quality data cited in Section III.B clearly shows the Red River is impaired by the same pollutants that will be generated by Herberg Dairy if DEQ approves Riverview's permit application, DEQ lacks crucial baseline data that would be necessary to detect and monitor any pollution impacts caused by the Dairy. Recent water quality data for reaches of the Red River directly up- and downstream from the proposed Herberg Dairy site are virtually nonexistent.[133] Likewise, DEQ has provided no baseline water quality data for the Elm River, a tributary to the Red River that runs approximately 2.5 miles south of the proposed Dairy.[134] Without recent baseline data measuring existing concentrations of pollutants of concern in these potentially impacted waters, DEQ has no way of knowing whether the Herberg Dairy is contributing to water quality impairments[135] and therefore no way to intervene to protect those waters, as is required by North Dakota and Federal law.

To evaluate the Dairy's effect on surface water pollution on the Red River and potentially impacted tributaries, both at the project site and applied fields, up-to-date baseline measurements of basic chemistries, heavy metals, hormones, pesticides and biologics should be done pre-project, followed by consistent monitoring. Measurements immediately upstream from the bulk of the field applications will assign appropriate contributions by the dairy; monitoring closely downstream close to the project will diminish the effect of dilution on the dairy's contribution to pollution. Baseline studies of biota such as invertebrates and fish should be part of the pre-project evaluation, and regular monitoring must be conducted throughout the life of the Dairy to ensure wildlife is adequately protected.

DEQ must also ensure adequate baseline soil data prior to allowing land application of CAFO waste on any given field. To calculate the nutrient assimilation capacity of a field, there must be measurement of baseline nutrient concentrations, soil type, and previous nutrient

[133] Relevant monitoring stations identified in DEQ's Water Quality Data Portal include Station 551507 (closest Red River Station upstream of the proposed site) and Station 551508 (closest Red River station downstream of the proposed site. The latest listed water quality data from Stations 551507 and 551508 are from 2010. DEQ, *Surface Water Quality Data for North Dakota*, https://deq.nd.gov/WQ/3_Watershed_Mgmt/SWDataApp/viewer/index.html.
[134] The latest water quality data from Station 380036, the closest Elm River monitoring station to the proposed site, are from 1993. *Id.*
[135] Numeric criteria for North Dakota streams can be found in N.D. Admin. Code 33.1-16-02.1.

application. Soil tests conducted within the past year appear to be missing for many of the proposed land application fields.[136]

2. No monitoring or reporting

Permits issued pursuant to the Clean Water Act "fundamentally rel[y] on self-monitoring" because "[e]ffective self-monitoring reveals permit violations, thereby promoting enforcement of the [law]."[137] Accordingly, EPA's NPDES permit writers' manual makes clear that "[m]onitoring is performed to determine compliance with effluent limitations established in NPDES permits."[138] Once collected, monitoring data must be reported to the permitting entity, making it publicly available via a records request or government website.[139] Without representative monitoring and reporting requirements, regulators and the public are left in the dark as to whether permitted CAFOs are actually complying with applicable effluent limitations and whether particular CAFOs are causing or contributing to violations of North Dakota's water quality standards. Critically, mere assumptions that implementing technologies and practices will result in permit compliance are impermissible.[140]

In *FWW v. EPA*, the Ninth Circuit Court of Appeals clarified what constituted adequate monitoring in a CAFO NPDES permit. In that case, the Court held Idaho's NPDES general permit for CAFOs did not satisfy the Clean Water Act's requirement. In doing so, the Court made the flaws in Idaho's permit plain: (1) "[w]ithout a requirement that CAFOs monitor waste

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[136] Fields with soil tests that are prior to 2024 include:35 fields with soil tests from fall 2023 (field numbers 7, 8, 16, 17, 29, 31, 70, 74, 76, 77, 78, 80, 81, 85, 86, 87, 90, 91, 92, 137, 138, 139, 140, 143, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, and 159) and 11 fields with soil tests from fall 2022 (field numbers 69, 71, 72, 73, 75, 79, 82, 83, 84, 93, and 95). Soil tests are apparently missing for 5 fields (field numbers 187, 192, 196, 198, and 129).

[137] *Food & Water Watch*, 20 F.4th at 516 (*citing Sierra Club v. Union Oil Co. of Cal*., 813 F.2d 1480, 1491 (9th Cir. 1987), *vacated and remanded on other grounds*, 485 U.S. 931, 108 S. Ct. 1102, 99 L. Ed. 2d 264 (1988), *and reinstated and amended by* 853 F.2d 667 (9th Cir. 1988)).

[138] EPA, NPDES PERMIT WRITERS' MANUAL 5-1, 8-2 (Sept. 2010), https://www.epa.gov/sites/production/files/2015-09/documents/pwm_2010.pdf; *see also Food & Water Watch*, 20 F.4th at 516 (*citing Sierra Club v. Union Oil Co. of Cal*., 813 F.2d 1480, 1491 (9th Cir. 1987), *vacated and remanded on other grounds*, 485 U.S. 931, 108 S. Ct. 1102, 99 L. Ed. 2d 264 (1988), *and reinstated and amended by* 853 F.2d 667 (9th Cir. 1988)) (explaining that CAFO NPDES permits "fundamentally rel[y] on self-monitoring" because "[e]ffective self-monitoring reveals permit violations, thereby promoting enforcement of the [law].").

[139] 33 U.S.C. § 1318(b).

[140] *Natural Resources Defense Council v. EPA,* 808 F.3d 556, 565, 583 (2d Cir. 2015) (striking down a NPDES permit for ballast water from vessels because compliance with that permit's water quality-based effluent limitations was merely assumed from compliance with other permit terms and rejecting U.S. EPA's argument that if a vessel was in compliance with the permit's other effluent limitations, the permittee was "generally expected to already be controlling [its] vessel discharges to a degree that is protective of water quality.").

containment structures for underground discharges, there is no way to ensure that production areas comply with the Permit's zero-discharge requirements," and (2) "[t]he Permit has no monitoring provisions for dry weather discharges from land-application areas."[141] The rationale underpinning the Court's holding was simple– "NPDES permits must contain monitoring provisions sufficient to ensure compliance with the terms of a permit."[142] Thus, although the Court's opinion did not explicitly touch on every conceivable production area or land application discharge activity, a NPDES CAFO permit that leaves any effluent limitation unmonitored is unlawful.

Despite the plain requirements of the Clean Water Act outlined above, the proposed Herberg permit does not contain monitoring and reporting conditions sufficient to ensure compliance with or facilitate enforcement of the Permit's production area or land application area effluent limits. First, the permit does not contain any requirements to monitor subsurface discharges from manure lagoons to ensure compliance with the prohibition on discharges from those lagoons.[143] Second, the permit does not contain any assurance that land application activities will be monitored to ensure compliance with the requirement that manure "be applied in a manner so it will not be washed into waters of the state."[144] And finally, the permit does not contain reporting requirements sufficient to facilitate enforcement against Riverview if the Herberg Dairy violates either of these permit conditions.

To remedy these deficiencies, the permit must be revised to include monitoring for both production area and land application area discharges. DEQ can remedy the lack of subsurface discharge monitoring for lagoons and other waste storage structures in one of two ways. First, DEQ could require a series of groundwater monitoring wells. Siting one well up-gradient from the production area and other wells down-gradient from the production area allows regulators and the public to compare data and determine whether the production area is contributing to elevated pollutant levels down-gradient. Second, DEQ could require that Riverview to install synthetic liners with leak detection in their lagoons. Either option will allow the Herberg Dairy

[141] 20 F.4th at 515.
[142] *Id.* at 515 (citing *NRDC v. County of L.A.*, 725 F.3d 1194, 1207 (9th Cir. 2013)).
[143] *See* Permit at 1 (requiring regular maintenance and upkeep "to ensure manure or wastewater does not discharge into waters of the state").
[144] Permit at 1.

operator to make regular informed reports to DEQ about whether it has discharged waste in violation of its permit.

With respect to field monitoring, nearly half (over 12,000) of the NMP's available acres are tile drained. Riverview should, at minimum, be required obtain contractual confirmation from those land applying the Dairy's waste that the applicators will comply with the CAFO's NMP and visually inspect tile drains, ditches, and down-gradient field edges immediately after land application. Further, any permit issued to Herberg Dairy should require that Riverview obtain confirmation that manure applicators will report any discharges that result from land applying the Dairy's waste to DEQ so the agency can conduct water quality testing to ensure the CAFO's manure management strategy is not indirectly contributing to degradation of state waters. The Minnesota Pollution Control Agency recently adopted similar requirements in the Minnesota NPDES General Permit for feedlots in that state.[145]

Because the Herberg Dairy's NMP relies on many acres of land application fields in Minnesota, DEQ should ensure Herberg's permit provides protections that are at least equivalent to those provided by Minnesota's feedlot regulations. Riverview should not be able to evade environmental regulation in either North Dakota or Minnesota by locating its facility in one state and shipping its waste across the border to another.

Finally, the proposed permit lacks any instruction about sampling discharges to waters of the state when they are discovered. The Livestock Manual also lacks instructions about sampling discharges for pollution content or volume of the discharge. Shockingly, the Livestock Manual even states that discharges to state waters can go unreported if the CAFO operator deems—with no training or qualification—that the discharge will not cause harm to human health or the environment. This is a blatant dereliction of DEQ's duties to administer the NPDES program in accordance with the Clean Water Act. Discharging facilities must notify DEQ so the agency—not the regulated CAFO—can determine an appropriate course of action. Without publicly reported monitoring data, North Dakotans are deprived of their right to participate in the enforcement of the Clean Water Act and DEQ is deprived of valuable data that should be used to

[145] MINNESOTA POLLUTION CONTROL AGENCY, AUTHORIZATION TO CONSTRUCT AND OPERATE A CONCENTRATED ANIMAL FEEDING OPERATION UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PROGRAM MNG440000 7-9 (effective Feb. 1, 2026).

initiate enforcement and inform future permit conditions.[146] As such, it is critical that DEQ revise the proposed permit to include representative discharge monitoring, sampling, and reporting provisions sufficient to ensure Herberg Dairy is complying with each of the permit's requirements.

V. DEQ Must Require Additional Treatments and Practices to Protect Water Quality.

DEQ should deny Riverview's Herberg Dairy application because a mega-dairy operated by an out-of-state corporation on the edge of the Red River will harm water quality, family farmers, and surrounding communities and ecosystems. However, if DEQ ultimately decides to approve Riverview's Herberg application, the agency must still "require necessary and reasonable treatment of sewage, industrial, or other wastes."[147] If approved as proposed, waste from the Herberg Dairy will pose unacceptable threats to water quality. DEQ could mitigate these threats, at least in part, by adding available, necessary, and reasonable treatment requirements to the final Herberg Dairy permit. These include:

- *Impose reduced spring application rates.* At present, fields with low or medium phosphorus risk assessments are permitted to apply CAFO waste to fields based on the nitrogen needs of the crop on the receiving field. Given the elevated likelihood of heavy precipitation events during the spring and water quality problems stemming from phosphorus loading in the Red River watershed, DEQ should limit all fields to the phosphorus-based application rates during springtime.

- *Prohibit land applying waste to frozen, snow covered, and saturated fields, as well as within 24 hours of forecasted rain*. At present, the Livestock Manual allows land application of waste to frozen, snow covered or saturated soils "if there is a likelihood of runoff."[148] However, application of waste to frozen, snow covered, or saturated soils inherently creates a likelihood of runoff.[149] To make this rule less confusing and facilitate

[146] *Waterkeeper*, 399 F.3d 486, 503-504 (2nd Cir. 2005) (citing 33 U.S.C. § 1251(e) and discussing citizens' right to participate in the permitting authority's development of effluent limits).
[147] ND Cent. Code §§ 61-28-01.
[148] Livestock Manual at 54.
[149] EPA, NPDES PERMIT WRITERS' MANUAL FOR CONCENTRATED ANIMAL FEEDING OPERATIONS App'x G, G-14, https://www3.epa.gov/npdes/pubs/cafo_permitmanual_appendixg.pdf; NRCS Conservation Practice Standard 590, Nutrient Management 3 (Oct. 2013), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1192371.pdf.

enforcement, DEQ should simply prohibit land application of CAFO waste under these soil conditions.

- *Require incorporation of land applied waste within 12 hours of application*. Incorporating land applied CAFO waste shortly after application can significantly reduce runoff losses of soluble phosphorus.[150] Incorporation also reduces ammonia volatilization, protection both air and water quality.[151] To further reduce phosphorus loading to the Red River, DEQ should require Riverview to amend its NMP to require incorporation of land applied waste within 12 hours of application.

- *Require advanced treatment to treat pollutants before land application*. Merely storing CAFO waste in anaerobic lagoons is an outdated treatment technology. More effective options are available and in use at other CAFOs. DEQ should consider modifying the Herberg permit to mandate more advanced treatment, such as the Super Soils treatment.[152]

VI. Conclusion

For all the reasons stated herein, DEQ should reject Riverview's attempt to site a polluting mega-dairy in North Dakota. Failing that, Commenters request that DEQ correct errors, provide missing information, and impose the additional pollution controls stated herein on Riverview as is necessary to protect North Dakota's waters.

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[150] *See* E. Osei et al., *Environmental Benefits and Economic Costs of Manure Incorporation on Dairy Waste Application Fields*, 68 J. Envtl. Mgmt. 1 (2003) (concluding incorporation of dairy waste reduced phosphorus losses by 45 percent); Brett L. Allen et al., *Effect of Liquid Swine Manure Rate, Incorporation, and Timing of Rainfall on Phosphorus Loss with Surface Runoff*, 37 J. ENVTL. QUALITY 125 (2008) (study of swine manure applied to Iowa cropland showing that total phosphorus concentrations in runoff from unincorporated fields were more than two times higher than concentrations in runoff from fields that incorporated manure after application).

[151] CORNELL U. COOP. EXTENSION, LIQUID MANURE INJECTION (2015) http://nmsp.cals.cornell.edu/publications/factsheets/factsheet87.pdf ("Liquid manure injection in the spring or into a growing crop reduces N volatilization loss, resulting in much greater retention of plant-available N."); Gabriella Burkett et al., *Influence of Manure Injection Versus Surface Application on Corn for Silage and Winter Rye Yield, Quality, Phosphorus Balance and Soil Test Phosphorus*, 16 J. AG. & FOOD RES. 1, 1 (2024) ("[S]urface application of manure often results in loss of ammonium-N (NH_4-N) fraction through ammonia volatilization.").

[152] M.B. Vanotti et al., *Development of Environmentally Superior Technology in North Carolina: The Super Soil Project* 2 (2005), https://www.ars.usda.gov/ARSUserFiles/60820000/Manuscripts/2005/Man707.pdf.

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Exhibit 1

DAVID J. ERICKSON CPG PE, RESPONSE TO RIVERVIEW, LLP APPLICATION FOR THE HERBERG DAIRY

Response to Riverview, LLP application for the Herberg Dairy.
David J Erickson CPG PG
Founder/Principal Hydrogeologist

Overview of Proposed Herberg Dairy and Environmental Concerns

The proposed Herberg Dairy (Dairy) in Section 34, T-145N, R-48W of Traill County North Dakota is a 25,000 head of cattle dairy operation in an area previously used for agricultural crop cultivation. The Dairy plans to apply 232,866,763 gallons of manure waste over 32,448 acres of formerly cropped fields. Simply 7,168 gallons of manure will be applied on every acre of property, every year with no attention to the actual agronomic rates that the land can sustain.

Much has been learned in the last 15 years about the impacts to human health and the environment from CAFO operations across the US. By granting this permit, the state of North Dakota is permitting pollution of thousands of acres around the proposed Herberg Dairy. The permit allows the contamination of the aquifer under and downgradient of the proposed dairy, and permits the contamination of area soil, ground water and surface water bodies with more than 232,866,763 gallons of manure, feces, and wastewater every year. This manure will add 8,648,211 pounds of nitrate and 4,312,239 pounds of phosphorus to the watershed every year. Figure 1 shows areas where manure will be applied in the watershed. Obviously, human health and environmental impacts will occur in this watershed.

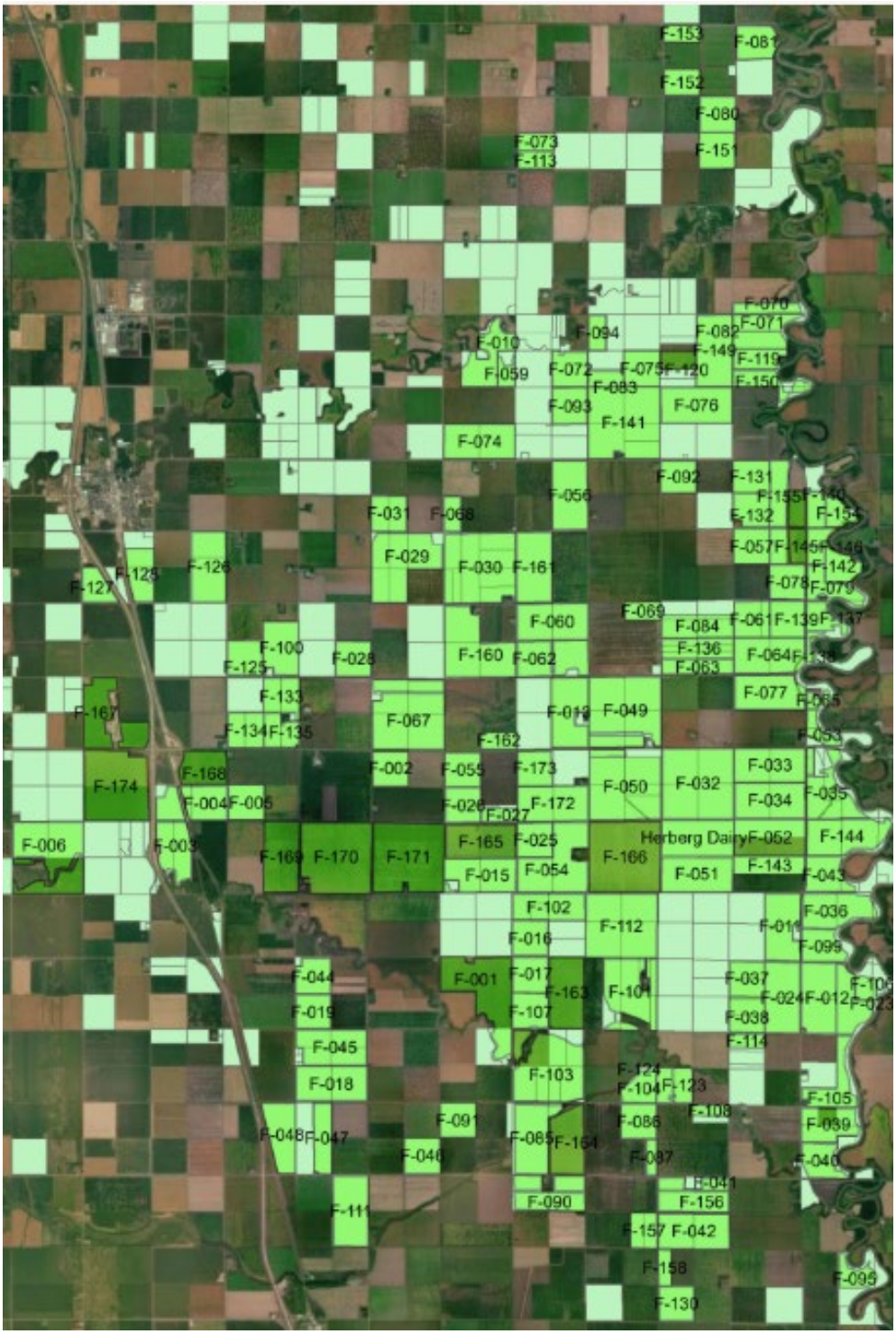
After investigating approximately thirty existing CAFOs across the US (Washington, California, Georgia, New York, Wisconsin, and Oregon), several characteristics remain consistent:

1. CAFO lagoons seep and leak contaminants into soil, ground water and surface water.
2. Composting and silage areas produce large quantities of leachate that result in ground water contamination and contaminated runoff.
3. The application of manure is imprecise and poorly planned resulting in ground water and surface water impacts in nearby seeps, wetlands, springs, and lakes.
4. Application fields are not monitored resulting in the accumulation of nutrients and leaching to ground water and surface water, and runoff events that directly contaminate surface water.
5. The 232,866,763 gallons of manure waste managed annually by the Dairy will result in spills on the facility and on nearby roads, will result in rancid manure odors over a large area, and will result in a substantial increase in the number of nuisance flies and insects in the area.
6. While the facility describes measures to “reduce” odor, area residents will be impacted in a very negative manner by the sheer volume of manure, the volume of anaerobic manure sludge in the lagoon, the application of over 233,000,000 gallons of manure waste on nearby fields, and the sheer mass of flies and insects from the manure.
7. “Emergency” applications are commonplace with CAFOs because lagoon capacity does not account for frequent extreme weather events.

I have investigated at least 30 CAFOs in the last 10 years and all facilities have had active releases of manure that impacted human health or the environment. These investigations included over one hundred lagoons, thousands of application fields, many compost, silage and feed storage areas, and have included leaking underground piping, and overapplication and catastrophic leaks and

releases. Since these facilities have no independent inspectors and only rely on self-reporting, many of the activities go unregulated and unreported.

Figure 1. Herberg Dairy Manure Application Area.



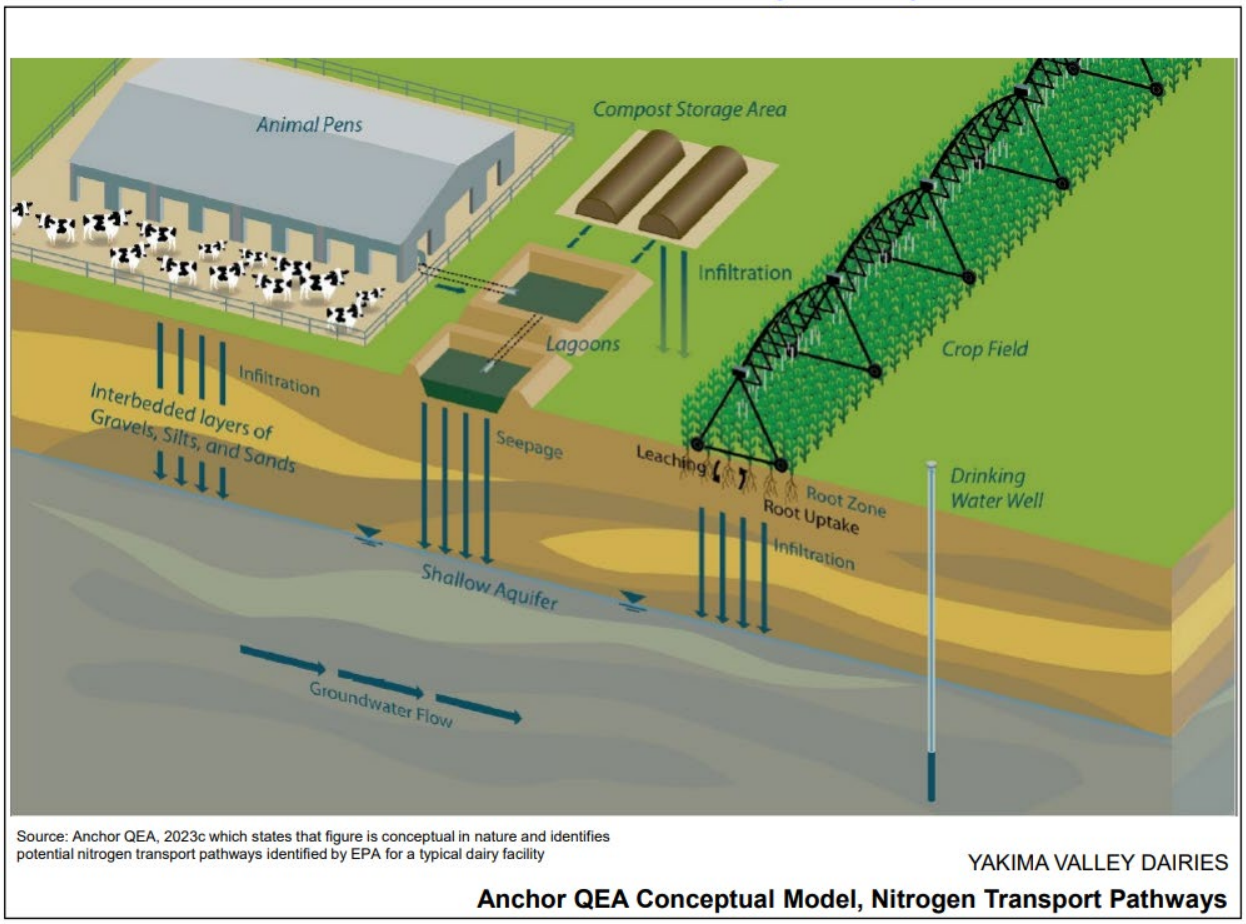
Conceptual Dairy Contamination Model

The Region 10 EPA has accepted a conceptual model for dairy operations that describes contaminant sources from day-to-day operation of a dairy CAFO. The EPA has been studying the Dairy contamination issues in Yakima, Washington for 12 years and has sampled and documented these contaminant transport pathways (Lower Yakima Valley Groundwater | US EPA). Currently the US Department of Justice is intervening because the Yakima Dairy Owners missed most of the Administrative Order deadlines and have not complied with many of the requirements; therefore, contamination from the dairies continues to impact the drinking water aquifer and nearby residents. Data on the website shows large areas of contaminated drinking water aquifer directly impacting area residents.

As shown below in a graphical representation of the conceptual model, seepage and release of contamination is possible from all aspects of the operation, mainly because of the large volume of waste generated from feces, urine, waste milk, animal mortalities and storm water runoff. All these waste sources seep to ground water then move downgradient to the nearest receptor or runoff into surface water in the watershed. Those receptors are either domestic water supply wells or surface water bodies. In Yakima, these specific dairies have contaminated over 7 square miles (4600+ acres) of the aquifer and contaminated more than 300 residential wells.

Even locations with low permeable (clayey) soil cause impacts to both ground water and surface water, especially when applied according to the proposed Nutrient Management Plan. Application before a precipitation event or late season applications cause direct runoff of manure to surface water. Seepage into ground water results in long-term discharge of nutrients to surface water. Over application or imprecise applications result in both ground water and surface water contamination.

Dairies have specific contaminants with unique and problematic fate and transport characteristics. While most of the lagoon's contaminant seepage occurs in the ammonium form (NH_4), through oxidation and microbes it quickly converts to nitrate (NO_3). These compounds have vastly different sorption characteristics. While ammonium sorbs strongly to soil, nitrate moves quickly in soil moisture and ground water with no adsorption. Simply, large ground water plumes above human health standard form quickly and migrate rapidly in the drinking water aquifer. The ammonium acts as a continual source as it nitrifies into nitrate in the soil.



Source: Anchor QEA, 2023c which states that figure is conceptual in nature and identifies potential nitrogen transport pathways identified by EPA for a typical dairy facility

YAKIMA VALLEY DAIRIES

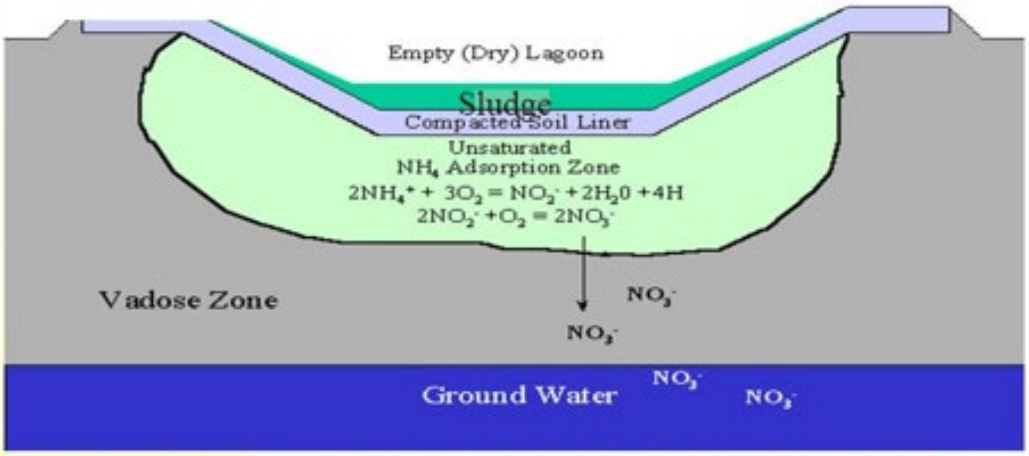
Anchor QEA Conceptual Model, Nitrogen Transport Pathways

Lagoons

The proposed lagoons at the Herberg Dairy are 17to 22 feet deep and constructed according to the North Dakota Livestock Program Design Manual (NDLPDM) with an allowable seepage rate of 1/16 inch per day. If the lagoon is constructed as designed, the lagoon conservatively leaks 1/16 inch per day, which is equal to 22 inches per year or approximately equal to a permeability of 1.84×10^{-6} cm/sec. At 17 to 22 feet deep, the bottom of the lagoon is most likely in contact with ground water; however, the borings completed as part of the design of the facility failed to monitor ground water depth; clearly a violation of design criteria. Of more concern, the twenty-two inches of seepage per year (equivalent to 42,593,017 gallons per year) will seep from the lagoons and contaminate the water table, assuming the lagoon meets the verbal construction standard in the permit with no construction oversight or regulatory inspections.

CAFO lagoons have been studied for years; however, many studies failed to look at the complete picture. The figure below shows an early study where Dr. Ham did not find a specific leak but concluded that the resulting large nitrate ground water plume was from lagoon seepage.

Conditions Around Lagoon Before Closure



Ham, J.M. 1999. Seepage Losses from Animal Waste Lagoons: Potential Impacts On Groundwater Quality. Kansas State University.

I have personally studied thousands of lagoons and, simply, earthen lagoons leak and seep. Most of my career since 1988 has been spent remediating seepage from lagoons and this facility, as proposed, will definitely result in contamination of the aquifer and surface water. At the Herberg site, the ground water contamination will eventually seep into surface water causing long-term chronic impacts to surface water quality.

My direct experience with earthen lagoons starting in 1988 provides me with the knowledge that construction of a lagoon with a permeability less than 1.8 $X10^{-6}$ cm/sec requires strict construction quality control and quality assurance and an experienced liner contractor. Dairy contractors are usually focused on agricultural construction and do not specialize in lagoon construction.

Even at the unrealistic seepage rates proposed in the permit (0.0015 to 0.002 inches per day), these two lagoons will leak an average of 43,000,000 gallons per year of high strength wastewater into the aquifer, by design.

Even though this is a clear violation of the Clean Water Act, the State of North Dakota is allowing this contamination to occur, even approving of this release of contaminants (see lagoon seepage estimates in permit application).

Dairy wastewater is extremely high in nutrients and bacteria (see Table 1) but also contains antibiotics and hormones from treating the cows and pesticides and herbicides from the feed. Table 2 contains a list of various compounds detected in ground water near the dairies in Yakima Washington. These compounds were detected in the drinking water aquifer used by area residents. Similar constituents can be expected at the Herberg Dairy.

Table 1. Contaminant Concentrations in CAFO Wastewater

pH	TDS	Chloride	Ammonia	TKN	Phosphorus	Calcium	Potassium
s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
7.6	3100	230	330	1600	358	122	80

TKN = Total Kjeldahl Nitrogen

Table 2. Contaminants Found in CAFO Lagoons and Drinking Water Wells, Yakima Washington

Nutrients & Minerals	Antibiotics
Nitrate Nitrite Ammonia TKN Chloride	Tylosin Enthromycin Lincomycin Sulfamethazine Tiamulin Virginiamycin Monensin Chlortetracycline Tetracycline
Hormones	**Pesticides & Herbicides**
Estradiol Androsterone Testosterone 7-a-estradiol Androstadienedione 17- β-trenbolone Epitestosterone	Atrazine Alachlor DEHP DEET Bentazon

Application Fields

Application of manure waste to crop fields is much more difficult than depicted in the permit and requires more monitoring to apply correctly. “Agronomic Rates” refers to application of the amount of nutrients that the crop will use for maximum growth for one crop. Unfortunately, overapplication and leaching commonly occurs for the following reasons:

1. The dairies’ application method is imprecise.
2. The lagoon sample is often collected without agitation, so the result is a minimum nutrient measurement while the application is at a much higher nutrient content.
3. The excess nutrient applied to the crop seeps below the root zone with precipitation and is lost to ground water.
4. Phosphorous is always overapplied due to ammonium off gassing and the resulting nitrogen loss in the anerobic lagoon process.

5. Storm water transports nitrogen, phosphorous and bacteria to the nearest surface water.
6. Sixty-seven of the fields have drain tile installed. Drain tile is used to drain high ground water from the field into nearby surface water. These structures are a direct conduit for waste applications to enter surface water.

In addition, the odor from the application process is overwhelming and rancid for days after the application regardless of the application method. Nearby residents will have to contend with rancid odors, spills, and releases on the roadways from hauling, additional manure truck traffic and routine misapplication by farm personnel.

The permit does refer to Fall applications. Unfortunately, when there is no crop growth in the Fall, thus there is also no plant uptake of nutrients. Fall applications are one of the leading causes of ground water contamination since the nutrients have all winter to migrate through the soil to ground water with no mechanism to remove the nutrient from the soil. Since these nutrients sit at the soil surface, these late season applications are also the leading cause of surface water contamination. Late season rain and snow runoff transports these contaminants to surface water with little attenuation.

At other facilities where the activities described in the permit have resulted in ground water contamination and in the states where they recognize the impacts of CAFO operation, soil sampling at 1', 2' and 3' is required prior to each application. A complete nutrient budget is required to prevent leaching contaminants. Also, soil moisture probes are placed in the field to monitor precipitation events and soil wetting fronts that move the nitrate to ground water. The contaminants will migrate in the ground water and seep into surface water.

This permit has no provisions for any meaningful monitoring. Year after year of application at agronomic rates with no monitoring is proven to build up nutrients throughout the soil column resulting in tons of nitrate moving through the soil column down to ground water and long-term contamination of the water table aquifer.

Continued applications at these rates also result in phosphorous accumulation in the topsoil, which leads directly to runoff of phosphorous laden sediments into surface water.

The application methods proposed by the dairy are both imprecise and lack the required monitoring to control runoff or infiltration.

Detailed Example

Detailed cross sections from a dairy in Wisconsin are included in Attachment A. This dairy had a concrete lined lagoon, concrete lined feed storage area and the correct acreage for application. By adding nutrients at the calculated crop uptake every year, ground water contamination from the fields was evident in the monitoring wells. In addition, algal blooms in Pentenwell Lake coincide with the dairy operation. As is shown in the cross sections, nitrate contamination seeps to ground water from application fields and from the lagoons, travels along the ground water flow path and enters the lake. This is a direct example of impacts from the dairy operation contaminating downgradient receptors such as residential wells and surface water. While less permeable soils result in slower contaminant transport, the end results are exactly the same, contamination of ground water and surface water.

In many areas of the country, where dairies have operated in the exact manner proposed at Herberg, drinking water is contaminated above drinking water standards and the remedy is now both difficult, time consuming and extremely expensive. This permit application is leading directly to that scenario in Herberg.

This permit should require a detailed nutrient management plan with field instruments to monitor leaching of nutrients, detailed calculation of the preapplication nutrient concentrations and post crop sampling to track the performance of the plan. Applications at crop requirement concentrations year after year without sampling and accounting for the existing nutrients causes excess leaching of nutrients to ground water and widespread contamination of the aquifer.

Ground Water

Based on studies of dairy operations across the country and direct experience investigating and characterizing the contamination from these operations, current construction standards and the regulations in the State of North Dakota are not strict enough to prevent the facility from contaminating ground water.

The lagoons are allowed to seep and, given the depth (head pressure) of this lagoon, there will be significant discharge of high strength animal waste to the drinking water aquifer. The current standard for waste lagoons near a drinking water aquifer is a double synthetic liner with leak detection. Earthen liners are both allowed to seep and designed to seep and are not protective of human health or the environment.

In addition to the lagoons, the application fields are a major source of ground water contamination. The nutrient management plan does not account for existing nutrients in the field but allows for full strength applications every year. It also does not account for the build up and conversion of organic nitrogen to nitrate. The repeated application of manure waste results in high organic nitrogen transformation to nitrate every year and is not accounted for in the nutrient budget.

Fall applications are also a major source of contamination, since no plant uptake occurs between fall and spring, but winter precipitation continues to flush nutrients into ground water. This is a major source of impacts to ground water and has been deemed to be waste disposal by a Federal Court in Washington State.

Lagoon seepage and application fields are identified as a major source of groundwater contamination. This permit does not adopt policies to eliminate those sources. As a result, if the Herberg Dairy is allowed to operate, extensive ground water contamination will cause residential wells to become contaminated and surface water to be degraded in a large area.

Surface Water

Dairy contamination of surface water occurs in several ways:

1. Storm water runoff from the facility enters surface water.
2. Overspray or overapplication on the fields.
3. Stormwater runoff from precipitation events transports manure waste to surface water.

4. Seepage and infiltration of nutrients to ground water is transported to surface water.
5. Seepage into field drains is transmitted directly to surface water with little attenuation.
6. Flood events mobilize contaminants from the field into surface water bodies.

All six transport mechanisms result in degradation of surface water quality with contaminants listed in Table 1 and 2. The manure waste and nutrients cause long-term impacts such as algal blooms and remobilization of nutrients each time a runoff event results in turbid conditions.

Several types of bacteria are also readily transported through runoff events including E-coli. These bacteria can cause acute effects in humans and other animals that are in contact with the surface water.

Summary

The current permit application for the Herberg Dairy fails to protect North Dakota's surface water and ground water due to insufficient requirements for manure application volumes, locations, timing, and methods. This facility directly threatens the Red River, and Elm Creek. Through the North Dakota Century Code 61-28-04 and Administrative Code Chapter 33.1-16-02-1. The overall goal of these regulations is to maintain surface water quality for "beneficial uses and prevent degradation of quality of the waters of the State."

If permitted according to the submittals, this site will result in violations of the Clean Water Act with contamination of both surface water and ground water in the watershed. These impacts will continue for many decades and will be exceedingly difficult to remediate once they occur.

The operation of the dairy in the manner proposed has been documented to cause degradation of both surface water and ground water at many facilities across the US.

To be specific, the application fields noted in the plan border the Elm River and the Red River. Acute and immediate impacts to water quality will result from application of manure in the volume and locations described in the permit.

Given changing weather patterns, these nearby fields will discharge soil and manure to the area surface water both because of runoff and flooding of the fields.

Even if the 232,866,763 gallons of waste were applied perfectly, the application rate is based on the faulty assumption that all nutrients are used by the crop every crop year. A substantial portion of these nutrients will seep into the ground, enter ground water, contaminate the aquifer, and eventually discharge to surface water. This problem creates long-term contamination issues and chronic impacts to surface water resources.

The addition of this proposed dairy to the watershed will negatively impact the area and community both immediately and impacts will continue to increase over time.

1. The addition of traffic, manure odors and flies will be immediate.
2. The impact on surface water will increase over time. If the State had required a reasonable surface water and ground water monitoring system, which is absent from the application requirements, the impacts could be tracked, documented, and immediately stopped as impacts are detected.

3. Ground water contamination will first be noticed in taste and odor from residential wells, then sampling will reveal ground water is unsafe for consumption because of dairy related contamination.

These impacts are not imaginary or undocumented. They are actively present in Yakima Washington, Whatcom County, Washington, Wisconsin, California, and Hawaii and documented by environmental investigations completed at CAFO operations.

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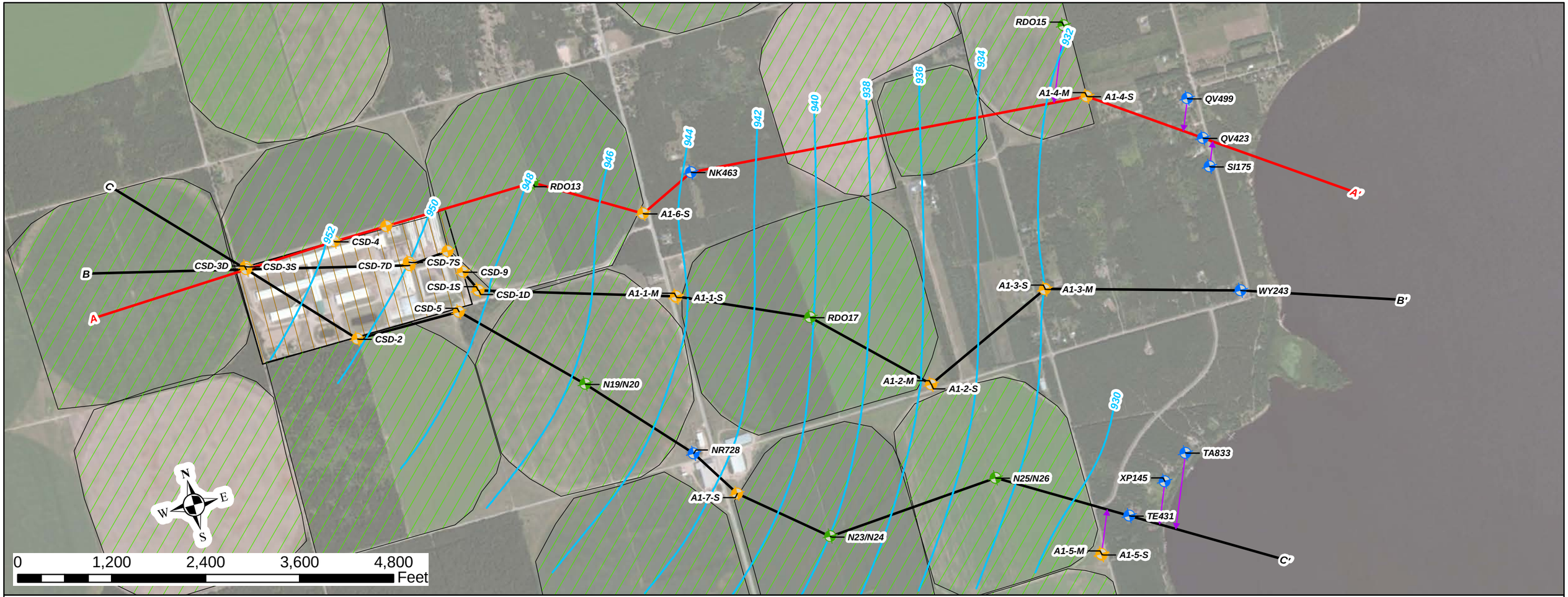
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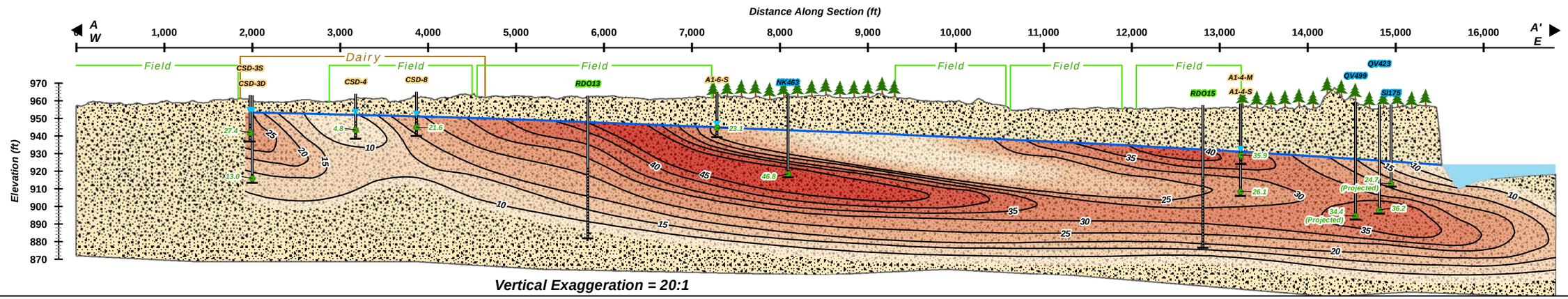
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Attachment A. Hydrogeologic Cross Sections





Legend

- Irrigation Well
- Monitoring Wells
- Potable Well
- 940 Groundwater Elevation Contour
- Groundwater Elevation in Well
- Nitrate Concentration Sample - July 2020
- Groundwater Elevation
- 30 Nitrate Concentration Contour (mg/L)
- Sand and Gravel
- Lagoon
- Petenwell Lake

Nitrate Concentration (mg/L)

- 0-10
- 10-15
- 15-20
- 20-25
- 25-30
- 30-35
- 35-40
- 40-45
- >45

Water & Environmental TECHNOLOGIES

Central Sands Dairy

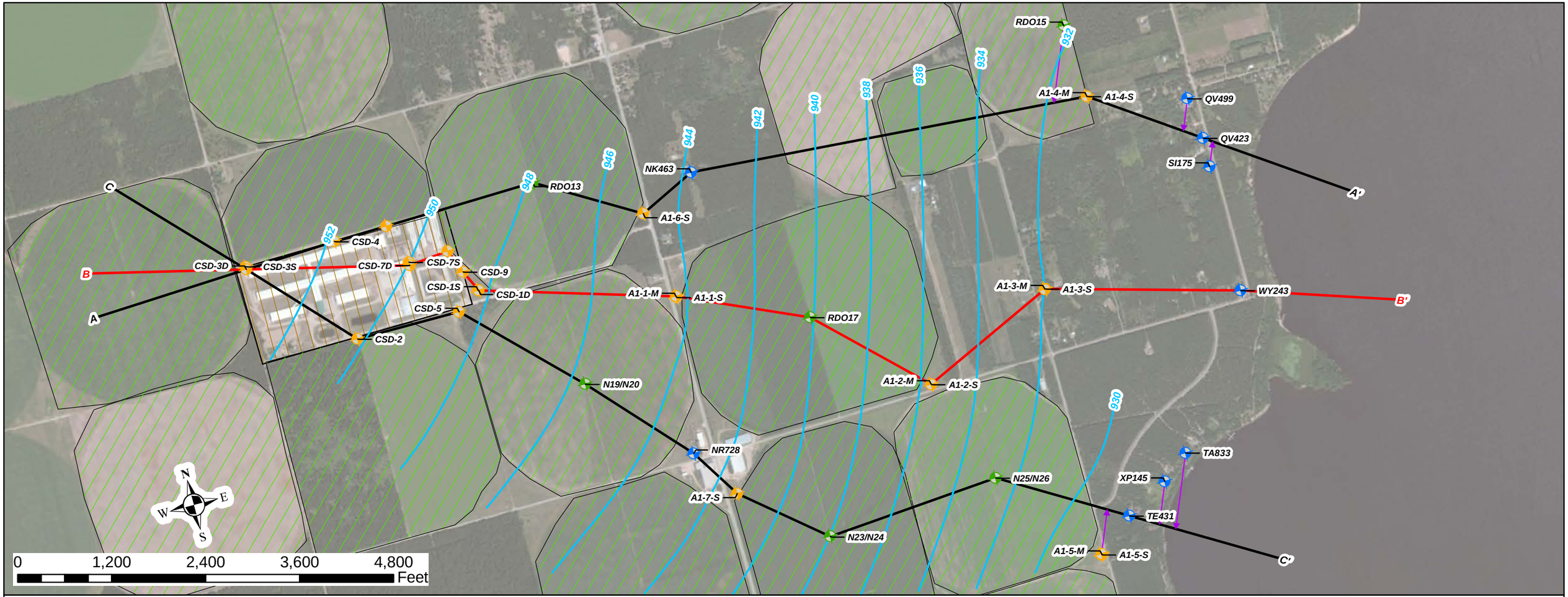
Cross-Section A-A'

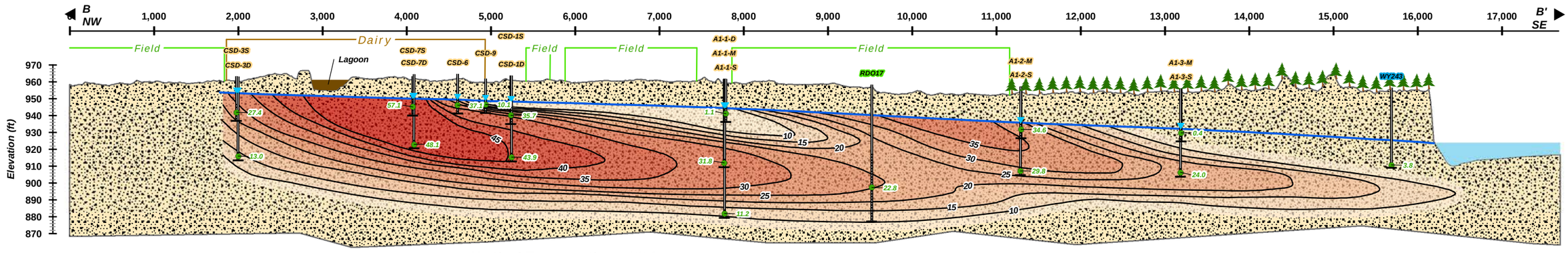
Job#: PINESBACHM01

Date: 1/21/2021

SHEET 1

Path: M:\PinesbachM01\2020\Maps\X_Sections.mxd, Author: brutherford





Legend

- Irrigation Well
- Monitoring Wells
- Potable Well
- 940 Groundwater Elevation Contour
- Groundwater Elevation in Well
- Nitrate Concentration Sample - July 2020
- Groundwater Elevation
- 30 Nitrate Concentration Contour (mg/L)
- Sand and Gravel
- Lagoon
- Petenwell Lake

Nitrate Concentration (mg/L)

- 0-10
- 10-15
- 15-20
- 20-25
- 25-30
- 30-35
- 35-40
- 40-45
- >45

Water & Environmental TECHNOLOGIES

Central Sands Dairy

Cross-Section B-B'

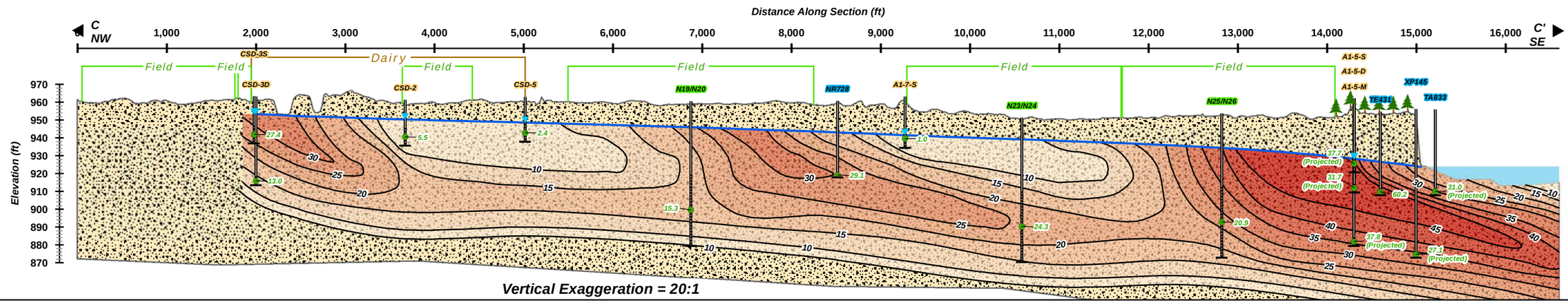
Job#: PINESBACHM01

Date: 1/21/2021

SHEET 2

Path: M:\PinesbachM01\2020\Maps\X_Sections.mxd, Author: brutherford





Legend

- Irrigation Well
- Monitoring Wells
- Potable Well
- 940 Groundwater Elevation Contour
- Groundwater Elevation in Well
- Nitrate Concentration Sample - July 2020
- Groundwater Elevation
- 30 Nitrate Concentration Contour (mg/L)
- Sand and Gravel
- Lagoon
- Petenwell Lake

Nitrate Concentration (mg/L)

- 0-10
- 10-15
- 15-20
- 20-25
- 25-30
- 30-35
- 35-40
- 40-45
- >45

Water & Environmental TECHNOLOGIES

Central Sands Dairy

Cross-Section C-C'

Job#: PINESBACHM01

Date: 1/21/2021

SHEET 3

Path: M:\PinesbachM01\2020\Maps\X_Sections.mxd, Author: brutherford

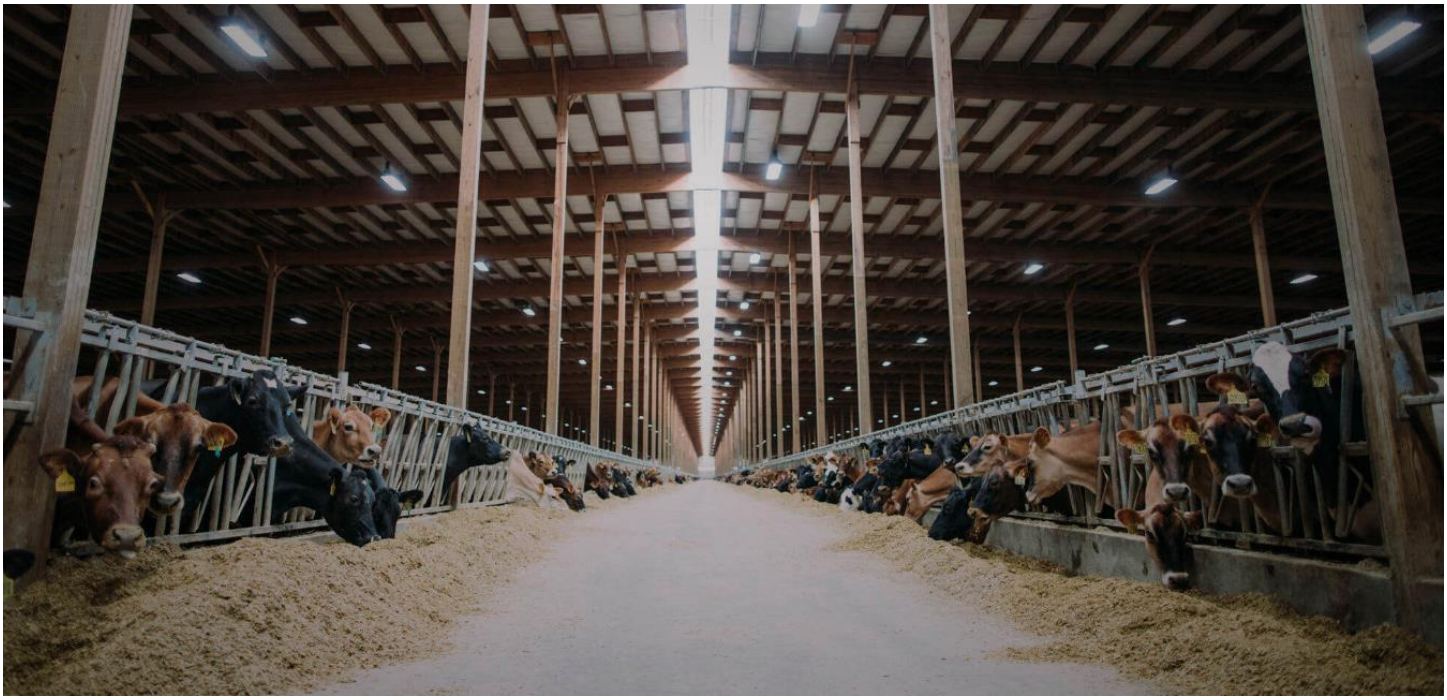
Exhibit 2

SETTJE AGRI-SERVICES & ENGINEERING, INC.,
CALCULATIONS

(*received from DEQ via public records request*)

CALCULATIONS

Prepared by Settje Agri-Services and Engineering, Inc.
15460 NW 48th Street | Raymond, Nebraska 68428



Herberg Dairy

Section 34, T-145-N, R-49-W
Traill County, North Dakota

Herberg Dairy

Synthetic Covered Manure Ponds 1-4 Design Volume

A. Minimum Precipitation Storage Requirements

1. Drainage Description . . . . . **Covered ponds - rain water will be pumped off site with stormwater**

2. County . . . . . **Traill**

B. Manure Storage Pond Requirement

Animal Head Count of Lactating and Dry Cows	**25,000**	
Days of Storage	**415**	
Total Manure Produced	**21,787,500**	cubic feet
Separated Solids	**1,307,250**	cubic feet
Remaining Liquid Manure	**20,480,250**	cubic feet
Flush Water		
Total Flush Water	**0 ***	cubic feet
Bedding		
Bedding Imported Per Year	**0 ****	cubic feet
Process Waste Water		
Parlor and Wash Bay Waste Water Per Day	**137,000**	gallons
Feed Bunk Cooling Mist	**2,773,879**	cubic feet
Water Softener Brine Water Per Day	**5,000**	gallons
Total Process Waste Water	**10,651,694**	cubic feet
Total		
Total Runoff, Manure, and Process Waste Water	**31,131,944**	cubic feet
Liquid Manure Storage Provided	**31,145,494**	cubic feet

* The Facility Scrapes the Barns

** The Facility Reuses the Separated Solids as Bedding

C. Combined Ponds 1-4 Solids Accumulation Allowance

Volume at Pond Floors (1 foot thick).	**1,150,400**	cubic feet

D. Combined Ponds 1-4 Storage Table

	Elevation (feet)	Volume (ft^3)	Volume (Acre-in)	Surface Area (ft^2)
Overflow Level	**875.20**	**39,207,257**	**10,801**	**2,397,456**
	873.20	**34,536,727**	**9,514**	**2,272,048**
Freeboard Level	**872.20**	**32,295,894**	**8,897**	**2,209,744**
	871.20	**30,116,975**	**8,297**	**2,148,218**
	869.20	**25,941,761**	**7,146**	**2,027,510**
	867.20	**22,004,843**	**6,062**	**1,909,922**
	865.20	**18,299,983**	**5,041**	**1,795,454**
	863.20	**14,820,938**	**4,083**	**1,684,108**
	861.20	**11,561,469**	**3,185**	**1,575,880**
	859.20	**8,515,334**	**2,346**	**1,470,772**
	857.20	**5,676,293**	**1,564**	**1,368,786**
	855.20	**3,038,105**	**837**	**1,269,918**
	853.20	**728,012**	**201**	**833,206**
Pond Floor	**851.20**	**0**	**0**	**0**

*Max Operating Level will be 0.5 feet below Freeboard Level



Herberg Dairy

Synthetic Covered Leachate Pond 5 Design Volume

A. Minimum Precipitation Storage Requirements

1. Type of Construction . . . . . **Feed Pad and Manure Stacking Pad**

2. County . . . . . **Traill**

3. Drainage Area

   Feed Pad Area and Stacking Pad Area . . . . . **46.8** acres

4. Runoff

   Feed Pad and Stacking Pad Area

   Mean Annual Precipitation . . . . . **23.96** inches

   Annual Precipitation Runoff Percentage. **100.0%**

   Mean Annual Runoff Volume. . . . . **4,070,421** cubic feet

   25-Year; 24-Hour Rainfall. . . . . **4.77** inches

   25-Year; 24-Hour Runoff (SCS Method; CN=98). . . . . **4.53** inches

   25-Year; 24-Hour Runoff Volume. . . . . **770,177** cubic feet

B. Pond 5 Surface Precipitation, Evaporation

Manure Storage Pond Area . . . . . **Covered pond - rain water will be pumped off site with stormwater**

Mean Annual Precipitation Volume on Pond Surface. . . . . **0** cubic feet

25-Year; 24-Hour Precipitation Volume on Pond Surface. . . . . **0** cubic feet

Evap. Surface Area (at 1/2 (Max. Operating - Max. Sludge Levels) . . . . . **0** square feet

Mean Annual Evaporation. . . . . **0.0** inches

Mean Annual Evaporation Volume. . . . . **0** cubic feet

C. Pond 5 Solids Accumulation Allowance

Allowable Solids Volume . . . . . **42,577** cubic feet

D. Pond 5 Total Requirements and Design Volumes

Total Req. Volume. . . . . **4,883,175** cubic feet

Total Req. Volume Above Marker (25-Year; 24-Hour Storm). . . . . **770,177** cubic feet

Total Req. Volume Below Marker (Mean Annual Precip. - Evap.). . . . . **4,070,421** cubic feet

Design Volume Above Marker . . . . . **984,235 cubic feet** **=** **127.8 %** of required volume

Design Volume Below Marker . . . . . **4,640,950 cubic feet** **=** **114.0 %** of required volume

E. Pond 5 Levels

	Elevation (feet)	Volume (ft^3)	Volume (Acre-in)	Surface Area (ft^2)
Overflow Level	**873.70**	**7,844,702**	**2,161**	**579,750**
*Freeboard Level	**869.70**	**5,667,762**	**1,561**	**509,233**
**Max. Operating Level	**867.70**	**4,683,527**	**1,290**	**475,130**
	861.20	**1,942,510**	**535**	**369,615**
Residual Level	**854.70**	**42,577**	**12**	**90,784**
Pond Floor	**853.70**	**0**	**0**	**0**

* Must be at least two feet below the top-of berm elevation

** If this level is exceeded, the manure storage pond shall be pumped below this level within 14 days.



Exhibit 3

HERBERG DAIRY MANURE APPLICATION FIELDS

(*received from DEQ via public records request*)

Herberg Dairy Manure Application Fields

updated 3/3/2025

Field No.	Field Name	T	R	S	Quarter	Landowner Reported Acres	Total Acres	Excluded Acres	Spreadable Acres	Setback map	Drain tile*	Flood risk	Owner	Easement Signed	PI - year done	PI Rating	N Soil lb/acre	Soil test	Soil map	P Soil Olson ppm	Lat.	Long.	Water Shed	Receiving Stream
001	Clyde's	144	50	12 & 13	Irregular	507.2	484.4	72.3	412.1	yes	yes	partial	Jason Lovas	6/28/2024	2024	low	18	yes	yes	15	47.30113	-96.95430	90201070303	Borke Drain No 16-North Branch Elm River
002	Mabel's	145	50	25	NW 1/4	154.1	154.1	1.6	152.5	yes	no	no	Jason Lovas	6/28/2024	2024	low	6	yes	yes	24	47.34901	-96.97951	90201070602	90201070602
003	South 1/4	145	50	33	W 1/2	214.2	211.0	46.4	164.6	yes	no	partial	Jason Lovas	6/28/2024	2024	low	8	yes	yes	16	47.33208	-97.04346	90201070303	Borke Drain No 16-North Branch Elm River
004	Behind Shop	145	50	28	S 1/2	279.4	279.4	0.1	279.3	yes	yes	no	Jason Lovas	6/28/2024	2024	low	5	yes	yes	31	47.34209	-97.03830	90201070603	Grandin Lake-Red River
005	Kyle's 1/4	145	50	27	SW 1/4	156.2	156.2	0.0	156.2	yes	yes	no	Jason Lovas	6/28/2024	2024	low	22	yes	yes	27	47.34220	-97.02219	90201070602	90201070602
006	Danny's	145	50	31	ALL	516.8	508.9	48.5	460.4	yes	no	partial	Jason Lovas	6/28/2024	2024	low	6	yes	yes	7	47.33112	-97.08060	90201070603	Grandin Lake-Red River
007	Andys	144	50	7	W 1/2	272.1	272.1	0.0	272.1	yes	yes	no	Jason Lovas	6/28/2024	2025	low	9	yes	yes	8	47.30399	-97.06566	90201070303	Borke Drain No 16-North Branch Elm River
008	Shornecks	144	50	8	NW 1/4	154.8	154.8	0.0	154.8	yes	yes	no	Jason Lovas	6/28/2024	2025	low	8	yes	yes	28	47.30759	-97.04508	90201070303	Borke Drain No 16-North Branch Elm River
009																								
010	Evenson Home	146	49	30		removed	227.2	25.3		yes	no	yes	Missing (EVENSON, MILES & KATHLEEN)		2024	low	8	yes	yes	11	47.43226	-96.95074	90201090605	Goose River
011	Gene Section 3	144	49	3	E 1/2	removed	282.5	1.5		yes	no	yes	Gene Christianson	7/1/2024	2024	low	45	yes	yes	28	47.31722	-96.86373	90201070603	Grandin Lake-Red River
012	Gene Section 11	144	49	11	W 1/2	removed	309.4	2.7		yes	yes	yes	Gene Christianson	7/1/2024	2024	low	12	yes	yes	11	47.30310	-96.85303	90201070601	Love Lake-Red River
013	Anderson Home	145	49	20	E 1/2	302.5	302.5	2.3	300.2	yes	no	no	Michael & Joanne Warner		2024	low	12	yes	yes	4	47.36026	-96.92671	90201070603	Grandin Lake-Red River
014	McNamee South of Home	144	50	1	All	534.2	534.2	7.4	526.8	yes	yes	no	Thomas & Elena McNamee	7/8/2024	2025	low	8	yes	yes	10	47.31780	-96.95433	90201070303	Borke Drain No 16-North Branch Elm River
015	McNamee Home	145	49	31	S 1/2	288.6	288.6	3.6	285.0	yes	yes	no	Thomas & Elena McNamee	7/8/2024	2024	low	9	yes	yes	15	47.32759	-96.95293	90201070602	90201070602
016	McNamee Section 6	144	49	6	SW 1/4	156.1	156.1	0.0	156.1	yes	yes	no	Thomas & Elena McNamee	7/8/2024	2024	low	2	yes	yes	12	47.31513	-96.93830	90201070303	Borke Drain No 16-North Branch Elm River
017	McNamee Section 7	144	49	7	NW 1/4	156.5	156.5	6.9	149.6	yes	yes	partial	Thomas & Elena McNamee	7/8/2024	2024	low	4	yes	yes	7	47.30769	-96.93824	90201070303	Borke Drain No 16-North Branch Elm River
018	15F2	144	50	15	S 1/2	309.5	309.5	0.6	308.9	yes	yes	no	Donald McInnes	7/9/2024	2024	low	39	yes	yes	42	47.28598	-96.99691	90201070303	Borke Drain No 16-North Branch Elm River
019	McInnes Section 10	144	50	10	SW 1/4	152.9	152.9	4.8	148.1	yes	no	no	Donald McInnes	7/9/2024	2024	medium	29	yes	yes	52	47.30035	-97.00235	90201070303	Borke Drain No 16-North Branch Elm River
020	Kelso 16	144	50	16	E 1/2, NW 1/4	54.3	54.3	2.3	52.0	yes	yes	no	Donald McInnes	7/9/2024	2025	low	38	yes	yes	7	47.29315	-97.02050	90201070303	Borke Drain No 16-North Branch Elm River
021	Noble 6	143	49	6	NE 1/2	154.7	154.7	10.3	144.4	yes	yes	no	Donald McInnes	7/9/2024	2025	low	15	yes	yes	9	47.23492	-96.92711	90201070106	County Ditch No 13-Red River
022	22 W	144	50	22	W 1/2, W 1/2	151.9	151.9	1.9	150.0	yes	yes	no	Tyler McInnes	7/10/2024	2025	low	7	yes	yes	18	47.27504	-97.00478	90201070406	Grandin Cemetery-Elm River
023	Harvey 11	144	49	11	E 1/2	removed	199.0	5.2		yes	no	yes	Harvey Christianson	7/8/2024	2024	low	16	yes	yes	14	47.30297	-96.84248	90201070601	Love Lake-Red River
024	Harvey 10	144	49	10	E 1/2	309.4	309.4	44.9	264.5	yes	no	partial	Harvey Christianson	7/8/2024	2024	low	8	yes	yes	24	47.30318	-96.86384	90201070601	Love Lake-Red River
025	Henka Section 32	145	49	32	NW 1/4	150.9	150.9	4.9	146.0	yes	no	no	Keith & Kevin Henka	7/8/2024	2024	low	23	yes	yes	19	47.33469	-96.93683	90201070602	90201070602
026	Henka Section 30 1/4	145	49	30	SW 1/4	157.7	157.7	2.2	155.5	yes	no	no	Keith & Kevin Henka	7/8/2024	2024	low	8	yes	yes	9	47.34163	-96.95813	90201070602	90201070602
027	Henka Section 30 80	145	49	30	S 1/2, SE 1/4	79.7	79.7	2.4	77.3	yes	no	no	Keith & Kevin Henka	7/8/2024	2024	low	7	yes	yes	35	47.33967	-96.94747	90201070602	90201070602
028	Henka Section 14	145	50	14	SE 1/4	153.9	153.9	6.5	147.4	yes	no	no	Keith & Kevin Henka	7/8/2024	2024	low	4	yes	yes	6	47.37092	-96.99047	90201070603	Grandin Lake-Red River
029	Henka Home	145	50	12	0.75	447.9	447.9	4.7	443.2	yes	yes	no	Keith & Kevin Henka	7/8/2024	2024	low	8	yes	yes	9	47.38904	-96.97460	90201070604	Steenerson Drain
030	Henka Section 7	145	49	7	ALL	610.8	610.8	9.0	601.8	yes	yes	no	Keith & Kevin Henka	7/8/2024	2024	low	16	yes	yes	14	47.38905	-96.95309	90201070604	Steenerson Drain
031	Henka North of Home	145	50	1	SW 1/4	158.4	158.4	0.0	158.4	yes	no	no	Keith & Kevin Henka	7/8/2024	2024	low	4	yes	yes	8	47.39998	-96.98000	90201070604	Steenerson Drain
032	Herberg 27	145	49	27	ALL	632.2	632.2	73.0	559.2	yes	no	partial	Bruce & Jeanne Viker	7/8/2024	2024	low	8	yes	yes	6	47.34597	-96.88879	90201070602	90201070602
033	Herberg 26 North	145	49	26	N 1/2	removed	301.9	12.0		yes	yes	yes	Bruce & Jeanne Viker	7/8/2024	2024	low	4	yes	yes	8	47.34972	-96.86742	90201070603	Grandin Lake-Red River
034	Herberg 26 South	145	49	26	S 1/2	removed	319.3	2.8		yes	no	partial	Bruce & Jeanne Viker	7/8/2024	2024	low	5	yes	yes	10	47.34254	-96.86742	90201070602	90201070602
035	Herberg 25	145	49	25	ALL	removed	257.9	9.5		yes	no	yes	Bruce & Jeanne Viker	7/8/2024	2024	low	4	yes	yes	20	47.34605	-96.84733	90201070602	90201070602
036	Jeremy's Farm	144	49	2	N 1/2	removed	266.5	3.0		yes	no	yes	Jeremy Paulsrud	7/9/2024	2024	low	4	yes	yes	8	47.32044	-96.84693	90201070603	Grandin Lake-Red River
037	Kim's Section 10	144	49	10	NW 1/4	155.2	155.2	3.1	152.1	yes	no	no	Kim & Tod Harrington	7/16/2024	2024	low	15	yes	yes	19	47.30694	-96.87422	90201070601	Love Lake-Red River
038	Tod Section 10	144	49	10	SW 1/4	154.3	154.3	0.0	154.3	yes	no	no	Tod & Rebecca Harrington	7/9/2024	2024	low	9	yes	yes	12	47.29972	-96.87424	90201070601	Love Lake-Red River
039	Section 23 North	144	49	23	N 1/2	230.6	230.6	123.5	107.1	yes	yes	partial	Tod & Rebecca Harrington	7/9/2024	2024	low	10	yes	yes	17	47.27771	-96.84975	90201070601	Love Lake-Red River
040	Section 23 South	144	49	23	SW 1/4	removed	149.4	1.5		yes	yes	partial	Tod & Rebecca Harrington	7/9/2024	2024	low	3	yes	yes	9	47.27053	-96.85088	90201070601	Love Lake-Red River
041	Tod's House	144	49	28	N 1/2, N 1/2	96.6	96.6	11.0	85.6	yes	no	partial	Tod & Rebecca Harrington	7/9/2024	2024	low	2	yes	yes	14	47.26577	-96.89004	90201070406	Grandin Cemetery-Elm River
042	Tod Section 28	144	49	28	S 1/2	316.6	316.6	59.7	256.9	yes	yes	partial	Tod & Rebecca Harrington	7/9/2024	2024	low	4	yes	yes	3	47.25640	-96.88993	90201070406	Grandin Cemetery-Elm River
043	West of Jeremy's	145	49	36	SW 1/4	removed	148.9	1.0		yes	no	yes	Randy Paulsrud	7/9/2024	2024	low	10	yes	yes	6	47.32790	-96.84985	90201070603	Grandin Lake-Red River
044	Jeff McInnes Section 10	144	50	10	NW 1/4	148.5	148.5	0.0	148.5	yes	no	no	Jeff McInnes	7/9/2024	2024	low	15	yes	yes	50	47.30744	-97.00243	90201070303	Borke Drain No 16-North Branch Elm River
045	McInnes Home	144	50	15	N 1/2	295.1	295.1	9.8	285.3	yes	yes	no	Jeff McInnes	7/9/2024	2024	low	14	yes	yes	30	47.29315	-96.99706	90201070303	Borke Drain No 16-North Branch Elm River
046	McInnes Section 23	144	50	23	SE 1/4	154.5	154.5	0.9	153.6	yes	no	no	Jeff McInnes	7/9/2024	2024	medium	26	yes	yes	63	47.27152	-96.97004	90201070406	Grandin Cemetery-Elm River
047	Substation	144	50	22	E 1/2, W 1/2	159.2	159.2	2.1	157.1	yes	yes	no	Jeff McInnes	7/9/2024	2024	low	6	yes	yes	24	47.27499	-96.99962	90201070406	Grandin Cemetery-Elm River
048	Section 21 E of Tracks	144	50	21	E 1/2	227	227.0	4.4	222.6	yes	no	no	Jeff McInnes	7/9/2024	2024	low	10	yes	yes	14	47.27505	-97.01270	90201070406	Grandin Cemetery-Elm River
049	Viker Home	145	49	21	ALL	590.7	590.7	5.4	585.3	yes	no	no	DEWEL III VIKER	7/10/2024	2024	low	7	yes	yes	17	47.36035	-96.91019	90201070603	Grandin Lake-Red River
050	South Home	145	49	28	ALL	573.4	573.4	36.3	537.1	yes	yes	no	DEWEL III VIKER	7/10/2024	2024	low	11	yes	yes	6	47.34574	-96.91021	90201070602	90201070602
051	South of Dairy	145	49	34	S 1/2	311.2	311.2	74.2	237.0	yes	no	partial	DEWEL III VIKER	7/10/2024	2024	low	9	yes	yes	27	47.32785	-96.88894	90201070602	90201070602
052	East of Dairy	145	49	35	N 1/2	removed	309.2	34.2		yes	no	yes	HARRIS, VICTORIA ANN, Elliot Vike	7/10/2024	2024	low	35	yes	yes	32	47.33515	-96.86751	90201070602	90201070602
053	Herberg 24	145	49	24	SW 1/4	removed	63.0	1.4		yes	no	yes	DEWEL III VIKER	7/10/2024	2024	low	2	yes	yes	4	47.35717	-96.85137	90201070603	Grandin Lake-Red River
054	August's	145	49	32	0.75	423.9	423.9	8.6	415.3	yes	no	no	DEWEL III VIKER	7/10/2024	2024	low	5	yes	yes	19	47.33121	-96.93164	90201070303	Borke Drain No 16-North Branch Elm River
055	Poland	145	49	30	NW 1/4	155.4	155.4	5.8	149.6	yes	no	no	DEWEL III VIKER	7/10/2024	2024	low	4	yes	yes	5	47.34879	-96.95822	90201070602	90201070602
056	East Section 5	145	49	5	E 1/2	302	302.0	0.0	302.0	yes	no	no	Arlen & Darin Oanes	7/10/2024	2024	low	16	yes	yes	25	47.40365	-96.92649	90201070604	Steenerson Drain
057	NW Section 11	145	49	11	NW 1/4	removed	155.9	0.0		yes	no	yes	Arlen & Darin Oanes	7/10/2024	2024	low	13	yes	yes	17	47.39341	-96.87294	90201070604	Steenerson Drain
058																								
059	Caledonia 30	146	49	30	E 1/2, SE 1/4	56.2	56.2	20.1	36.1	yes	no	partial	Darin Oanes	7/10/2024	2024	low	12	yes	yes	19	47.42879	-96.94534	90201070605	Augustana Church-Red River
060	Herberg 17	145	49	17	N 1/2	317.3	317.3	18.2	299.1	yes	no	no	Darin Oanes	7/10/2024	2024	low	12	yes	yes	20	47.37835	-96.93172	90201070604	Steenerson Drain
061	Herberg 14	145	49	14	NW 1/4	removed	160.4	2.7		yes	no	yes	Arlen Oanes	7/10/2024	2024	low	15	yes	yes	34	47.37880	-96.87285	90201070604	Steenerson Drain
062	Oanes Home	145	49	17	S 1/2	295.4	295.4	0.7	294.7	yes	no	no	Arlen Oanes	7/10/2024	2024	low	4	yes	yes	6	47.37104	-96.93155	90201070604	Steenerson Drain
063	South Herberg 15	145	49	15	S 1/2, S 1/2	removed	131.9	3.9		yes	no	yes	Arlen Oanes	7/10/2024	2024	low	7	yes	yes	29	47.36933	-96.88886	90201070604	Steenerson Drain
064	South Herberg 14	145	49	14	S 1/2	removed	299.9	1.0		yes	no	yes	Arlen Oanes	7/10/2024	2024	low	19	yes	yes	23	47.37159	-96.86752	90201070604	Steenerson Drain
065	Riverbend	145	49	24	NW 1/4	removed	48.3	2.7		yes	no	yes	Arlen Oanes	7/10/2024	2024	low	22	yes	yes	19	47.36273	-96.85307	90201070603	Grandin Lake-Red River
066																								
067	Home Section	145	50	24	ALL	600	600.0	13.3	586.7	yes	yes	no	Paul Kozojed	7/11/2024	2024	low	10	yes	yes	9	47.35987	-96.97431	90201070602	90201070602
068	Herberg 6	145	49	6	W 1/2, SW 1/4	76.9	76.9	0.0	76.9	yes	yes	no	Paul Kozojed	7/11/2024	2024	low	4	yes	yes	12	47.39986	-96.96130	90201070604	Steenerson Drain
069	Warner 80	145	49	16	N 1/2, NE 1/4	77.9	77.9	2.3	75.6	yes	no	no	Brian & Kevin Kuehl	7/10/2024	2024	low	6	yes	yes	10	47.38044	-96.90508	90201070604	Steenerson Drain
070	Red River North	146	49	23	S 1/2, S 1/2	removed	80.2	0.1		yes	no	yes	Gerald & Ann Boeddeker	7/11/2024	2024	low	6	yes	yes	9	47.44087	-96.86822	90201070605	Augustana Church-Red River
071	Red River South	146	49	26	N 1/2, N 1/2	removed	120.9	1.2		yes	no	yes	Gerald & Ann Boeddeker	7/11/2024	2024	low	5	yes	yes	4	47.43807	-96.86797	90201070605	Augustana Church-Red River
072	Home 1/4	146	49	29	SE 1/4	148.3	148.3	23.4	124.9	yes	yes	partial	Gerald & Ann Boeddeker	7/11/2024	2024	low	6	yes	yes	3	47.42890	-96.92651	90201070605	Augustana Church-Red River
073	N 80	146	49	8	N 1/2, SW 1/4	79.8	79.8	0.0	79.8	yes	no	no	Gerald & Ann Boeddeker	7/11/2024	2024	low	31	yes	yes	3	47.47411	-96.93640	90203010401	Judicial Ditch No 54-Red River
074	Dales 1/2 Section	146	49	31	S 1/2	309.6	309.6	1.4	308.2	yes	no	no	Dale & Joyce Boeddeker	7/11/2024	2024	low	39	yes	yes	11	47.41432	-96.95333	90201070605	Augustana Church-Red River
075	Jay's Section 28	146	49	28	SE 1/4	155.1	155.1	0.0	155.1	yes	no	no	Jay Boeddeker	7/9/2024	2024	low	9	yes	yes	19	47.42894	-96.90540	90201070605	Augustana Church-Red River

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	AK	AL	AM	AN	AP	AQ	AR	AS
2		Field No.	Field Name	T	R	S	Quarter	Landowner Reported Acres	Total Acres	Excluded Acres	Spreadable Acres	Setback map	Drain tile*	Flood risk	Owner	Easement Signed	PI - year done	PI Rating	N Soil lb/acre	Soil test	Soil map	P Soil Olson ppm	Lat.	Long.	Water Shed	Receiving Stream
78		076	Dallas 1/2 Section	146	49	34	N 1/2	removed	317.2	0.0		yes	no	partial	Jay Boeddeker	7/9/2024	2024	low	6	yes	yes	11	47.42156	-96.88918	90201070605	Augustana Church-Red River
79		077	Halstad 1/2	145	49	23	N 1/2	removed	286.4	3.5		yes	yes	yes	Jay Boeddeker	7/9/2024	2024	low	6	yes	yes	8	47.36416	-96.86744	90201070603	Grandin Lake-Red River
80		078	Jay's W of Co Rd 2	145	49	11	SE 1/4	removed	149.6	9.9		yes	no	yes	Jay Boeddeker	7/9/2024	2024	low	9	yes	yes	11	47.38617	-96.86235	90201070604	Steenerson Drain
81		079	Jay's E of Co Rd 2	145	49	12	SW 1/4	removed	143.0	4.0		yes	no	yes	Jay Boeddeker	7/9/2024	2024	low	9	yes	yes	6	47.38559	-96.84813	90201070605	Augustana Church-Red River
82		080	Caledonia 1/4	146	49	10	NE 1/4	156.2	156.2	0.0	156.2	yes	no	no	Jay Boeddeker	7/9/2024	2024	low	19	yes	yes	11	47.47965	-96.88294	90203010401	Judicial Ditch No 54-Red River
83		081	Foss Farm	146	49	2	NW 1/4	removed	156.9	3.1		yes	no	yes	Jay Boeddeker	7/11/2024	2024	low	11	yes	yes	2	47.49392	-96.87127	90203010401	Judicial Ditch No 54-Red River
84		082	Solee Red River	146	49	26	S 1/2, N 1/2	removed	103.3	1.1		yes	no	yes	Phyllis Solee	7/11/2024	2024	low	5	yes	yes	4	47.43453	-96.87035	90201070605	Augustana Church-Red River
85		083	Solee 28	146	49	28	S 1/2, SW 1/4	76.4	76.4	0.0	76.4	yes	yes	no	Phyllis Solee	7/11/2024	2024	low	12	yes	yes	5	47.42690	-96.91587	90201070605	Augustana Church-Red River
86		084	Solee 1/2 Section	145	49	15	S 1/2, N 1/2	removed	159.6	0.0		yes	yes	yes	Phyllis Solee	7/11/2024	2024	low	8	yes	yes	5	47.37739	-96.88877	90201070604	Steenerson Drain
87		085	Brady	144	49	19	W 1/2	304.4	304.4	124.7	179.7	yes	no	partial	Brady Bernadine (William J BRADY	4/15/2024	2024	low	16	yes	yes	8	47.27491	-96.93533	90201070406	Grandin Cemetery-Elm River
88		086	Tungseth 1/4	144	49	20	NE 1/4	155.2	155.2	0.0	155.2	yes	no	no	Loren & Sharon Tungseth	7/16/2024	2024	low	38	yes	yes	15	47.27836	-96.90623	90201070406	Grandin Cemetery-Elm River
89		087	Tungseth 51	144	49	20	E 1/2, SE 1/4	46.7	46.7	0.0	46.7	yes	yes	no	Loren & Sharon Tungseth	7/16/2024	2024	low	38	yes	yes	15	47.27120	-96.90239	90201070406	Grandin Cemetery-Elm River
90		088	Gadberry Section 4	143	49	4	N 1/2 & SW 1/4	467.7	467.7	14.5	453.2	yes	yes	no	Wayne Gadberry	7/15/2024	2025	low	79	yes	yes	9	47.23098	-96.88961	90201070106	County Ditch No 13-Red River
91		089	Gadberry 200	143	49	3	S 1/2	194.8	194.8	9.8	185.0	yes	yes	no	Wayne Gadberry	7/15/2024	2025	low	44	yes	yes	9	47.22713	-96.87011	90201070106	County Ditch No 13-Red River
92		090	Gadberry Home	144	49	30	N 1/2	278.2	278.2	0.0	278.2	yes	yes	no	Wayne Gadberry	7/15/2024	2024	low	19	yes	yes	7	47.26407	-96.93267	90201070406	Grandin Cemetery-Elm River
93		091	Highline	144	50	24	NW 1/4	152	152.0	4.5	147.5	yes	yes	no	Kevin Weller		2024	low	20	yes	yes	10	47.27863	-96.95951	90201070406	Grandin Cemetery-Elm River
94		092	Herberg 3	145	49	3	NW 1/4	removed	140.1	0.0		yes	no	yes	Paul Fossum	7/15/2024	2024	low	10	yes	yes	9	47.40729	-96.89447	90201070604	Steenerson Drain
95		093	Caledonia 32	146	49	32	NE 1/4	154.5	154.5	0.0	154.5	yes	no	no	Paul Fossum	7/15/2024	2024	low	9	yes	yes	7	47.42146	-96.92663	90201070605	Augustana Church-Red River
96		094	Fossum 28	146	49	28	W 1/2, NW 1/4	75.3	75.3	22.1	53.2	yes	no	partial	Paul Fossum	7/15/2024	2024	low	6	yes	yes	30	47.43601	-96.91850	90201090605	Goose River
97		095	McAndrew 100	144	49	35	NE 1/4	removed	98.0	1.2		yes	no	yes	James McAndrew	7/17/2024	2024	low	30	yes	yes	7	47.24862	-96.84145	90201070106	County Ditch No 13-Red River
98		096	McAndrew 80	143	49	3	S 1/2, NW 1/4	79.8	79.8		79.8	yes	yes	no	Margaret McAndrew Beasley	7/17/2024	2025	low	53	yes	yes	9	47.23254	-96.87364	90201070106	County Ditch No 13-Red River
99		097	Section 10	143	49	10	NE 1/4	158.1	158.1	5.1	153.0	yes	yes	no	Margaret McAndrew Beasley	7/17/2024	2025	low	13	yes	yes	10	47.21973	-96.86286	90201070106	County Ditch No 13-Red River
100		098	River 1/4	143	49	11	NW 1/4	153.3	153.3	0.1	153.2	yes	yes	no	Margaret McAndrew Beasley	7/17/2024	2025	low	30	yes	yes	6	47.21966	-96.85211	90201070106	County Ditch No 13-Red River
101		099	Derek's Section 2	144	49	2	SW 1/4	removed	159.8	7.7		yes	yes	yes	Derek Paulsrud	7/15/2024	2024	low	7	yes	yes	35	47.31364	-96.85132	90201070601	Love Lake-Red River
102		100	Hillboro 15	145	50	15	E 1/2	225.9	225.9	0.0	225.9	yes	no	no	Derek Paulsrud	7/15/2024	2024	low	34	yes	yes	23	47.37299	-97.01181	90201070604	Steenerson Drain
103		101	Elm River 8	144	49	8	0.75	removed	391.4	23.8		yes	yes	partial	Kevin Paulsrud	7/19/2024	2024	low	12	yes	yes	18	47.30369	-96.90866	90201070303	Borke Drain No 16-North Branch Elm River
104		102	Paulsrud Section 6	144	49	6	N 1/2	241.2	241.2	10.1	231.1	yes	yes	no	Kevin Paulsrud	7/19/2024	2024	low	6	yes	yes	13	47.32116	-96.93281	90201070303	Borke Drain No 16-North Branch Elm River
105		103	Elm River 18	144	49	18	ALL	554.7	554.7	132.8	421.9	yes	yes	partial	Kevin Paulsrud	7/19/2024	2024	low	10	yes	yes	14	47.28950	-96.93295	90201070303	Borke Drain No 16-North Branch Elm River
106		104	Elm River 17	144	49	17	SE 1/4	122.2	122.2	19.5	102.7	yes	yes	partial	Kevin Paulsrud	7/19/2024	2024	low	9	yes	yes	9	47.28530	-96.90640	90201070406	Grandin Cemetery-Elm River
107		105	Kevin's on The River	144	49	14	Part of	removed	182.0	4.0		yes	yes	yes	Kevin Paulsrud	7/19/2024	2024	low	8	yes	yes	4	47.28836	-96.85003	90201070601	Love Lake-Red River
108		106	Derek's Place	144	49	11	NE 1/4	removed	62.6	0.8		yes	no	yes	Kevin Paulsrud	7/19/2024	2024	low	8	yes	yes	21	47.30523	-96.83914	90201070601	Love Lake-Red River
109		107	Paulsrud Section 7	144	49	7	SW 1/4	156.3	156.3	24.4	131.9	yes	yes	partial	Kevin Paulsrud	7/19/2024	2024	low	5	yes	yes	5	47.30061	-96.93816	90201070303	Borke Drain No 16-North Branch Elm River
110		108	Elm River 21	144	49	21	N 1/2, NE 1/4	80.2	80.2	0.0	80.2	yes	no	no	Kevin Paulsrud	7/15/2024	2024	low	2	yes	yes	5	47.28059	-96.88531	90201070406	Grandin Cemetery-Elm River
111		109	Section 2 Kinyon	143	50	2	All	624.3	624.3	10.9	613.4	yes	yes	no	Kevin Paulsrud	7/15/2024	2025	low	12	yes	yes	7	47.23157	-96.97499	90201070106	County Ditch No 13-Red River
112		110	Kinyon Highway	143	50	10	NE 1/4	143	143.0	5.8	137.2	yes	yes	no	Kevin Paulsrud	7/15/2024	2025	low	8	yes	yes	4	47.22057	-96.99098	90201070106	County Ditch No 13-Red River
113		111	Kelso 27	144	50	27	E 1/2	312.1	312.1	6.4	305.7	yes	yes	no	Kevin Paulsrud	7/15/2024	2024	medium	130	yes	yes	51	47.26045	-96.99133	90201070406	Grandin Cemetery-Elm River
114		112	Elm River 5	144	49	5	ALL	569.5	569.5	80.9	488.6	yes	no	partial	ILLENE MASTERS	7/16/2024	2024	low	8	yes	yes	8	47.31753	-96.91132	90201070303	Borke Drain No 16-North Branch Elm River
115		113	Dallas/Mary Ann's 80	146	49	8	S 1/2, SW 1/4	76.4	76.4	0.0	76.4	yes	no	no	Dallas & MaryAnn Boeddeker	7/15/2024	2024	low	10	yes	yes	3	47.47065	-96.93657	90203010401	Judicial Ditch No 54-Red River
116		114	Kim's Section 15	144	49	15	N 1/2, NW 1/4	76.9	76.9	0.0	76.9	yes	no	no	Kim & Tod Harrington	7/16/2024	2024	low	8	yes	yes	15	47.29448	-96.87417	90201070406	Grandin Cemetery-Elm River
117		115																								
118		116																								
119		117																								
120		118																								
121		119	Caledonia 26	146	49	26	N 1/2, S 1/2	removed	110.9	0.0		yes	no	yes	Lucas Steinberger	7/29/2024	2024	low	10	yes	yes	13	47.43070	-96.87030	90201070605	Augustana Church-Red River
122		120	Caledonia 27	146	49	27	N 1/2, SW 1/4	79.5	79.5	16.5	63.0	yes	no	partial	Lucas Steinberger	7/29/2024	2024	low	5	yes	yes	4	47.43064	-96.89438	90201070605	Augustana Church-Red River
123		121	Hansen Section 11	145	49	11	E 1/2, NE 1/4	removed	74.6	3.8		no	no	yes	Bob & Priscilla Hanson	7/29/2024	2024	low	23	yes	yes	38	47.39347	-96.85938	90201070604	Steenerson Drain
124		122																								
125		123	Hansen Section 16	144	49	16	E 1/2, SW 1/4	79	79.0	8.2	70.8	yes	yes	partial	Bob & Priscilla Hanson	7/29/2024	2024	low	43	yes	yes	8	47.28563	-96.89333	90201070406	Grandin Cemetery-Elm River
126		124	Marshall Hansen Sec 16	144	49	16	W 1/2, SW 1/4	78.6	78.6	0.0	78.6	yes	yes	no	Marshall & Holly Hansen	7/29/2024	2024	low	5	yes	yes	10	47.28567	-96.89861	90201070406	Grandin Cemetery-Elm River
127		125	Helgoe	145	50	15	SW 1/4	154.5	154.5	0.0	154.5	yes	no	no	Jon Diehl	7/30/2024	2024	low	61	yes	yes	16	47.37107	-97.02251	90201070604	Steenerson Drain
128		126	Bovard 1/2	145	50	9	E 1/2	312	312.0	11.5	300.5	yes	no	no	Jon Diehl	7/30/2024	2024	low	7	yes	yes	9	47.38928	-97.03317	90201090605	Goose River
129		127	Clara's	145	50	8	SW 1/4	117.2	117.2	3.1	114.1	yes	no	no	Jon Diehl	7/30/2024	2024	low	6	yes	yes	3	47.38564	-97.06515	90201090605	Goose River
130		128	Diehl Home	145	50	8	E 1/2	152.1	152.1	3.4	148.7	yes	no	no	Jon Diehl	7/30/2024	2024	low	10	yes	yes	7	47.38751	-97.05365	90201090605	Goose River
131		129	McInness Farm	143	49	4	SE 1/4	154.8	154.8	3.9	150.9	yes	yes	no	Wayne Diekrager	7/24/2024	2025	low	5	yes	yes	3	47.22727	-96.88433	90201070106	County Ditch No 13-Red River
132		130	Johnson Farm	144	49	33	SW 1/4	removed	151.8	1.1		yes	no	partial	Wayne Diekrager	7/24/2024	2024	low	6	yes	yes	7	47.24190	-96.89516	90201070406	Grandin Cemetery-Elm River
133		131	Annastasia North	145	49	2	NW 1/4	removed	138.1	0.0		yes	yes	yes	Anastasia Boedekker Bassil	7/31/2024	2024	low	6	yes	yes	10	47.40726	-96.87293	90201070604	Steenerson Drain
134		132	Annastasia South	145	49	2	SW 1/4	removed	146.6	0.0		yes	yes	yes	Anastasia Boedekker Bassil	7/31/2024	2024	low	8	yes	yes	30	47.40060	-96.87280	90201070604	Steenerson Drain
135		133	Karla NE	145	50	22	NE 1/4	158.8	158.8	2.6	156.2	yes	no	no	Karla Diehl	7/31/2024	2024	low	11	yes	yes	12	47.36281	-97.01171	90201070603	Grandin Lake-Red River
136		134	Karla SW	145	50	22	SW 1/4	155.6	155.6	0.0	155.6	yes	yes	no	Karla Diehl	7/31/2024	2024	low	29	yes	yes	19	47.35662	-97.02223	90201070602	90201070602
137		135	Karla SE	145	50	22	SE 1/4	129.7	129.7	0.0	129.7	yes	yes	no	Karla Diehl	7/31/2024	2024	low	13	yes	yes	15	47.35660	-97.01177	90201070602	90201070602
138		136	Hustad's	145	49	15	S 1/2	removed	189.2	0.0		yes	yes	yes	Robert Stenerson	7/26/2024	2024	low	50	yes	yes	21	47.37305	-96.88882	90201070604	Steenerson Drain
139		137	Home Buildings	145	49	13	NW 1/4	removed	97.9	2.6		yes	no	yes	Todd Stenerson	7/17/2024	2024	low	35	yes	yes	14	47.37896	-96.85068	90201070605	Augustana Church-Red River
140		138	Home Drive	145	49	13	W 1/2	removed	27.6	0.1		yes	no	yes	Todd Stenerson	7/17/2024	2024	low	7	yes	yes	7	47.37335	-96.85395	90201070605	Augustana Church-Red River
141		139	Stenerson Home 1/4	145	49	14	NE 1/4	removed	155.4	1.2		yes	yes	yes	Todd Stenerson	7/17/2024	2024	low	32	yes	yes	5	47.37880	-96.86226	90201070604	Steenerson Drain
142		140	L&R	145	49	1	W 1/2, SW 1/4	removed	78.0	0.4		yes	yes	yes	Devin Stenerson	7/17/2024	2024	low	28	yes	yes	7	47.40076	-96.85377	90201070605	Augustana Church-Red River
143		141	Cactus Section	146	49	33	ALL	620.9	620.9	65.5	555.4	yes	yes	no	Brianna Watson	7/29/2024	2024	low	13	yes	yes	6	47.41803	-96.91058	90201070605	Augustana Church-Red River
144		142	Cactus Woods	145	49	12	Irregular	removed	177.5	3.9		yes	no	yes	Brianna Watson	7/29/2024	2024	low	18	yes	yes	31	47.39159	-96.84836	90201070605	Augustana Church-Red River
145		143	South Herberg 35	145	49	35	N 1/2, S 1/2	removed	159.4	0.0		yes	no	yes	Heidi Christianson	7/28/2024	2024	low	5	yes	yes	5	47.32958	-96.86768	90201070602	90201070602
146		144	North Herberg 36	145	49	36	N 1/2	removed	286.5	6.3		yes	no	yes	Heidi Christianson	7/28/2024	2024	low	3	yes	yes	3	47.33539	-96.84417	90201070603	Grandin Lake-Red River
147		145	Larry 80	145	49	11	W 1/2, NE 1/4	removed	81.3	3.7		yes	no	yes	Larry Chandler	7/28/2024	2024	low	7	yes	yes	10	47.39344	-96.86463	90201070604	Steenerson Drain
148		146	Larry 40	145	49	12	SW 1/4, NW 1/4	removed	38.3	0.0		yes	no	yes	Larry Chandler	7/28/2024	2024	low	9	yes	yes	6	47.39152	-96.85380	90201070605	Augustana Church-Red River
149		147																								
150		148																								
151		149	Half Section	146	49	27	E 1/2	removed	315.6	0.0		yes	no	yes	Michael, Douglas, Gregory, Betty A	8/1/2024	2024	low	4	yes	yes	4	47.43249	-96.88391	90201070605	Augustana Church-Red River
152		150	South 80+	146	49	26 & 35	S 1/2, SW 1/4	removed	140.9	1.0		yes	no	yes	Michael, Douglas, Gregory Anders	8/1/2024	2024	low	6	yes	yes	7	47.42536	-96.86663	90201070605	Augustana Church-Red River
153		151	McDonald 1/4	146	49	10	SE 1/4	159.8	159.8	0.0	159.8	yes	no	no	Michael, Douglas, Gregory Anders	8/1/2024	2024	low	8	yes	yes	3	47.47247	-96.88301	90203010401	Judicial Ditch No 54-Red River

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	AK	AL	AM	AN	AP	AQ	AR	AS
2		Field No.	Field Name	T	R	S	Quarter	Landowner Reported Acres	Total Acres	Excluded Acres	Spreadable Acres	Setback map	Drain tile*	Flood risk	Owner	Easement Signed	PI - year done	PI Rating	N Soil lb/acre	Soil test	Soil map	P Soil Olson ppm	Lat.	Long.	Water Shed	Receiving Stream
154		152	The 120	146	49	3	SW 1/4	114.6	114.6	0.0	114.6	yes	no	no	Michael, Douglas, Gregory Anders	8/1/2024	2024	low	4	yes	yes	6	47.48599	-96.89339	90203010401	Judicial Ditch No 54-Red River
155		153	North 80	146	49	3	N 1.2, NW 1/4	74.6	74.6	5.0	69.6	yes	no	no	Michael, Douglas, Gregory Anders	8/1/2024	2024	low	13	yes	yes	7	47.49570	-96.89348	90203010401	Judicial Ditch No 54-Red River
156		154	L&R	145	49	1	Pt of S 1/2	removed	90.4	0.0		yes	yes	yes	Tim O'Gorman	8/1/2024	2024	low	28	yes	yes	7	47.40055	-96.84605	90201070605	Augustana Church-Red River
157		155	Holland 1/4	145	49	2	W 1/2, E 1/2	removed	147.3	5.3		yes	no	yes	Mark Dudgeon	8/5/2024	2024	low	4	yes	yes	6	47.40400	-96.86482	90201070604	Steenerson Drain
158		156	Gary 180	144	49	28	S 1/2, N 1/2	182.4	182.4	22.6	159.8	yes	no	partial	Gary Cossette	7/31/2024	2024	low	6	yes	yes	5	47.26230	-96.89007	90201070406	Grandin Cemetery-Elm River
159		157	Gary 120	144	49	29	SE 1/4	114.6	114.6	0.0	114.6	yes	no	no	Gary Cossette	7/31/2024	2024	low	10	yes	yes	14	47.25658	-96.90467	90201070406	Grandin Cemetery-Elm River
160		158	Gary 60	144	49	33	W 1/2, NW 1/4	69.6	69.6	0.0	69.6	yes	no	no	Gary Cossette	7/31/2024	2024	low	11	yes	yes	8	47.24913	-96.89861	90201070406	Grandin Cemetery-Elm River
161		159	Roberta 80	145	49	2	E 1/2, SE 1/4	removed	76.5	4.0		yes	no	yes	Dale Schuader	8/7/2024	2024	low	5	yes	yes	5	47.40083	-96.85961	90201070604	Steenerson Drain
162		160	Herberg 18	145	49	18	0.75	463.3	463.3	21.7	441.6	yes	no	no	Mavis Hettervig	7/31/2024	2024	low	16	yes	yes	14	47.37438	-96.95295	90201070604	Steenerson Drain
163		161	Herberg 8	145	49	8	W 1/2	317.7	317.7	7.1	310.6	yes	no	no	Mavis Hettervig	7/31/2024	2024	low	10	yes	yes	7	47.38916	-96.93706	90201070604	Steenerson Drain
164		162	Herberg 19	145	49	19	S 1/2, SE 1/4	74.3	74.3	0.0	74.3	yes	no	no	Mavis Hettervig	7/31/2024	2024	low	8	yes	yes	24	47.35464	-96.94753	90201070602	90201070602
165		163	Dairymple Section 7	144	49	7	E 1/2	removed	309.0	16.5		yes	no	yes	J Dalrymple	8/14/2024	2024	low	18	yes	yes	35	47.30406	-96.92751	90201070303	Borke Drain No 16-North Branch Elm River
166		164	Zimmerman	144	49	19	E 1/2	285.9	285.9	65.5	220.4	yes	yes	partial	J Dalrymple	8/14/2024	2024	low	28	yes	yes	37	47.27493	-96.92742	90201070406	Grandin Cemetery-Elm River
167		165	Herberg 31	145	49	31	N 1/2	289.8	289.8	5.0	284.8	yes	yes	no	J Dalrymple	8/14/2024	2024	low	12	yes	yes	18	47.33438	-96.95292	90201070602	90201070602
168		166	Herberg 33	145	49	33	ALL	619.5	619.5	12.9	606.6	yes	no	no	J Dalrymple	8/14/2024	2024	low	25	yes	yes	16	47.33135	-96.91026	90201070602	90201070602
169		167	Hillsboro Airport	145	50	20	0.75	348.8	348.8	4.1	344.7	yes	no	no	J Dalrymple	8/14/2024	2024	low	13	yes	yes	27	47.36013	-97.06057	90201070603	Grandin Lake-Red River
170		168	Hillsboro 28	145	50	28	N 1/2	198.8	198.8	0.0	198.8	yes	no	no	J Dalrymple	8/14/2024	2024	low	22	yes	yes	8	47.34927	-97.03499	90201070603	Grandin Lake-Red River
171		169	Hillsboro 34	145	50	34	E 1/2	306.5	306.5	0.0	306.5	yes	yes	no	J Dalrymple	8/14/2024	2024	low	5	yes	yes	12	47.33133	-97.01176	90201070602	90201070602
172		170	Hillsboro 35	145	50	35	ALL	606.9	606.9	12.3	594.6	yes	no	no	J Dalrymple	8/14/2024	2024	low	14	yes	yes	32	47.33111	-96.99563	90201070602	90201070602
173		171	Hillsboro 36	145	50	36	ALL	594.1	594.1	10.6	583.5	yes	no	no	J Dalrymple	8/14/2024	2024	low	24	yes	yes	28	47.33120	-96.97428	90201070602	90201070602
174		172	Herberg 29	145	49	29	S 1/2	310.8	310.8	30.9	279.9	yes	no	no	Neal & Bonnie Messer	8/5/2024	2024	low	16	yes	yes	7	47.34200	-96.93161	90201070602	90201070602
175		173	Herberg 29 NW	145	49	29	NW 1/4	149.2	149.2	3.6	145.6	yes	no	no	Neal & Bonnie Messer	8/6/2024	2024	low	3	yes	yes	8	47.34906	-96.93688	90201070602	90201070602
176		174	Hillsboro 29	145	50	29	ALL	550.8	550.8	4.0	546.8	yes	no	no	J Dalrymple	8/14/2024	2024	low	4	yes	yes	21	47.34564	-97.06048	90201070603	Grandin Lake-Red River
177		175	North Quarter	146	50	2	NW 1/4	157.4	157.4	1.6	155.8	yes	no	no	Michael Anderson	7/1/2024	2025	low	9	yes	yes	9	47.49417	-97.00046	90203010401	Judicial Ditch No 54-Red River
178		176	Orlin	146	50	2	SE 1/4	143.8	143.8	0.5	143.3	yes	no	no	Michael Anderson	7/1/2024	2025	low	7	yes	yes	2	47.48703	-96.98979	90203010401	Judicial Ditch No 54-Red River
179		177	Mike & Mark Red Barn	146	50	11	NW 1/4	156.6	156.6	0.0	156.6	yes	no	no	Michael Anderson	7/1/2024	2025	low	10	yes	yes	5	47.47953	-97.00065	90201090605	Goose River
180		178	Henka Sec 14 Bloomfield	145	51	14	S 1/2	295.6	295.6	32.7	262.9	yes	yes	no	Keith & Keneth Henka	7/8/2024	2025	low	22	yes	yes	12	47.37101	-97.12373	90201070303	Borke Drain No 16-North Branch Elm River
181		179	Taft Road East	146	50	13	SE 1/4	187	187.0	3.4	183.6	yes	no	no	Gerald & Ann Boeddeker	7/11/2024	2025	low	44	yes	yes	11	47.45789	-96.97051	90201090605	Goose River
182		180	Taft Road West	146	50	13	E 1/2, SW 1/4	38.8	38.8	0.0	38.8	yes	no	no	Dale & Joyce Boeddeker	7/11/2024	2025	low	44	yes	yes	11	47.45791	-96.97841	90201090605	Goose River
183		181	Bohn 22	144	51	22	S 1/2	291.2	291.2	43.9	247.3	yes	no	no	Dennis Peterson	7/29/2024	2025	low	43	yes	yes	16	47.27141	-97.12315	90201070405	Town of Greenfield-Elm River
184		182	Bohn 19	144	51	19	S 1/2	298.6	298.6	0.0	298.6	yes	no	no	Dennis Peterson	7/29/2024	2025	low	65	yes	yes	34	47.27149	-97.18687	90201070405	Town of Greenfield-Elm River
185		183	Green 24	144	52	24	SE 1/4	156.6	156.6	0.0	156.6	yes	no	no	Dennis Peterson	7/29/2024	2025	low	34	yes	yes	39	47.27154	-97.20269	90201070405	Town of Greenfield-Elm River
186		184	Green 36	144	52	36	SW 1/4 & S 1/2, NW 1/4	217.9	217.9	0.2	217.7	yes	no	no	Dennis Peterson	7/29/2024	2025	low	18	yes	yes	38	47.24425	-97.21254	90201070203	Lower South Branch Elm River
187		185	Beitz Home	145	49	6	NE 1/4	140.8	140.8	0.0	140.8	yes	no	no	Eugene & Margaret Beitz	8/16/2024	2025	low	10	yes	yes	3	47.40694	-96.948	90201070604	Steenerson Drain
188		186	NW Herberg 5	145	49	5	NW 1/4	149	149.0	0.0	149.0	yes	no	no	Eugene & Margaret Beitz	8/16/2024	2025	low	8	yes	yes	2	47.40709	-96.93727	90201070604	Steenerson Drain
189		187	SW Herberg 5	145	49	5	East 11 ac	11.3	11.3	0.0	11.3	yes	no	no	Eugene & Margaret Beitz	8/16/2024	2025	low	12	yes	yes	11	47.40012	-96.93219	90201070604	Steenerson Drain
190		188	SW Herberg 5	145	49	5	SW 1/4	145.7	145.7	0.0	145.7	yes	no	no	Lorraine Reinpold	8/16/2024	2025	low	14	yes	yes	9	47.40013	-96.9375	90201070604	Steenerson Drain
191		189	Steve Reinpold Home	145	49	18	NE 1/4	150.3	150.3	4.8	145.5	yes	no	no	Lorraine Reinpold	8/16/2024	2025	low	8	yes	yes	4	47.37807	-96.9479	90201070604	Steenerson Drain
192		190	Madsons	145	48	31	NE 1/4 & E 1/2, NW 1/4	229.8	229.8	0.4	229.4	yes	yes	no	Randy Aarestad	7/24/2024	2025	low	45	yes	yes	3	47.33551	-96.69553	90201070507	Lower Marsh River
193		191	Church	145	48	9	NW 1/4 & N 1/2, SW 1/4	213.5	213.5	0.6	212.9	yes	no	no	Randy Aarestad	7/24/2024	2025	low	14	yes	yes	2	47.39161	-96.78801	90201070507	Lower Marsh River
194		192	Gilbertsons	145	48	23	NE 1/4	157.2	157.2	0.0	157.2	yes	no	no	Randy Aarestad	7/24/2024	2025	low	18	yes	yes	5	47.36475	-96.73458	90201070507	Lower Marsh River
195		193	Charlies	145	48	22	N 1/2	288.9	288.9	5.2	283.7	yes	no	no	Randy Aarestad	7/24/2024	2025	low	11	yes	yes	4	47.36483	-96.761	90201070603	Grandin Lake-Red River
196		194	REA	145	48	20	SW 1/4	143.2	143.2	0.0	143.2	yes	no	no	Randy Aarestad	7/24/2024	2025	low	41	yes	yes	3	47.35728	-96.80907	90201070603	Grandin Lake-Red River
197		195	Hellerud Home 1/4	145	48	23	SE 1/4	140.7	140.7	0.4	140.3	yes	yes	no	Philip Hellerud	unknown	2025	low	22	yes	yes	5	47.35732	-96.73468	90201070603	Grandin Lake-Red River
198		196	Warner 1/2	145	49	16	W 1/2	320	320.0	4.0	316.0	yes	yes	no	The Warner Group	8/13/2024	2025	low	27	yes	yes	17	47.37496	-96.91562	90201070604	Steenerson Drain
199		197	Elm River Sec 15	144	49	15	SW 1/4 & S 1/2, NE 1/4	221	221.0	49.7	171.3	yes	no	partial	Wendy & Guy Solemsaas	11/14/2024	2025	low	20	yes	yes	3	47.28785	-96.87397	90201070406	Grandin Cemetery-Elm River
200		198	Bohn 31	144	51	31	SW 1/4	147.2	147.2	0.6	146.6	yes	no	no	Donald McInnes	7/9/2024	2025	low	16	yes	yes	14	47.24255	-97.19185	90201070203	Lower South Branch Elm River
201		199	Reimer NW	145	50	23	NW 1/4	140.8	140.8	2.8	138.0	yes	no	no	Donald Riemer Residuary Trust	9/11/2024	2025	low	16	yes	yes	9	47.36379	-97.00092	90201070603	Grandin Lake-Red River
202		200	Reimer NE	145	50	23	NE 1/4	150.2	150.2	2.6	147.6	yes	no	no	Marjorie Riemer	9/10/2024	2025	low	14	yes	yes	9	47.3636	-96.99043	90201070603	Grandin Lake-Red River
203									Total Spreadable Acres		30,221				* Drain tile determination was based on best profesional judgement of aerial maps.											

Exhibit 4

SETTJE AGRI-SERVICE ENGINEERING, INC.,
GEOTECHNICAL REPORT (Nov. 21, 2024)

(*received from DEQ via public records request*)

GEOTECHNICAL REPORT

Prepared by Settje Agri-Services and Engineering, Inc.
15460 NW 48th Street | Raymond, Nebraska 68428



Herberg Dairy

Section 34, T-145-N, R-49-W
Traill County, North Dakota

REPORT OF GEOTECHNICAL EXPLORATION AND REVIEW

Herberg Dairy
Traill County
near Hillsboro, North Dakota

AET Project No. P-0032825.1

Date:
November 21, 2024

Prepared for:

Riverview, LLP
26406 470th Avenue
Morris, MN 56267

Geotechnical • Materials
Forensic • Environmental
Building Technology
Petrography/Chemistry

American Engineering Testing
601 East 48th Street North
Sioux Falls, SD 57104
TeamAET.com • 605.332.5371

November 21, 2024

Riverview, LLP
26406 470th Avenue
Morris, Minnesota 56267

Attn: Jordan Nieland
jordan.nieland@riverviewllp.com

RE: Report of Geotechnical Exploration
Proposed Herberg Dairy
Herberg Township, Traill County
near Hillsboro, North Dakota
AET Project No. P-0032825.1

Dear Mr. Nieland:

American Engineering Testing, Inc. (AET) is pleased to present the results of our subsurface exploration program and geotechnical engineering review for your Herberg Dairy project in Traill County, near Hillsboro, North Dakota. These services were performed according to our proposal to you dated April 23, 2024 and the additional work proposal dated September 27, 2024.

We are submitting one electronic copy of the report to you.

Please contact me if you have any questions about the report. I can also be contacted for arranging construction observation and testing services during the earthwork phase.

Sincerely,
American Engineering Testing, Inc.

Gregory A. Guyer, PE
Senior Engineer
gguyer@teamAET.com
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SIGNATURE PAGE

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REGISTERED PROFESSIONAL ENGINEER
GREGORY GUYER
11-21-24
PE-8657
NORTH DAKOTA

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STANDARD SHEETS

Freezing Weather Effects on Building Construction

APPENDIX A

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Figure 1 – Site Location Map
Figure 2 - Boring Location Map (Furnished by Settje Agri-Services)
Subsurface Boring Logs (101-156, 201-214, 301-305, 401, 501, 601)
Proctor Reports (16)
Permeability Test Data (16)
Hydrometer Test Data (16)

APPENDIX B

Geotechnical Report Limitations and Guidelines for Use

1.0 INTRODUCTION

Riverview LLP is proposing to construct a new dairy facility in Section 34 of Herberg Township in Traill County, North Dakota. To assist planning and design, you have authorized American Engineering Testing, Inc. (AET) to conduct a subsurface exploration program at the site, conduct soil laboratory testing, and perform a geotechnical engineering review for the project. This report presents the results of the above services and provides our engineering recommendations based on this data. AET utilized the services of Interstate Drilling from Grand Forks, North Dakota to perform the field exploration for the initial project scope of work. The additional soil borings were performed by AET.

2.0 SCOPE OF SERVICES

AET's services were performed according to our original proposal to you dated April 23, 2024, and the proposal for additional services dated September 27, 2024. You authorized these services on April 23, 2024, and October 15, 2024, respectively. The authorized scope consists of the following.

- Drilling and sampling 78 standard penetration test borings to a depth of 10 to 35 feet.
- Soil laboratory testing.
- Geotechnical engineering review based on the data and preparation of this report.

These services are intended for geotechnical purposes only. The scope is not intended to explore for the presence or extent of environmental contamination in the soil or groundwater.

3.0 PROJECT INFORMATION

We understand that you are planning to construct five clay lined liquid manure storage areas (LMSA) at the proposed Herberg Dairy facility located in Section 34 of Herberg Township in Traill County, North Dakota. The additional soil borings were requested to address adjustment to the proposed site layout. Specific grading plans and details of the

construction were not available at the time of this report. We assume the pond bottom elevations will range between 15 to 25 feet below existing grade. The proposed construction will also include a concrete LMSA and other barn and building structures. The earthen LMSA ponds will be constructed to meet a maximum seepage rate of 1/16 inch per day.

The above stated information represents our understanding of the proposed construction. This information is an integral part of our engineering review. It is important that you contact us if there are changes from that described so that we can evaluate whether modifications to our recommendations are appropriate.

4.0 SUBSURFACE EXPLORATION AND TESTING

4.1 FIELD EXPLORATION PROGRAM

The subsurface exploration program conducted for the project consisted of 78 standard penetration test borings. The proposed soil boring locations and the respective depths were selected by Riverview. The logs of the borings and details of the methods used appear in Appendix A. The logs contain information concerning soil layering, soil classification, geologic origins, and moisture condition. A density description or consistency is also noted for the natural soils, which is based on the standard penetration resistance (N-value).

The approximate boring locations are shown on Figure 2 in Appendix A. The borings were located in the field, and the surface elevation of each boring location was provided by Riverview. The surface elevation is recorded on each boring log within Appendix A.

4.2 LABORATORY TESTING

The laboratory test program included performing water content, dry density, Atterberg Limits, Standard Proctor, sieve/hydrometer, and permeability tests. The test results appear in Appendix A on the individual boring logs adjacent to the samples upon which they were performed, or on the data sheets following the logs.

5.0 SITE CONDITIONS

5.1 SURFACE OBSERVATIONS

The proposed project site is located in Section 34 of Herberg Township in Traill County, North Dakota. The 320-acre site is in the middle of several sections surrounded completely by farmland and is accessible by dirt roads. Nearby site features include agricultural land in all directions. Current site vegetation consists of crop residue.

The general site topography is fairly level to gently sloping. Based upon the soil boring surface elevation information provided to us, it appears that the existing ground surface in the proposed project area varies from elevation 866.3 to 870.5 feet.

5.2 SUBSURFACE SOILS/ GEOLOGY

The site geology consists of a layer of black, lean clay or fat clay topsoil underlain by fine alluvial deposits with lacustrine glacial Lake Agassiz deposits to the boring termination depths.

The surficial topsoil layer was about ½ to 2½ feet deep at the boring locations. The topsoil consisted mostly of black, lean clay or fat clay with numerous visible organics.

Underlying the surficial deposits, brown and dark brown, fat clay and lean clay, fine alluvial deposits were encountered at the boring locations. The fine alluvium contained lenses of silt. Based upon the penetration resistance, N values, the consistency varied from firm to very stiff.

The main geologic deposit encountered at the site consisted of fat clay lacustrine, glacial Lake Agassiz deposits. The lacustrine varied in color from brown to gray, and gray mottled. The consistency of the fat clay varied from soft to stiff.

5.3 GROUNDWATER

No subsurface water was noted at the boring locations at the time our field work was performed. The depth or lack of subsurface water noted at the boring locations should

not be taken as an accurate representation of the actual subsurface water levels. A long period of time is generally required for groundwater to stabilize in the impermeable soils generally present at the site; this period of time is generally not available during a typical subsurface exploration program.

The lean clay and fat clay soil types present at the project site have low permeability. Lenses and layers of silt present within the clay soils may contain perched ground water. It is our opinion that the subsurface water levels at the site could be quite near the ground surface during periods of significant precipitation, particularly during the spring of the year. It should also be recognized that groundwater levels can fluctuate due to natural seasonal variations in rainfall and snowmelt amounts.

The surface level in the nearby Red River could be expected to affect the subsurface water levels present at the site.

5.4 REVIEW OF SOIL PROPERTIES

5.4.1 TOPSOIL

The topsoil consisted mostly of black, lean and fat clay with numerous visible organics. The topsoil deposits are judged to be low strength and compressible.

5.4.2 FINE ALLUVIUM

The N-values recorded in the fine alluvium ranged from 3 to 16 bpf, indicating these soils exhibit soft to very stiff consistency. We judge the fine-alluvium to have low to moderate strength and compressibility characteristics. The lean clay is a slow-draining soil type that is susceptible to freeze-thaw movements when subject to freezing temperatures.

5.4.3 LACUSTRINE

The main geologic deposit encountered at the site consisted of fat clay lacustrine, glacial Lake Agassiz deposits. We judge the lacustrine deposits to have low strength and moderate to high compressibility characteristics. The fat clay lacustrine soils are generally a very slow draining soil type with moderate to high susceptibility to freeze-thaw frost

movements.

6.0 RECOMMENDATIONS

6.1 APPROACH DISCUSSION

Based on the results of the field exploration and laboratory testing, it is our opinion the fine-grained native soils encountered in our borings (fat clay, and lean clay soils) are suitable for dike and liner construction of the proposed LMSA ponds. We do not recommend using the lean or fat clay topsoil materials for liner construction. Some dewatering maybe required during construction of the deep LMSAs.

Based on the laboratory test results, the moisture content of the clay soils was generally above to significantly above the optimum moisture content based on the standard Proctor optimum moisture contents, at the time the borings were completed. Depending upon the conditions at the time of construction, the moisture content will need to be adjusted to near optimum moisture content prior to use as liner and dike material. This will likely require significant drying to achieve proper compaction.

Our authorized scope of work was completed to document the subsurface soil conditions mainly for construction of the proposed liquid manure storage areas (LMSA) which will include clay liners constructed from on site soils. Our scope of work did not include any slope stability analysis of the proposed excavation and embankments for the proposed LMSAs. Specific plans or grading information were not provided for our review. The Red River Valley soils are comprised mostly of glacial Lake Agassiz lacustrine deposits. The Lake Agassiz deposits occur in geologically different layers and extend to depths of over 100 feet. The fat clay soils are generally low strength and can be moderate to highly compressible under loading. High or steep earth embankments in the Red River Valley region are susceptible to slope failures. AET is available for further discussion of this issue. We can review options to pursue grading and slope stability analysis for the proposed construction.

6.2 GENERAL EARTHWORK RECOMMENDATIONS

6.2.1 SITE PREPARATION

Site preparation should include removing all vegetation and topsoil materials from borrow areas and areas receiving new engineered fill (including dike embankments). Site grading to rapidly drain surface runoff well away from exposed subgrade soils should be established as soon as possible after stripping and maintained through the duration of construction.

We anticipate that excavation of the site soils to the proposed depths can be accomplished using conventional earth excavating equipment such as bulldozers and scrapers. Based on the proposed LMSA pond bottom elevations, the excavations will terminate in firm to stiff fat clay soils. Depending upon the moisture content of the fat clay soils and the amount of water encountered, we expect final excavation work will likely need to be completed with an excavator. As stated previously, the in-place water content of the clay soils was significantly above the optimum water content of representative soils as determined by the Standard Proctor test. The clay soils from the area of the proposed LMSA holding ponds will need to be moisture conditioned (dried) to our recommended soils water content for compaction discussed in the following sections.

6.2.2 SHRINKAGE

It is our opinion the clay soils encountered at the site will experience a moderate amount of shrinkage when excavated and replaced during the construction of the LMSAs. We recommend that a shrinkage factor of 25% be used for the estimation purposes of the earthwork volumes.

6.3 SOIL LMSA CONSTRUCTION

6.3.1 DIKE CONSTRUCTION

The existing lean or fat clay topsoil should not be used for dike construction. We recommend the existing topsoil be removed from the base areas of the proposed dikes

to expose the lean clay or fat clay soils. The topsoil can be stockpiled and used for establishing vegetation after mass grading is completed.

Prior to constructing the dikes, we recommend scarifying the top 6 inches of the exposed clay soils and recompacting them to at least 95% of the Standard Proctor density (ASTM:D698). Following the scarification and surface compaction operations, the dike embankments could be raised using the on-site, nonorganic clay soils. The dikes should be constructed with maximum loose layer soil thicknesses of 8 inches. The soils should be moisture conditioned to within +/-3 percent of optimum moisture content and compacted to at least 95% of Standard Proctor density.

Due to the fat clay deposits, we recommend the interior and exterior slopes of the dikes be restricted to a maximum of 5 feet horizontal to 1 foot vertical. This recommendation is based upon our experience with the engineering properties of the Lake Agassiz fat clay soils. Our experience has shown that slopes constructed at such orientation are generally stable with minor changes in grade; however, we recommend slope stability analyses be performed once grading plans and design pool elevations are established for the LMSAs. This analysis may require additional soil borings and/or laboratory testing to determine geotechnical properties of the soil impacted by the LMSA berms. Depending on the proposed LMSA depth, embankment height, and design pool elevation, flatter slopes may be required for stability. Grade increases should be limited to a maximum of 5 feet. The maintenance and integrity of the liner soils will be critical in the performance of the dike embankment slopes.

6.3.2 CLAY LINER CONSTRUCTION

Based on our review of the boring logs as well as the results of the laboratory tests, it is our opinion that the clay soils encountered in our borings is suitable for use as liner material. The results of the laboratory tests indicate these soils should satisfy the recommended seepage rate of less than 1/16 inch per day at maximum operating depth if placed at the recommended compaction and moisture specifications listed below. We recommend that a geotechnical engineer or his representative be on-site during the initial excavation at the site to assist with identifying suitable liner material.

We recommend a minimum liner thickness of 24 inches be used for the proposed liner. The excavation for the pond should extend through the topsoil and into the clay soils to a depth of 18 inches below the designed bottom of the pond. The excavation should then be followed by scarifying, moisture conditioning, and recompacting a minimum of 6 inches of the exposed clay soils followed by the placement of an additional 18 inches of clay soils. The clay soils should be placed in a maximum loose lift thickness of 8 inches. The clay liner should be compacted to at least 95% of the Standard Proctor density at a moisture content ranging from optimum to 3% over optimum moisture content as determined by the Standard Proctor.

If sand soils or cobbles and boulders are encountered within the excavation for the ponds, they should be completely removed or excavated to a depth of at least 2 feet below the designed pond bottom elevation.

During construction and once the liner has been completed, the liner soils should not be allowed to dry out. The fat clay soils will be extremely susceptible to shrinkage from dying. Drying of the liner will cause cracking, which will be very difficult to repair and may result in seepage rates above the desired rate. Therefore, once the liner has been completed, we recommend that compaction tests along with a representative number of permeability tests be performed as soon as possible so that the pond can be flooded. If construction staging does not allow for immediate flooding, it may be advisable to place a layer of soil over the completed liner to reduce the drying effects.

6.3.3 EROSION CONTROL

Once the clay liner has been completed, the inner slopes of the dikes should be protected from erosion. The erosion protection could include riprap placement or vegetative cover. If vegetative cover is chosen, the correct type of plant growth should be selected such that root development will not penetrate the liner and breach the liner integrity.

6.4 CONCRETE LMSA RECOMMENDATIONS

Soil borings 301 through 305 were advanced at the locations of proposed concrete LMSA. We were not provided any specific information on the proposed concrete tank size or depths. The tanks can be supported on the natural non organic soils. The tank

foundation should extend a minimum of 72 inches below grade for frost protection. If the tank will ever be empty and exposed to freezing weather the footings/floor should be provided a minimum of 3 feet of granular non frost susceptible base. Potential buoyancy effects should be accounted for in design.

6.4.1 LATERAL EARTH PRESSURE

Below-grade concrete walls will retain soils and must be designed to resist the resulting lateral earth pressures. For design, we recommend the ultimate lateral earth pressure values (given in equivalent fluid pressure values) presented in Table 6.4.1 below. The use of saturated soil conditions will depend upon the design groundwater level with respect to the wall bottom elevation.

Table 6.4.1 – Recommended Lateral Earth Pressure Design Parameters

Soil Type	Equivalent Fluid Density, Drained			Equivalent Fluid Density, Saturated		
	Active (pcf)	At-Rest (pcf)	Passive (pcf)	Active (pcf)	At-Rest (pcf)	Passive (pcf)
Sands (SP or SP-SM)	35	60	330	80	90	265
Silty Sand (SM)	45	65	290	85	95	250
Fine-Grained Soils (SC, CL, or ML)	70	90	220	90	100	235
Fat Clay (CH)	--	95	130	--	105	145

Active and passive earth pressure design assumes the top of the wall is free to rotate. For coarse-grained soils (SM, SP, or SP-SM), deflections on the order of 1 to 2 percent of the subsurface wall height are necessary in order to fully mobilize active or passive earth pressure. For fine-grained soils (SC, CL, or ML), wall deflections on the order of 2 to 5 percent are necessary to fully develop active or passive state earth pressure. At-rest earth pressures should be used for walls which are restrained from rotation by the superstructure or floor system.

The above values for lateral earth pressure (equivalent fluid density) and sliding friction are ultimate and do not include a factor of safety. Therefore, the designer should apply appropriate safety factors for the respective design element. Typically, a factor of 1.5 is applied to these values.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 POTENTIAL DIFFICULTIES

7.1.1 RUNOFF WATER IN EXCAVATION

Water can be expected to collect in the excavation bottom during times of inclement weather or snow melt. To allow observation of the excavation bottom, to reduce the potential for soil disturbance, and to facilitate filling operations, we recommend water be removed from within the excavation during construction. Based on the soils encountered, we anticipate the groundwater can be handled with conventional sump pumping.

7.1.2 DISTURBANCE OF SOILS

The on-site soils can be disturbed under construction traffic, especially if the soils are wet. If soils become disturbed, they should be subcut to the underlying undisturbed soils. The subcut soils can then be dried and recompacted back into place, or they should be removed and replaced with drier imported fill.

7.1.3 COBBLES AND BOULDERS

The soils at this site can include cobbles and boulders. This may make excavating procedures somewhat more difficult than normal if they are encountered.

7.1.4 WINTER CONSTRUCTION

If construction occurs during the winter, it is necessary for the contractor to protect the base soils from freezing each day and each night before new fill is placed. Fill should not be placed over frozen soils, snow, or ice, nor should the use of frozen fill soils be permitted. The contractor must protect base soils from freezing before and after fill

placement, and before, during, and after concrete placement. If the interior footings will be exposed to freezing temperatures during construction, we recommend that you consider lowering the footings to protect against frost penetration into the footing subgrade soils. We recommend that a special pre-construction meeting be held to discuss the procedures and precautions that must be followed.

7.2 EXCAVATION BACKSLOPING

If excavation faces are not retained, the excavations should maintain maximum allowable slopes in accordance with *OSHA Regulations (Standards 29 CFR), Part 1926, Subpart P, "Excavations"* (can be found on www.osha.gov). Even with the required OSHA sloping, water seepage or surface runoff can potentially induce sideslope erosion or sloughing which could require slope maintenance.

7.3 OBSERVATIONS AND TESTING

The recommendations in this report are based on the subsurface conditions found at our test boring locations. Since the soil conditions can be expected to vary away from the soil boring locations, we recommend on-site observation by a geotechnical engineer/technician during construction to evaluate these potential changes. Soil density testing and permeability testing should also be performed on new fill placed in order to document that project specifications for compaction, moisture content and allowable seepage rates have been satisfied.

8.0 ASTM STANDARDS

When we refer to an ASTM Standard in this report, we mean that our services were performed in general accordance with that standard. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

9.0 LIMITATIONS

Within the limitations of scope, budget, and schedule, we have endeavored to provide our services according to generally accepted geotechnical engineering practices at this time and location. Other than this, no warranty, express or implied, is intended.

Important information regarding risk management and proper use of this report is given in Appendix B entitled “Geotechnical Report Limitations and Guidelines for Use.”

Standard Data Sheets

Freezing Weather Effects on Building Construction

FREEZING WEATHER EFFECTS ON BUILDING CONSTRUCTION

GENERAL

Because water expands upon freezing and soils contain water, soils which are allowed to freeze will heave and lose density. Upon thawing, these soils will not regain their original strength and density. The extent of heave and density/strength loss depends on the soil type and moisture condition. Heave is greater in soils with higher percentages of fines (silts/clays). High silt content soils are most susceptible, due to their high capillary rise potential which can create ice lenses. Fine grained soils generally heave about 1/4" to 3/8" for each foot of frost penetration. This can translate to 1" to 2" of total frost heave. This total amount can be significantly greater if ice lensing occurs.

DESIGN CONSIDERATIONS

Clayey and silty soils can be used as perimeter backfill, although the effect of their poor drainage and frost properties should be considered. Basement areas will have special drainage and lateral load requirements which are not discussed here. Frost heave may be critical in doorway areas. Stoops or sidewalks adjacent to doorways could be designed as structural slabs supported on frost footings with void spaces below. With this design, movements may then occur between the structural slab and the adjacent on-grade slabs. Non-frost susceptible sands (with less than 40% by weight passing a #40 sieve and no more than 5% by weight passing a #200 sieve) can be used below such areas. Depending on the function of surrounding areas, the sand layer may need a thickness transition away from the area where movement is critical. With sand placement over slower draining soils, subsurface drainage would be needed for the sand layer. High density extruded polystyrene insulation could be used within the sand to reduce frost penetration, thereby reducing the sand thickness needed. We caution that insulation placed near the surface can increase the potential for ice glazing of the surface.

The possible effects of adfreezing should be considered if clayey or silty soils are used as backfill. Adfreezing occurs when backfill adheres to rough surfaced foundation walls and lifts the wall as it freezes and heaves. This occurrence is most common with masonry block walls, unheated or poorly heated building situations and clay backfill. The potential is also increased where backfill soils are poorly compacted and become saturated. The risk of adfreezing can be decreased by placing a low friction separating layer between the wall and backfill.

Adfreezing can occur on exterior piers (such as deck, fence, or other similar pier footings), even if a smooth surface is provided. This is more likely in poor drainage situations where soils become saturated. Additional footing embedment and/or widened footings below the frost zones (which include tensile reinforcement) can be used to resist uplift forces. Specific designs would require individual analysis.

CONSTRUCTION CONSIDERATIONS

Foundations, slabs and other improvements which may be affected by frost movements should be insulated from frost penetration during freezing weather. If filling takes place during freezing weather, all frozen soils, snow and ice should be stripped from areas to be filled prior to new fill placement. The new fill should not be allowed to freeze during transit, placement or compaction. This should be considered in the project scheduling, budgeting and quantity estimating. It is usually beneficial to perform cold weather earthwork operations in small areas where grade can be attained quickly rather than working larger areas where a greater amount of frost stripping may be needed. If slab subgrade areas freeze, we recommend the subgrade be thawed prior to floor slab placement. The frost action may also require reworking and recompaction of the thawed subgrade.

Appendix A

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Site Location Map
Boring Location Map (Furnished by Settje Agri-Services) Subsurface Boring Logs (101-156, 201-214, 301-305, 401, 501, 601) Proctor Reports (16)
Permeability Test Data (16)
Hydrometer Test Data (16)

Appendix A
Geotechnical Field Exploration and Testing
Report No. P-0032825.1

A.1 FIELD EXPLORATION

The subsurface conditions at the site were explored by drilling and sampling seventy-eight standard penetration test borings. The locations of the borings appear on Figure 2, preceding the Subsurface Boring Logs in this appendix.

A.2 SAMPLING METHODS

A.2.1 Split-Spoon Samples (SS)

Standard penetration (split-spoon) samples were collected in general accordance with ASTM: D1586. The ASTM test method consists of driving a 2-inch O.D. split-barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30 inches. The sampler is driven a total of 18 inches into the soil. After an initial set of 6 inches, the number of hammer blows to drive the sampler the final 12 inches is known as the standard penetration resistance or N-value.

A.2.2 Disturbed Samples (DS)/Spin-up Samples (SU)

Sample types described as “DS” or “SU” on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

A.2.3 Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

Determining the thickness of “topsoil” layers is usually limited, due to variations in topsoil definition, sample recovery, and other factors. Visual-manual description often relies on color for determination, and transitioning changes can account for significant variation in thickness judgment. Accordingly, the topsoil thickness presented on the logs should not be the sole basis for calculating topsoil stripping depths and volumes. If more accurate information is needed relating to thickness and topsoil quality definition, alternate methods of sample retrieval and testing should be employed.

A.3 CLASSIFICATION METHODS

Soil descriptions shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM: D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM: D2487 are possible. Otherwise, soil descriptions shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

A.4 WATER LEVEL MEASUREMENTS

The groundwater level measurements are shown at the bottom of the boring logs. The following information appears under “Water Level Measurements” on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

A.5 LABORATORY TEST METHODS

A.5.1 Water Content Tests

Conducted per AET Procedure 01-LAB-010, which is performed in general accordance with ASTM: D2216 and AASHTO: T265.

A.5.2 Atterberg Limits Tests

Conducted per AET Procedure 01-LAB-030, which is performed in general accordance with ASTM: D4318 and AASHTO: T89, T90.

A.5.4 Particle Size Analysis of Soils (with hydrometer)

Conducted per AET Procedure 01-LAB-050, which is performed in general accordance with ASTM: D422 and AASHTO: T88.

A.6 TEST STANDARD LIMITATIONS

Field and laboratory testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

A.7 SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.

BORING LOG NOTES

DRILLING AND SAMPLING SYMBOLS

Symbol	Definition
AR:	Sample of material obtained from cuttings blown out the top of the borehole during air rotary procedure.
B, H, N:	Size of flush-joint casing
CAS:	Pipe casing, number indicates nominal diameter in inches
COT:	Clean-out tube
DC:	Drive casing; number indicates diameter in inches
DM:	Drilling mud or bentonite slurry
DR:	Driller (initials)
DS:	Disturbed sample from auger flights
DP:	Direct push drilling; a 2.125 inch OD outer casing with an inner 1½ inch ID plastic tube is driven continuously into the ground.
FA:	Flight auger; number indicates outside diameter in inches
HA:	Hand auger; number indicates outside diameter
HSA:	Hollow stem auger; number indicates inside diameter in inches
LG:	Field logger (initials)
MC:	Column used to describe moisture condition of samples and for the ground water level symbols
N (BPF):	Standard penetration resistance (N-value) in blows per foot (see notes)
NQ:	NQ wireline core barrel
PQ:	PQ wireline core barrel
RDA:	Rotary drilling with compressed air and roller or drag bit.
RDF:	Rotary drilling with drilling fluid and roller or drag bit
REC:	In split-spoon (see notes), direct push and thin-walled tube sampling, the recovered length (in inches) of sample. In rock coring, the length of core recovered (expressed as percent of the total core run). Zero indicates no sample recovered.
SS:	Standard split-spoon sampler (steel; 1.5" is inside diameter; 2" outside diameter); unless indicated otherwise
SU	Spin-up sample from hollow stem auger
TW:	Thin-walled tube; number indicates inside diameter in inches
WASH:	Sample of material obtained by screening returning rotary drilling fluid or by which has collected inside the borehole after "falling" through drilling fluid
WH:	Sampler advanced by static weight of drill rod and hammer
WR:	Sampler advanced by static weight of drill rod
94mm:	94 millimeter wireline core barrel
▼:	Water level directly measured in boring
▽:	Estimated water level based solely on sample appearance

TEST SYMBOLS

Symbol	Definition
CONS:	One-dimensional consolidation test
DEN:	Dry density, pcf
DST:	Direct shear test
E:	Pressuremeter Modulus, tsf
HYD:	Hydrometer analysis
LL:	Liquid Limit, %
LP:	Pressuremeter Limit Pressure, tsf
OC:	Organic Content, %
PERM:	Coefficient of permeability (K) test; F - Field; L - Laboratory
PL:	Plastic Limit, %
q_p:	Pocket Penetrometer strength, tsf (approximate)
q_c:	Static cone bearing pressure, tsf
q_u:	Unconfined compressive strength, psf
R:	Electrical Resistivity, ohm-cms
RQD:	Rock Quality Designation of Rock Core, in percent (aggregate length of core pieces 4" or more in length as a percent of total core run)
SA:	Sieve analysis
TRX:	Triaxial compression test
VSR:	Vane shear strength, remolded (field), psf
VSU:	Vane shear strength, undisturbed (field), psf
WC:	Water content, as percent of dry weight
%-200:	Percent of material finer than #200 sieve

STANDARD PENETRATION TEST NOTES

The standard penetration test consists of driving a split-spoon sampler with a drop hammer counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), permitted in ASTM: D1586, the blows for each complete 6" increment and for each partial increment is on the boring log. For partial increments, the number of blows is shown to the nearest 0.1' below the slash.

The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM: D1586 is encountered) whereas the length of sample recovered is for the entire sampler drive (which may even extend more than 18").

UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM Designations: D 2487, D2488

AMERICAN ENGINEERING TESTING, INC.

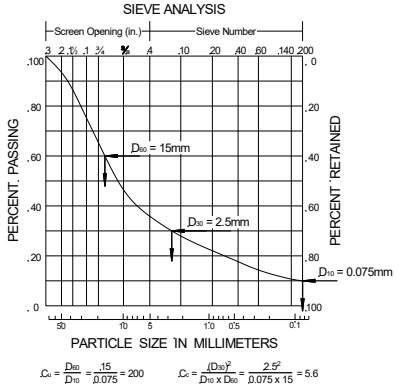
Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu≥4 and 1≤Cc≤3[E]	GW	Well graded gravel[F]
			Cu<4 and/or 1>Cc>3[E]	GP	Poorly graded gravel[F]
		Gravels with Fines more than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	Cu≥6 and 1≤Cc≤3[E]	SW	Well-graded sand[I]
			Cu<6 and/or 1>Cc>3[E]	SP	Poorly-graded sand[I]
		Sands with Fines more than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve (see Plasticity Chart below)	Silts and Clays Liquid limit less than 50	inorganic	PI>7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI<4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OL	Organic clay[K,L,M,N] / Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OH	Organic clay[K,L,M,P] / Organic silt[K,L,M,Q]
Highly organic soil			Primarily organic matter, dark in color, and organic in odor	PT	Peat[R]

Notes

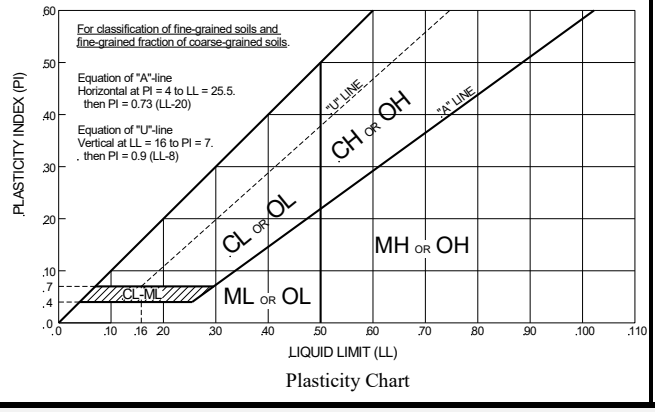
[A]Based on the material passing the 3-in (75-mm) sieve.
[B]If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C]Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
[D]Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E]$Cu = D_{60} / D_{10}$, $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F]If soil contains ≥15% sand, add "with sand" to group name.
[G]If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H]If fines are organic, add "with organic fines" to group name.
[I]If soil contains ≥15% gravel, add "with gravel" to group name.
[J]If Atterberg limits plot is hatched area, soil is a CL-ML silty clay.
[K]If soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel", whichever is predominant.
[L]If soil contains ≥30% plus No. 200, predominantly sand, add "sandy" to group name.
[M]If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N]PI≥4 and plots on or above "A" line.
[O]PI<4 or plots below "A" line.
[P]PI plots on or above "A" line.
[Q]PI plots below "A" line.
[R]Fiber Content description shown below.



$Cu = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{2.5^2}{0.075 \times 15} = 5.6$



Plasticity Chart

ADDITIONAL TERMINOLOGY NOTES USED BY AET FOR SOIL IDENTIFICATION AND DESCRIPTION

Grain Size

Term	Particle Size
Boulders	Over 12"
Cobbles	3" to 12"
Gravel	#4 sieve to 3"
Sand	#200 to #4 sieve
Fines (silt & clay)	Pass #200 sieve

Gravel Percentages

Term	Percent
A Little Gravel	3% - 14%
With Gravel	15% - 29%
Gravelly	30% - 50%

Consistency of Plastic Soils

Term	N-Value, BPF
Very Soft	less than 2
Soft	2 - 4
Firm	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	Greater than 30

Relative Density of Non-Plastic Soils

Term	N-Value, BPF
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Greater than 50

Moisture/Frost Condition

(MC Column)

D (Dry): Absence of moisture, dusty, dry to touch.
M (Moist): Damp, although free water not visible. Soil may still have a high water content (over "optimum").
W (Wet/ Waterbearing): Free water visible, intended to describe non-plastic soils. Waterbearing usually relates to sands and sand with silt.
F (Frozen): Soil frozen

Layering Notes

Laminations: Layers less than ½" thick of differing material or color.
Lenses: Pockets or layers greater than ½" thick of differing material or color.

Peat Description

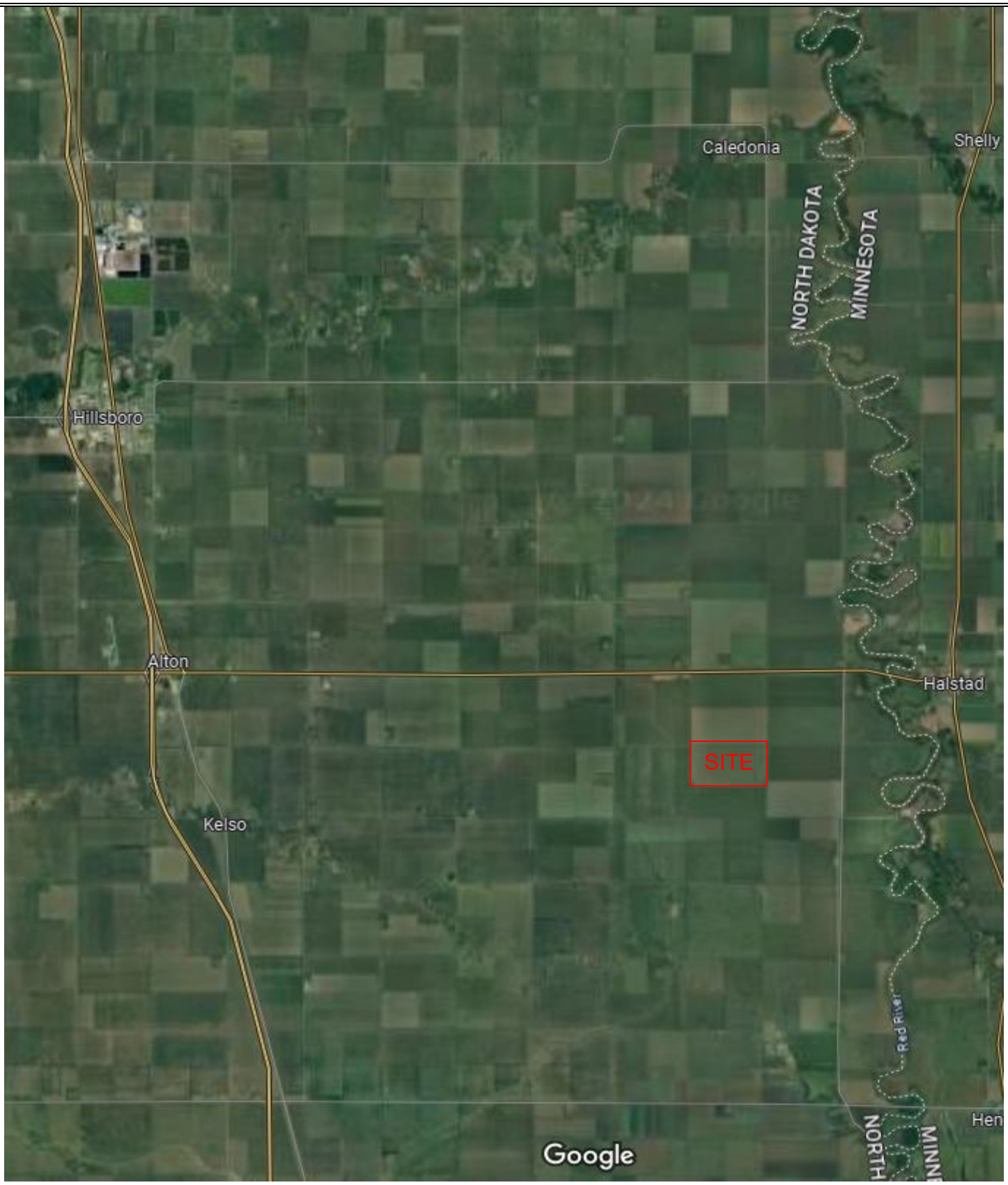
Term	Fiber Content (Visual Estimate)
Fibric Peat:	Greater than 67%
Hemic Peat:	33 – 67%
Sapric Peat:	Less than 33%

Organic Description (if no lab tests)

Soils are described as *organic*, if soil is not peat and is judged to have sufficient organic fines content to influence the Liquid Limit properties. *Slightly organic* used for borderline cases.

Root Inclusions

With roots: Judged to have sufficient quantity of roots to influence the soil properties.
Trace roots: Small roots present, but not judged to be in sufficient quantity to significantly affect soil properties.



AMERICAN ENGINEERING TESTING	Project: Herberg Dairy Near Hillsboro, ND			AET Job No. P-0032825
	Subject: Site Location			Date: Sept. 4, 2024
	Scale: NTS	Drawn By: GG	Checked By: JH	Figure: 1

Exhibit 5

RIVERVIEW ND, LLP, APPLICATION TO OBTAIN A STATE PERMIT ASSOCIATED WITH ANIMAL FEEDING OPERATIONS (Feb. 21, 2025)

(*received from DEQ via public records request*)

FORMS

Prepared by Settje Agri-Services and Engineering, Inc.
15460 NW 48th Street | Raymond, Nebraska 68428



Herberg Dairy

Section 34, T-145-N, R-49-W
Traill County, North Dakota

FOR DEPT. USE ONLY

Application Number
Date Received

APPLICATION TO OBTAIN A STATE PERMIT ASSOCIATED WITH ANIMAL FEEDING OPERATIONS

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY
SFN 8296 (08-2021)

GENERAL INFORMATION

1. Legal Name of Organization Responsible for Facility		2. Telephone Number	
Riverview ND, LLP		320-392-5609	
3. Mailing Address	4. City	5. State/Province	6. Zip Code
26406 470th Avenue	Morris	MN	56267
7. Name of Facility	8. Contact Person Name	9. Contact Telephone Number	
Herberg Dairy	Brady Janzen	320-392-5609	
10. Contact Mailing Address	11. City	12. State/Province	13. ZIP Code
26406 470th Avenue	Morris	MN	56267
14. Contact Email Address			
brady.janzen@riverviewllp.com			
15. Location of the facility		16. County	
¼ 1/2 SEC. 34 TWP. 145 N RGE. 49 W		Traill	

ANIMAL INFORMATION

17. Animal Type	18. Max Number of Animals	19. Avg Weight of Animals	20. Days Animals Handled per Year	21. Confinement Type
Dairy Cow, Milking	21,250	1,250	365	Under Roof
22. Animal Type	23. Max Number of Animals	24. Avg Weight of Animals	25. Days Animals Handled per Year	26. Confinement Type
Dairy Cow, Dry	3,750	1,250	365	Under Roof
27. Animal Type	28. Max Number of Animals	29. Avg Weight of Animals	30. Days Animals Handled per Year	31. Confinement Type

WASTE CONTAINMENT AND STORAGE

32. Containment/Storage Type	33. Max Capacity (indicate units)	34. Est. amt. Waste Generated per Year (indicate units)	35. Material
Ponds	32,295,894 Cu. Ft.	27,381,108 Cu. Ft.	Manure
36. Containment/Storage Type	37. Max Capacity (indicate units)	38. Est. amt. Waste Generated per Year (indicate units)	39. Material
Ponds	5,667,762 Cu. Ft.	4,070,421 Cu. Ft.	Process Wastewater
40. Containment/Storage Type	41. Max Capacity (indicate units)	42. Est. amt. Waste Generated per Year (indicate units)	43. Material

WASTE HANDLING

44. Total Acres Controlled and Available for Land Application	45. Est. amt. of Waste Transferred per Year (indicate units)	46. Material
30,175.6 acres	27,381,108 Cu. Ft.	
47. Total Acres Controlled and Available for Land Application	48. Est. amt. of Waste Transferred per Year (indicate units)	49. Material
30,175.6 acres	4,070,421 Cu. Ft.	
50. Total Acres Controlled and Available for Land Application	51. Est. amt. of Waste Transferred per Year (indicate units)	52. Material

53. Provide a brief description of how animal mortalities will be handled

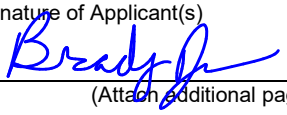
Mortalities will be removed from the facility with equipment and located in a secure rendering depot facility with impervious concrete floor surface and locked gate. Mortalities will be picked up daily by a professional rendering service.

The following additional attachments must be submitted at least 180 days prior to the time permit coverage is needed in addition to this application:

1. A topographic map of the area where the facility is or proposed to be located which shows the specific production area.
2. Designs, including location, for all manure storage and water pollution control structures and site-specific background information as specified in the North Dakota Livestock Program Design Manual. Design plans developed by anyone other than the facility owner must be signed by the engineer who prepared or supervised the preparation of the plans under North Dakota Administrative Code chapter 33.1-16-03.1-08.
3. Site-specific information on topography, surface water, groundwater, and soil geology.
4. A nutrient management plan or information related to a nutrient management plan as specified in subsections 4 and 5 of North Dakota Administrative Code 33.1-16-03.1-08.
5. All submitted applications where local zoning has been properly established shall contain documentation of approval from the zoning authority. If such documentation has not been provided, the application process shall be put on hold until the required approval documentation has been received by this department.

Facilities must receive department approval prior to construction.

SIGNATURE

RETURN COMPLETED APPLICATION TO: North Dakota Dept. of Env. Quality Division of Water Quality 4201 Normandy Street Bismarck, ND 58503-1324 Telephone: (701) 328-5210	I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	
	54. Printed Name of Applicant(s) Brady Janzen	55. Title Partner
	56. Signature of Applicant(s) 	57. Date 2/21/2025

(Attach additional pages if needed)

FOR DEPT. USE ONLY

☐ Individual	☐ General	
Design	NMP	Zoning

Instructions

Submission of this application is notice that the applicant identified on the application intends to obtain coverage under a state individual permit associated with Animal Feeding Operations in the state of North Dakota.

General Information

1. **Legal Name of Organization Responsible for Facility.** List the individual, company, organization or entity for which the legal responsibility falls.

2. **Telephone Number.** Provide a valid telephone number of organization responsible for facility.

3 through 6. **Mailing Address.** Provide a valid mailing address for organization responsible for facility.

7. **Name of Facility.** Provide the name of the facility.

8. **Contact Person Name.** Provide name of the main contact for the facility.

9. **Contact Telephone Number.** Provide a valid phone number for the main contact for the facility.

10 through 13. **Contact Mailing Address.** Provide a valid mailing address for the main contact for the facility.

14. **Contact Email Address.** Provide a valid email address for the main contact for the facility.

15 through 16. **Township, Range, Section, and Quarter Section.** Provide the numerical township, range, section and county of the facility. Provide the quarter section in the ABCD format. (*See Figure 1*).

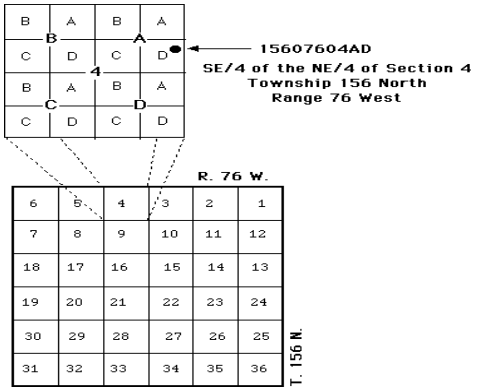


Figure 1: ABCD Quarter Section format

17, 22, and 27. **Animal Type.** Select the animal type from the drop down.

18, 23, and 28. **Max Number of Animals.** Enter the maximum number of animals the facility is designed for.

21, 26, and 31. **Confinement Type.** Select the confinement type from the drop down.

32, 36, and 40. **Containment/Storage Type.** Select the containment/storage type from the drop down for waste generated at the facility.

33, 37, and 41. **Max Capacity**. Enter the maximum capacity of the containment/storage structure along with the units (e.g. gallons, million gallons, etc.).

34, 38, and 42. **Est. amt. Waste Generated per Year.** Enter the estimated amount of waste that is produced at the facility per year.

35, 39, and 43. **Material.** Select the type of material the waste is from the drop down list.

44, 47, and 50. **Total Acres Controlled and Available for Land Application**. Enter the total number of acres that are controlled and available for land application.

45, 46, and 51. **Estimated amount of Waste Transferred per Year.** Enter the estimated amount of waste which is transferred per year and indicate the units.

46, 49, and 52. **Material.** Select the material type from the drop down list.

53. **Provide a brief description of how animal mortalities will be handled.** Describe how animal mortalities are planned to be handled.

54. **Printed Name of Applicant(s).** Enter the name of the applicant(s).

55. **Title.** Enter the title for the signatory listed.

56. **Signature of Applicant.** Signature of applicant listed. Signature must be an original "wet ink" signature.

57. **Date.** Enter the date which the application was signed.

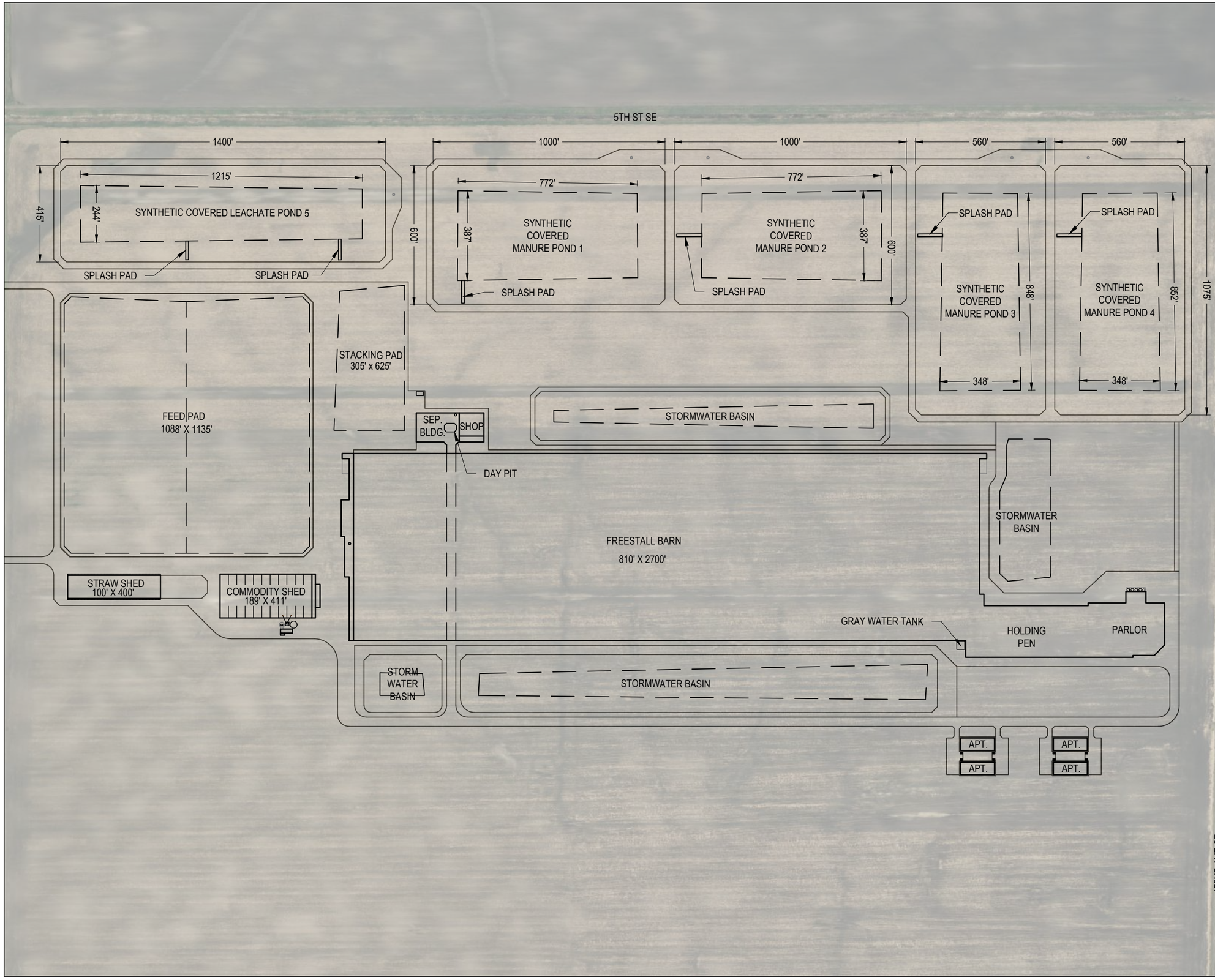
PLANS

Prepared by Settje Agri-Services and Engineering, Inc.
15460 NW 48th Street | Raymond, Nebraska 68428



Herberg Dairy

Section 34, T-145-N, R-49-W
Traill County, North Dakota



Date Printed	2/14/25
Drawn By	MPG
Reviewed By	TZ

N

0 400 800 Feet

RIVERVIEW ND, LLP
SITE PLAN

HERBERG DAIRY
SECTION 34, T-145-N, R-49-W
TRAILL COUNTY, NORTH DAKOTA

15460 NW 48th St.
Raymond, NE 68428
Office: (402) 783-2100
Fax: (402) 783-2104
Web Site: www.settje.com

Settje Agri-Services & Engineering, Inc.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN K. WESTERBUHR
PE-30143
DATE 02/21/25
NORTH DAKOTA

P-1

5TH ST SE

SYNTHETIC COVERED LEACHATE POND 5

SYNTHETIC COVERED MANURE POND 1

SYNTHETIC COVERED MANURE POND 2

SYNTHETIC COVERED MANURE POND 3

SYNTHETIC COVERED MANURE POND 4

SPLASH PAD

SPLASH PAD

SPLASH PAD

SPLASH PAD

SPLASH PAD

SPLASH PAD

STACKING PAD

FEED PAD

SEP. BLDG.

SHOP

DAY PIT

STORMWATER BASIN

FREESTALL BARN

STORMWATER BASIN

STRAW SHED

COMMODITY SHED

GRAY WATER TANK

HOLDING PEN

PARLOR

STORM WATER BASIN

STORMWATER BASIN

APT.

APT.

APT.

APT.

172ND AVE SE

REGISTERED PROFESSIONAL ENGINEER
STEPHEN K. WESTERBUHR
PE-30143
DATE 02/21/25
NORTH DAKOTA

Date Printed	2/14/25
Drawn By	MPG
Reviewed By	TZ

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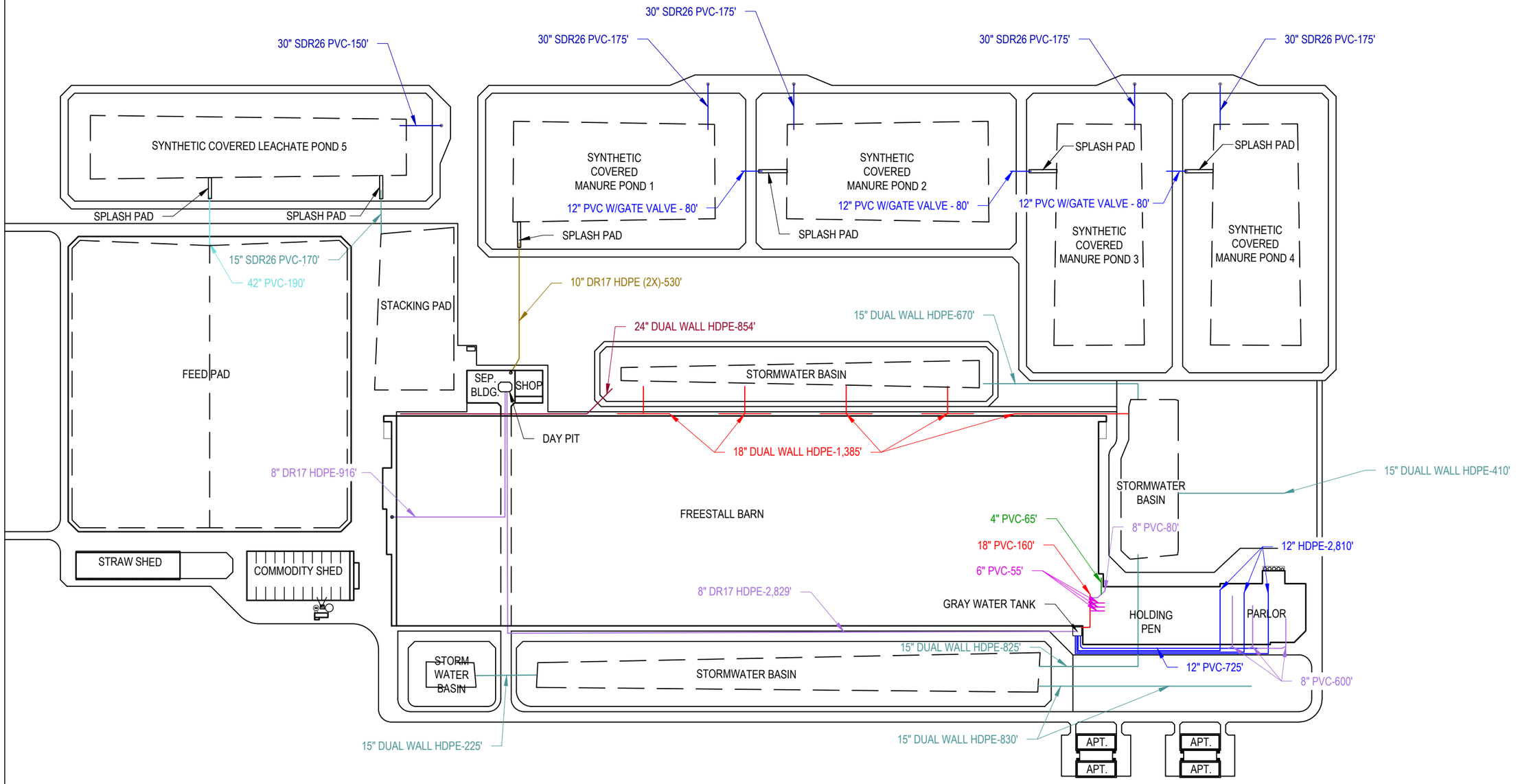
RIVERVIEW ND, LLP
PROPOSED TOPOGRAPHY

HERBERG DAIRY
SECTION 34, T-145-N, R-49-W
TRAILL COUNTY, NORTH DAKOTA

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Raymond, NE 68428
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SETTJE
Agri-Services & Engineering, Inc.

P-2



REGISTERED PROFESSIONAL ENGINEER
STEPHEN K WESTERBUHR
PE-30143
DATE 02/21/25
NORTH DAKOTA

Date Printed	2/14/25
Drawn By	MPG
Reviewed By	TZ

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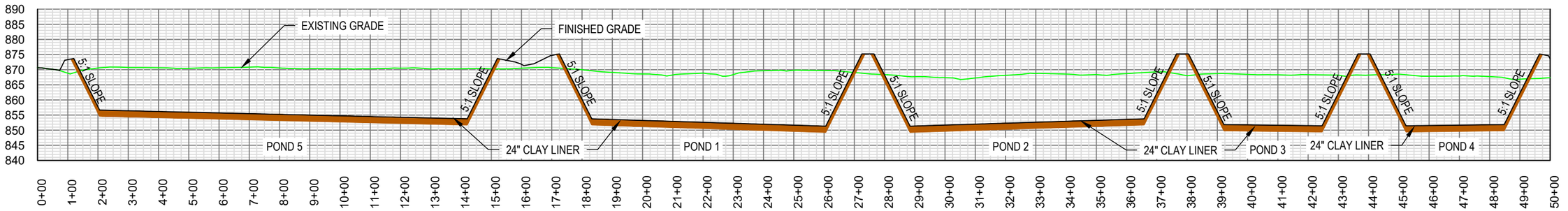
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RIVERVIEW ND, LLP
PIPE PLAN

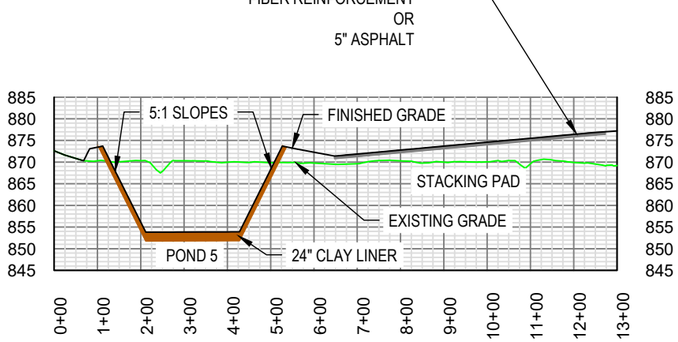
HERBERG DAIRY
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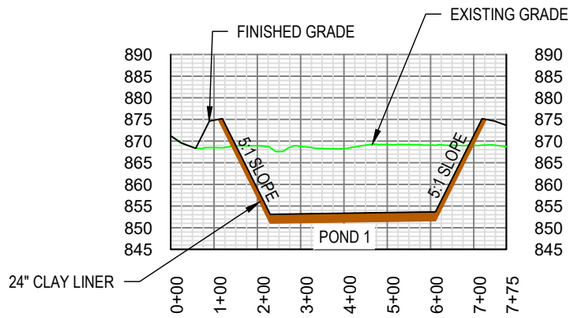
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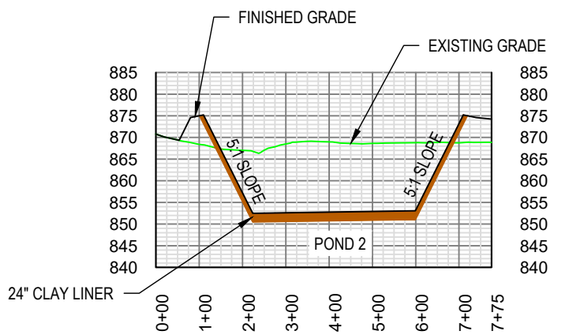
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VERTICAL EXAGGERATION = 10:1



2 SYNTHETIC COVERED LEACHATE POND & STACKING PAD PROFILES
VERTICAL EXAGGERATION = 10:1



3 SYNTHETIC COVERED MANURE POND PROFILE
VERTICAL EXAGGERATION = 10:1



4 SYNTHETIC COVERED MANURE POND PROFILE
VERTICAL EXAGGERATION = 10:1

REGISTERED PROFESSIONAL ENGINEER
STEPHEN K. WESTERBUHR
PE-30143
DATE 02/21/25
NORTH DAKOTA

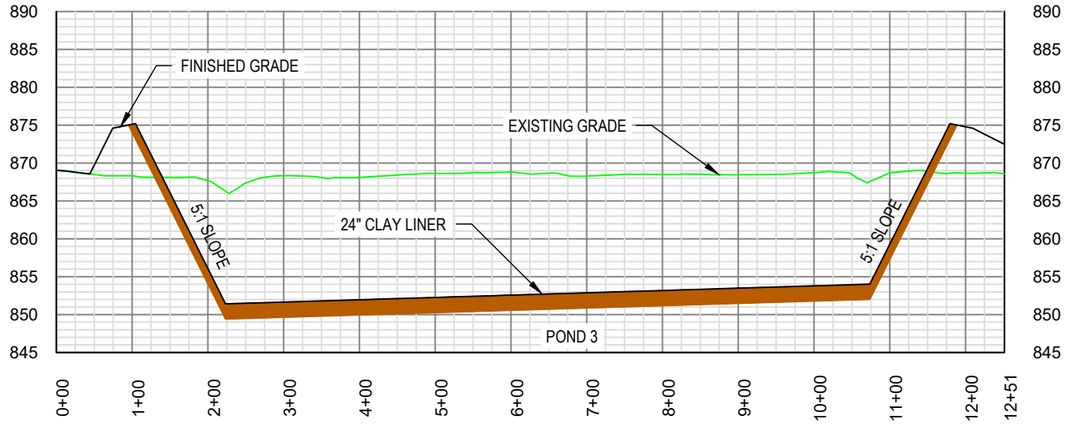
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Drawn By	KMH
Reviewed By	TZ

RIVERVIEW ND, LLP
PROFILES

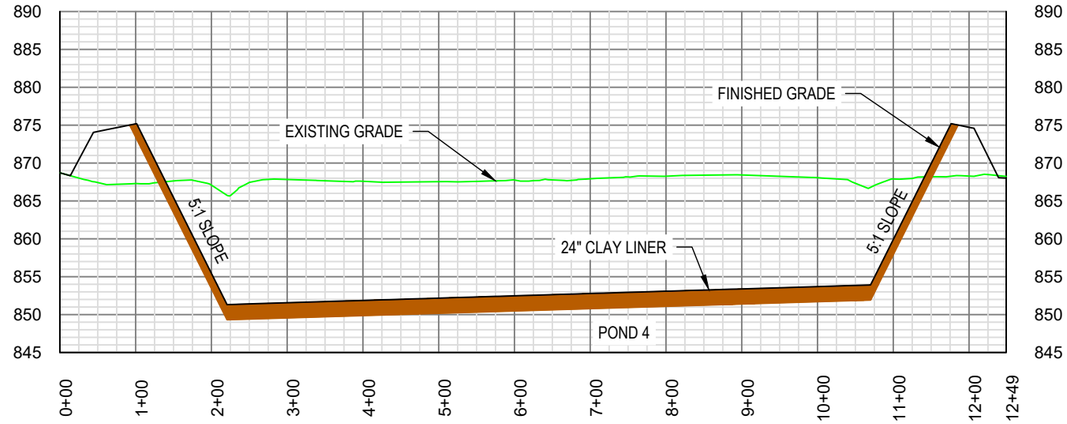
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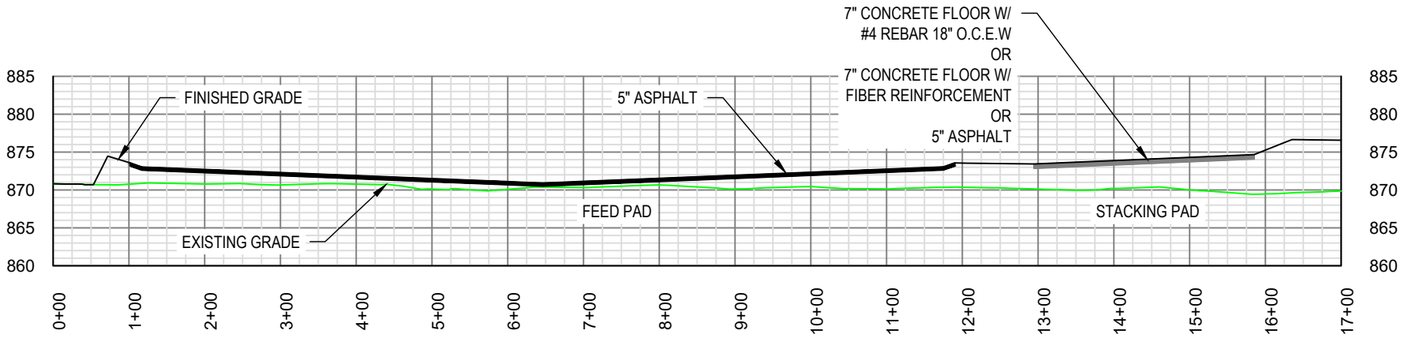
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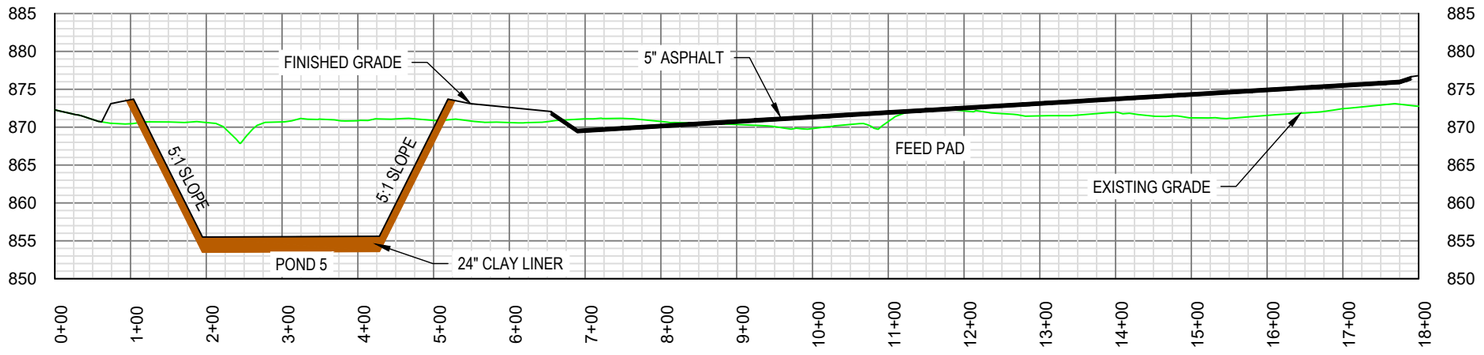
5 SYNTHETIC COVERED MANURE POND PROFILE
VERTICAL EXAGGERATION = 10:1



6 SYNTHETIC COVERED MANURE POND PROFILE
VERTICAL EXAGGERATION = 10:1



7 FEED PAD AND STACKING PAD PROFILE
VERTICAL EXAGGERATION = 10:1



8 FEED PAD AND LEACHATE POND PROFILE
VERTICAL EXAGGERATION = 10:1

REGISTERED PROFESSIONAL ENGINEER
STEPHEN K WESTERBUHR
PE-30143
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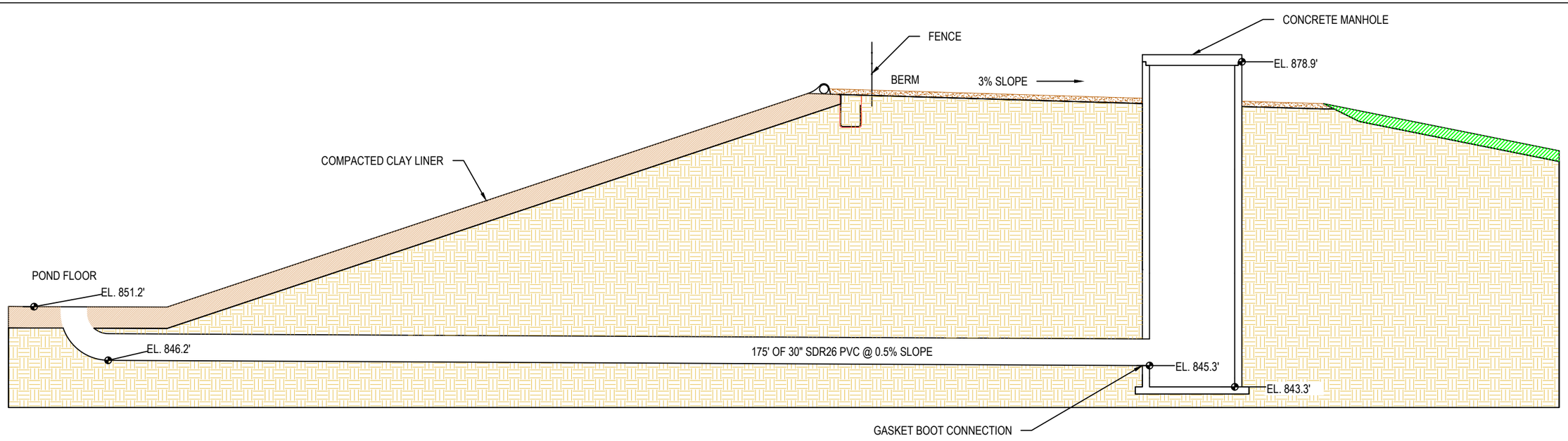
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Drawn By	KMH	
Reviewed By	TZ	

RIVERVIEW ND, LLP
PROFILES

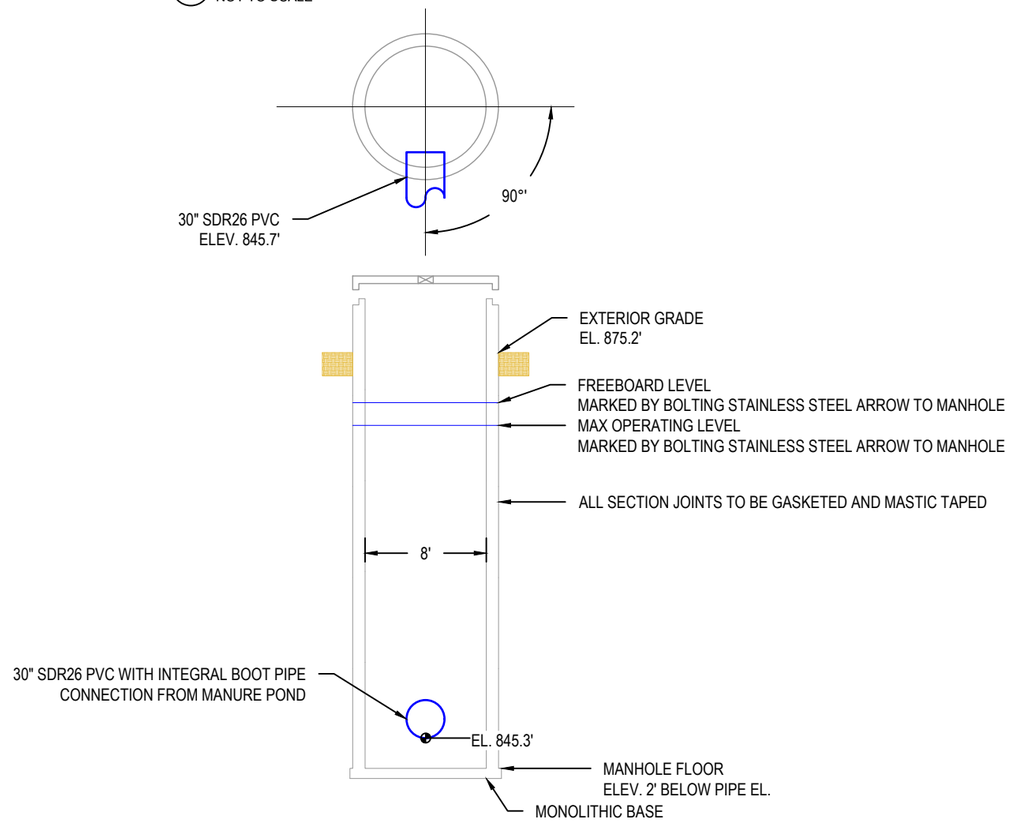
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SETTJE
Agri-Services & Engineering, Inc.



1 MANURE PONDS 1, 2, 3, & 4 PUMP OUT SECTION VIEW
NOT TO SCALE



2 MANURE PONDS 1, 2, 3, & 4 PUMP OUT
NOT TO SCALE

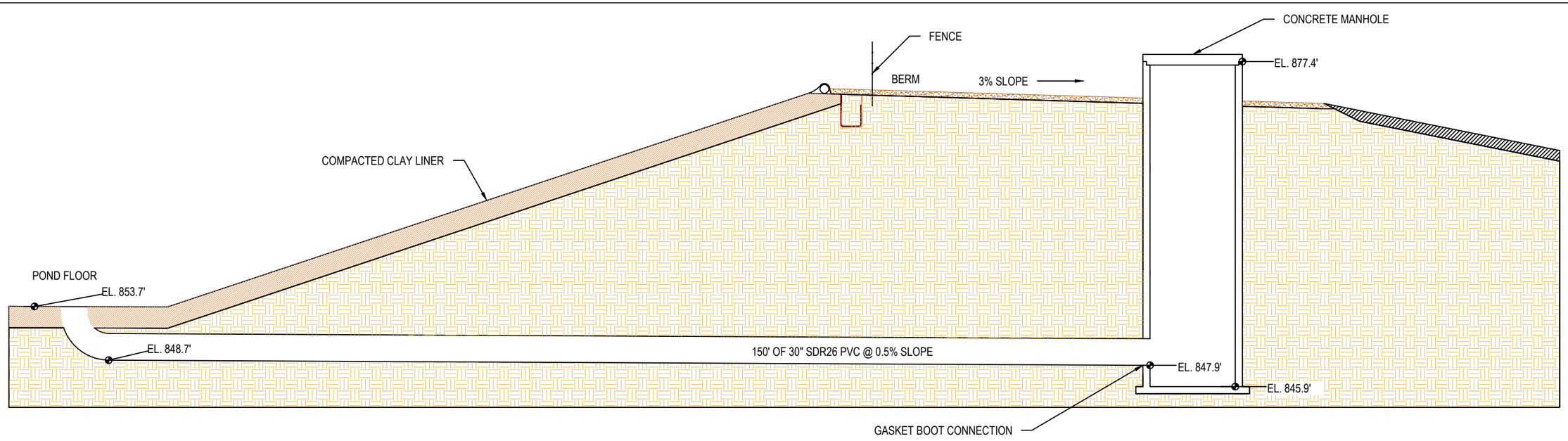
REGISTERED PROFESSIONAL ENGINEER
STEPHEN K. WESTERBUHR
PE-30143
DATE 02/21/25
NORTH DAKOTA

Date Printed	Drawn By	Reviewed By
2/14/25	KMH	TZ

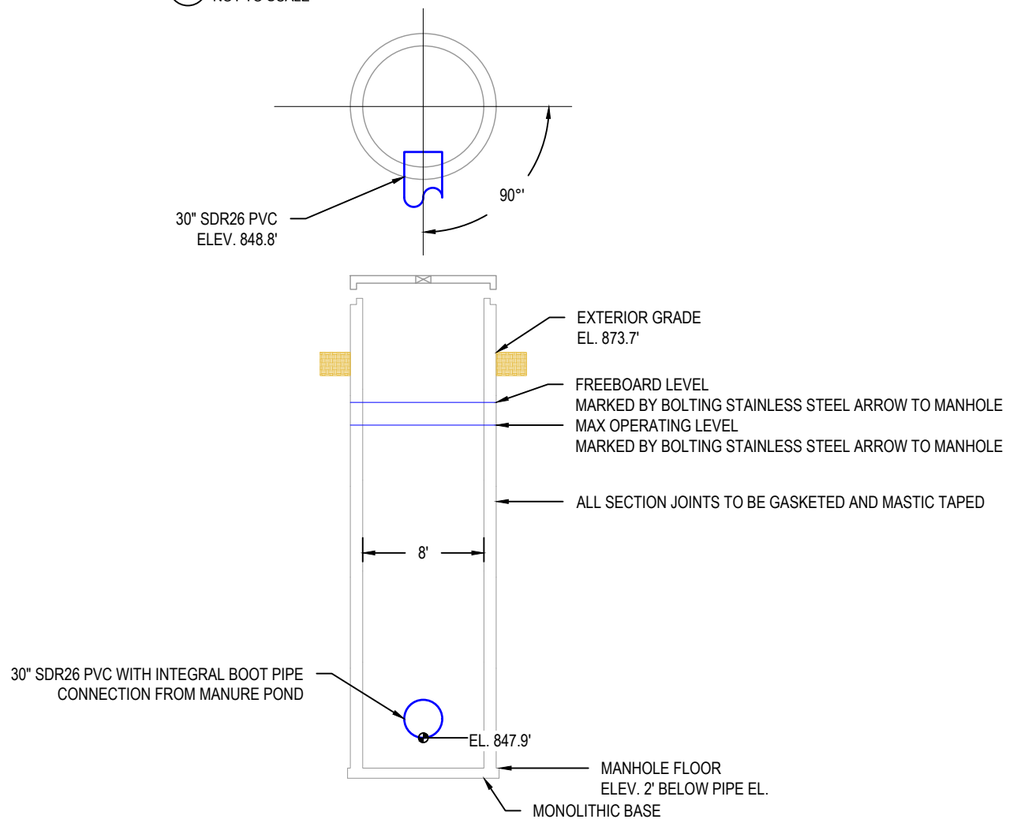
RIVERVIEW ND, LLP
PUMP OUT PORT DETAILS

HERBERG DAIRY
SECTION 34, T-145-N, R-49W
TRAILL COUNTY, NORTH DAKOTA

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Raymond, NE 68428
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Web Site: www.settje.com
SETTJE Agri-Services & Engineering, Inc.



1 LEACHATE POND 5 PUMP OUT SECTION VIEW
NOT TO SCALE



2 LEACHATE POND 5 PUMP OUT
NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
STEPHEN K WESTERBUHR
PE-30143
DATE 02/21/25
NORTH DAKOTA

2/14/25	KMH	TZ
Date Printed	Drawn By	Reviewed By

RIVERVIEW ND, LLP
PUMP OUT PORT DETAILS

HERBERG DAIRY
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Agri-Services & Engineering, Inc.

Exhibit 6

SETTJE AGRI-SERVICES & ENGINEERING, INC.,
OPERATIONS & MAINTENANCE PLAN

(Sept. 16, 2024)

(*received from DEQ via public records request*)

OPERATIONS & MAINTANENCE PLAN

Prepared by Settje Agri-Services and Engineering, Inc.
15460 NW 48th Street | Raymond, Nebraska 68428



Herberg Dairy

Section 34, T-145-N, R-49-W
Traill County, North Dakota

I have reviewed and approved these guidelines for the Waste Management System.

X_____ Date 9/16/2024

TABLE OF CONTENTS

FACILITY SUMMARY 2
Introduction 2
Objective 2
REQUIRED OPERATION, MAINTENANCE AND INSPECTIONS 2
Utilization of Manure Other Than Land Application 3
Livestock Mortality Disposal 3
Records Required to be Maintained 3
Operation and Maintenance (O&M) Plans and Standard Operating Procedures (SOPs) 3
Odor Control & Manure Handling at the Facility 4

FACILITY SUMMARY

Introduction

Herberg Dairy is located in Traill County, North Dakota. This facility will be a new dairy facility that is proposing to contain a one-time capacity of 25,000 head.

This plan will provide management with a system that will ensure compliance with State and Federal regulations and provide a means of monitoring, measuring, and determining compliance.

Manure and process wastewater from Herberg Dairy will be applied to cropland as fertilizer. This plan considers manure production, storage, and usage of nutrients from manure produced at Herberg Dairy. Any reference to “the Producer” in these plans shall be a reference to Herberg Dairy and its management.

Objective

Facilities requiring a permit pursuant to NDAC Chapter 33.1-16-01 or NDAC Chapter 33.1-16-03.1 shall be operated and maintained so they continue to operate as designed. Particular attention shall be paid to: (1) the handling and storage of manure and process wastewater, (2) measures to prevent the unplanned release of manure, and (3) dead animal disposal.

Chemicals and other contaminants handled on site shall not be disposed of in any manure storage or treatment system unless it is designed for that purpose. In addition, specific records shall be maintained to document the implementation and management of the minimum elements needed for operation.

REQUIRED OPERATION, MAINTENANCE AND INSPECTIONS

The Producer shall conduct the following routine visual inspections of the production area:

- Weekly inspections of all storm water diversion devices, runoff diversion structures and devices channeling runoff to the manure storage structure.
- Daily inspection of water lines, including drinking water or cooling water lines.
- Weekly inspections of the manure storage structures noting the level of liquid in the structure as indicated by the depth marker.

All open manure storage structures shall: maintain a depth marker which clearly indicates the minimum capacity necessary to contain the runoff and direct precipitation from a 25-year, 24-hour rainfall event

- Any deficiencies discovered during the inspections listed above shall be corrected as soon as possible.
- Chemicals or other contaminants handled on site shall not be disposed of in a structure used for storage or treatment of manure, process wastewater or storm water unless it is specifically designed for that purpose.
- The operator of a facility requiring a permit under this chapter or under NDAC 33.1-16-01 should maintain a rain gauge at the production area and record measurable rainfall events.

Utilization of Manure Other Than Land Application

The Producer shall keep records of how the manure, litter, or process wastewater was reused or disposed. Manure will be collected and processed through a screw-press separator where the liquid and solids will be separated. The liquid will be routed to the liquid manure storage ponds while the solids will be reused as bedding material.

Livestock Mortality Disposal

Livestock mortality shall be disposed of in a manner acceptable to the Board of Animal Health and in accordance with NDCC Section 36-14-19. Livestock mortality shall be disposed of in areas that will not discharge into waters of the state and where they will not detrimentally impact air quality. Livestock mortality shall not be disposed of in any structure used to store or treat liquid manure, process wastewater, or storm water unless the department-approved system is designed for such a purpose.

Herberg Dairy plans to ship all mortalities off-site approximately every 72 hours using a rendering service. Prior to shipment off-site, Herberg Dairy will store mortalities in a roofed building with concrete sides and floor. The building is designed so that Herberg Dairy may convert it to a composting building if a rendering service becomes unavailable.

Records Required to be Maintained

Management shall maintain complete copies on site of the information listed below and a copy of the most current nutrient management plan. These documents shall be made available to department personnel upon request. This information shall be maintained for a period of five years from the date created. Management must make the following records available to the department for review upon request:

- Records documenting the visual inspections.
- Weekly records of the depth of the manure and process wastewater in the liquid manure storage structure as indicated by the depth gauge in the storage structure.
- Records documenting any actions taken to correct deficiencies. Deficiencies not corrected within 30 days must be accompanied by an explanation of the factors preventing immediate correction.
- Records of mortalities management and practices used.
- Records documenting the current design of any manure storage structures, including solids accumulation volume, design treatment volume, total design volume and the approximate number of days of storage capacity.
- Records of the date, time and estimated volume of any overflow.
- Records documenting the land application of manure.

Operation and Maintenance (O&M) Plans and Standard Operating Procedures (SOPs)

- The Producer shall conduct routine maintenance and inspections of the manure handling system. These shall include, but are not limited to, manure storage structures, diversions, water pollution control structures, and transfer and land application equipment.

- General site inspections should note any areas where seepage, erosion, rodent infestation or degradation may be occurring at all manure handling system structures, diversions, and transfer and land application equipment.

- The Manure Management Plan shall describe how manure will be sampled and tested.

Odor Control & Manure Handling at the Facility

Herberg Dairy will collect manure generated in the barn facilities using self-propelled vacuum wagons and transport the manure to the temporary storage tank outlined on P-11. The manure will route through screw-press separators to retain manure solids to use as bedding in the dairy barn free-stalls. Herberg then transfers the liquid fraction of the manure to the manure storage basin where any remaining solid particles in the manure can settle out. Manure is cleaned from these production areas daily, and all manure basins will be covered with synthetic covers to control odors. Herberg Dairy will utilize a cross-ventilated barn. There will be a bank of fans along the north side of the barn that will consistently draw air through the barn from south to north helping dilute odor in the barn.

According to NDCC Section 23.1-06-15(4), a person is exempt from any odor violations while spreading or applying animal manure to land in accordance with a NMP approved by the department.

Exhibit 7

ENVIRONMENTAL SCIENTIFIC, FLOODPLAIN EVALUATION—HERBERG DAIRY (Feb. 20, 2025)

(*received from DEQ via public records request*)

ENVIRONMENTAL SCIENTIFIC

Office (320) 589-9893
Cell (320) 349-0794
Email: jason@environmental-scientific.com

February 20, 2025

Riverview
26406 470th Avenue
Morris, MN 56267

RE: Floodplain Evaluation – Herberg Dairy
North ½ of Section 34, Herberg Township (+/-320 Acres)
Traill County, North Dakota

Dear Riverview:

I. Executive Summary

Environmental Scientific (ES) was contracted by Riverview to review possible floodplain concerns with regards to the proposed Herberg Dairy located in Traill County, North Dakota (Project). ES reviewed all Project information and North Dakota Century Codes, which regulate development in floodplains. Based on that review, ES identified a small area of the proposed Project is located within a mapped flood fringe. However, development is allowed in the flood fringe as long as the lowest structure elevation is at least one (1) foot above the base flood elevation. In this case, not only will all Project structures range between two (2) and twelve (12) feet above the base flood elevation, but an elevated perimeter road and dike will also be constructed along the east side, thereby avoiding the potential for flooding at this Project and allowing development.

II. Site Description

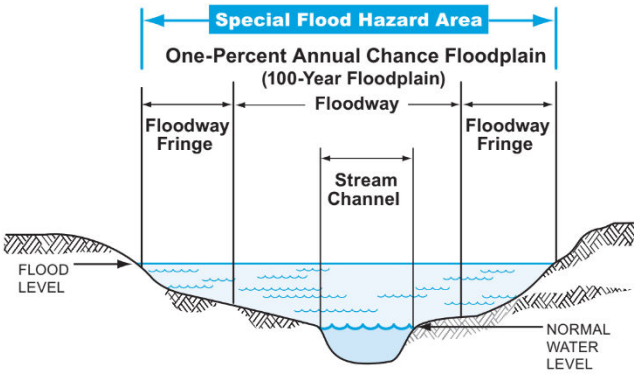
The Project is in the north ½ of Section 34 of Herberg Township in Traill County, North Dakota approximately 2 miles southwest of Halstad, Minnesota (Figure 1). The Project site occupies approximately 320 acres on the western edge of the Red River floodplain with existing elevations ranging between 874 and 868 feet above mean sea level (MSL) from west to east respectively. The Project includes the construction of four (4) clay-lined liquid manure storage areas (LMSAs), four (4) stormwater ponds, a clay-lined leachate pond, a feed pad, a stacking pad, a straw shed, a freestall barn, a milking parlor, four (4) residential structures for workers, a perimeter road, and a dike. Each of these structures will be elevated above the existing grade with minimum elevations ranging from 870-882 feet above MSL depending on their location within the Project site (Appendix A).

III. Regulatory Review

The relevant laws for the proposed Project are outlined in the North Dakota Century Code, Chapter 61-16.2 for Floodplain Management. In general, these laws regulate development in floodplains to protect people and property by: 1) ensuring the regulatory floodway maintains its ability to carry floodwaters away, and 2) ensuring construction within the floodway fringe is adequately protected from a 100-year flood event. As identified in North Dakota Century Code 61-16.2-.02, the definitions for a *floodway* and a *flood fringe* are listed below:

- *"Flood fringe" means that portion of the floodplain outside the floodway.*
- *"Floodway" or "regulatory floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without increasing the water surface elevation more than one foot.*

The base flood elevation (BFE) is defined in Section 61-16.2-06 as "the water level that would result from a flood that has a 1% chance of occurring in any given year" (100-year floodplain). As outlined in Figure 2, a small portion of the proposed Project is located on the western edge of the identified 100-year floodplain and not within any mapped regulatory floodway. The adjacent thumbnail provides a generic depiction of the 100-year floodplain boundary versus the regulatory floodway boundary[1]. In addition, the attached Figure 3 provides an actual depiction of the proposed Project clearly located within the floodway fringe and outside any regulatory floodway.



As outlined in North Dakota Century Code, Chapter 61-16.2-08, permissible uses in the flood fringe include residential and non-residential structures as long as they are elevated at least one (1) foot above the BFE. In this case, the BFE for the Project area is 868 feet above MSL, whereas the lowest elevation of any structure is 870 feet above MSL.

[1] Quick Guide – Floodplain Management in North Dakota, 2024 Page 24.

IV. Flooding Potential Evaluation

While the proposed Project fits within the regulatory requirements outlined above, Riverview asked ES to review their plans and evaluate the potential for flood related impacts to their proposed facility. To complete this evaluation, ES first reviewed elevations of various Project structures as outlined in Appendix A:

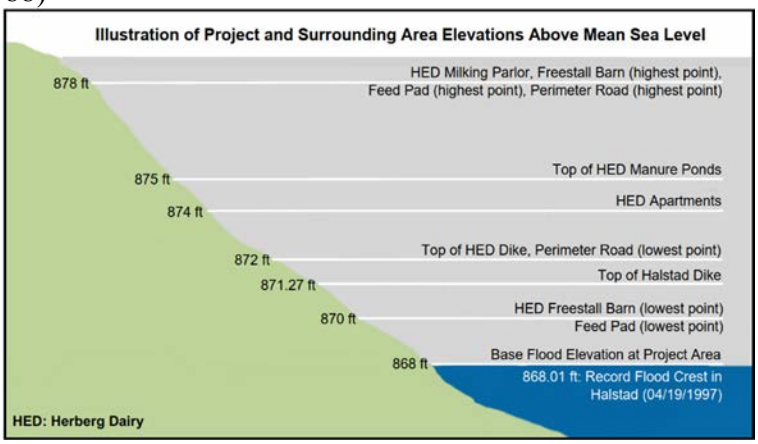
Project Elevations above mean sea level (NAVD88)

- Freestall Barn: 870-878 feet
- Feed Pad: 870-878 feet
- Top of Dike: 872 feet
- Perimeter Road (east side): 872-878 feet
- Grade at Apartments: 874 feet
- Top of Manure Ponds: 875 feet
- Grade at Milking Parlor: 878 feet
- Straw Shed: 879-882 feet

ES then reviewed historic flood data collected by the US National Oceanic and Atmospheric Administration (NOAA) for the Red River of the North at Halstad, Minnesota[2]. The proposed dairy is located 2.3 miles southwest of Halstad and the NOAA flood data is considered representative of the Project site. Summarized below are relevant flood-related elevations utilized for this evaluation:

Relevant Flood Elevations (NAVD88)

- Base Flood Elevation for Project Area: 868 ft
- Record Flood Crest in Halstad (4/19/97): 868.01 ft
- Halstad Dike Elevation: 871.27 ft



As summarized above and illustrated in the thumbnail to the right, all Project structures will be

[2] Red River of the North at Halstad, National Oceanic and Atmospheric Administration, https://water.noaa.gov/gauges/hiln8

higher than the established Base Flood Elevation and 1997 Record Flood Crest. These structures notably include the apartments, the manure ponds, and the milking parlor which will be six (6), seven (7), and ten (10) feet respectively higher than the Base Flood Elevation. In addition, the perimeter road and dike constructed on the east side will range from four (4) to ten (10) feet higher than the Base Flood Elevation. Based on this evaluation, the Project has an ample number of design features to adequately avoid inundation by flood waters.

V. Conclusions

A small portion of the proposed 320-acre Project is located within a defined flood fringe. Following review of all project information and applicable North Dakota Century Codes, the proposed Project complies with all floodplain management rules as outlined in Century Code 61-16.2 Floodplain Management.

Additionally, our detailed review of historic flood data identified that all Project structures range between two (2) and twelve (12) feet above both the Base Flood Elevation and the Record Flood Crest (4/19/1997). Therefore, taking into consideration the facilities, dike, and perimeter road elevations, ES concludes that the Project has been adequately designed to ensure it will never be inundated by flood water as depicted in Appendix B.

This report outlines the professional observations and recommendations of Environmental Scientific. If you have any questions regarding this report, or would like additional information, please don't hesitate to contact ES at (320) 589-9893.

Sincerely,



Jason Kirwin
President

Herberg Township

Section 34 Township 145N Range 49W

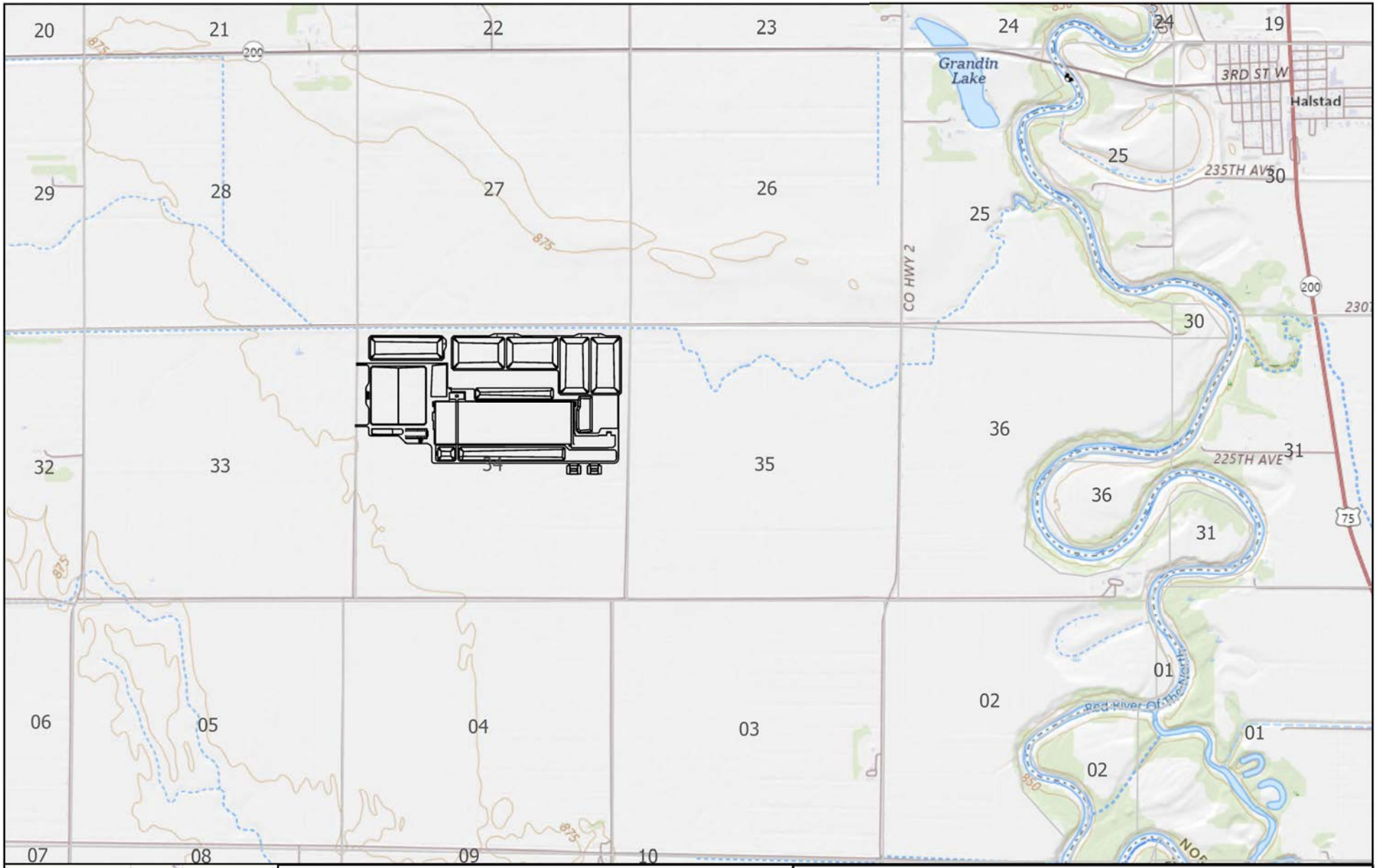




Figure 1 - Topographic Site Location Map

Herberg Dairy

Traill County, ND

Herberg Dairy

N

0 0.5 1 1.5

Miles

ENVIRONMENTAL SCIENTIFIC

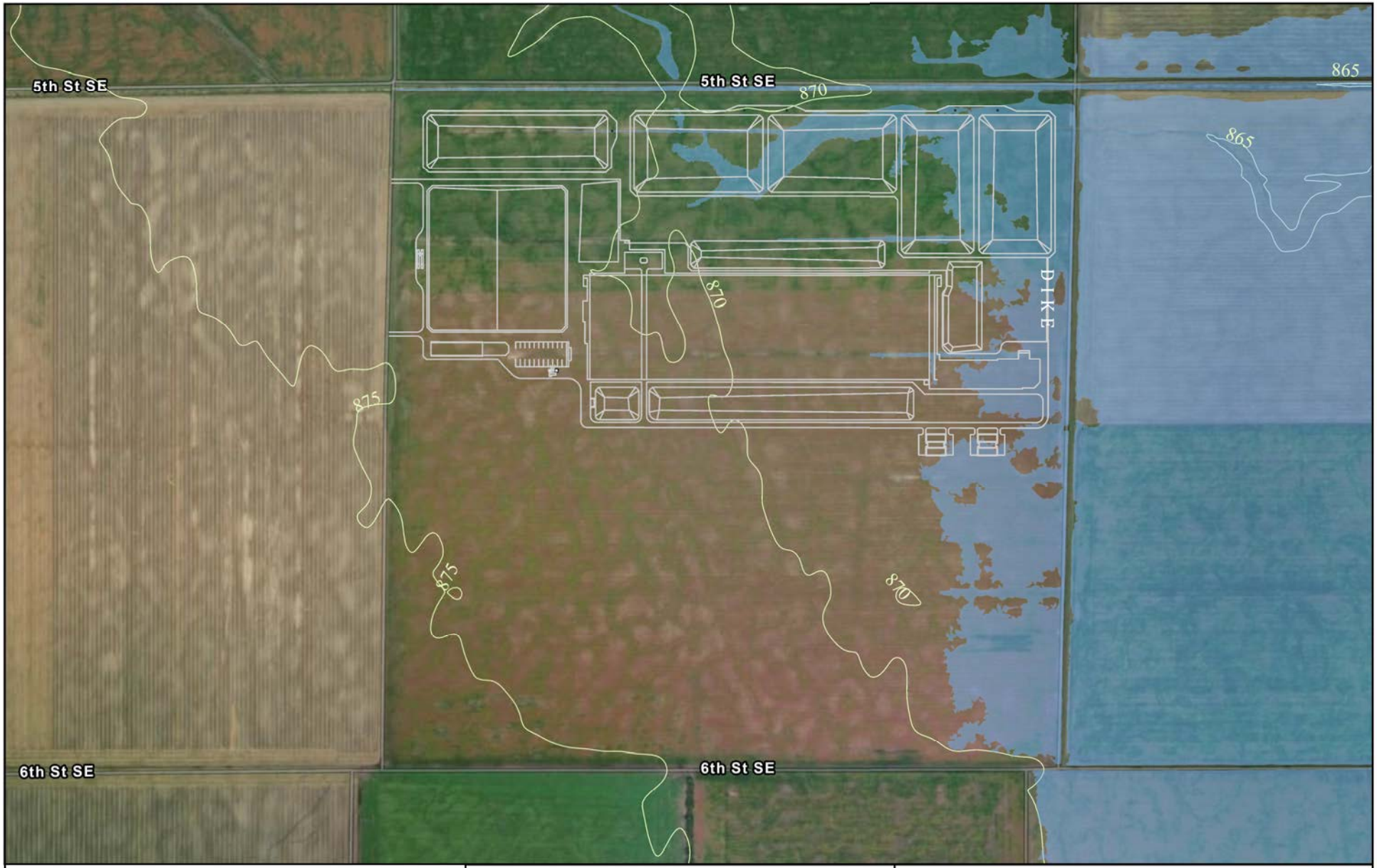


Figure 2
FEMA Floodplain Site Map

Herberg Dairy
Traill County, ND

Herberg Dairy
Elevation Contours (5 ft)

Flood Hazard Zones
1% Annual Chance Flood Hazard
Regulatory Floodway
Base Flood Elevation (BFE): 868 feet above MSL

N
0 0.25 0.5
Miles

ENVIRONMENTAL SCIENTIFIC

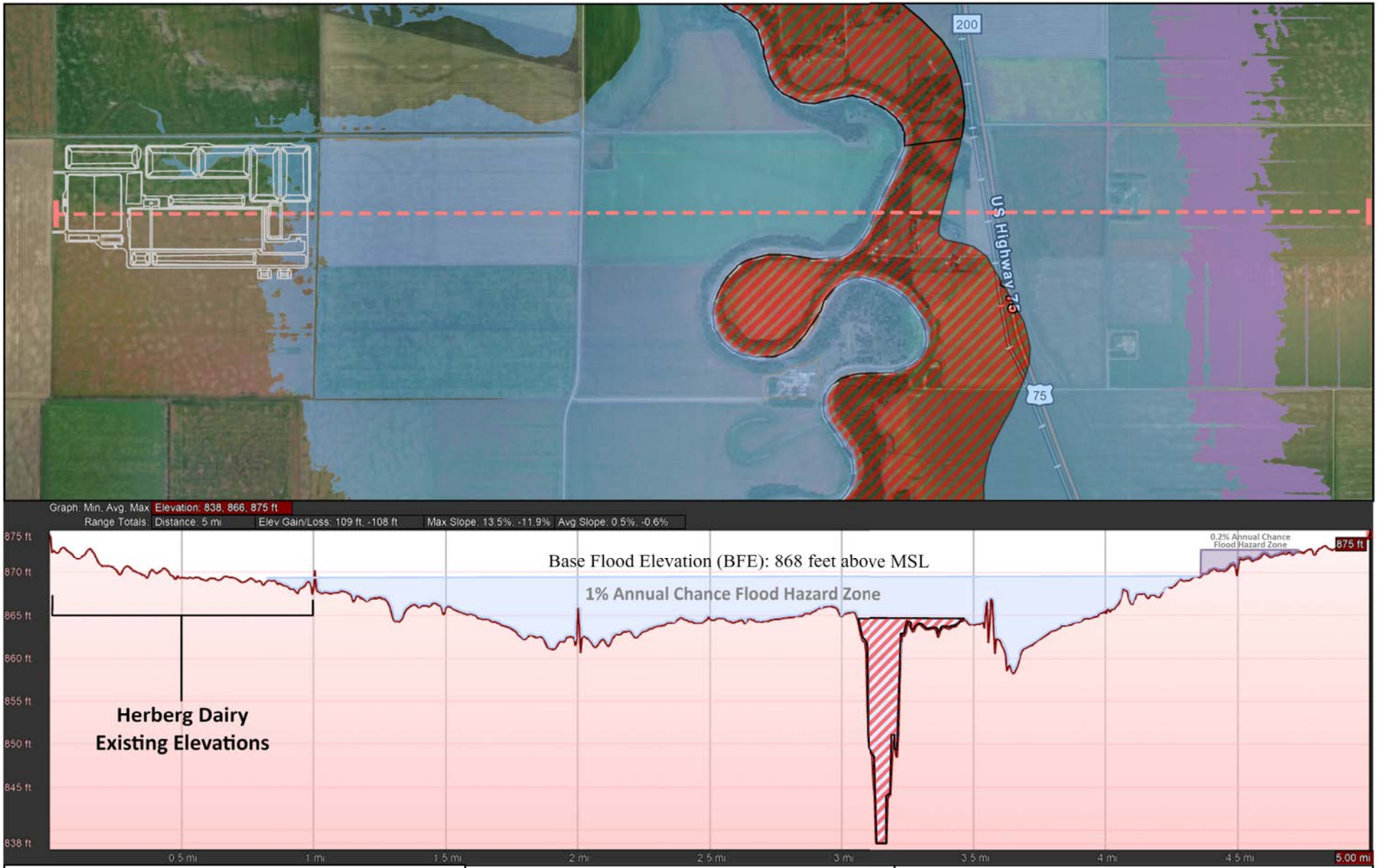


Figure 3
FEMA Floodplain & Elevation Map

Herberg Dairy
Traill County, ND

Herberg Dairy
Elevation Profile Cross Section

Flood Hazard Zones
0.2% Annual Chance Flood Hazard
1% Annual Chance Flood Hazard
Regulatory Floodway

N
0 0.5 1 1.5
Miles

ENVIRONMENTAL SCIENTIFIC

LEACHATE POND 5

MANURE POND 1

MANURE POND 2

MANURE POND 3

MANURE POND 4

STACKING PAD

FEED PAD

SEPARATOR BLDG

STORMWATER BASIN

FREESTALL BARN

FREESTALL BARN

STORMWATER BASIN

STRAW SHED

COMMODITY BLDG

HOLDING PEN

PARLOR

N

1 TOPOGRAPHY PLAN

0' 400' 800'

Date Printed: 02/11/2025

Rev.	Date

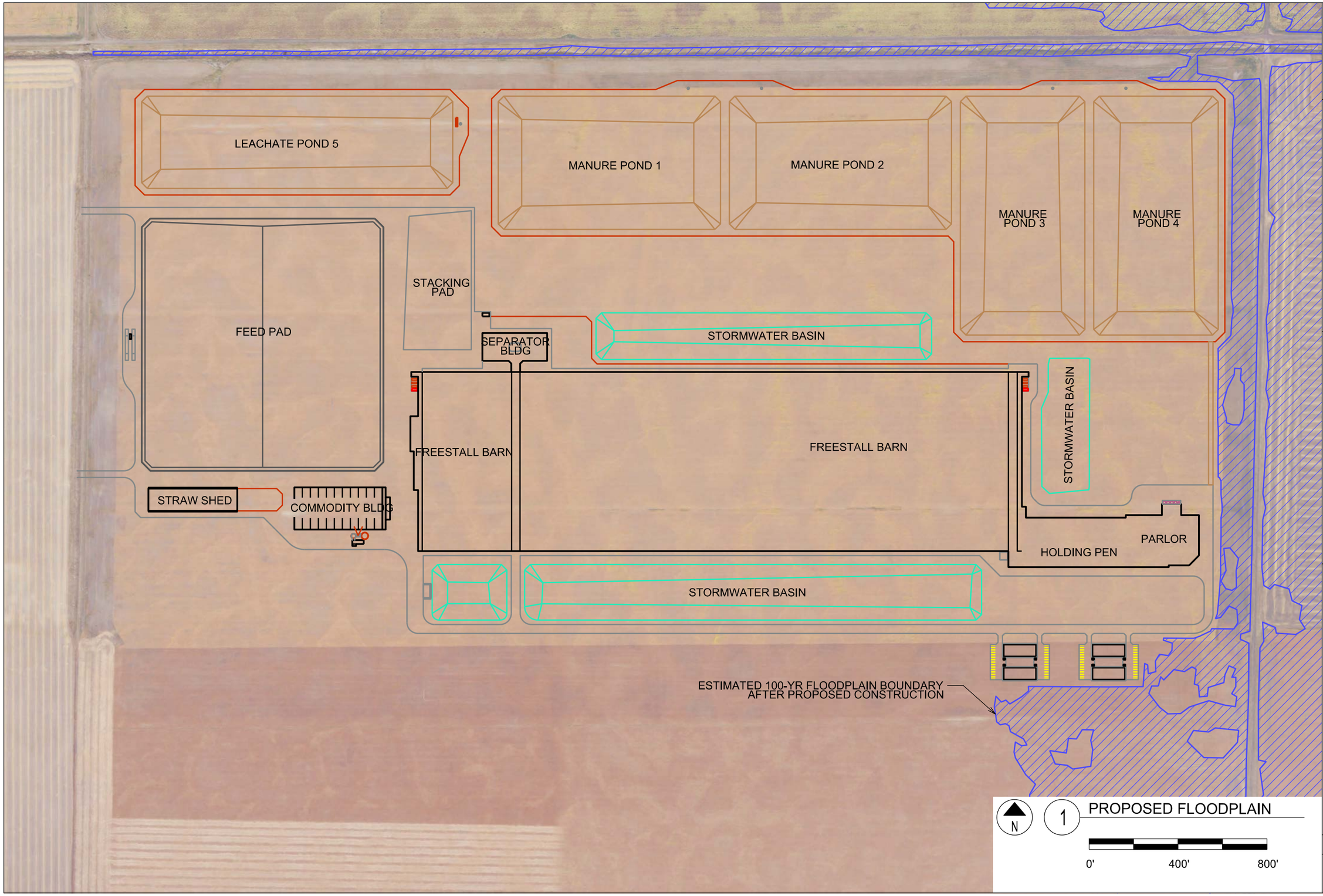
Riverview, LLP
Topography Plan

Herberg Dairy
Section 34, Township 145N, Range 49W
Traill County, North Dakota

15460 NW 48th St.
Raymond, NE 68428
Office: (402) 783-2100
Fax: (402) 783-2104
Web Site: www.settje.com

SETTJE
Agri-Services & Engineering, Inc.

P1



Date Printed: 02/20/2025

Rev.	Date

Riverview, LLP
Proposed Floodplain Plan

Herberg Dairy
Section 34, Township 145N, Range 49W
Traill County, North Dakota

15460 NW 48th St.
Raymond, NE 68428
Office: (402) 783-2100
Fax: (402) 783-2104
Web Site: www.setjie.com

Agri-Services & Engineering, Inc.

P2

Exhibit 8

AGRI-SERVICES & ENGINEERING, INC., NUTRIENT MANAGEMENT PLAN & MANURE MANAGEMENT PLAN

(*received from DEQ via public records request*)

NUTRIENT MANAGEMENT PLAN

Prepared by Settje Agri-Services and Engineering, Inc.
15460 NW 48th Street | Raymond, Nebraska 68428



Herberg Dairy

Section 34, T-145-N, R-48-W

Traill County, North Dakota

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CLOSURE PLAN 2
NUTRIENT MANAGEMENT PLAN 3
EMERGENCY RESPONSE PLAN 8
SPILL RESPONSE PRACTICES 8

MANURE MANAGEMENT PLAN

Introduction

Herberg Dairy is located in Traill County, North Dakota. This facility will be a new dairy facility that is proposing to contain a one-time capacity of 25,000 head.

This plan will provide management with a system that will ensure compliance with State and Federal regulations and provide a means of monitoring, measuring and determining compliance.

Manure and process wastewater from Herberg Dairy will be applied to cropland as fertilizer. This plan considers manure production, storage, and usage of nutrients from manure produced at Herberg Dairy. Any reference to “the Producer” in these plans shall be a reference to Herberg Dairy and its management.

Application Land Considerations

Herberg Dairy currently has 32,448.5 acres of cropland available for manure distribution. These areas are used for crop production as illustrated in the Nutrient Management Plan and will be adequate for distribution of all manure and process wastewater from the dairy.

Application Site Management

Surface Water Considerations

Management shall maintain a buffer zone between manure application areas and features related to surface water as indicated in Section 3.2 – Application Conditions.

Application Land Modifications

Herberg Dairy shall obtain prior approval from DEQ before any application sites are added to, or removed from, the Nutrient Management Plan.

Uniform Spreading

Manure or process wastewater shall be spread as uniformly as possible.

CLOSURE PLAN

Should Herberg Dairy ever need to be abandoned, the following appropriate measures will be taken:

Closure Notification

The management of the facility will notify the DEQ within 30 days should the facility become permanently abandoned or closed.

Liquid & Solid Distribution

All manure (liquid and solid) and process wastewater will be distributed according to the Nutrient Management Plan.

Storm Water Basin Cleaning

All stormwater basins will be cleaned and solids distributed according to this plan.

Manure Removal

Liquid manure will be tested and land applied at agronomic rates per the Nutrient Management Plan. Liquids will be pumped until the storage basins are as dry as possible, after which sludge will be removed and land applied.

Final DEQ Inspection

Before coverage under the state permit can be terminated, the Producer must submit a Notice of Termination to the North Dakota DEQ, and DEQ staff will inspect the operation to determine if all manure and wastewater has been removed and safely land applied in accordance with the terms and conditions of the state permit.

NUTRIENT MANAGEMENT PLAN

Objective

The objective of the Nutrient Management Plan is to ensure manure, including bedding, litter, waste feed and process wastewater, and runoff from animal areas is land applied to crop or grass land at a rate the nutrients will be utilized by the vegetation grown. The manure shall be handled in a manner so as not to impact waters of the state, exceed air quality standards while it is stored on site, and minimize odors to residences or public areas during land application.

The department understands the Nutrient Management Plan is based on estimated realistic yield goals which can vary depending on weather conditions. Manure and soil sampling as well as record keeping, are necessary to verify proper land application of manure.

General Conditions

Manure, process wastewater and runoff shall be collected and stored in such a manner that it will not:

- Drain into surface waters, including lakes, streams, ditches, channels or other waterways that convey concentrated water flow.
- Detrimentally impact groundwater.
- Cause air quality violations.

Manure shall be transported in a manner where it will not leak or spill on to public roads or into areas where it could enter surface or ground water.

Manure shall be land applied at rates where the nutrients will be used by the crop grown. These rates shall be expressed in tons or gallons of manure, litter, and process wastewater to be land applied. Land application shall not impact waters of the state and precautions shall be used to minimize odors to residences or public areas where people may be present.

Nutrient Management Plan Information

Facilities requiring a Nutrient Management Plan pursuant to NDAC Chapter 33.1-16-01 or NDAC Chapter 33.1-16-03.1 shall include the following information in their current Nutrient Management Plan:

- The type of livestock and number of days per year they are on site.
- A description of the manure handling at the facility, including how often manure is cleaned from the livestock areas and how and where manure may be temporarily stored.

- An aerial photograph/map and a soil map of the site where manure is to be applied.
- Fields where manure will be applied during frozen conditions shall be identified as applicable and when needed.
- Current and/or planned plant production sequence or crop rotation. Also include alternative crops that may be planted.
- Complete nutrient budget for nitrogen and phosphorous for the rotation or crop sequence that considers all potential sources of these nutrients.
- Results of field specific soil, plant, water, manure or organic by-product sample analysis. Nutrient planning shall be based on current field specific soil and manure test results and developed in accordance with NDSU Extension Service guidance. Soil and manure tests are considered current if they are no older than three years for livestock facilities that require a Nutrient Management Plan or one year for CAFOs.
- Quantify all nitrogen and phosphorus sources.
- Recommended nitrogen and phosphorous rates, timing, method of application and incorporation.
- The form of manure (liquid or solid) and the expected frequency of land application. Maximum application rates of manure, litter, and process wastewater for each year, for each crop identified in the NMP with rates expressed in chemical form and pounds per acre for each field used for land application. For example, the application of manure can vary from once-a-year, every other year, or twice a year depending on the nutrient utilization of the crop and the amount of nutrients already present in the soil.
- Location of sensitive areas or resources such as water ways, drainage ways, wellhead or source water protection areas, high water table areas, residences or public areas and the associated manure-handling or nutrient management restrictions.
- Guidance for implementation, operation, maintenance and record keeping.
- A field-specific assessment of the potential for nitrogen and phosphorous transport from the field to surface waters. The assessment shall address the form, source, amount, timing and method of application of nutrients on each field to achieve realistic production goals, while minimizing nitrogen and phosphorous movement to surface waters.
- Precautions that will be used to prevent manure from impacting surface water, exceeding air quality standards while it is stored on site, and causing excess odors to nearby residences or public areas when manure is land applied.
- A description of the land application manure records that will be maintained to document the minimum Nutrient Management Plan requirements are met.
- Realistic yield goals for the crops in the rotation. These goals shall be established based on soil productivity information and historic yield data from the farm land or county wide average. If the yield goal exceeds NDSU Extension Service or NRCS recommendations or is 20 percent higher than county record or historical crop yield data, the reasons for the increased yield goal shall be documented. For new crops or varieties, industry yield

recommendations may be used until documented yield information is available in the area of the facility.

- BMPs implemented to manage nutrients as efficiently and effectively as possible.
- The name of the individual who developed the Nutrient Management Plan and the organization with which he/she is affiliated.

Sampling and Testing of Manure and Soil

Soil samples shall be collected and prepared according to NDSU Extension Service guidance. Laboratories shall use testing procedures accepted by NDSU to perform soil sample analyses.

- Soil testing shall include analyses for soil organic matter, nitrogen, and phosphorous. If there is concern about heavy metals or salts, the department may require testing of the soil for these materials.
- Manure samples shall be collected and prepared according to NDSU Extension Service guidance or industry standard methods, as approved by the department. Manure testing shall include analyses for nitrogen, ammonia, and phosphorous.
- If the operator uses feed or feed additives with high concentrations of salts or heavy metals, the department may require the manure be tested for these materials. The same is true if there is a reasonable expectation that the manure might contain elevated salts, metals or other potentially harmful materials.
- Manure to be land applied shall be sampled from each manure storage structure that holds manure from separate types of livestock or from similar types of livestock in different phases of growth.
- Facilities identified by the department as needing nutrient management plans shall have their manure and the soil where manure is being applied tested in accordance with items 1-5 once every three years. CAFOs shall have their manure and the soil where manure is being applied tested in accordance with items 1-5 each year.

Application Rates to Meet Nutrient Requirements

- The manure application rate, expressed in pounds of nitrogen or phosphorus, shall not exceed the recommendations for nitrogen and phosphorous based on either the North Dakota Phosphorous Index (PI), as developed by the NRCS, or NDSU Extension Service recommendations based on soil testing.
- The PI allows manure and other sources of nutrients to be applied at rates to meet the nitrogen needs of a crop if the PI rating is low or medium. If the PI is high, it allows manure and other sources of nutrients to be applied at rates to meet the phosphorous removal in the crop biomass. If the PI is very high, it requires that no manure be applied to that field. Manure shall not be applied to fields where the soil test phosphorous exceeds 125 parts per million (ppm) (250 lbs per acre).
- Manure and other sources of nitrogen must not be applied at rates that exceed:
    - The recommended nitrogen application rate during the year of application.

- The estimated nitrogen removal in harvested plant biomass for legumes during the year of application.

- Nutrient Management Plans shall contain a field-specific assessment of the potential for nitrogen and phosphorous transport from the field. The assessment for phosphorous can be done using the phosphorous screening tool and soil tests, or the PI assessment.

Precautions to Prevent Surface Water and Air Quality Impacts

- When land applying manure, the operator shall use reasonable judgment and take adequate precautions to prevent surface water impacts and minimize odors to nearby residences and public areas. Land application shall not occur during rainfall events, except to prevent the catastrophic failure of a storage structure.

- On land controlled by the operator, manure shall not be applied closer than 100 feet to any down-gradient surface waters, open tile line intake structures, sinkholes, agricultural well heads or other conduits to surface waters, unless:

  - A 35-foot wide vegetated buffer on which there are no applications of manure is used.

  - The facility's owner/operator demonstrates that a setback or buffer is not necessary because implementation of alternative conservation practices or field-specific conditions will provide pollutant reductions equal to or greater than the reductions achieved by the 100-foot setback.

- When irrigating with manure or runoff water the application rate shall not exceed the estimated soil infiltration rate, or the nutrient requirements of the crop. Irrigation application rates shall be adjusted to avoid significant ponding of manure or process waste water in surface depressions or seasonal drainage ways.

- Manure shall be injected or incorporated within eight hours if applied within 1/2 mile of an occupied residence (other than the owner's residence), building or public area where people may be present. The operator shall be required to inject or incorporate the manure into the soil if manure is applied in a manner such that it causes an odor reading, for two or more days within a 10-day period, (as measured with a scentometer) of 7 or greater within 100 feet of an occupied residence, building or public area. A plan to minimize excess odors will be required before future application of manure in this area.

- Manure shall not be applied to frozen, snow covered or saturated soils if there is a likelihood of runoff. However, manure can be land applied during frozen conditions provided it is applied on land where runoff is contained and does not drain off during spring runoff. The department recommends operators consider land with slopes of less than 6 percent, where there is stubble or vegetative cover and less than 8 inches of snow on the ground surface. Conservation measures such as terraces, contour strips and reduced tillage effective at reducing runoff. Other factors to consider are permit requirements, contract agreements, or other legally binding requirements that do not allow the application of manure to frozen ground.

- When manure is being land applied, the equipment operator shall periodically inspect equipment for leaks. This shall be done daily for trucks or tanks used to handle solid or liquid manure. For an umbilical cord system or irrigation system, a measurement device shall be used to continuously check pressure so leaks can be found and pumps shut down immediately.

Record Retention

- Owners/operators of facilities requiring a permit pursuant to NDAC Chapter 33.1-16-01 or NDAC Chapter 33.1-16-03.1 shall maintain on site a copy of the Nutrient Management Plan, the facility design plan for the manure handling system and any other required information listed in items 2, 3 and 4 below. The plan and information shall be available to the department for review upon request.

- CAFOs shall maintain complete copies of the following information on site for a minimum of five years from the date they are created:

  - The crops grown and expected realistic crop yields.
  - The date(s) manure, litter or process waste water is applied to each field.
  - Weather conditions at time of application and for 24 hours prior to and following application.
  - Test methods used to sample and analyze manure, litter, process wastewater and soil.
  - Results from the annual testing of the manure, litter, and process wastewater, and annual soil sample results for land where manure was applied that year.
  - An explanation of how the manure application rates were determined in accordance with the standards established by the department.
  - Calculations showing the total nitrogen and phosphorus to be applied to each field, including sources other than manure, litter or process wastewater.
  - Total amount of nitrogen and phosphorus actually applied to each field, including documentation of calculations for the total amount applied.
  - The method used to apply the manure, litter or process wastewater.
  - Inspection of manure application equipment including method, frequency, dates and repairs made if leaks were found.
  - Setbacks, vegetated buffers or other alternative practices used when land applying manure near surface water or potential conduits to surface water.

- If manure is transferred from a CAFO to other persons or entities not associated with the facility, the following conditions shall apply, and records shall be maintained:

  - Owners/operators shall provide the recipient of the manure, litter or process wastewater with the most current nutrient analysis prior to transfer.
  - The analysis provided shall be consistent with the requirements of Section 7.4.
  - The owners/operators of the CAFO shall retain records for five years after the transfer date documenting the recipient's name and address, the approximate amount of manure transferred, and the date the manure was transferred.

- A facility which is not a CAFO and requires department review under NDAC Chapter 33.1-16-03.1, shall maintain complete copies of the following information on site for a minimum of three years from the date created:
  - The crops grown and realistic crop yields.
  - The date(s) and rates manure, litter or process wastewater is applied to each field.
  - Test results of manure, litter, and process wastewater, that are not more than three years old, and test results of the soil where manure was applied that are not more than three years old.
  - Setbacks, vegetated buffers or other alternative practices used when land applying manure near surface water or potential conduits to surface water.

Back-flow Prevention

Irrigation equipment used to apply manure shall have back-flow prevention to stop manure from siphoning back into the irrigation source water.

EMERGENCY RESPONSE PLAN

Emergency Response Strategies

All employees of the facility are responsible for taking immediate action to contain any spill or leak, if one were to occur, provided that their immediate safety is not in jeopardy. Containment procedures include taking action to prevent further loss of the material and then taking action to prevent the material from spreading.

In the event of an immediate safety hazard, the area should be evacuated to a safe distance, other employees should be warned as best possible, and the DEQ and the Local Fire Department, rescue squad or Traill County sheriff's office at (911) shall be notified immediately.

Spill & Leak Prevention

All equipment associated with manure containment, transport, and distribution shall be kept in optimum working conditions to help prevent spills and leaks. Each employee responsible for handling manure will be trained on the proper maintenance of the equipment. When equipment is in long-term continual use, it will be monitored regularly to detect leaks.

Unplanned Release of Manure to Ground surface

If there is an unplanned relaease of manure on to the ground surface, the following priorities shall be followed in addressing and cleaning up the release:

SPILL RESPONSE PRACTICES

Stop the Cause

Shut off any mechanical device (such as a pump) or empty any containment structure that may be causing the spill or leak to continue. Repair any equipment failure such as valves or joints in piping that may be causing a small-scale leak.

Verbal Notification

The Producer shall report any discharge as soon as possible, but no later than twenty- four (24) hours from the time the Producer first became aware of the discharge. The report shall be made to the State of North Dakota at (701) 328-5210. If after normal business hours (8:00 am to 5:00 p.m. central time on Monday through Friday), the Producer shall report the discharge by calling the Division of Emergency Services at 1-800-773-3259 during non-working hours (including weekends and holidays).The Producer shall also take immediate steps to stop the discharge and notify anyone downstream that may be impacted by the discharge.

Notification to the department shall include: date, time, location, volume of manure released and actions taken to contain, utilize or properly dispose of the manure. A written report with the above information shall also be submitted to the department within five days of the release, along with a description of the actions taken to prevent a similar release in the future.

If the volume of manure released will not directly impact waters of the state and does not pose an immediate danger to human health or the environment, the department does not need to be notified; however, records must be kept of the release.

Containment

Contain the spill with local area soils and/or straw bales by building temporary dikes or dams. The equipment to build such structures is readily available to the owner.

Absorb Process Wastewater

Absorb any process wastewater substance with local soil and/or straw bales. The material will then be disposed of by land application at agronomical rates.

Record Retention

If there is an unplanned release of manure from a facility which requires a permit under NDAC Chapter 33.1-16-01 or NDAC Chapter 33.1-16-03.1, records shall be kept which document the date, time, location, volume of manure released, and the action taken to contain the release, properly utilize or dispose of the manure and clean the site. The records shall be kept on site for a minimum of 3 years for AFOs and 5 years for CAFOs.

MANURE MANAGEMENT PLAN

Prepared by Settje Agri-Services and Engineering, Inc.
15460 NW 48th Street | Raymond, Nebraska 68428



Herberg Dairy

Section 34, T-145-N, R-49-W
Traill County, North Dakota

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INITIAL NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

SD-CPA-63A
Rev. 5/17

1. **Operator:** Herberg Dairy 2. **County:** 3. **Prepared By:** Settje Agri-Services & Engineering, Inc. 4. **Date:** 15-Sep-24

Total Nitrogen And Phosphorus Produced From Livestock Operation(s)

5.	6.	7.	8.	9.		10.		11.	12.	13.		14.	15.		16.	
Animal Type:	No. of animals	Avg. weight (lbs.)	Days of Confine-ment	N Total solid/liquid Manure as Excreted (lbs.)	P_2O_5 Total solid/liquid Manure as Excreted (lbs.)	N retained Handling/Storage	%	Total N available for application (lbs.)	Time of applic-ation	N Retained Application Method	%	Total N retained in field (lbs.)	3-Yr. Mineralization Rate Manure Handling	%	N Available for the crop (lbs.)	P_2O_5 Available for the crop (lbs.)
Dairy	18,750	1,150	365	3,541,641	1,259,250	Liquid - above-ground (covered)	85	3,010,395	Spring/Fall/Summer	Injection	98	2,950,187	Anaerobic liquid	65	1,917,621	1,259,250
Dairy	6,250	1,150	365	1,180,547	419,750	Solid/Liquid separator system	78	920,827	Spring/Fall/Summer	Broadcast (incorp. 1 - 5 days)	85	782,703	Solid with bedding	45	352,216	419,750
Other Animals																

Total Manure as Excreted: 2,300,000 **OR** 839,500,000 **lbs/year** **Total lbs. of N and P2O5 available for the crop:** 2,269,837 1,679,000

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

SD-CPA-63B
Rev. 9/17

Field Information

Operator: Herberg Dairy **County:** **Date:** 09/15/24

Line #	17. Field ID (Include maps to illustrate location) Name or Tract	Field #	18. Date added to Plan	19. Beginning acres in field	20. County	21. Soil map unit symbol	22. Field Location: Section, Township, Range (1/4							23. Predicted soil loss - Wind/Water (T/ac/yr)	24. Control of Land	25. 100' Vegetated Buffer	25. Excluded acres	26. Irrigated	27. Winter Application	28. No-Till	29. Current Soil Test Levels: N lb/ac 0-2'	N lb/ac 2-4'	Phosphorus (ppm) 0-6"	Phosphorus (ppm) P Test	K (ppm)	Organic Matter	Soil PH	Electric Conductivity (EC) Surface	Electric Conductivity (EC) Sub-surface	Soil Sample Date
1	Clyde's	1	9/15/24	507.2				Sec.	12 & 13	, T	144	, R	50	0.1	Leased		22.8				18		15	Olsen	332	5.6%	8.1	0.55		08/15/24
2	Mabel's	2	9/15/24	154.1			NW 1/4	Sec.	25	, T	145	, R	50	0.1	Leased		1.6				6		24	Olsen	268	5.0%	7.9	1.88		08/15/24
3	South 1/4	3	9/15/24	214.2			W 1/2	Sec.	33	, T	145	, R	50	0.2	Leased		3.2				8		16	Olsen	313	6.0%	8.0	0.24		09/05/24
4	Behind Shop	4	9/15/24	279.4			S 1/2	Sec.	28	, T	145	, R	50	0.1	Leased		0.1				5		31	Olsen	381	7.0%	7.5	0.19		09/05/24
5	Kyle's 1/4	5	9/15/24	156.2			SW 1/4	Sec.	27	, T	145	, R	50	0.1	Leased		0.0				22		27	Olsen	361	4.1%	8.0	0.53		08/23/24
6	Danny's	6	9/15/24	516.8			ALL	Sec.	31	, T	145	, R	50	0.2	Leased		7.9				6		7	Olsen	181	5.2%	7.2	0.17		09/05/24
7								Sec.		, T		, R																		
8								Sec.		, T		, R																		
9								Sec.		, T		, R																		
10	Evenson Home	10	9/15/24	227.2				Sec.	30	, T	146	, R	49	0.3	Leased		25.3				8		11	Olsen	391	6.5%	8.0	0.32		09/05/24
11	Gene Section 3	11	9/15/24	282.5			E 1/2	Sec.	3	, T	144	, R	49	0.1	Leased		1.5				45		28	Olsen	320	5.7%	8.1	0.44		08/15/24
12	Gene Section 11	12	9/15/24	309.4			W 1/2	Sec.	11	, T	144	, R	49	0.1	Leased		2.7				12		11	Olsen	270	5.8%	8.2	0.43		08/15/24
13	Anderson Home	13	9/15/24	302.5			E 1/2	Sec.	20	, T	145	, R	49	0.2	Leased		2.3				12		4	Olsen	139	3.6%	8.3	0.65		08/15/24
14								Sec.		, T		, R																		
15	McNamee Home	15	9/15/24	288.6			S 1/2	Sec.	31	, T	145	, R	49	0.1	Leased		3.6				9		15	Olsen	313	5.2%	7.9	1.6		08/15/24
16	McNamee Section 6	16	9/15/24	156.1			SW 1/4	Sec.	6	, T	144	, R	49	0.1	Leased		0.0				5		12	Olsen	437	6.1%	8.1	0.59	1.09	09/12/23
17	McNamee Section 7	17	9/15/24	156.5			NW 1/4	Sec.	7	, T	144	, R	49	0.1	Leased		0.0				7		7	Olsen	364	5.6%	8.2	0.7	1.0	09/12/23
18	15F2	18	9/15/24	309.5			S 1/2	Sec.	15	, T	144	, R	50	0.1	Leased		0.6				39		42	Olsen	367	5.2%	8.0	1.03		08/15/24
19	McInnes Section 10	19	9/15/24	152.9			SW 1/4	Sec.	10	, T	144	, R	50	0.1	Leased		4.8				29		52	Olsen	518	5.3%	8.0	0.65		08/15/24
20								Sec.		, T		, R																		
								Sec.		, T		, R																		
								Sec.		, T		, R																		
23	Harvey 11	23	9/15/24	199.0			E 1/2	Sec.	11	, T	144	, R	49	0.1	Leased		5.2				16		14	Olsen	320	5.8%	8.2	0.37		08/15/24
24	Harvey 10	24	9/15/24	309.4			E 1/2	Sec.	10	, T	144	, R	49	0.2	Leased		6.6				8		24	Olsen	265	6.0%	8.1	0.71		08/15/24
25	Henka Section 32	25	9/15/24	150.9			NW 1/4	Sec.	32	, T	145	, R	49	0.1	Leased		4.9				23		19	Olsen	374	4.5%	8.1	0.52		08/15/24
26	Henka Section 30 1/4	26	9/15/24	157.7			SW 1/4	Sec.	30	, T	145	, R	49	0.1	Leased		2.2				8		9	Olsen	284	4.4%	8.1	0.39		08/15/24
27	Henka Section 30 80	27	9/15/24	79.7			S 1/2, SE 1/4	Sec.	30	, T	145	, R	49	0.1	Leased		2.4				7		35	Olsen	367	5.1%	8.0	0.36		08/15/24
28	Henka Section 14	28	9/15/24	153.9			SE 1/4	Sec.	14	, T	145	, R	50	0.1	Leased		6.5				4		6	Olsen	319	5.0%	8.0	0.43		08/15/24
29	Henka Home	29	9/15/24	447.9			75%	Sec.	12	, T	145	, R	50	0.1	Leased		4.7				9.5		7	Olsen	295	3.9%	8.3	0.55	0.73	09/07/23
30	Henka Section 7	30	9/15/24	610.8			ALL	Sec.	7	, T	145	, R	49	0.2	Leased		9.0				16		14	Olsen	190	5.2%	8.2	0.29		08/15/24
31	Henka North of Home	31	9/15/24	158.4			SW 1/4	Sec.	1	, T	145	, R	50	0.1	Leased		0.0				7		8	Olsen	297	4.2%	8.2	0.45	1.15	10/06/23
32	Herberg 27	32	9/15/24	632.2			ALL	Sec.	27	, T	145	, R	49	0.2	Leased		6.9				8		6	Olsen	205	5.0%	8.1	0.69		08/15/24

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Field Information

Operator: Herberg Dairy **County:** **Date:** 09/15/24

Line #	17. Field ID (Include maps to illustrate location) Name or Tract	Field #	18. Date added to Plan	19. Beginning acres in field	20. County	21. Soil map unit symbol	22. Field Location: Section, Township, Range (1/4							23. Predicted soil loss - Wind/Water (T/ac/yr)	24. Control of Land	25. 100' Vegetated Buffer	25. Excluded acres	26. Irrigated	27. Winter Application	28. No-Till	29. Current Soil Test Levels: N lb/ac 0-2'	N lb/ac 2-4'	Phosphorus (ppm) 0-6"	Phosphorus (ppm) P Test	K (ppm)	Organic Matter	Soil PH	Electric Conductivity (EC) Surface	Electric Conductivity (EC) Sub-surface	Soil Sample Date
33	Herberg 26 North	33	9/15/24	301.9			N 1/2	Sec.	26	, T	145	, R	49	0.1	Leased		12.0				4		8	Olsen	385	3.3%	8.2	0.65		08/15/24
34	Herberg 26 South	34	9/15/24	319.3			S 1/2	Sec.	26	, T	145	, R	49	0.2	Leased		2.8				5		10	Olsen	280	5.7%	7.8	0.31		08/15/24
35	Herberg 25	35	9/15/24	257.9			ALL	Sec.	25	, T	145	, R	49	0.1	Leased		9.5				4		20	Olsen	259	5.8%	7.6	0.28		08/15/24
36	Jeremy's Farm	36	9/15/24	266.5			N 1/2	Sec.	2	, T	144	, R	49	0.1	Leased		3.0				4		8	Olsen	295	4.6%	8.1	0.65		08/15/24
37	Kim's Section 10	37	9/15/24	155.2			NW 1/4	Sec.	10	, T	144	, R	49	0.2	Leased		3.1				15		19	Olsen	281	5.2%	8.2	0.43		09/03/24
38	Tod Section 10	38	9/15/24	154.3			SW 1/4	Sec.	10	, T	144	, R	49	0.2	Leased		0.0				9		12	Olsen	246	6.7%	8.1	0.34		08/15/24
39	Section 23 North	39	9/15/24	230.6			N 1/2	Sec.	23	, T	144	, R	49	0.2	Leased		3.6				10		17	Olsen	322	5.3%	8.1	0.36		09/03/24
40	Section 23 South	40	9/15/24	149.4			SW 1/4	Sec.	23	, T	144	, R	49	0.1	Leased		1.5				3		9	Olsen	276	3.7%	8.3	0.23		08/15/24
41	Tod's House	41	9/15/24	96.6			N 1/2, N 1/2	Sec.	28	, T	144	, R	49	0.1	Leased		0.0				2		14	Olsen	391	5.0%	8.0	0.72		08/15/24
42	Tod Section 28	42	9/15/24	316.6			S 1/2	Sec.	28	, T	144	, R	49	0.1	Leased		8.1				4		3	Olsen	310	3.8%	8.1	0.29		08/15/24
43	West of Jeremy's	43	9/15/24	148.9			SW 1/4	Sec.	36	, T	145	, R	49	0.1	Leased		1.0				10		6	Olsen	252	4.3%	8.1	0.5		08/15/24
44	Jeff McInnes Section 10	44	9/15/24	148.5			NW 1/4	Sec.	10	, T	144	, R	50	0.1	Leased		0.0				15		50	Olsen	484	5.5%	8.0	0.7		08/15/24
45	McInnes Home	45	9/15/24	295.1			N 1/2	Sec.	15	, T	144	, R	50	0.1	Leased		9.8				14		30	Olsen	486	5.2%	7.9	0.47		08/15/24
46	McInnes Section 23	46	9/15/24	154.5			SE 1/4	Sec.	23	, T	144	, R	50	0.1	Leased		0.9				26		63	Olsen	484	5.9%	7.8	0.55		08/15/24
47	Substation	47	9/15/24	159.2			E 1/2, W 1/2	Sec.	22	, T	144	, R	50	0.1	Leased		2.1				6		24	Olsen	502	5.0%	7.9	0.54		08/15/24
48	Section 21 E of Tracks	48	9/15/24	227.0			E 1/2	Sec.	21	, T	144	, R	50	0.1	Leased		4.4				10		14	Olsen	429	4.4%	8.0	0.37		08/15/24
49	Viker Home	49	9/15/24	590.7			ALL	Sec.	21	, T	145	, R	49	0.2	Leased		5.4				7		17	Olsen	318	5.8%	8.2	0.34		08/15/24
50	South Home	50	9/15/24	573.4			ALL	Sec.	28	, T	145	, R	49	0.2	Leased		36.3				11		6	Olsen	183	5.9%	8.0	0.75		08/15/24
51	South of Dairy	51	9/15/24	311.2			S 1/2	Sec.	34	, T	145	, R	49	0.2	Leased		0.0				9		27	Olsen	388	5.4%	8.1	0.39		08/15/24
52	East of Dairy	52	9/15/24	309.2			N 1/2	Sec.	35	, T	145	, R	49	0.1	Leased		34.2				35		32	Olsen	326	5.7%	8.0	0.82		08/15/24
53	Herberg 24	53	9/15/24	63.0			SW 1/4	Sec.	24	, T	145	, R	49	0.1	Leased		1.4				2		4	Olsen	197	4.3%	8.3	0.31		08/15/24
54	August's	54	9/15/24	423.9			75%	Sec.	32	, T	145	, R	49	0.1	Leased		8.6				5		19	Olsen	337	6.2%	8.1	0.51		08/15/24
55	Poland	55	9/15/24	155.4			NW 1/4	Sec.	30	, T	145	, R	49	0.1	Leased		5.8				4		5	Olsen	263	5.3%	8.1	0.38		08/15/24
56	East Section 5	56	9/15/24	302.0			E 1/2	Sec.	5	, T	145	, R	49	0.2	Leased		0.0				16		25	Olsen	274	5.2%	8.1	0.29		08/15/24
57	NW Section 11	57	9/15/24	155.9			NW 1/4	Sec.	11	, T	145	, R	49	0.1	Leased		0.0				13		17	Olsen	373	6.0%	8.0	0.35		08/15/24
58								Sec.		, T		, R																		
59	Caledonia 30	59	9/15/24	56.2			E 1/2, SE 1/4	Sec.	30	, T	146	, R	49	0.1	Leased		0.8				12		19	Olsen	318	6.3%	7.9	0.32		09/05/24
60	Herberg 17	60	9/15/24	317.3			N 1/2	Sec.	17	, T	145	, R	49	0.2	Leased		18.2				12		20	Olsen	329	4.7%	8.1	0.36		08/15/24
61	Herberg 14	61	9/15/24	160.4			NW 1/4	Sec.	14	, T	145	, R	49	0.1	Leased		2.7				15		34	Olsen	360	6.4%	7.6	0.35		08/15/24
62	Oanes Home	62	9/15/24	295.4			S 1/2	Sec.	17	, T	145	, R	49	0.2	Leased		0.7				4		6	Olsen	340	4.7%	8.2	0.28		08/15/24
63	South Herberg 15	63	9/15/24	131.9			S 1/2, S 1/2	Sec.	15	, T	145	, R	49	0.1	Leased		3.9				7		29	Olsen	582	4.9%	8.3	0.37		08/15/24
64	South Herberg 14	64	9/15/24	299.9			S 1/2	Sec.	14	, T	145	, R	49	0.1	Leased		1.0				19		23	Olsen	283	5.9%	8.0	0.37		08/15/24
65	Riverbend	65	9/15/24	48.3			NW 1/4	Sec.	24	, T	145	, R	49	0.1	Leased		2.7				22		19	Olsen	314	6.2%	8.1	0.43		08/15/24

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Field Information

Operator: Herberg Dairy **County:** **Date:** 09/15/24

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66								Sec.		, T		, R	49																		
67	Home Section	67	9/15/24	600.0			ALL	Sec.	24	, T	145	, R	50	0.1	Leased		13.3				10		9	Olsen	356	5.6%	8.1	0.37		08/15/24
68	Herberrg 6	68	9/15/24	76.9			W 1/2, SW 1/4	Sec.	6	, T	145	, R	49	0.1	Leased		0.0				4		12	Olsen	335	5.1%	8.1	0.3		08/15/24
69	Warner 80	69	9/15/24	77.9			N 1/2, NE 1/4	Sec.	16	, T	145	, R	49	0.1	Leased		2.3				33		10	Olsen	292	4.2%	8.4	0.53	0.91	10/06/22
70	Red River North	70	9/15/24	80.2			S 1/2, S 1/2	Sec.	23	, T	146	, R	49	0.1	Leased		0.1				15		9	Olsen	314	6.5%	8.1	0.52	0.81	10/02/23
71	Red River South	71	9/15/24	120.9			N 1/2, N 1/2	Sec.	26	, T	146	, R	49	0.1	Leased		1.2				11		4	Olsen	351	4.5%	8.2	0.77	1.16	10/24/22
72	Home 1/4	72	9/15/24	148.3			SE 1/4	Sec.	29	, T	146	, R	49	0.1	Leased		0.0				9		3	Olsen	336	4.8%	8.0	0.58	0.92	10/06/22
73	N 80	73	9/15/24	79.8			N 1/2, SW 1/4	Sec.	8	, T	146	, R	49	0.2	Leased		0.0				31		3	Olsen	138	3.3%	8.2	1.3	1.83	10/24/22
74	Dales 1/2 Section	74	9/15/24	309.6			S 1/2	Sec.	31	, T	146	, R	49	0.2	Leased		1.4				57		11	Olsen	301	4.6%	8.2	0.86	1.2	10/21/23
75	Jay's Section 28	75	9/15/24	155.1			SE 1/4	Sec.	28	, T	146	, R	49	0.1	Leased		0.0				21		19	Olsen	284	5.0%	8.2	0.96	0.83	10/06/22
76	Dallas 1/2 Section	76	9/15/24	317.2			N 1/2	Sec.	34	, T	146	, R	49	0.1	Leased		0.0				15		11	Olsen	255	5.7%	8.2	0.46	0.59	10/02/23
77	Halstad 1/2	77	9/15/24	286.4			N 1/2	Sec.	23	, T	145	, R	49	0.1	Leased		3.5				15		8	Olsen	287	5.5%	8.1	0.49	0.8	10/02/23
78	Jay's W of Co Rd 2	78	9/15/24	149.6			SE 1/4	Sec.	11	, T	145	, R	49	0.1	Leased		9.9				18		11	Olsen	284	5.3%	8.0	0.54	0.65	10/21/23
79	Jay's E of Co Rd 2	79	9/15/24	143.0			SW 1/4	Sec.	12	, T	145	, R	49	0.1	Leased		4.0				42		6	Olsen	360	4.9%	8.0	0.61	0.61	10/06/22
80	Caledonia 1/4	80	9/15/24	156.2			NE 1/4	Sec.	10	, T	146	, R	49	0.2	Leased		0.0				25		11	Olsen	253	5.0%	8.4	0.76	1.24	10/06/23
81	Foss Farm	81	9/15/24	156.9			NW 1/4	Sec.	2	, T	146	, R	49	0.1	Leased		3.1				26		2	Olsen	239	3.9%	8.2	1.35	1.64	10/25/23
82	Solee Red River	82	9/15/24	103.3			S 1/2, N 1/2	Sec.	26	, T	146	, R	49	0.1	Leased		1.1				14		4	Olsen	369	3.8%	8.1	1.23	2.34	10/25/22
83	Solee 28	83	9/15/24	76.4			S 1/2, SW 1/4	Sec.	28	, T	146	, R	49	0.1	Leased		0.0				33		5	Olsen	295	4.8%	8.0	0.84	0.8	10/06/22
84	Solee 1/2 Section	84	9/15/24	159.6			S 1/2, N 1/2	Sec.	15	, T	145	, R	49	0.1	Leased		0.0				17		5	Olsen	274	4.6%	8.2	0.51	0.81	10/06/22
85	Brady	85	9/15/24	304.4			W 1/2	Sec.	19	, T	144	, R	49	0.1	Leased		8.1				28	6	8	Olsen	308	5.2%	8.2	0.72	1.42	09/15/23
86	Tungseth 1/4	86	9/15/24	155.2			NE 1/4	Sec.	20	, T	144	, R	49	0.1	Leased		0.0				59		15	Olsen	446	4.8%	7.8	0.67	0.6	10/27/23
87	Tungseth 51	87	9/15/24	46.7			E 1/2, SE 1/4	Sec.	20	, T	144	, R	49	0.1	Leased		0.0				59		15	Olsen	446	4.8%	7.8	0.67	0.6	10/27/23
88								Sec.		, T		, R																		
89								Sec.		, T		, R																		
90	Gadberry Home	90	9/15/24	278.2			N 1/2	Sec.	30	, T	144	, R	49	0.1	Leased		0.0				58	24	7	Olsen	363	4.8%	8.0	0.68	1.42	09/15/23
91	Highline	91	9/15/24	152.0			NW 1/4	Sec.	24	, T	144	, R	50	0.1	Leased		4.5				62	12	10	Olsen	330	4.1%	8.1	0.57	1.05	09/22/23
92	Herberg 3	92	9/15/24	140.1			NW 1/4	Sec.	3	, T	145	, R	49	0.1	Leased		0.0				13		9	Olsen	443	5.2%	8.4	0.58	0.52	10/11/23
93	Caledonia 32	93	9/15/24	154.5			NE 1/4	Sec.	32	, T	146	, R	49	0.1	Leased		0.0				15		7	Olsen	297	5.3%	8.1	0.46	0.44	09/12/22
94	Fossum 28	94	9/15/24	75.3			W 1/2, NW 1/4	Sec.	28	, T	146	, R	49	0.1	Leased		5.8				6		30	Olsen	471	6.0%	6.8	0.3		09/05/24
95	McAndrew 100	95	9/15/24	98.0			NE 1/4	Sec.	35	, T	144	, R	49	0.1	Leased		1.2				39	9	7	Olsen	388	6.0%	8.2	0.64	0.87	10/06/22
96								Sec.		, T		, R																		
97								Sec.		, T		, R																		
98								Sec.		, T		, R																		

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Field Information

Operator: Herberg Dairy **County:** **Date:** 09/15/24

Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	18. Date added to Plan	19. Beginning acres in field	20. County	21. Soil map unit symbol	22. Field Location: Section, Township, Range (1/4	Sec.	, T	, R	23. Predicted soil loss - Wind/Water (T/ac/yr)	24. Control of Land	25. 100' Vegetated Buffer	Excluded acres	26. Irrigated	27. Winter Application	28. No-Till	29. Current Soil Test Levels: N lb/ac 0-2'	N lb/ac 2-4'	Phosphorus (ppm) 0-6"	Phosphorus (ppm) P Test	K (ppm)	Organic Matter	Soil PH	Electric Conductivity (EC) Surface	Electric Conductivity (EC) Sub-surface	Soil Sample Date
99	Derek's Section 2	99	9/15/24	159.8			SW 1/4	Sec. 2	, T 144	, R 49	0.1	Leased		7.7				7		35	Olsen	434	6.6%	7.9	0.33		08/15/24
100	Hillboro 15	100	9/15/24	225.9			E 1/2	Sec. 15	, T 145	, R 50	0.1	Leased		0.0				34		23	Olsen	392	5.8%	8.0	0.44		08/15/24
101	Elm River 8	101	9/15/24	391.4			75%	Sec. 8	, T 144	, R 49	0.1	Leased		23.8				12		18	Olsen	371	5.4%	8.1	0.46		08/15/24
102	Paulsrud Section 6	102	9/15/24	241.2			N 1/2	Sec. 6	, T 144	, R 49	0.1	Leased		10.1				6		13	Olsen	441	5.0%	8.1	0.35		09/03/24
103	Elm River 18	103	9/15/24	554.7			ALL	Sec. 18	, T 144	, R 49	0.1	Leased		13.4				10		14	Olsen	358	6.2%	8.0	0.42		08/15/24
104	Elm River 17	104	9/15/24	122.2			SE 1/4	Sec. 17	, T 144	, R 49	0.1	Leased		2.3				9		9	Olsen	393	5.7%	7.9	0.41		08/15/24
105	Kevin's on The River	105	9/15/24	182.0			Part of	Sec. 14	, T 144	, R 49	0.2	Leased		4.0				8		4	Olsen	203	4.8%	8.4	0.39		08/15/24
106	Derek's Place	106	9/15/24	62.6			NE 1/4	Sec. 11	, T 144	, R 49	0.1	Leased		0.8				8		21	Olsen	293	5.5%	8.0	0.35		08/15/24
107	Paulsrud Section 7	107	9/15/24	156.3			SW 1/4	Sec. 7	, T 144	, R 49	0.1	Leased		1.7				5		5	Olsen	298	4.9%	8.2	0.66		08/15/24
108	Elm River 21	108	9/15/24	80.2			N 1/2, NE 1/4	Sec. 21	, T 144	, R 49	0.1	Leased		0.0				2		5	Olsen	219	3.6%	8.4	0.53		08/15/24
109								Sec.	, T	, R																	
110								Sec.	, T	, R																	
111	Kelso 27	111	9/15/24	312.1			E 1/2	Sec. 27	, T 144	, R 50	0.1	Leased		6.4				130		51	Olsen	515	5.1%	7.9	0.79		08/15/24
112	Elm River 5	112	9/15/24	569.5			ALL	Sec. 5	, T 144	, R 49	0.2	Leased		51.8				8		8	Olsen	236	5.1%	8.4	0.37		08/15/24
113	Dallas/Mary Ann's 80	113	9/15/24	76.4			S 1/2, SW 1/4	Sec. 8	, T 146	, R 49	0.2	Leased		0.0				31		3	Olsen	138	3.3%	8.2	1.3	1.83	10/24/22
114	Kim's Section 15	114	9/15/24	76.9			N 1/2, NW 1/4	Sec. 15	, T 144	, R 49	0.2	Leased		0.0				8		15	Olsen	336	6.2%	8.1	0.28		08/15/24
115								Sec.	, T	, R																	
116								Sec.	, T	, R																	
117								Sec.	, T	, R																	
118								Sec.	, T	, R																	
119	Caledonia 26	119	9/15/24	110.9			N 1/2, S 1/2	Sec. 26	, T 146	, R 49	0.1	Leased		0.0				10		13	Olsen	359	6.4%	7.6	0.31		09/05/24
120	Caledonia 27	120	9/15/24	79.5			N 1/2, SW 1/4	Sec. 27	, T 146	, R 49	0.1	Leased		0.0				5		4	Olsen	316	5.4%	8.1	0.27		09/05/24
121	Hansen Section 11	121	9/15/24	74.6			E 1/2, NE 1/4	Sec. 11	, T 145	, R 49	0.1	Leased		3.8				23		38	Olsen	386	6.8%	8.0	0.55		08/15/24
122								Sec.	, T	, R																	
123	Hansen Section 16	123	9/15/24	79.0			E 1/2, SW 1/4	Sec. 16	, T 144	, R 49	0.1	Leased		0.1				43		8	Olsen	266	3.1%	8.3	0.96		08/15/24
124	Marshall Hansen Sec 16	124	9/15/24	78.6			W 1/2, SW 1/4	Sec. 16	, T 144	, R 49	0.1	Leased		0.0				5		10	Olsen	378	5.1%	8.2	0..33		08/15/24
125	Helgoe	125	9/15/24	154.5			SW 1/4	Sec. 15	, T 145	, R 50	0.1	Leased		0.0				61		16	Olsen	315	5.7%	8.0	0.62		08/15/24
126	Bovard 1/2	126	9/15/24	312.0			E 1/2	Sec. 9	, T 145	, R 50	0.2	Leased		11.5				7		9	Olsen	506	5.0%	8.0	0.37		09/05/24
127	Clara's	127	9/15/24	117.2			SW 1/4	Sec. 8	, T 145	, R 50	0.1	Leased		3.1				6		3	Olsen	397	5.5%	7.9	0.37		09/05/24
128	Diehl Home	128	9/15/24	152.1			E 1/2	Sec. 8	, T 145	, R 50	0.2	Leased		3.4				10		7	Olsen	238	4.3%	8.1	0.34		09/05/24
129								Sec.	, T	, R																	
130	Johnson Farm	130	9/15/24	151.8			SW 1/4	Sec. 33	, T 144	, R 49	0.1	Leased		1.1				6		7	Olsen	359	5.5%	7.8	0.27		09/03/24
131	Annastasia North	131	9/15/24	138.1			NW 1/4	Sec. 2	, T 145	, R 49	0.1	Leased		0.0				6		10	Olsen	375	4.8%	8.1	0.32		08/15/24

NUTRIENT MANAGEMENT PLAN
FOR
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Field Information

Operator: Herberg Dairy **County:** **Date:** 09/15/24

Line #	17. Field ID (Include maps to illustrate location) Name or Tract	Field #	18. Date added to Plan	19. Beginning acres in field	20. County	21. Soil map unit symbol	22. Field Location: Section, Township, Range (1/4							23. Predicted soil loss - Wind/Water (T/ac/yr)	24. Control of Land	25. 100' Vegetated Buffer	25. Excluded acres	26. Irrigated	27. Winter Application	28. No-Till	29. Current Soil Test Levels: N lb/ac 0-2'	N lb/ac 2-4'	Phosphorus (ppm) 0-6"	Phosphorus (ppm) P Test	K (ppm)	Organic Matter	Soil PH	Electric Conductivity (EC) Surface	Electric Conductivity (EC) Sub-surface	Soil Sample Date
132	Annastasia South	132	9/15/24	146.6			SW 1/4	Sec.	2	, T	145	, R	49	0.1	Leased		0.0				8		30	Olsen	388	6.4%	7.6	0.35		08/15/24
133	Karla NE	133	9/15/24	158.8			NE 1/4	Sec.	22	, T	145	, R	50	0.1	Leased		2.6				11		12	Olsen	360	6.9%	7.7	0.46		08/15/24
134	Karla SW	134	9/15/24	155.6			SW 1/4	Sec.	22	, T	145	, R	50	0.1	Leased		0.0				29		19	Olsen	488	6.2%	7.8	0.54		08/15/24
135	Karla SE	135	9/15/24	129.7			SE 1/4	Sec.	22	, T	145	, R	50	0.1	Leased		0.0				13		15	Olsen	486	6.7%	7.8	0.35		09/05/24
136	Hustad's	136	9/15/24	189.2			S 1/2	Sec.	15	, T	145	, R	49	0.1	Leased		0.0				50		21	Olsen	425	5.8%	8.1	0.45		08/15/24
137	Home Buildings	137	9/15/24	97.9			NW 1/4	Sec.	13	, T	145	, R	49	0.1	Leased		2.6				53		14	Olsen	328	6.5%	7.5	0.58	0.59	11/06/23
138	Home Drive	138	9/15/24	27.6			W 1/2	Sec.	13	, T	145	, R	49	0.1	Leased		0.1				16		7	Olsen	276	5.2%	8.1	0.53	0.58	09/26/23
139	Stenerson Home 1/4	139	9/15/24	155.4			NE 1/4	Sec.	14	, T	145	, R	49	0.1	Leased		1.2				35		5	Olsen	270	6.0%	7.9	0.67	0.66	10/16/23
140	L&R	140	9/15/24	78.0			W 1/2, SW 1/4	Sec.	1	, T	145	, R	49	0.1	Leased		0.4				40		7	Olsen	394	6.2%	8.0	0.78	0.72	11/16/23
141	Cactus Section	141	9/15/24	620.9			ALL	Sec.	33	, T	146	, R	49	0.1	Leased		0.0				13		6	Olsen	300	5.0%	8.3	0.38		08/15/24
142	Cactus Woods	142	9/15/24	177.5				Sec.	12	, T	145	, R	49	0.1	Leased		3.9				18		31	Olsen	347	6.4%	7.9	0.45		08/15/24
143	South Herberg 35	143	9/15/24	159.4			N 1/2, S 1/2	Sec.	35	, T	145	, R	49	0.1	Leased		0.0				8		5	Olsen	305	5.4%	8.3	0.55	0.68	10/17/23
144	North Herberg 36	144	9/15/24	286.5			N 1/2	Sec.	36	, T	145	, R	49	0.1	Leased		6.3				3		3	Olsen	264	5.1%	8.1	0.31		08/15/24
145	Larry 80	145	9/15/24	81.3			W 1/2, NE 1/4	Sec.	11	, T	145	, R	49	0.1	Leased		3.7				7		10	Olsen	374	6.5%	8.0	0.4		08/15/24
146	Larry 40	146	9/15/24	38.3			SW 1/4, NW 1/4	Sec.	12	, T	145	, R	49	0.1	Leased		0.0				9		6	Olsen	297	5.4%	8.2	0.51		08/15/24
147								Sec.		, T		, R																		
148								Sec.		, T		, R																		
149	Half Section	149	9/15/24	315.6			E 1/2	Sec.	27	, T	146	, R	49	0.1	Leased		0.0				10		4	Olsen	322	5.2%	8.2	0.47	0.76	09/30/23
150	South 80+	150	9/15/24	140.9			S 1/2, SW 1/4	Sec.	26 & 35	, T	146	, R	49	0.1	Leased		1.0				24		7	Olsen	333	6.3%	7.8	0.39	0.54	09/30/23
151	McDonald 1/4	151	9/15/24	159.8			SE 1/4	Sec.	10	, T	146	, R	49	0.2	Leased		0.0				14		3	Olsen	233	5.0%	8.2	1.17	1.94	09/30/23
152	The 120	152	9/15/24	114.6			SW 1/4	Sec.	3	, T	146	, R	49	0.2	Leased		0.0				10		6	Olsen	222	5.0%	8.3	0.8	1.41	09/30/23
153	North 80	153	9/15/24	74.6			N 1.2, NW 1/4	Sec.	3	, T	146	, R	49	0.2	Leased		5.0				22		7	Olsen	274	4.0%	8.2	0.92	2.44	11/09/23
154	L&R	154	9/15/24	90.4			Pt of S 1/2	Sec.	1	, T	145	, R	49	0.1	Leased		0.0				40		7	Olsen	394	6.2%	7.9	0.78	0.72	11/16/23
155	Holland 1/4	155	9/15/24	147.3			W 1/2, E 1/2	Sec.	2	, T	145	, R	49	0.1	Leased		5.3				7		6	Olsen	387	5.1%	8.0	0.65	0.93	09/30/23
156	Gary 180	156	9/15/24	182.4			S 1/2, N 1/2	Sec.	28	, T	144	, R	49	0.1	Leased		8.8				12		5	Olsen	318	4.4%	8.3	0.53	0.93	10/16/23
157	Gary 120	157	9/15/24	113.7			SE 1/4	Sec.	29	, T	144	, R	49	0.1	Leased		12.9				13		14	Olsen	319	5.2%	7.9	0.6	0.81	10/16/23
158	Gary 60	158	9/15/24	56.9			W 1/2, NW 1/4	Sec.	33	, T	144	, R	49	0.1	Leased		0.0				14		8	Olsen	376	4.3%	7.9	0.43	0.55	10/16/23
159	Roberta 80	159	9/15/24	76.5			E 1/2, SE 1/4	Sec.	2	, T	145	, R	49	0.1	Leased		4.0				8		5	Olsen	343	5.6%	8.1	0.53	0.51	09/30/23
160	Herberg 18	160	9/15/24	463.3			75%	Sec.	18	, T	145	, R	49	0.1	Leased		21.7				16		14	Olsen	303	4.4%	8.4	0.39		08/15/24
161	Herberg 8	161	9/15/24	317.7			W 1/2	Sec.	8	, T	145	, R	49	0.2	Leased		7.1				10		7	Olsen	272	6.1%	8.1	0.26		09/05/24
162	Herberg 19	162	9/15/24	74.3			S 1/2, SE 1/4	Sec.	19	, T	145	, R	49	0.1	Leased		0.0				8		24	Olsen	386	6.0%	8.0	0.44		08/15/24
163	Dairymple Section 7	163	9/15/24	309.0			E 1/2	Sec.	7	, T	144	, R	49	0.1	Leased		16.5				18		35	Olsen	481	5.0%	8.0	0.54		08/23/24
164	Zimmerman	164	9/15/24	285.9			E 1/2	Sec.	19	, T	144	, R	49	0.1	Leased		2.8				28		37	Olsen	728	4.9%	7.9	0.39		08/23/24

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165	Herberg 31	165	9/15/24	289.8			N 1/2	Sec.	31	, T	145	, R	49	0.1	Leased		5.0				12		18	Olsen	457	4.8%	7.9	0.39		08/23/24
166	Herberg 33	166	9/15/24	619.5			ALL	Sec.	33	, T	145	, R	49	0.2	Leased		12.9				25		16	Olsen	230	4.4%	8.2	0.48		08/23/24
167	Hillsboro Airport	167	9/15/24	348.8			75%	Sec.	20	, T	145	, R	50	0.2	Leased		4.1				13		27	Olsen	283	5.3%	7.9	0.41		09/05/24
168	Hillsboro 28	168	9/15/24	198.8			N 1/2	Sec.	28	, T	145	, R	50	0.1	Leased		0.0				22		8	Olsen	307	5.3%	7.8	0.38		09/05/24
169	Hillsboro 34	169	9/15/24	306.5			E 1/2	Sec.	34	, T	145	, R	50	0.1	Leased		0.0				5		12	Olsen	505	5.7%	8.0	0.27		09/05/24
170	Hillsboro 35	170	9/15/24	606.9			ALL	Sec.	35	, T	145	, R	50	0.1	Leased		12.3				14		32	Olsen	472	4.8%	8.0	0.4		08/23/24
171	Hillsboro 36	171	9/15/24	594.1			ALL	Sec.	36	, T	145	, R	50	0.1	Leased		10.6				24		28	Olsen	550	4.8%	7.9	0.47		08/23/24
172	Herberg 29	172	9/15/24	310.8			S 1/2	Sec.	29	, T	145	, R	49	0.1	Leased		30.9				16		7	Olsen	369	5.0%	8.0	0.48		08/23/24
173	Herberg 29 NW	173	9/15/24	149.2			NW 1/4	Sec.	29	, T	145	, R	49	0.1	Leased		3.6				3		8	Olsen	381	5.6%	8.1	0.32		09/05/24
174	Hillsboro 29	174	9/15/24	550.8			ALL	Sec.	29	, T	145	, R	50	0.1	Leased		4.0				4		21	Olsen	203	4.5%	7.4	1.69		09/05/24
175								Sec.		, T		, R																			
176								Sec.		, T		, R																			
177								Sec.		, T		, R																			
178								Sec.		, T		, R																			
179								Sec.		, T		, R																			
180								Sec.		, T		, R																			
181								Sec.		, T		, R																			
182								Sec.		, T		, R																			
183								Sec.		, T		, R																			
184								Sec.		, T		, R																			
185								Sec.		, T		, R																			
186								Sec.		, T		, R																			
187								Sec.		, T		, R																			
188								Sec.		, T		, R																			
189								Sec.		, T		, R																			
190								Sec.		, T		, R																			
191								Sec.		, T		, R																			
192								Sec.		, T		, R																			

Total: 33,150.6

Comments:

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Estimated Nutrient Requirement

17. 30.

(●) Actual or Yield Goal
( ) Yields indexed by soil productivity (Productivity Index)
( ) County Average Yields (SD Agricultural Statistics Service)

Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	Previous Year Crop	Previous Year Actual Yield	Year 1 Crop	Year 1 Yield Goal	Year 2 Crop	Year 2 Yield Goal	Year 3 Crop	Year 3 Yield Goal	Year 4 Crop	Year 4 Yield Goal	Year 5 Crop	Year 5 Yield Goal
1	Clyde's	1	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
2	Mabel's	2	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
3	South 1/4	3	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
4	Behind Shop	4	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
5	Kyle's 1/4	5	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
6	Danny's	6	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
7														
8														
9														
10	Evenson Home	10	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
11	Gene Section 3	11	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
12	Gene Section 11	12	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
13	Anderson Home	13	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
14									Corn (bu)					
15	McNamee Home	15	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
16	McNamee Section 6	16	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
17	McNamee Section 7	17	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
18	15F2	18	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
19	McInnes Section 10	19	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
20														
23	Harvey 11	23	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
24	Harvey 10	24	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
25	Henka Section 32	25	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
26	Henka Section 30 1/4	26	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
27	Henka Section 30 80	27	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
28	Henka Section 14	28	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
29	Henka Home	29	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
30	Henka Section 7	30	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
31	Henka North of Home	31	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
32	Herberg 27	32	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170

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FOR
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( ) County Average Yields (SD Agricultural Statistics Service)

Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	Previous Year Crop	Previous Year Actual Yield	Year 1 Crop	Year 1 Yield Goal	Year 2 Crop	Year 2 Yield Goal	Year 3 Crop	Year 3 Yield Goal	Year 4 Crop	Year 4 Yield Goal	Year 5 Crop	Year 5 Yield Goal
33	Herberg 26 North	33	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
34	Herberg 26 South	34	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
35	Herberg 25	35	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
36	Jeremy's Farm	36	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
37	Kim's Section 10	37	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
38	Tod Section 10	38	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
39	Section 23 North	39	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
40	Section 23 South	40	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
41	Tod's House	41	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
42	Tod Section 28	42	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
43	West of Jeremy's	43	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
44	Jeff McInnes Section 10	44	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
45	McInnes Home	45	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
46	McInnes Section 23	46	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
47	Substation	47	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
48	Section 21 E of Tracks	48	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
49	Viker Home	49	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
50	South Home	50	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
51	South of Dairy	51	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
52	East of Dairy	52	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
53	Herberg 24	53	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
54	August's	54	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
55	Poland	55	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
56	East Section 5	56	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
57	NW Section 11	57	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
58														
59	Caledonia 30	59	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
60	Herberg 17	60	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
61	Herberg 14	61	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
62	Oanes Home	62	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
63	South Herberg 15	63	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
64	South Herberg 14	64	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
65	Riverbend	65	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170

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Line #	Field ID (Include maps to illustrate location)		Previous Year		Year 1		Year 2		Year 3		Year 4		Year 5	
	Name or Tract	Field #	Crop	Actual Yield	Crop	Yield Goal	Crop	Yield Goal	Crop	Yield Goal	Crop	Yield Goal	Crop	Yield Goal
66														
67	Home Section	67	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
68	Herberrg 6	68	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
69	Warner 80	69	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
70	Red River North	70	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
71	Red River South	71	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
72	Home 1/4	72	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
73	N 80	73	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
74	Dales 1/2 Section	74	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
75	Jay's Section 28	75	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
76	Dallas 1/2 Section	76	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
77	Halstad 1/2	77	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
78	Jay's W of Co Rd 2	78	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
79	Jay's E of Co Rd 2	79	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
80	Caledonia 1/4	80	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
81	Foss Farm	81	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
82	Solee Red River	82	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
83	Solee 28	83	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
84	Solee 1/2 Section	84	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
85	Brady	85	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
86	Tungseth 1/4	86	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
87	Tungseth 51	87	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
88														
89														
90	Gadberry Home	90	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
91	Highline	91	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
92	Herberg 3	92	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
93	Caledonia 32	93	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
94	Fossum 28	94	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
95	McAndrew 100	95	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
96														
97														
98														

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Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	Previous Year Crop	Previous Year Actual Yield	Year 1 Crop	Year 1 Yield Goal	Year 2 Crop	Year 2 Yield Goal	Year 3 Crop	Year 3 Yield Goal	Year 4 Crop	Year 4 Yield Goal	Year 5 Crop	Year 5 Yield Goal
99	Derek's Section 2	99	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
100	Hillboro 15	100	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
101	Elm River 8	101	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
102	Paulsrud Section 6	102	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
103	Elm River 18	103	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
104	Elm River 17	104	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
105	Kevin's on The River	105	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
106	Derek's Place	106	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
107	Paulsrud Section 7	107	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
108	Elm River 21	108	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
109														
110														
111	Kelso 27	111	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
112	Elm River 5	112	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
113	Dallas/Mary Ann's 80	113	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
114	Kim's Section 15	114	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
115														
116														
117														
118														
119	Caledonia 26	119	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
120	Caledonia 27	120	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
121	Hansen Section 11	121	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
122														
123	Hansen Section 16	123	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
124	Marshall Hansen Sec 16	124	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
125	Helgoe	125	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
126	Bovard 1/2	126	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
127	Clara's	127	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
128	Diehl Home	128	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
129														
130	Johnson Farm	130	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
131	Annastasia North	131	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170

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132	Annastasia South	132	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
133	Karla NE	133	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
134	Karla SW	134	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
135	Karla SE	135	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
136	Hustad's	136	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
137	Home Buildings	137	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
138	Home Drive	138	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
139	Stenerson Home 1/4	139	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
140	L&R	140	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
141	Cactus Section	141	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
142	Cactus Woods	142	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
143	South Herberg 35	143	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
144	North Herberg 36	144	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
145	Larry 80	145	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
146	Larry 40	146	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
147														
148														
149	Half Section	149	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
150	South 80+	150	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
151	McDonald 1/4	151	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
152	The 120	152	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
153	North 80	153	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
154	L&R	154	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
155	Holland 1/4	155	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
156	Gary 180	156	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
157	Gary 120	157	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
158	Gary 60	158	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
159	Roberta 80	159	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
160	Herberg 18	160	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
161	Herberg 8	161	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
162	Herberg 19	162	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
163	Dairymple Section 7	163	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
164	Zimmerman	164	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Estimated Nutrient Requirement

17. 30.

(●) Actual or Yield Goal
( ) Yields indexed by soil productivity (Productivity Index)
( ) County Average Yields (SD Agricultural Statistics Service)

Line #	Field ID (Include maps to illustrate location)		Previous Year		Year 1		Year 2		Year 3		Year 4		Year 5	
	Name or Tract	Field #	Crop	Actual Yield	Crop	Yield Goal	Crop	Yield Goal	Crop	Yield Goal	Crop	Yield Goal	Crop	Yield Goal
165	Herberg 31	165	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
166	Herberg 33	166	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
167	Hillsboro Airport	167	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
168	Hillsboro 28	168	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
169	Hillsboro 34	169	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
170	Hillsboro 35	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
171	Hillsboro 36	171	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
172	Herberg 29	172	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
173	Herberg 29 NW	173	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
174	Hillsboro 29	174	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170	Soybean (bu)	40	Corn (bu)	170
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NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Part 3: Planned Nutrient Application

Date: 09/15/24 **Operator:** **County:** **Date:** 09/15/24

17.			31.	32.			33.	34.	35.	36.									37.
Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	**Alternative crops for years 1 through 5**	Initial Nutrient Mgt. Plan - N based fields (acres)	Nutrient Recommendation - *SDSU Extension Service EC-750*			Manure application based on:	Phosphorus Risk Assessment	Nitrogen Risk Assessment	Nutrients Applied								Estimated years to reapplication based on P_2O_5 rate
											Commercial lbs/acre			Manure lbs/acre			Total lbs/acre		
					N	P_2O_5	K_2O				N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
1	Clyde's	1	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	484.4	146	7	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
2	Mabel's	2	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	152.5	158	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
3	South 1/4	3	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	211.0	156	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
4	Behind Shop	4	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	279.3	159	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
5	Kyle's 1/4	5	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	156.2	142	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
6	Danny's	6	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	508.9	158	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
7											0	0	0	0	0	0	0	0	0	
8											0	0	0	0	0	0	0	0	0	
9											0	0	0	0	0	0	0	0	0	
10	Evenson Home	10	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	201.9	156	37	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
11	Gene Section 3	11	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	281.0	119	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
12	Gene Section 11	12	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	306.7	152	37	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
13	Anderson Home	13	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	300.2	152	89	60	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
14											0	0	0	0	0	0	0	0	0	
15	McNamee Home	15	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	285.0	155	7	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
16	McNamee Section 6	16	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	156.1	159	29	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
17	McNamee Section 7	17	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	156.5	157	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
18	15F2	18	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	308.9	125	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
19	McInnes Section 10	19	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	148.1	135	0	0	5 Yr P Removal	Moderate	Low	0	0	0	0	0	0	0	0	0	0
20											0	0	0	0	0	0	0	0	0	
											0	0	0	0	0	0	0	0	0	
											0	0	0	0	0	0	0	0	0	
23	Harvey 11	23	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	193.8	148	14	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
24	Harvey 10	24	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	302.8	156	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
25	Henka Section 32	25	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	146.0	141	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
26	Henka Section 30 1/4	26	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	155.5	156	52	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
27	Henka Section 30 80	27	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	77.3	157	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
28	Henka Section 14	28	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	147.4	160	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
29	Henka Home	29	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	443.2	154	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
30	Henka Section 7	30	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	601.8	148	14	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
31	Henka North of Home	31	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	158.4	157	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
32	Herberg 27	32	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	625.3	156	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Part 3: Planned Nutrient Application

Date: 09/15/24 **Operator:** **County:** **Date:** 09/15/24

17.				31.	32.			33.	34.	35.	36.									37.
Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	**Alternative crops for years 1 through 5**	Initial Nutrient Mgt. Plan - N based fields (acres)	Nutrient Recommendation - *SDSU Extension Service EC-750*			Manure application based on:	Phosphorus Risk Assessment	Nitrogen Risk Assessment	Nutrients Applied									Estimated years to reapplication based on P_2O_5 rate
											Commercial lbs/acre			Manure lbs/acre			Total lbs/acre			
					N	P_2O_5	K_2O				N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
33	Herberg 26 North	33	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	289.9	160	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
34	Herberg 26 South	34	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	316.5	159	44	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
35	Herberg 25	35	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	248.4	160	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
36	Jeremy's Farm	36	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	263.5	160	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
37	Kim's Section 10	37	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	152.1	149	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
38	Tod Section 10	38	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	154.3	155	29	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
39	Section 23 North	39	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	227.0	154	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
40	Section 23 South	40	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	147.9	161	52	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
41	Tod's House	41	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	96.6	162	14	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
42	Tod Section 28	42	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	308.5	160	97	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
43	West of Jeremy's	43	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	147.9	154	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
44	Jeff McInnes Section 10	44	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	148.5	149	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
45	McInnes Home	45	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	285.3	150	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
46	McInnes Section 23	46	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	153.6	138	0	0	5 Yr P Removal	Moderate	Low	0	0	0	0	0	0	0	0	0	0
47	Substation	47	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	157.1	158	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
48	Section 21 E of Tracks	48	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	222.6	154	14	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
49	Viker Home	49	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	585.3	157	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
50	South Home	50	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	537.1	153	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
51	South of Dairy	51	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	311.2	155	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
52	East of Dairy	52	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	275.0	129	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
53	Herberg 24	53	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	61.6	162	89	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
54	August's	54	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	415.3	159	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
55	Poland	55	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	149.6	160	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
56	East Section 5	56	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	302.0	148	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
57	NW Section 11	57	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	155.9	151	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
58											0	0	0	0	0	0	0	0	0	
59	Caledonia 30	59	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	55.4	152	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
60	Herberg 17	60	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	299.1	152	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
61	Herberg 14	61	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	157.7	149	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
62	Oanes Home	62	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	294.7	160	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
63	South Herberg 15	63	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	128.0	157	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
64	South Herberg 14	64	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	298.9	145	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
65	Riverbend	65	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	45.6	142	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Part 3: Planned Nutrient Application

Date: 09/15/24 **Operator:** **County:** **Date:** 09/15/24

Line #	17. Field ID (Include maps to illustrate location) Name or Tract	Field #	Alternative crops for years 1 through 5	31. Initial Nutrient Mgt. Plan - N based fields (acres)	32. Nutrient Recommendation - *SDSU Extension Service EC-750* N	P_2O_5	K_2O	33. Manure application based on:	34. Phosphorus Risk Assessment	35. Nitrogen Risk Assessment	36. Nutrients Applied: Commercial lbs/acre N	Commercial P_2O_5	Commercial K_2O	Manure lbs/acre N	Manure P_2O_5	Manure K_2O	Total lbs/acre N	Total P_2O_5	Total K_2O	37. Estimated years to reapplication based on P_2O_5 rate
66											0	0	0	0	0	0	0	0	0	
67	Home Section	67	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	586.7	154	52	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
68	Herberrg 6	68	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	76.9	160	29	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
69	Warner 80	69	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	75.6	131	44	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
70	Red River North	70	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	80.1	149	52	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
71	Red River South	71	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	119.7	153	89	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
72	Home 1/4	72	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	148.3	155	97	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
73	N 80	73	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	79.8	133	97	60	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
74	Dales 1/2 Section	74	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	308.2	107	37	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
75	Jay's Section 28	75	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	155.1	143	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
76	Dallas 1/2 Section	76	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	317.2	149	37	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
77	Halstad 1/2	77	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	282.9	149	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
78	Jay's W of Co Rd 2	78	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	139.7	146	37	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
79	Jay's E of Co Rd 2	79	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	139.0	122	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
80	Caledonia 1/4	80	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	156.2	139	37	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
81	Foss Farm	81	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	153.8	138	104	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
82	Solee Red River	82	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	102.2	150	89	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
83	Solee 28	83	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	76.4	131	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
84	Solee 1/2 Section	84	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	159.6	147	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
85	Brady	85	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	296.3	136	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
86	Tungseth 1/4	86	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	155.2	105	7	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
87	Tungseth 51	87	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	46.7	105	7	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
88											0	0	0	0	0	0	0	0	0	
89											0	0	0	0	0	0	0	0	0	
90	Gadberry Home	90	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	278.2	106	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
91	Highline	91	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	147.5	102	44	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
92	Herberg 3	92	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	140.1	151	52	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
93	Caledonia 32	93	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	154.5	149	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
94	Fossum 28	94	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	69.5	158	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
95	McAndrew 100	95	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	96.8	125	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
96											0	0	0	0	0	0	0	0	0	
97											0	0	0	0	0	0	0	0	0	
98											0	0	0	0	0	0	0	0	0	

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Part 3: Planned Nutrient Application

Date: 09/15/24 **Operator:** **County:** **Date:** 09/15/24

17.				31.	32.			33.	34.	35.	36.									37.
Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	Alternative crops for years 1 through 5	Initial Nutrient Mgt. Plan - N based fields (acres)	Nutrient Recommendation - *SDSU Extension Service EC-750*			Manure application based on:	Phosphorus Risk Assessment	Nitrogen Risk Assessment	Nutrients Applied									Estimated years to reapplication based on P_2O_5 rate
											Commercial lbs/acre			Manure lbs/acre			Total lbs/acre			
					N	P_2O_5	K_2O				N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
99	Derek's Section 2	99	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	152.1	157	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
100	Hillboro 15	100	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	225.9	130	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
101	Elm River 8	101	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	367.6	152	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
102	Paulsrud Section 6	102	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	231.1	158	22	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
103	Elm River 18	103	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	541.3	154	14	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
104	Elm River 17	104	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	119.9	155	52	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
105	Kevin's on The River	105	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	178.0	156	89	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
106	Derek's Place	106	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	61.8	156	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
107	Paulsrud Section 7	107	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	154.6	159	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
108	Elm River 21	108	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	80.2	162	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
109											0	0	0	0	0	0	0	0	0	
110											0	0	0	0	0	0	0	0	0	
111	Kelso 27	111	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	305.7	34	0	0	5 Yr P Removal	Moderate	Low	0	0	0	0	0	0	0	0	0	0
112	Elm River 5	112	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	517.7	156	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
113	Dallas/Mary Ann's 80	113	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	76.4	133	97	60	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
114	Kim's Section 15	114	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	76.9	156	7	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
115											0	0	0	0	0	0	0	0	0	
116											0	0	0	0	0	0	0	0	0	
117											0	0	0	0	0	0	0	0	0	
118											0	0	0	0	0	0	0	0	0	
119	Caledonia 26	119	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	110.9	154	22	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
120	Caledonia 27	120	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	79.5	159	89	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
121	Hansen Section 11	121	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	70.8	141	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
122											0	0	0	0	0	0	0	0	0	
123	Hansen Section 16	123	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	78.9	121	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
124	Marshall Hansen Sec 16	124	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	78.6	159	44	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
125	Helgoe	125	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	154.5	103	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
126	Bovard 1/2	126	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	300.5	157	52	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
127	Clara's	127	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	114.1	158	97	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
128	Diehl Home	128	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	148.7	154	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
129											0	0	0	0	0	0	0	0	0	
130	Johnson Farm	130	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	150.7	158	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
131	Annastasia North	131	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	138.1	158	44	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Part 3: Planned Nutrient Application

Date: 09/15/24 **Operator:** **County:** **Date:** 09/15/24

17.				31.	32.			33.	34.	35.	36.									37.
Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	**Alternative crops for years 1 through 5**	Initial Nutrient Mgt. Plan - N based fields (acres)	Nutrient Recommendation - *SDSU Extension Service EC-750*			Manure application based on:	Phosphorus Risk Assessment	Nitrogen Risk Assessment	Nutrients Applied									Estimated years to reapplication based on P_2O_5 rate
											Commercial lbs/acre			Manure lbs/acre			Total lbs/acre			
					N	P_2O_5	K_2O				N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
132	Annastasia South	132	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	146.6	156	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
133	Karla NE	133	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	156.2	153	29	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
134	Karla SW	134	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	155.6	135	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
135	Karla SE	135	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	129.7	151	7	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
136	Hustad's	136	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	189.2	114	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
137	Home Buildings	137	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	95.3	111	14	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
138	Home Drive	138	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	27.5	148	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
139	Stenerson Home 1/4	139	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	154.2	129	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
140	L&R	140	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	77.6	124	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
141	Cactus Section	141	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	620.9	151	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
142	Cactus Woods	142	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	173.6	146	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
143	South Herberg 35	143	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	159.4	156	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
144	North Herberg 36	144	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	280.2	161	97	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
145	Larry 80	145	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	77.6	157	44	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
146	Larry 40	146	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	38.3	155	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
147											0	0	0	0	0	0	0	0	0	
148											0	0	0	0	0	0	0	0	0	
149	Half Section	149	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	315.6	154	89	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
150	South 80+	150	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	139.9	140	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
151	McDonald 1/4	151	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	159.8	150	97	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
152	The 120	152	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	114.6	154	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
153	North 80	153	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	69.6	142	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
154	L&R	154	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	90.4	124	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
155	Holland 1/4	155	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	142.0	157	74	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
156	Gary 180	156	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	173.6	152	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
157	Gary 120	157	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	100.8	151	14	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
158	Gary 60	158	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	56.9	150	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
159	Roberta 80	159	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	72.5	156	82	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
160	Herberg 18	160	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	441.6	148	14	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
161	Herberg 8	161	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	310.6	154	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
162	Herberg 19	162	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	74.3	156	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
163	Dairymple Section 7	163	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	292.5	146	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
164	Zimmerman	164	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	283.1	136	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Part 3: Planned Nutrient Application

Date: 09/15/24 **Operator:** **County:** **Date:** 09/15/24

17.				31.	32.			33.	34.	35.	36.									37.
Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	Alternative crops for years 1 through 5	Initial Nutrient Mgt. Plan - N based fields (acres)	Nutrient Recommendation - *SDSU Extension Service EC-750*			Manure application based on:	Phosphorus Risk Assessment	Nitrogen Risk Assessment	Nutrients Applied									Estimated years to reapplication based on P_2O_5 rate
											Commercial lbs/acre			Manure lbs/acre			Total lbs/acre			
					N	P_2O_5	K_2O				N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
165	Herberg 31	165	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	284.8	152	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
166	Herberg 33	166	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	606.6	139	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
167	Hillsboro Airport	167	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	344.7	151	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
168	Hillsboro 28	168	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	198.8	142	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
169	Hillsboro 34	169	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	306.5	159	29	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
170	Hillsboro 35	170	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	594.6	150	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
171	Hillsboro 36	171	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	583.5	140	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
172	Herberg 29	172	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	279.9	148	67	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
173	Herberg 29 NW	173	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	145.6	161	59	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
174	Hillsboro 29	174	Silage, 20.5 ton; S.Wheat, 55 bu; Oats, 80 bu; Alf., 3 ton	546.8	160	0	0	Nitrogen need	Low	Low	0	0	0	0	0	0	0	0	0	N/A
175											0	0	0	0	0	0	0	0	0	
176											0	0	0	0	0	0	0	0	0	
177											0	0	0	0	0	0	0	0	0	
178											0	0	0	0	0	0	0	0	0	
179											0	0	0	0	0	0	0	0	0	
180											0	0	0	0	0	0	0	0	0	
181											0	0	0	0	0	0	0	0	0	
182											0	0	0	0	0	0	0	0	0	
183											0	0	0	0	0	0	0	0	0	
184											0	0	0	0	0	0	0	0	0	
185											0	0	0	0	0	0	0	0	0	
186											0	0	0	0	0	0	0	0	0	
187											0	0	0	0	0	0	0	0	0	
188											0	0	0	0	0	0	0	0	0	
189											0	0	0	0	0	0	0	0	0	
190											0	0	0	0	0	0	0	0	0	
191											0	0	0	0	0	0	0	0	0	
192											0	0	0	0	0	0	0	0	0	

		N	P_2O_5
	32,448.5		
Total lbs of N and P2O5 available for crops:		**2,269,837**	**1,679,000**
Total lbs of N and P2O5 required by fields:		**4,839,614**	**1,529,010**

Comments:

Adequate acres are available based on Nitrogen analysis

However, P2O5 is in excess of removal. At this rate, it will take more than 40 years to build all listed fields up to 50 ppm P (Olsen).

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

SD-CPA-63D
Rev. 5/17

Manure/Compost Application

County: **Date:** 09/15/24 **Operator:** Herberg Dairy

Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	39. Manure Application and Incorporation: Type of Manure (Year of Application)	Type of Application (Time of incorporation)	40. Manure Test: Total N	Inorganic N	Total P2O5	Total K2O	Date Tested	41. Available N (First crop year) lbs/Ton or lbs/1,000 gal	42. Maximum Manure Application Rate: To meet N needs	Quantity of Manure per Field	43. Acres of Actual Nutrient Application	44. Manure Application: Actual Manure Rate Applied		Date Manure Applied	Time Period When Manure Applied	45. Estimated years to reapplication based on P_2O_5 rate	46. Value of Manure per Acre
1	Clyde's	1	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,000 Gal/ac	9,203,600 Gal			Gal/ac			N/A	
2	Mabel's	2	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,500 Gal/ac	3,126,250 Gal			Gal/ac			N/A	
3	South 1/4	3	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	4,283,300 Gal			Gal/ac			N/A	
4	Behind Shop	4	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,600 Gal/ac	5,753,580 Gal			Gal/ac			N/A	
5	Kyle's 1/4	5	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	18,400 Gal/ac	2,874,080 Gal			Gal/ac			N/A	
6	Danny's	6	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,500 Gal/ac	10,432,450 Gal			Gal/ac			N/A	
7																				
8																				
9																				
10	Evenson Home	10	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	4,098,570 Gal			Gal/ac			N/A	
11	Gene Section 3	11	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	15,500 Gal/ac	4,355,500 Gal			Gal/ac			N/A	
12	Gene Section 11	12	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,700 Gal/ac	6,041,990 Gal			Gal/ac			N/A	
13	Anderson Home	13	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,700 Gal/ac	5,913,940 Gal			Gal/ac			N/A	
14						22.0		8.3	22.0											
15	McNamee Home	15	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,100 Gal/ac	5,728,500 Gal			Gal/ac			N/A	
16	McNamee Section 6	16	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,600 Gal/ac	3,215,660 Gal			Gal/ac			N/A	
17	McNamee Section 7	17	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,400 Gal/ac	3,192,600 Gal			Gal/ac			N/A	
18	15F2	18	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	16,200 Gal/ac	5,004,180 Gal			Gal/ac			N/A	
19	McInnes Section 10	19	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	17,500 Gal/ac	2,591,750 Gal			Gal/ac			0	
20																				
21																				
22																				
23	Harvey 11	23	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,200 Gal/ac	3,720,960 Gal			Gal/ac			N/A	
24	Harvey 10	24	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	6,146,840 Gal			Gal/ac			N/A	
25	Henka Section 32	25	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	18,300 Gal/ac	2,671,800 Gal			Gal/ac			N/A	
26	Henka Section 30 1/4	26	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	3,156,650 Gal			Gal/ac			N/A	
27	Henka Section 30 80	27	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,400 Gal/ac	1,576,920 Gal			Gal/ac			N/A	
28	Henka Section 14	28	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,800 Gal/ac	3,065,920 Gal			Gal/ac			N/A	
29	Henka Home	29	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,000 Gal/ac	8,864,000 Gal			Gal/ac			N/A	
30	Henka Section 7	30	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,200 Gal/ac	11,554,560 Gal			Gal/ac			N/A	
31	Henka North of Home	31	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,400 Gal/ac	3,231,360 Gal			Gal/ac			N/A	
32	Herberg 27	32	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	12,693,590 Gal			Gal/ac			N/A	
33	Herberg 26 North	33	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,800 Gal/ac	6,029,920 Gal			Gal/ac			N/A	
34	Herberg 26 South	34	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,600 Gal/ac	6,519,900 Gal			Gal/ac			N/A	
35	Herberg 25	35	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,800 Gal/ac	5,166,720 Gal			Gal/ac			N/A	
36	Jeremy's Farm	36	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,800 Gal/ac	5,480,800 Gal			Gal/ac			N/A	
37	Kim's Section 10	37	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,400 Gal/ac	2,950,740 Gal			Gal/ac			N/A	
38	Tod Section 10	38	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,100 Gal/ac	3,101,430 Gal			Gal/ac			N/A	
39	Section 23 North	39	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,000 Gal/ac	4,540,000 Gal			Gal/ac			N/A	
40	Section 23 South	40	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,900 Gal/ac	3,091,110 Gal			Gal/ac			N/A	
41	Tod's House	41	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	21,000 Gal/ac	2,028,600 Gal			Gal/ac			N/A	
42	Tod Section 28	42	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,800 Gal/ac	6,416,800 Gal			Gal/ac			N/A	
43	West of Jeremy's	43	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,000 Gal/ac	2,958,000 Gal			Gal/ac			N/A	
44	Jeff McInnes Section 10	44	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,400 Gal/ac	2,880,900 Gal			Gal/ac			N/A	
45	McInnes Home	45	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,500 Gal/ac	5,563,350 Gal			Gal/ac			N/A	
46	McInnes Section 23	46	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	17,900 Gal/ac	2,749,440 Gal			Gal/ac			0	
47	Substation	47	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,500 Gal/ac	3,220,550 Gal			Gal/ac			N/A	

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Manure/Compost Application

County: **Date:** 09/15/24 **Operator:** Herberg Dairy

			39.			40.						41.	42.		43.	44.			45.	46.
Line #	Field ID (Include maps to illustrate location)		Manure Application and Incorporation			Manure Test						Available N (First crop year)	Maximum Manure Application Rate		Acres of Actual Nutrient Application	Manure Application			Estimated years to reapplication based on P_2O_5 rate	Value of Manure per Acre
						Total N	Inorganic N	Total P2O5	Total K2O	Date Tested										
	Name or Tract	Field #	Type of Manure (Year of Application)		Type of Application (Time of incorporation)							lbs/Ton or lbs/1,000 gal	To meet N needs	Quantity of Manure per Field		Actual Manure Rate Applied		Date Manure Applied	Time Period When Manure Applied		
48	Section 21 E of Tracks	48	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,000 Gal/ac	4,452,000 Gal			Gal/ac			N/A	
49	Viker Home	49	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,400 Gal/ac	11,940,120 Gal			Gal/ac			N/A	
50	South Home	50	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,900 Gal/ac	10,688,290 Gal			Gal/ac			N/A	
51	South of Dairy	51	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,100 Gal/ac	6,255,120 Gal			Gal/ac			N/A	
52	East of Dairy	52	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	16,800 Gal/ac	4,620,000 Gal			Gal/ac			N/A	
53	Herberg 24	53	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	21,000 Gal/ac	1,293,600 Gal			Gal/ac			N/A	
54	August's	54	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,600 Gal/ac	8,555,180 Gal			Gal/ac			N/A	
55	Poland	55	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,800 Gal/ac	3,111,680 Gal			Gal/ac			N/A	
56	East Section 5	56	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,200 Gal/ac	5,798,400 Gal			Gal/ac			N/A	
57	NW Section 11	57	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,600 Gal/ac	3,055,640 Gal			Gal/ac			N/A	
58																					
59	Caledonia 30	59	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,700 Gal/ac	1,091,380 Gal			Gal/ac			N/A	
60	Herberg 17	60	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,700 Gal/ac	5,892,270 Gal			Gal/ac			N/A	
61	Herberg 14	61	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,400 Gal/ac	3,059,380 Gal			Gal/ac			N/A	
62	Oanes Home	62	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,800 Gal/ac	6,129,760 Gal			Gal/ac			N/A	
63	South Herberg 15	63	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,400 Gal/ac	2,611,200 Gal			Gal/ac			N/A	
64	South Herberg 14	64	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,800 Gal/ac	5,619,320 Gal			Gal/ac			N/A	
65	Riverbend	65	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,400 Gal/ac	839,040 Gal			Gal/ac			N/A	
66																					
67	Home Section	67	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,000 Gal/ac	11,734,000 Gal			Gal/ac			N/A	
68	Herberrg 6	68	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,800 Gal/ac	1,599,520 Gal			Gal/ac			N/A	
69	Warner 80	69	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	17,000 Gal/ac	1,285,200 Gal			Gal/ac			N/A	
70	Red River North	70	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,400 Gal/ac	1,553,940 Gal			Gal/ac			N/A	
71	Red River South	71	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,900 Gal/ac	2,382,030 Gal			Gal/ac			N/A	
72	Home 1/4	72	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,100 Gal/ac	2,980,830 Gal			Gal/ac			N/A	
73	N 80	73	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	17,300 Gal/ac	1,380,540 Gal			Gal/ac			N/A	
74	Dales 1/2 Section	74	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	13,900 Gal/ac	4,283,980 Gal			Gal/ac			N/A	
75	Jay's Section 28	75	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,600 Gal/ac	2,884,860 Gal			Gal/ac			N/A	
76	Dallas 1/2 Section	76	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,400 Gal/ac	6,153,680 Gal			Gal/ac			N/A	
77	Halstad 1/2	77	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,400 Gal/ac	5,488,260 Gal			Gal/ac			N/A	
78	Jay's W of Co Rd 2	78	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,000 Gal/ac	2,654,300 Gal			Gal/ac			N/A	
79	Jay's E of Co Rd 2	79	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	15,800 Gal/ac	2,196,200 Gal			Gal/ac			N/A	
80	Caledonia 1/4	80	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,100 Gal/ac	2,827,220 Gal			Gal/ac			N/A	
81	Foss Farm	81	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	17,900 Gal/ac	2,753,020 Gal			Gal/ac			N/A	
82	Solee Red River	82	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,500 Gal/ac	1,992,900 Gal			Gal/ac			N/A	
83	Solee 28	83	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	17,000 Gal/ac	1,298,800 Gal			Gal/ac			N/A	
84	Solee 1/2 Section	84	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,100 Gal/ac	3,048,360 Gal			Gal/ac			N/A	
85	Brady	85	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	17,700 Gal/ac	5,244,510 Gal			Gal/ac			N/A	
86	Tungseth 1/4	86	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	13,600 Gal/ac	2,110,720 Gal			Gal/ac			N/A	
87	Tungseth 51	87	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	13,600 Gal/ac	635,120 Gal			Gal/ac			N/A	
88																					
89																					
90	Gadberry Home	90	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	13,800 Gal/ac	3,839,160 Gal			Gal/ac			N/A	
91	Highline	91	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	13,200 Gal/ac	1,947,000 Gal			Gal/ac			N/A	
92	Herberg 3	92	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,600 Gal/ac	2,745,960 Gal			Gal/ac			N/A	
93	Caledonia 32	93	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,400 Gal/ac	2,997,300 Gal			Gal/ac			N/A	
94	Fossum 28	94	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,500 Gal/ac	1,424,750 Gal			Gal/ac			N/A	
95	McAndrew 100	95	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	16,200 Gal/ac	1,568,160 Gal			Gal/ac			N/A	

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Manure/Compost Application

County: **Date:** 09/15/24 **Operator:** Herberg Dairy

			39.			40.						41.	42.		43.	44.				45.	46.
Line #	Field ID (Include maps to illustrate location) Name or Tract	Field #	Manure Application and Incorporation: Type of Manure (Year of Application)		Type of Application (Time of incorporation)	Manure Test: Total N	Inorganic N	Total P2O5	Total K2O	Date Tested	Available N (First crop year) lbs/Ton or lbs/1,000 gal	Maximum Manure Application Rate: To meet N needs	Quantity of Manure per Field	Acres of Actual Nutrient Application	Manure Application: Actual Manure Rate Applied		Date Manure Applied	Time Period When Manure Applied	Estimated years to reapplication based on P_2O_5 rate	Value of Manure per Acre
96																					
97																					
98																					
99	Derek's Section 2	99	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,400 Gal/ac	3,102,840 Gal			Gal/ac			N/A	
100	Hillboro 15	100	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	16,900 Gal/ac	3,817,710 Gal			Gal/ac			N/A	
101	Elm River 8	101	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,700 Gal/ac	7,241,720 Gal			Gal/ac			N/A	
102	Paulsrud Section 6	102	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,500 Gal/ac	4,737,550 Gal			Gal/ac			N/A	
103	Elm River 18	103	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,000 Gal/ac	10,826,000 Gal			Gal/ac			N/A	
104	Elm River 17	104	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,100 Gal/ac	2,409,990 Gal			Gal/ac			N/A	
105	Kevin's on The River	105	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	3,613,400 Gal			Gal/ac			N/A	
106	Derek's Place	106	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	1,254,540 Gal			Gal/ac			N/A	
107	Paulsrud Section 7	107	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,600 Gal/ac	3,184,760 Gal			Gal/ac			N/A	
108	Elm River 21	108	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	21,000 Gal/ac	1,684,200 Gal			Gal/ac			N/A	
109																					
110																					
111	Kelso 27	111	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	4,400 Gal/ac	1,345,080 Gal			Gal/ac			0	
112	Elm River 5	112	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	10,509,310 Gal			Gal/ac			N/A	
113	Dallas/Mary Ann's 80	113	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	17,300 Gal/ac	1,321,720 Gal			Gal/ac			N/A	
114	Kim's Section 15	114	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	1,561,070 Gal			Gal/ac			N/A	
115																					
116																					
117																					
118																					
119	Caledonia 26	119	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,000 Gal/ac	2,218,000 Gal			Gal/ac			N/A	
120	Caledonia 27	120	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,600 Gal/ac	1,637,700 Gal			Gal/ac			N/A	
121	Hansen Section 11	121	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	18,300 Gal/ac	1,295,640 Gal			Gal/ac			N/A	
122																					
123	Hansen Section 16	123	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	15,700 Gal/ac	1,238,730 Gal			Gal/ac			N/A	
124	Marshall Hansen Sec 16	124	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,600 Gal/ac	1,619,160 Gal			Gal/ac			N/A	
125	Helgoe	125	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	13,400 Gal/ac	2,070,300 Gal			Gal/ac			N/A	
126	Bovard 1/2	126	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,400 Gal/ac	6,130,200 Gal			Gal/ac			N/A	
127	Clara's	127	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,500 Gal/ac	2,339,050 Gal			Gal/ac			N/A	
128	Diehl Home	128	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,000 Gal/ac	2,974,000 Gal			Gal/ac			N/A	
129																					
130	Johnson Farm	130	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,500 Gal/ac	3,089,350 Gal			Gal/ac			N/A	
131	Annastasia North	131	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,500 Gal/ac	2,831,050 Gal			Gal/ac			N/A	
132	Annastasia South	132	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	2,975,980 Gal			Gal/ac			N/A	
133	Karla NE	133	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,900 Gal/ac	3,108,380 Gal			Gal/ac			N/A	
134	Karla SW	134	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	17,500 Gal/ac	2,723,000 Gal			Gal/ac			N/A	
135	Karla SE	135	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,600 Gal/ac	2,542,120 Gal			Gal/ac			N/A	
136	Hustad's	136	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	14,800 Gal/ac	2,800,160 Gal			Gal/ac			N/A	
137	Home Buildings	137	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	14,400 Gal/ac	1,372,320 Gal			Gal/ac			N/A	
138	Home Drive	138	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,200 Gal/ac	528,000 Gal			Gal/ac			N/A	
139	Stenerson Home 1/4	139	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	16,800 Gal/ac	2,590,560 Gal			Gal/ac			N/A	
140	L&R	140	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	16,100 Gal/ac	1,249,360 Gal			Gal/ac			N/A	
141	Cactus Section	141	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,600 Gal/ac	12,169,640 Gal			Gal/ac			N/A	
142	Cactus Woods	142	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	19,000 Gal/ac	3,298,400 Gal			Gal/ac			N/A	
143	South Herberg 35	143	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23	7.7	20,300 Gal/ac	3,235,820 Gal			Gal/ac			N/A	

NUTRIENT MANAGEMENT PLAN
FOR
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Manure/Compost Application

County: **Date:** 09/15/24 **Operator:** Herberg Dairy

			39.			40.						41.	42.		43.	44.			45.	46.
Line #	Field ID (Include maps to illustrate location)		Manure Application and Incorporation			Manure Test						Available N (First crop year)	Maximum Manure Application Rate		Acres of Actual Nutrient Application	Manure Application			Estimated years to reapplication based on P_2O_5 rate	Value of Manure per Acre
	Name or Tract	Field #	Type of Manure (Year of Application)		Type of Application (Time of incorporation)	Total N	Inorganic N	Total P2O5	Total K2O	Date Tested		To meet N needs	Quantity of Manure per Field		Actual Manure Rate Applied		Date Manure Applied	Time Period When Manure Applied		
												lbs/Ton or lbs/1,000 gal								
144	North Herberg 36	144	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,900 Gal/ac	5,856,180 Gal			Gal/ac			N/A	
145	Larry 80	145	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,400 Gal/ac	1,583,040 Gal			Gal/ac			N/A	
146	Larry 40	146	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,100 Gal/ac	769,830 Gal			Gal/ac			N/A	
147																					
148																					
149	Half Section	149	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,000 Gal/ac	6,312,000 Gal			Gal/ac			N/A	
150	South 80+	150	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,200 Gal/ac	2,546,180 Gal			Gal/ac			N/A	
151	McDonald 1/4	151	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,500 Gal/ac	3,116,100 Gal			Gal/ac			N/A	
152	The 120	152	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,000 Gal/ac	2,292,000 Gal			Gal/ac			N/A	
153	North 80	153	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,400 Gal/ac	1,280,640 Gal			Gal/ac			N/A	
154	L&R	154	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	16,100 Gal/ac	1,455,440 Gal			Gal/ac			N/A	
155	Holland 1/4	155	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,400 Gal/ac	2,896,800 Gal			Gal/ac			N/A	
156	Gary 180	156	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,700 Gal/ac	3,419,920 Gal			Gal/ac			N/A	
157	Gary 120	157	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,600 Gal/ac	1,975,680 Gal			Gal/ac			N/A	
158	Gary 60	158	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,500 Gal/ac	1,109,550 Gal			Gal/ac			N/A	
159	Roberta 80	159	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,300 Gal/ac	1,471,750 Gal			Gal/ac			N/A	
160	Herberg 18	160	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,200 Gal/ac	8,478,720 Gal			Gal/ac			N/A	
161	Herberg 8	161	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,000 Gal/ac	6,212,000 Gal			Gal/ac			N/A	
162	Herberg 19	162	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,300 Gal/ac	1,508,290 Gal			Gal/ac			N/A	
163	Dairymple Section 7	163	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,000 Gal/ac	5,557,500 Gal			Gal/ac			N/A	
164	Zimmerman	164	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	17,700 Gal/ac	5,010,870 Gal			Gal/ac			N/A	
165	Herberg 31	165	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,700 Gal/ac	5,610,560 Gal			Gal/ac			N/A	
166	Herberg 33	166	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,100 Gal/ac	10,979,460 Gal			Gal/ac			N/A	
167	Hillsboro Airport	167	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,600 Gal/ac	6,756,120 Gal			Gal/ac			N/A	
168	Hillsboro 28	168	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,400 Gal/ac	3,657,920 Gal			Gal/ac			N/A	
169	Hillsboro 34	169	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,600 Gal/ac	6,313,900 Gal			Gal/ac			N/A	
170	Hillsboro 35	170	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,500 Gal/ac	11,594,700 Gal			Gal/ac			N/A	
171	Hillsboro 36	171	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	18,200 Gal/ac	10,619,700 Gal			Gal/ac			N/A	
172	Herberg 29	172	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	19,200 Gal/ac	5,374,080 Gal			Gal/ac			N/A	
173	Herberg 29 NW	173	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,900 Gal/ac	3,043,040 Gal			Gal/ac			N/A	
174	Hillsboro 29	174	Livestock (1st Year)	Liquid	Injection	22.0		8.3	22.0	10/23/23		7.7	20,800 Gal/ac	11,373,440 Gal			Gal/ac			N/A	
175																					
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South Dakota Phosphorus Loss Risk Assessment						
Soil Test Phosphorus (ppm)		Predicted Annual Erosion - Sum of Wind and Water Erosion (tons per acre per year)				
		Less than 6		6 to 8		Greater than 8
		100 Foot Vegetated Buffer[1]		100 Foot Vegetated Buffer[1]		
Olsen	Bray-1	Yes	No	Yes	No	
0-25	0-35	Low	Low	Low	Low	Moderate
26-50	36-75	Low	Low	Low	Moderate	High
51-75	76-110	Low	Moderate	Moderate	Moderate	High
76-100	111-150	High	High	High	High	No application
Greater than 100	Greater than 150	No application	No application	No application	No application	No application

[1] Refers to the vegetated area width between manure or wastewater land application and a natural/manmade drainage, tile inlet or other conduit.

Low Risk - Phosphorus can be applied at rates greater than crop phosphorus removal not to exceed the nitrogen requirement for the succeeding crop.

Moderate Risk - Phosphorus can be applied not to exceed crop phosphorus removal for up to a 5 year crop sequence. Application cannot exceed the nitrogen requirement for the succeeding crop.

High Risk - Phosphorus can be applied not to exceed one year crop phosphorus removal. Application cannot exceed the nitrogen requirement for the succeeding crop. The following requirements must also be met: 1. A soil phosphorus drawdown strategy has been implemented. 2. A site assessment for nutrients & soil loss has been conducted to determine if mitigation practices are required to protect water quality. 3. Any deviation from these high risk requirements must have the approval of the Chief of the NRCS.

Planning Considerations:

Wind erosion (WEPS) should be completed for all fields with predominate soils of I =>134 or if a wind erosion resource concern exists.

Crop removal is the amount of phosphorus used in one crop year according to SDSU-Extra 8009, "Quantities of Nutrients Contained in Crops."

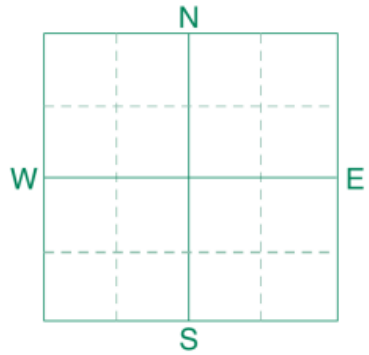
All fertilizer phosphorus sources should be placed below the soil surface. However, surface application is permitted on no-till cropland, pastureland, or hayland. In all other cropland tillage systems, phosphorus sources will be placed below the soil surface.

Winter manure applications are allowed only when all of the following conditions are met: 1. When incidental amounts of manure are collected during feedlot snow removal or cleaning of feed bunks or enclosed pens to facilitate livestock feeding and handling. 2. Winter manure applications will not exceed the rate per acre calculated in the nutrient budget for the application field based on fall soil test results. 3. Set back distances from surface waters or water conveyances will be 300 ft and 1,000 ft from named lakes, rivers, and perennial streams. 4. Winter manure applications are prohibited on floodplains with soils classified as frequently or occasionally flooded as listed in National Cooperative Soil Survey. 5. Applications will only be allowed on fields with slopes less than 4 percent and will be prioritized based on the water erosion prediction technology as listed in the SD tech guide. 6. Fields with lowest predicted soil loss (water erosion) will generally have the highest priority for winter applications. 7. Manure will be uniformly spread.

AGVISE LABORATORIES
P.O. BOX 510, NORTHWOOD, ND 58267
Northwood: (701) 587-6010
Benson: (320) 843-4109

MANURE REPORT

SAMPLE **10-20-23 AM CAD-8663-PIT #1**
TYPE **Liquid Manure**
SOURCE **Dairy**
STORAGE **Pit**
LAB NUM **BN1576**



SUBMITTED FOR:
CAD
,

SUBMITTED BY: **RI4170**
RIVERVIEW FARMS
26406 470TH AVE
MORRIS, MN 56267

MOISTURE **96**
DRY MATTER **3.5**

Date Sampled | Date Received **10/23/23** | Date Reported **11/13/2023**

	Dry Basis	As Received	lbs/1000 gal
Total Nitrogen (N):		**0.27 %**	**22**
Ammonium Nitrogen:			
Nitrate Nitrogen:			
Inorganic Nitrogen:			
Organic Nitrogen:			
Phosphate (P2O5):	**3.0 %**	**0.100 %**	**8.3**
Potash (K2O):	**7.5 %**	**0.26 %**	**22**
Sodium:	**3.1 %**	**0.11 %**	**9.1**
Calcium:	**2.8 %**	**0.099 %**	**8.2**
Magnesium:	**2.3 %**	**0.081 %**	**6.7**
Zinc:	**316 ppm**	**11.0 ppm**	**0.091**
Iron:	**712 ppm**	**25 ppm**	**0.21**
Manganese:	**250 ppm**	**8.7 ppm**	**0.072**
Copper:	**203 ppm**	**7.1 ppm**	**0.059**
Sulfur:	**0.90 %**	**0.031 %**	**2.6**
Chloride:			
pH:			
Salts:			
Total Carbon:			
Volatile Solids:			
Bulk Density:			
Percent Ash:			

Exhibit 9

REPORT OF CAROLINE D'HUYVETTER, NUTRIENT MANAGEMENT TSP #18-22299

May 30, 2025

To whom it may concern,

After review of the Nutrient Management Plan written for Herberg Dairy, several items were found lacking. The current plan that was reviewed, submission date February 21, 2025, contains the following errors and omissions as required under North Dakota Administrative Code – Chapter 33.1-16-01, Chapter 33.1-16-03.1 as well as the North Dakota Livestock Program Design Manual – Section 7.

Missing Items from North Dakota Livestock Program Design Manual Section 7.3

Item 4: "*Fields where manure will be applied during frozen conditions shall be identified;"*

- Although manure is not planned to be applied on frozen soil, fields should be identified in case of an emergency.

Item 5: "*Current and/or planned plant production sequence or crop rotation. Also include alternative crops that may be planted;"*

- Throughout the plan three different crop rotations are shown, a corn grain-soybean rotation, a corn silage-soybean-alfalfa-sugar beet-wheat rotation, and a corn silage-wheat-oats-alfalfa rotation. These varying rotations have different nutrient requirements and it should be made clear which is the planned rotation going forward.

Item 6: *"Complete nutrient budget for nitrogen and phosphorous for the rotation or crop sequence that considers all potential sources of these nutrients;"*

- There was no attempt to make a complete nutrient budget for an entire rotation to ensure that the land base available to the CAFO can utilize all the nutrients produced. There was no mention of second year nitrogen manure credits, legume nitrogen credits, or purchased commercial fertilizer.
- An attempt was made on page 218 to quantify a single year of nutrient requirements, but nitrogen needs for sugar beets was grossly overestimated according to NDSU Extension publication SF882: *North Dakota Fertilizer Recommendation Tables (Revised October 2023)*
  Also on page 218 there's no reference to what publication they used to make the nutrient removal estimations. In a previous submission, they did make reference to an outdated NDSU publication, which has been retired.

Item 8: "*Quantify all nitrogen and phosphorus sources;"*

- There was no mention of second year nitrogen manure credits, legume nitrogen credits, or purchased commercial fertilizer.

Item 9: "*Recommended nitrogen and phosphorous rates, timing, method of application and incorporation;"*

- The plan made no mention of planned rates, timing, method of application, or incorporation (Reference: Pages 211-217).

Item 10: "*The form of manure (liquid or solid) and the expected frequency of land application. Maximum application rates of manure, litter, and process wastewater for each year, for each crop identified in the NMP with rates expressed in chemical form and pounds per acre for each field used for land application."*

- The plan made no mention of planned rates, timing, method of application, or incorporation

Item 13: "*A field-specific assessment of the potential for nitrogen and phosphorous transport from the field to surface waters."*

- Erosion calculations were made with the corn grain-soybean rotation, calculations should be made using the planned rotation.
- Additionally, there were also no wind erosion calculations provided. The area proposed for this CAFO is prone to very high wind erosion as seen in this publication from the University of Minnesota Extension (https://extension.umn.edu/soil-management-and-health/reduce-wind-erosion-long-term-profitability).

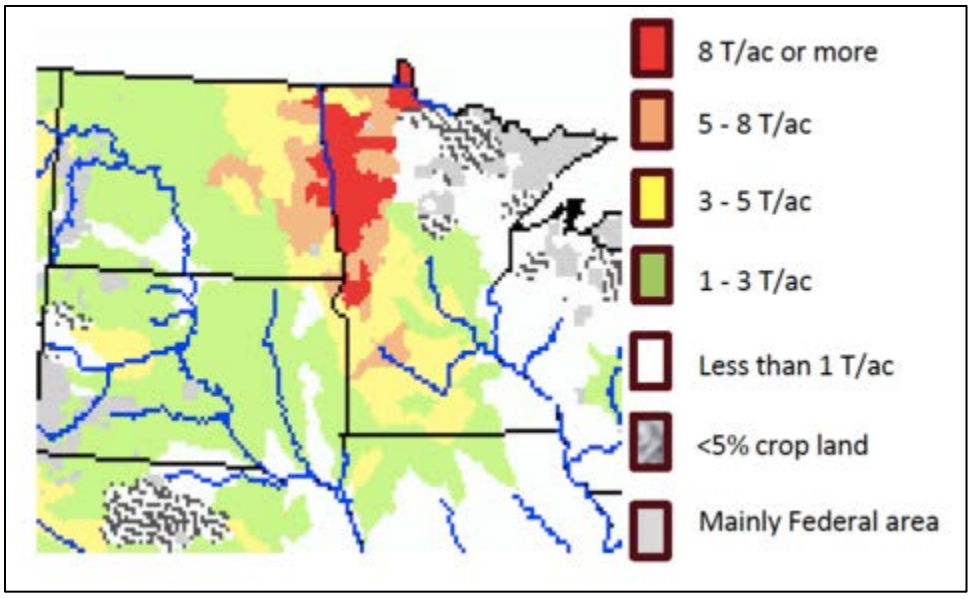


Figure 4: Average annual soil erosion by wind for cropland in Minnesota and North and South Dakota.

Please reach out to me with any questions you may have.

Sincerely,

Caroline D'Huyvetter
Nutrient Management TSP #18-22299

Appendix A – Studies/Articles-Bibliography

33 United States Code (U.S.C.) 1311 Effluent limitations
https://www.law.cornell.edu/uscode/text/33/1311.

33 United States Code (U.S.C.) 1318 Records and Reports; Inspections
https://www.govinfo.gov/content/pkg/USCODE-2011-title33/html/USCODE-2011-title33-chap26-subchapIII-sec1318.htm.

33 United States Code (U.S.C.) 1342 National pollutant discharge elimination system
https://www.law.cornell.edu/uscode/text/33/1342.

33 United States Code (U.S.C.) 1362 Definitions https://www.law.cornell.edu/uscode/text/33/1362.

40 CFR 122.23 Concentrated animal feeding operations https://www.law.cornell.edu/cfr/text/40/122.23.

40 CFR 122.4, 123.25 Prohibitions https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-122/subpart-A/section-122.4.

40 CFR 122.44 Establishing limitations, standards, and other permit conditions
https://www.law.cornell.edu/cfr/text/40/122.44.

68 Fed. Reg. 7,176, 7,181 (Feb. 12, 2003); JoAnn Burkholder et al., "Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality", 115(2) *ENV'T HEALTH PERSPS*. 308 (Feb. 2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817674/.

68 Fed. Reg. 7,176, 7,186; Xunde Li et al., *Fecal Indicator and Pathogenic Bacteria and Their Antibiotic Resistance in Alluvial Groundwater of an Irrigated Agricultural Region with Dairies*, 44 J. Envtl. Quality 1435, 1435 (2015).

68 Fed. Reg. 7,236; Laura M. Bexfield et al., *Hormones and Pharmaceuticals in Groundwater Used as a Source of Drinking Water Across the United States*, 53 Envtl. Sci. & Tech 2950, 2950-51, 2958 (2019); see also Scott A. Bradford ET AL., U.S. Dep't Agric. (2008), Reuse of Concentrated Animal Feeding Operation Wastewater on Agricultural Land,
https://www.ars.usda.gov/arsuserfiles/20360500/pdf_pubs/P2194.pdf

68 Fed. Reg. at 7,181; EPA, Managing CAFO Manure at 2-25 2-26 (discussing voluntary controls to minimize spills and leaks from storage structures), 4-2 (noting that certain CAFOs must have "reception pits…, diversion, sediment basins, and underground outlets"); 4-15 (describing irrigation systems for applying CAFO waste), 7-2 (discussing "unplanned discharges" from pumps and pipes), 0-10 (explaining that fields with subsurface (tile) drainage "create a surface water pollution hazard from direct tile discharge"); EPA, Risk Assessment Evaluation for Concentrated Animal Feeding Operations, EPA/600/R-04/042, at 52, 72-73 (May 2004),
https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=NRMRL&dirEntryId=85107; Nat'l Pork Producers Council v. U.S. E.P.A., 635 F .3d 738, 748 (5th Cir. 2011) (agreeing with EPA's position that "litter discharged through confinement house ventilation fans" would be a Clean Water Act violation).

73 Fed. Reg. 70,418, 70,469 (Nov. 20, 2008) (explaining that only about 25 percent of CAFOs are not designed to discharge).

Adeel M. et al., *Environmental Impacts of Estrogens on Human, Animal and Plant Life: A Critical Review,* 99 Env't Int'l 107 (2017), https://pdf.sciencedirectassets.com/271763/1-s2.0-S0160412016X00104/1-s2.0-S0160412016304494/main.pdf.

Admin, L., (2019) "Liquid Manure Storage Ponds, Pits, and Tanks" *Livestock And Poultry Environmental Learning Community.* Available at Liquid Manure Storage Ponds, Pits, and Tanks – Livestock and Poultry Environmental Learning Community.

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Appendix B – Mortality Management Plan Approval

Doug Goehring
AGRICULTURE COMMISSIONER

Dr. Ethan Andress
STATE VETERINARIAN

Dr. Beth Carlson
DEPUTY STATE VETERINARIAN

Dr. Margo Kunz
ASSISTANT STATE VETERINARIAN

Dr. Gerald Kitto, McClusky
PRESIDENT, VETERINARIAN

Warren Zenker, Gackle
SECRETARY, COMMERCIAL BEEF CATTLE

Dr. Quynn Steichen, Fargo
CONSULTING VETERINARIAN

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Ryan Homelvig, New Rockford
BISON

Christopher Ryckman, Bismarck
NONTRADITIONAL LIVESTOCK

July 8, 2025

Brett Boyum, DVM
Riverview
26406 470th Avenue
Morris, Minnesota 56267

Dear Dr. Boyum,

The attached disposal plan (Herberg Dairy), as directed by North Dakota Century Code. § 36-14-19(3), is approved.

Disposal management, if conducted in accordance with the attached plan, would satisfactorily limit disease risks and fulfill applicable State legal and regulatory requirements.

To ensure the plan is being properly and consistently implemented, the North Dakota state veterinarian's office shall periodically inspect the facility.

Additionally, Riverview must coordinate with the North Dakota Department of Environmental Quality (DEQ) for inspection of its facilities to ensure compliance with applicable environmental requirements. As an initial part of this coordination, Riverview should timely submit its building design to DEQ and comply with that agency's requirements prior to beginning construction.

As this project moves forward, the State Veterinarian's Office looks forward to working with and assisting Riverview in achieving and maintaining proper levels of biosecurity and meeting the needs of its customers and community.

Sincerely,

Ethan Andress, DVM
North Dakota State Veterinarian
North Dakota Department of Agriculture | Board of Animal Health

cc: Doug Goehring, Agriculture Commissioner
Gerald Kitto, DVM, President, Board of Animal Health
Dave Glatt, Director, Department of Environmental Quality

Herberg Dairy Mortality Management Plan

Based on North Dakota Century Code § 36-14-19, Riverview ND, LLP has proposed the following mortality management practices for approval by the state veterinarian:

1. **Rendering Depot Plans and Specifications**

Riverview ND, LLP has designed the dairy site with a specialized "Rendering Depot" to manage mortalities. The rendering depot will be built as a distinct, physically distanced structure from animal housing and production areas. This facility will be built on an impervious surface, and all potential drainage from this facility will be captured and contained in a covered basin. The Rendering Depot is an enclosed structure with a roof, concrete sides with solid panels, locked doors, and is sufficiently sized to accommodate mortalities for 72 hours. See below for location on site map and photo.

2. **Mortalities will be removed every 72 hours**

Riverview ND, LLP will contract a rendering service to remove mortalities every 72 hours. The licensed rendering service provider will also comply with farm biosecurity expectations.

Given Herberg Dairy's location in rural North Dakota, it is not always possible to schedule rendering services for pickup within thirty-six hours. North Dakota Century Code § 36-14-19(3), however, allows alternative plans upon state veterinarian approval.

3. **Best Management Practices for pest and odor control.**

Riverview ND, LLP uses good hygiene practices in all production areas, including the mortality management area. The Rendering Depot will be cleaned as needed. The fly control protocol includes biological measures, such as predator wasps, and approved pesticides as needed. Riverview ND, LLP uses bait and traps for the control of rodents.

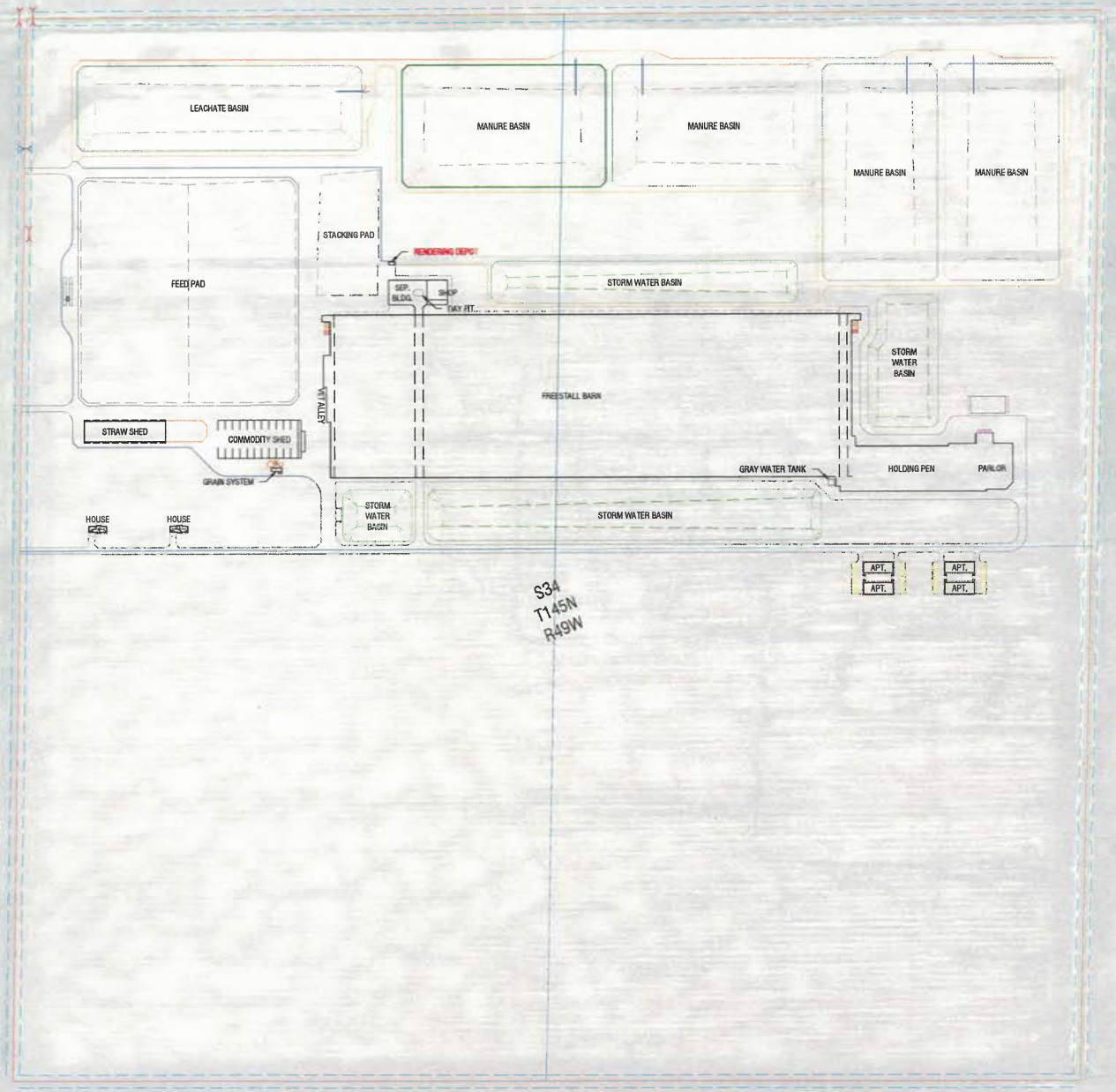
Mortalities are promptly removed from the production area and separately placed pending pickup by a licensed rendering service. Mortalities are housed in an enclosed area, out of direct sunlight, while pending pickup by a rendering service. The Rendering Depot is cleaned after every pickup, which also reduces odor from the mortalities.

Photo of Rendering Depot



Location on Site Map

*Labeled in red



- PRELIMINARY -
- NOT FOR CONSTRUCTION -

RIVERVIEW
Riverview, LLP
26406 470th Ave.
Morris, MN 56267
www.RiverviewLLP.com

THIS DRAWING IS THE PROPERTY OF RIVERVIEW, LLP, AND IS NOT TO BE REPRODUCED IN ANY MANNER WITHOUT WRITTEN PERMISSION.

JOBSITE ADDRESS:
HERBERG DAIRY
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PROJECT: HERBERG DAIRY
SHEET TITLE: SITE PLAN
SHEET DESCRIPTION: PRELIMINARY - NOT FOR CONSTRUCTION

DATE: 06/18/25
DRAWN BY: JCN
SHEET SIZE: 24" x 30"
SHEET NO: SP01

Appendix C – Updated RUSLE2 and P Index

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NUTRIENT MANAGEMENT PLAN
FOR
ANIMAL FEEDING OPERATIONS

Field Information

Operator: Herberg Dairy **County:** **Date:** 09/15/24

Line #	17. Field ID (Include maps to illustrate location) Name or Tract	Field #	18. Date added to Plan	19. Beginning acres in field	20. County	21. Soil map unit symbol	22. Field Location: Township, Range)	(1/4 Section,	23. Predicted soil loss - Wind/Water (T/ac/yr)	24. Control of Land	25. 100' Vegetated Buffer	Excluded acres	26. Irrigated	27. Winter Application	28. No-Till	29. Current Soil Test Levels: N lb/ac 0-2'	N lb/ac 2-4'	Phosphorus (ppm) 0-6"	Phosphorus (ppm) P Test	K (ppm)	Organic Matter	Soil PH	Electric Conductivity (EC) Surface	Electric Conductivity (EC) Sub-surface	Soil Sample Date
1	Clyde's	1	9/15/24	507.2				Sec. 12 & 13 , T 144 , R 50	0.2	Leased		95.1				18		15	Olsen	332	5.6%	8.1	0.55		08/15/24
2	Mabel's	2	9/15/24	154.1			NW 1/4	Sec. 25 , T 145 , R 50	0.2	Leased		1.6				6		24	Olsen	268	5.0%	7.9	1.88		08/15/24
3	South 1/4	3	9/15/24	214.2			W 1/2	Sec. 33 , T 145 , R 50	0.4	Leased		49.6				8		16	Olsen	313	6.0%	8.0	0.24		09/05/24
4	Behind Shop	4	9/15/24	279.4			S 1/2	Sec. 28 , T 145 , R 50	0.2	Leased		0.1				5		31	Olsen	381	7.0%	7.5	0.19		09/05/24
5	Kyle's 1/4	5	9/15/24	156.2			SW 1/4	Sec. 27 , T 145 , R 50	0.2	Leased		0.0				22		27	Olsen	361	4.1%	8.0	0.53		08/23/24
6	Danny's	6	9/15/24	516.8			ALL	Sec. 31 , T 145 , R 50	0.4	Leased		56.4				6		7	Olsen	181	5.2%	7.2	0.17		09/05/24
7	Andys	7	2/14/25	272.1			W 1/2	Sec. 7 , T 144 , R 50	0.1	Leased		0.0				9		8	Olsen	272	4.3%	7.8	0.44	0.56	10/06/23
8	Shornecks	8	2/14/25	154.8			NW 1/4	Sec. 8 , T 144 , R 50	0.4	Leased		0.0				8		28	Olsen	319	4.9%	7.7	0.37	0.59	10/11/23
9								Sec. , T , R																	
10								Sec. , T , R																	
11								Sec. , T , R																	
12								Sec. , T , R																	
13	Anderson Home	13	9/15/24	302.5			E 1/2	Sec. 20 , T 145 , R 49	0.4	Leased		2.3				12		4	Olsen	139	3.6%	8.3	0.65		08/15/24
14	McNamee South of Home	14	2/14/25	534.2			ALL	Sec. 1 , T 144 , R 50	0.1	Leased		7.4				8		10	Olsen	338	5.9%	7.8	0.54	0.98	09/11/23
15	McNamee Home	15	9/15/24	288.6			S 1/2	Sec. 31 , T 145 , R 49	0.2	Leased		3.6				9		15	Olsen	313	5.2%	7.9	1.6		08/15/24
16	McNamee Section 6	16	9/15/24	156.1			SW 1/4	Sec. 6 , T 144 , R 49	0.2	Leased		0.0				5		12	Olsen	437	6.1%	8.1	0.59	1.09	09/12/23
17	McNamee Section 7	17	9/15/24	156.5			NW 1/4	Sec. 7 , T 144 , R 49	0.2	Leased		6.9				7		7	Olsen	364	5.6%	8.2	0.7	1.0	09/12/23
18	15F2	18	9/15/24	309.5			S 1/2	Sec. 15 , T 144 , R 50	0.2	Leased		0.6				39		42	Olsen	367	5.2%	8.0	1.03		08/15/24
19	McInnes Section 10	19	9/15/24	152.9			SW 1/4	Sec. 10 , T 144 , R 50	0.2	Leased		4.8				29		52	Olsen	518	5.3%	8.0	0.65		08/15/24
20	Kelso 16	20	2/14/25	54.3			E 1/2, NW 1/4	Sec. 16 , T 144 , R 50	0.2	Leased		2.3				38		7	Olsen	392	4.3%	8.1	0.61	0.75	10/16/24
21	Noble 6	21	2/14/25	154.7			NE 1/4	Sec. 6 , T 143 , R 49	0.1	Leased		10.3				15		9	Olsen	357	3.9%	8.4	0.37	0.56	10/12/24
22	22W	22	2/14/25	151.9			W 1/2, W 1/2	Sec. 22 , T 144 , R 50	0.2	Leased		1.9				7		18	Olsen	450	4.6%	7.9	0.7		10/02/23
23								Sec. , T , R																	
24	Harvey 10	24	9/15/24	309.4			E 1/2	Sec. 10 , T 144 , R 49	0.4	Leased		44.9				8		24	Olsen	265	6.0%	8.1	0.71		08/15/24
25	Henka Section 32	25	9/15/24	150.9			NW 1/4	Sec. 32 , T 145 , R 49	0.2	Leased		4.9				23		19	Olsen	374	4.5%	8.1	0.52		08/15/24
26	Henka Section 30 1/4	26	9/15/24	157.7			SW 1/4	Sec. 30 , T 145 , R 49	0.2	Leased		2.2				8		9	Olsen	284	4.4%	8.1	0.39		08/15/24
27	Henka Section 30 80	27	9/15/24	79.7			S 1/2, SE 1/4	Sec. 30 , T 145 , R 49	0.2	Leased		2.4				7		35	Olsen	367	5.1%	8.0	0.36		08/15/24
28	Henka Section 14	28	9/15/24	153.9			SE 1/4	Sec. 14 , T 145 , R 50	0.2	Leased		6.5				4		6	Olsen	319	5.0%	8.0	0.43		08/15/24
29	Henka Home	29	9/15/24	447.9			75%	Sec. 12 , T 145 , R 50	0.2	Leased		4.7				9.5		7	Olsen	295	3.9%	8.3	0.55	0.73	09/07/23
30	Henka Section 7	30	9/15/24	610.8			ALL	Sec. 7 , T 145 , R 49	0.4	Leased		9.0				16		14	Olsen	190	5.2%	8.2	0.29		08/15/24
31	Henka North of Home	31	9/15/24	158.4			SW 1/4	Sec. 1 , T 145 , R 50	0.2	Leased		0.0				7		8	Olsen	297	4.2%	8.2	0.45	1.15	10/06/23
32	Herberg 27	32	9/15/24	632.2			ALL	Sec. 27 , T 145 , R 49	0.4	Leased		73.0				8		6	Olsen	205	5.0%	8.1	0.69		08/15/24
33								Sec. , T , R																	
34								Sec. , T , R																	
35								Sec. , T , R																	
36								Sec. , T , R																	
37	Kim's Section 10	37	9/15/24	155.2			NW 1/4	Sec. 10 , T 144 , R 49	0.4	Leased		3.1				15		19	Olsen	281	5.2%	8.2	0.43		09/03/24
38	Tod Section 10	38	9/15/24	154.3			SW 1/4	Sec. 10 , T 144 , R 49	0.4	Leased		0.0				9		12	Olsen	246	6.7%	8.1	0.34		08/15/24
39	Section 23 North	39	9/15/24	230.6			NE 1/4	Sec. 23 , T 144 , R 49	0.4	Leased		123.5				10		17	Olsen	322	5.3%	8.1	0.36		09/03/24
40								Sec. , T , R																	
41	Tod's House	41	9/15/24	96.6			N 1/2, N 1/2	Sec. 28 , T 144 , R 49	0.2	Leased		11.0				2		14	Olsen	391	5.0%	8.0	0.72		08/15/24
42	Tod Section 28	42	9/15/24	316.6			S 1/2	Sec. 28 , T 144 , R 49	0.2	Leased		59.7				4		3	Olsen	310	3.8%	8.1	0.29		08/15/24
43								Sec. , T , R																	
44	Jeff McInnes Section 10	44	9/15/24	148.5			NW 1/4	Sec. 10 , T 144 , R 50	0.2	Leased		0.0				15		50	Olsen	484	5.5%	8.0	0.7		08/15/24
45	McInnes Home	45	9/15/24	295.1			N 1/2	Sec. 15 , T 144 , R 50	0.2	Leased		9.8				14		30	Olsen	486	5.2%	7.9	0.47		08/15/24
46	McInnes Section 23	46	9/15/24	154.5			SE 1/4	Sec. 23 , T 144 , R 50	0.2	Leased		0.9				26		63	Olsen	484	5.9%	7.8	0.55		08/15/24
47	Substation	47	9/15/24	159.2			E 1/2, W 1/2	Sec. 22 , T 144 , R 50	0.2	Leased		2.1				6		24	Olsen	502	5.0%	7.9	0.54		08/15/24

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Field Information

Operator: Herberg Dairy **County:** **Date:** 09/15/24

Line #	17. Field ID (Include maps to illustrate location) Name or Tract	Field #	18. Date added to Plan	19. Beginning acres in field	20. County	21. Soil map unit symbol	22. Field Location: Township, Range							23. Predicted soil loss - Wind/Water (T/ac/yr)	24. Control of Land	25. 100' Vegetated Buffer	25. Excluded acres	26. Irrigated	27. Winter Application	28. No-Till	29. Current Soil Test Levels: N lb/ac 0-2'	N lb/ac 2-4'	Phosphorus (ppm) 0-6"	Phosphorus (ppm) P Test	K (ppm)	Organic Matter	Soil PH	Electric Conductivity (EC) Surface	Electric Conductivity (EC) Sub-surface	Soil Sample Date
48	Section 21 E of Tracks	48	9/15/24	227.0			E 1/2	Sec.	21	, T	144	, R	50	0.2	Leased		4.4				10		14	Olsen	429	4.4%	8.0	0.37		08/15/24
49	Viker Home	49	9/15/24	590.7			ALL	Sec.	21	, T	145	, R	49	0.4	Leased		5.4				7		17	Olsen	318	5.8%	8.2	0.34		08/15/24
50	South Home	50	9/15/24	573.4			ALL	Sec.	28	, T	145	, R	49	0.4	Leased		36.3				11		6	Olsen	183	5.9%	8.0	0.75		08/15/24
51	South of Dairy	51	9/15/24	311.2			S 1/2	Sec.	34	, T	145	, R	49	0.4	Leased		74.2				9		27	Olsen	388	5.4%	8.1	0.39		08/15/24
52								Sec.		, T		, R																		
53								Sec.		, T		, R																		
54	August's	54	9/15/24	423.9			75%	Sec.	32	, T	145	, R	49	0.2	Leased		8.6				5		19	Olsen	337	6.2%	8.1	0.51		08/15/24
55	Poland	55	9/15/24	155.4			NW 1/4	Sec.	30	, T	145	, R	49	0.2	Leased		5.8				4		5	Olsen	263	5.3%	8.1	0.38		08/15/24
56	East Section 5	56	9/15/24	302.0			E 1/2	Sec.	5	, T	145	, R	49		Leased		0.0				16		25	Olsen	274	5.2%	8.1	0.29		08/15/24
57								Sec.		, T		, R																		
58								Sec.		, T		, R																		
59	Caledonia 30	59	9/15/24	56.2			E 1/2, SE 1/4	Sec.	30	, T	146	, R	49	0.2	Leased		20.1				12		19	Olsen	318	6.3%	7.9	0.32		09/05/24
60	Herberg 17	60	9/15/24	317.3			N 1/2	Sec.	17	, T	145	, R	49	0.4	Leased		18.2				12		20	Olsen	329	4.7%	8.1	0.36		08/15/24
61								Sec.		, T		, R																		
62	Oanes Home	62	9/15/24	295.4			S 1/2	Sec.	17	, T	145	, R	49	0.4	Leased		0.7				4		6	Olsen	340	4.7%	8.2	0.28		08/15/24
63								Sec.		, T		, R																		
64								Sec.		, T		, R																		
65								Sec.		, T		, R																		
66								Sec.		, T		, R																		
67	Home Section	67	9/15/24	600.0			ALL	Sec.	24	, T	145	, R	50	0.2	Leased		13.3				10		9	Olsen	356	5.6%	8.1	0.37		08/15/24
68	Herberrg 6	68	9/15/24	76.9			W 1/2, SW 1/4	Sec.	6	, T	145	, R	49	0.2	Leased		0.0				4		12	Olsen	335	5.1%	8.1	0.3		08/15/24
69	Warner 80	69	9/15/24	77.9			N 1/2, NE 1/4	Sec.	16	, T	145	, R	49	0.2	Leased		2.3				33		10	Olsen	292	4.2%	8.4	0.53	0.91	10/06/22
70								Sec.		, T		, R																		
71								Sec.		, T		, R																		
72	Home 1/4	72	9/15/24	148.3			SE 1/4	Sec.	29	, T	146	, R	49	0.2	Leased		23.4				9		3	Olsen	336	4.8%	8.0	0.58	0.92	10/06/22
73	N 80	73	9/15/24	79.8			N 1/2, SW 1/4	Sec.	8	, T	146	, R	49	0.4	Leased		0.0				31		3	Olsen	138	3.3%	8.2	1.3	1.83	10/24/22
74	Dales 1/2 Section	74	9/15/24	309.6			S 1/2	Sec.	31	, T	146	, R	49	0.4	Leased		1.4				57		11	Olsen	301	4.6%	8.2	0.86	1.2	10/21/23
75	Jay's Section 28	75	9/15/24	155.1			SE 1/4	Sec.	28	, T	146	, R	49	0.2	Leased		0.0				21		19	Olsen	284	5.0%	8.2	0.96	0.83	10/06/22
76								Sec.		, T		, R																		
77								Sec.		, T		, R																		
78								Sec.		, T		, R																		
79								Sec.		, T		, R																		
80	Caledonia 1/4	80	9/15/24	156.2			NE 1/4	Sec.	10	, T	146	, R	49	0.4	Leased		0.0				25		11	Olsen	253	5.0%	8.4	0.76	1.24	10/06/23
81								Sec.		, T		, R																		
82								Sec.		, T		, R																		
83	Solee 28	83	9/15/24	76.4			S 1/2, SW 1/4	Sec.	28	, T	146	, R	49	0.2	Leased		0.0				33		5	Olsen	295	4.8%	8.0	0.84	0.8	10/06/22
84								Sec.		, T		, R																		
85	Brady	85	9/15/24	304.4			W 1/2	Sec.	19	, T	144	, R	49	0.1	Leased		124.7				28	6	8	Olsen	308	5.2%	8.2	0.72	1.42	09/15/23
86	Tungseth 1/4	86	9/15/24	155.2			NE 1/4	Sec.	20	, T	144	, R	49	0.1	Leased		0.0				59		15	Olsen	446	4.8%	7.8	0.67	0.6	10/27/23
87	Tungseth 51	87	9/15/24	46.7			E 1/2, SE 1/4	Sec.	20	, T	144	, R	49	0.2	Leased		0.0				59		15	Olsen	446	4.8%	7.8	0.67	0.6	10/27/23
88	Gadberry Section 4	88	2/14/25	467.7			N 1/2 & SW 1/4	Sec.	4	, T	143	, R	49	0.2	Leased		14.5				79		9	Olsen	478	4.6%	8.1	0.62	0.55	10/23/23
89	Gadberry 200	89	2/14/25	194.8			S 1/2	Sec.	3	, T	143	, R	49	0.1	Leased		9.8				44		9	Olsen	346	4.6%	8.1	0.79	0.55	09/29/23
90	Gadberry Home	90	9/15/24	278.2			N 1/2	Sec.	30	, T	144	, R	49	0.1	Leased		0.0				58	24	7	Olsen	363	4.8%	8.0	0.68	1.42	09/15/23
91	Highline	91	9/15/24	152.0			NW 1/4	Sec.	24	, T	144	, R	50	0.2	Leased		4.5				62	12	10	Olsen	330	4.1%	8.1	0.57	1.05	09/22/23
92								Sec.		, T		, R																		
93	Caledonia 32	93	9/15/24	154.5			NE 1/4	Sec.	32	, T	146	, R	49	0.2	Leased		0.0				15		7	Olsen	297	5.3%	8.1	0.46	0.44	09/12/22
94	Fossum 28	94	9/15/24	75.3			W 1/2, NW 1/4	Sec.	28	, T	146	, R	49	0.2	Leased		22.1				6		30	Olsen	471	6.0%	6.8	0.3		09/05/24
95								Sec.		, T		, R																		

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96	McAndrew 80	96	2/14/25	79.8			S 1/2, NW 1/4	Sec.	3	, T	143	, R	49		0.2	Leased		0.0				53		9	Olsen	353	4.0%	8.2	0.64	0.83	09/21/23
97	Section 10	97	2/14/25	158.1			NE 1/4	Sec.	10	, T	143	, R	49		0.1	Leased		5.1				13		10	Olsen	257	3.8%	8.2	0.61	0.79	09/14/23
98	River 1/4	98	2/14/25	153.3			NW 1/4	Sec.	11	, T	143	, R	49		0.2	Leased		0.1				30		6	Olsen	294	5.0%	8.2	0.58	0.63	09/05/23
99								Sec.		, T		, R																			
100	Hillboro 15	100	9/15/24	225.9			E 1/2	Sec.	15	, T	145	, R	50		0.2	Leased		0.0				34		23	Olsen	392	5.8%	8.0	0.44		08/15/24
101								Sec.		, T		, R																			
102	Paulsrud Section 6	102	9/15/24	241.2			N 1/2	Sec.	6	, T	144	, R	49		0.2	Leased		10.1				6		13	Olsen	441	5.0%	8.1	0.35		09/03/24
103	Elm River 18	103	9/15/24	554.7			ALL	Sec.	18	, T	144	, R	49		0.1	Leased		132.8				10		14	Olsen	358	6.2%	8.0	0.42		08/15/24
104	Elm River 17	104	9/15/24	122.2			SE 1/4	Sec.	17	, T	144	, R	49		0.1	Leased		19.5				9		9	Olsen	393	5.7%	7.9	0.41		08/15/24
105								Sec.		, T		, R																			
106								Sec.		, T		, R																			
107	Paulsrud Section 7	107	9/15/24	156.3			SW 1/4	Sec.	7	, T	144	, R	49		0.2	Leased		24.4				5		5	Olsen	298	4.9%	8.2	0.66		08/15/24
108	Elm River 21	108	9/15/24	80.2			N 1/2, NE 1/4	Sec.	21	, T	144	, R	49		0.2	Leased		0.0				2		5	Olsen	219	3.6%	8.4	0.53		08/15/24
109	Section 2 Kinyon	109	2/14/25	624.3			ALL	Sec.	2	, T	143	, R	50		0.2	Leased		10.9				12		7	Olsen	385	5.3%	8.3	0.4	0.94	08/30/23
110	Kinyon Highway	110	2/14/25	143.0			NE 1/4	Sec.	10	, T	143	, R	50		0.2	Leased		5.8				8		4	Olsen	323	5.1%	8.2	0.58	0.61	09/15/23
111	Kelso 27	111	9/15/24	312.1			E 1/2	Sec.	27	, T	144	, R	50		0.2	Leased		6.4				130		51	Olsen	515	5.1%	7.9	0.79		08/15/24
112	Elm River 5	112	9/15/24	569.5			ALL	Sec.	5	, T	144	, R	49		0.4	Leased		80.9				8		8	Olsen	236	5.1%	8.4	0.37		08/15/24
113	Dallas/Mary Ann's 80	113	9/15/24	76.4			S 1/2, SW 1/4	Sec.	8	, T	146	, R	49		0.4	Leased		0.0				31		3	Olsen	138	3.3%	8.2	1.3	1.83	10/24/22
114	Kim's Section 15	114	9/15/24	76.9			N 1/2, NW 1/4	Sec.	15	, T	144	, R	49		0.4	Leased		0.0				8		15	Olsen	336	6.2%	8.1	0.28		08/15/24
115								Sec.		, T		, R																			
116								Sec.		, T		, R																			
117								Sec.		, T		, R																			
118								Sec.		, T		, R																			
119								Sec.		, T		, R																			
120	Caledonia 27	120	9/15/24	79.5			N 1/2, SW 1/4	Sec.	27	, T	146	, R	49		0.2	Leased		16.5				5		4	Olsen	316	5.4%	8.1	0.27		09/05/24
121								Sec.		, T		, R																			
122								Sec.		, T		, R																			
123	Hansen Section 16	123	9/15/24	79.0			E 1/2, SW 1/4	Sec.	16	, T	144	, R	49		0.1	Leased		8.2				43		8	Olsen	266	3.1%	8.3	0.96		08/15/24
124	Marshall Hansen Sec 16	124	9/15/24	78.6			W 1/2, SW 1/4	Sec.	16	, T	144	, R	49		0.1	Leased		0.0				5		10	Olsen	378	5.1%	8.2	0..33		08/15/24
125	Helgoe	125	9/15/24	154.5			SW 1/4	Sec.	15	, T	145	, R	50		0.2	Leased		0.0				61		16	Olsen	315	5.7%	8.0	0.62		08/15/24
126	Bovard 1/2	126	9/15/24	312.0			E 1/2	Sec.	9	, T	145	, R	50		0.4	Leased		11.5				7		9	Olsen	506	5.0%	8.0	0.37		09/05/24
127	Clara's	127	9/15/24	117.2			SW 1/4	Sec.	8	, T	145	, R	50		0.1	Leased		3.1				6		3	Olsen	397	5.5%	7.9	0.37		09/05/24
128	Diehl Home	128	9/15/24	152.1			E 1/2	Sec.	8	, T	145	, R	50		0.4	Leased		3.4				10		7	Olsen	238	4.3%	8.1	0.34		09/05/24
129	McInness Farm	129	2/14/25	154.8			SE 1/4	Sec.	4	, T	143	, R	49		0.2	Leased		3.9				5		3	Olsen	330	4.0%	8.3	0.49	0.88	10/04/24
130								Sec.		, T		, R																			
131								Sec.		, T		, R																			
132								Sec.		, T		, R																			
133	Karla NE	133	9/15/24	158.8			NE 1/4	Sec.	22	, T	145	, R	50		0.2	Leased		2.6				11		12	Olsen	360	6.9%	7.7	0.46		08/15/24
134	Karla SW	134	9/15/24	155.6			SW 1/4	Sec.	22	, T	145	, R	50		0.2	Leased		0.0				29		19	Olsen	488	6.2%	7.8	0.54		08/15/24
135	Karla SE	135	9/15/24	129.7			SE 1/4	Sec.	22	, T	145	, R	50		0.2	Leased		0.0				13		15	Olsen	486	6.7%	7.8	0.35		09/05/24
136								Sec.		, T		, R																			
137								Sec.		, T		, R																			
138								Sec.		, T		, R																			
139								Sec.		, T		, R																			
140								Sec.		, T		, R																			
141	Cactus Section	141	9/15/24	620.9			ALL	Sec.	33	, T	146	, R	49		0.2	Leased		65.5				13		6	Olsen	300	5.0%	8.3	0.38		08/15/24
142								Sec.		, T		, R																			
143								Sec.		, T		, R																			

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144									Sec.	, T	, R																		
145									Sec.	, T	, R																		
146									Sec.	, T	, R																		
147									Sec.	, T	, R																		
148									Sec.	, T	, R																		
149									Sec.	, T	, R																		
150									Sec.	, T	, R																		
151	McDonald 1/4	151	9/15/24	159.8			SE 1/4		Sec.	10	, T 146 , R 49	0.4	Leased		0.0				14		3	Olsen	233	5.0%	8.2	1.17	1.94	09/30/23
152	The 120	152	9/15/24	114.6			SW 1/4		Sec.	3	, T 146 , R 49	0.4	Leased		0.0				10		6	Olsen	222	5.0%	8.3	0.8	1.41	09/30/23
153	North 80	153	9/15/24	74.6			N 1.2, NW 1/4		Sec.	3	, T 146 , R 49	0.4	Leased		5.0				22		7	Olsen	274	4.0%	8.2	0.92	2.44	11/09/23
154									Sec.		, T , R																		
155									Sec.		, T , R																		
156	Gary 180	156	9/15/24	182.4			S 1/2, N 1/2		Sec.	28	, T 144 , R 49	0.2	Leased		41.5				12		5	Olsen	318	4.4%	8.3	0.53	0.93	10/16/23
157	Gary 120	157	9/15/24	113.7			SE 1/4		Sec.	29	, T 144 , R 49	0.2	Leased		12.9				13		14	Olsen	319	5.2%	7.9	0.6	0.81	10/16/23
158	Gary 60	158	9/15/24	56.9			W 1/2, NW 1/4		Sec.	33	, T 144 , R 49	0.2	Leased		0.0				14		8	Olsen	376	4.3%	7.9	0.43	0.55	10/16/23
159									Sec.		, T , R																		
160	Herberg 18	160	9/15/24	463.3			75%		Sec.	18	, T 145 , R 49	0.2	Leased		21.7				16		14	Olsen	303	4.4%	8.4	0.39		08/15/24
161	Herberg 8	161	9/15/24	317.7			W 1/2		Sec.	8	, T 145 , R 49	0.4	Leased		7.1				10		7	Olsen	272	6.1%	8.1	0.26		09/05/24
162	Herberg 19	162	9/15/24	74.3			S 1/2, SE 1/4		Sec.	19	, T 145 , R 49	0.2	Leased		0.0				8		24	Olsen	386	6.0%	8.0	0.44		08/15/24
163									Sec.		, T , R																		
164	Zimmerman	164	9/15/24	285.9			E 1/2		Sec.	19	, T 144 , R 49	0.1	Leased		65.5				28		37	Olsen	728	4.9%	7.9	0.39		08/23/24
165	Herberg 31	165	9/15/24	289.8			N 1/2		Sec.	31	, T 145 , R 49	0.2	Leased		5.0				12		18	Olsen	457	4.8%	7.9	0.39		08/23/24
166	Herberg 33	166	9/15/24	619.5			ALL		Sec.	33	, T 145 , R 49	0.4	Leased		12.9				25		16	Olsen	230	4.4%	8.2	0.48		08/23/24
167	Hillsboro Airport	167	9/15/24	348.8			75%		Sec.	20	, T 145 , R 50	0.4	Leased		4.1				13		27	Olsen	283	5.3%	7.9	0.41		09/05/24
168	Hillsboro 28	168	9/15/24	198.8			N 1/2		Sec.	28	, T 145 , R 50	0.2	Leased		0.0				22		8	Olsen	307	5.3%	7.8	0.38		09/05/24
169	Hillsboro 34	169	9/15/24	306.5			E 1/2		Sec.	34	, T 145 , R 50	0.2	Leased		0.0				5		12	Olsen	505	5.7%	8.0	0.27		09/05/24
170	Hillsboro 35	170	9/15/24	606.9			ALL		Sec.	35	, T 145 , R 50	0.2	Leased		12.3				14		32	Olsen	472	4.8%	8.0	0.4		08/23/24
171	Hillsboro 36	171	9/15/24	594.1			ALL		Sec.	36	, T 145 , R 50	0.2	Leased		10.6				24		28	Olsen	550	4.8%	7.9	0.47		08/23/24
172	Herberg 29	172	9/15/24	310.8			S 1/2		Sec.	29	, T 145 , R 49	0.2	Leased		30.9				16		7	Olsen	369	5.0%	8.0	0.48		08/23/24
173	Herberg 29 NW	173	9/15/24	149.2			NW 1/4		Sec.	29	, T 145 , R 49	0.2	Leased		3.6				3		8	Olsen	381	5.6%	8.1	0.32		09/05/24
174	Hillsboro 29	174	9/15/24	550.8			ALL		Sec.	29	, T 145 , R 50	0.1	Leased		4.0				4		21	Olsen	203	4.5%	7.4	1.69		09/05/24
175	North Quarter	175	2/14/25	157.4			NW 1/4		Sec.	2	, T 146 , R 50	0.4	Leased		1.6				9		9	Olsen	173	4.3%	8.1	1.29		08/14/24
176	Orlin	176	2/14/25	143.8			SE 1/4		Sec.	2	, T 146 , R 50	0.4	Leased		0.5				7		2	Olsen	137	4.2%	8.2	0.33		08/14/24
177	Mike & Mark Red Barn	177	2/14/25	156.6			NW 1/4		Sec.	11	, T 146 , R 50	0.4	Leased		0.0				10		5	Olsen	150	4.3%	8.1	2.12		08/14/24
178	Henka Sec 14 Bloomfield	178	2/14/25	295.6			S 1/2		Sec.	14	, T 145 , R 51	0.2	Leased		32.7				22		12	Olsen	105	2.4%	8.1	0.29	0.47	10/11/23
179	Taft Road East	179	2/14/25	187.0			SE 1/4		Sec.	13	, T 146 , R 50	0.4	Leased		3.4				44		11	Olsen	178	4.0%	8.3	0.58	1.68	10/04/23
180	Taft Road West	180	2/14/25	38.8			E 1/2, SW 1/4		Sec.	13	, T 146 , R 50	0.4	Leased		0.0				44		11	Olsen	178	4.0%	8.3	0.58	1.68	10/04/23
181	Bohn 22	181	2/14/25	291.2			S 1/2		Sec.	22	, T 144 , R 51	0.2	Leased		43.9				43		16	Olsen	423	3.8%	7.4	0.9		11/03/23
182	Bohn 19	182	2/14/25	298.6			S 1/2		Sec.	19	, T 144 , R 51	0.1	Leased		0.0				65		34	Bray1	480	5.4%	6.4	1		10/20/23
183	Green 24	183	2/14/25	156.6			SE 1/4		Sec.	24	, T 144 , R 52	0.1	Leased		0.0				34		39	Bray1	532	5.6%	6.4	0.6		10/20/23
184	Green 36	184	2/14/25	217.9			SW 1/4&S 1/2,NW 1/4		Sec.	36	, T 144 , R 52	0.1	Leased		0.2				18		38	Bray1	423	5.3%	7.8	0.8		10/12/23
185	Beitz Home	185	2/14/25	140.8			NE 1/4		Sec.	6	, T 145 , R 49	0.2	Leased		0.0				10		3	Olsen	320	4.9%	8.1	0.39		09/16/24
186	NW Herberg 5	186	2/14/25	149.0			NW 1/4		Sec.	5	, T 145 , R 49	0.4	Leased		0.0				8		2	Olsen	274	4.2%	8.2	0.32		09/16/24
187	SW Herberg 5	187	2/14/25	11.3			Eeast 11 Ac		Sec.	5	, T 145 , R 49	0.4	Leased		0.0				12		11	Olsen	299	5.0%	8.1	0.38		09/16/24
188	SW Herberg 5	188	2/14/25	145.7			SW 1/4		Sec.	5	, T 145 , R 49	0.2	Leased		0.0				14		9	Olsen	309	5.1%	8.1	0.53		09/16/24
189	Steve Reinpold Home	189	2/14/25	150.3			NE 1/4		Sec.	18	, T 145 , R 49	0.4	Leased		4.8				8		4	Olsen	247	4.9%	8.1	0.33		09/16/24
190	Madsons	190	2/14/25	229.8			NE 1/4&E1/2,NW 1/4		Sec.	31	, T 145 , R 48	0.4	Leased		0.4				45		3	Olsen	287	4.4%	8.4	0.7	0.97	10/26/22
191	Church	191	2/14/25	213.5			NW 1/4&N1/2,SW1/4		Sec.	9	, T 145 , R 48	0.2	Leased		0.6				14		2	Olsen	265	4.1%	8.3	0.59	0.58	11/10/22

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NUTRIENT MANAGEMENT PLAN
FOR
NIMAL FEEDING OPERATIONS

Field Information

Operator: Herberg Dairy **County:** **Date:** 09/15/24

Line #	17. Field ID (Include maps to illustrate location) Name or Tract	Field #	18. Date added to Plan	19. Beginning acres in field	20. County	21. Soil map unit symbol	22. Field Location: Township, Range)	(1/4 Section,	23. Predicted soil loss - Wind/Water (T/ac/yr)	24. Control of Land	25. 100' Vegetated Buffer	Excluded acres	26. Irrigated	27. Winter Application	28. No-Till	29. Current Soil Test Levels: N lb/ac 0-2'	N lb/ac 2-4'	Phosphorus (ppm) 0-6"	Phosphorus (ppm) P Test	K (ppm)	Organic Matter	Soil PH	Electric Conductivity (EC) Surface	Electric Conductivity (EC) Sub-surface	Soil Sample Date
192	Gilbertsons	192	2/14/25	157.2			NE 1/4	Sec. 23 , T 145 , R 48	0.2	Leased		0.0				18		5	Olsen	259	4.7%	8.3	0.63	0.84	10/26/22
193	Charlies	193	2/14/25	288.9			N 1/2	Sec. 22 , T 145 , R 48	0.4	Leased		5.2				11		4	Olsen	185	3.6%	8.3	0.46	0.79	11/08/22
194	REA	194	2/14/25	143.2			SW 1/4	Sec. 20 , T 145 , R 48	0.1	Leased		0.0				41		3	Olsen	241	4.7%	8.2	0.83	1.35	11/11/22
195	Hellerud Home 1/4	195	2/14/25	140.7			SE 1/4	Sec. 23 , T 145 , R 48	0.2	Leased		0.4				22		5	Olsen	272	4.2%	8.5	0.42	0.46	10/26/22
196	Warner 1/2	196	2/14/25	320.0			W 1/2	Sec. 16 , T 145 , R 49	0.2	Leased		4.0				27		17	Olsen	243	3.7%	8.4	0.48	0.57	10/02/24
197	Elm River Sec 15	197	2/14/25	221.0			SW 1/4&S 1/2, NE 1/4	Sec. 15 , T 144 , R 49	0.4	Leased		49.7				20		3	Olsen	265	4.3%	8.3	0.65	1.03	10/14/24
198	Bohn 31	198	2/14/25	147.2			SW 1/4	Sec. 31 , T 144 , R 51	0.1	Leased		0.6				16		14	Olsen	436	5.5%	7.9	0.94	1.49	10/09/24
199	Reimer NW	199	2/14/25	140.8			NW 1/4	Sec. 23 , T 145 , R 50	0.2	Leased		2.8				16		9	Olsen	395	5.7%	7.9	0.39	1.33	10/16/24
200	Reimer NE	200	2/14/25	150.2			NE 1/4	Sec. 23 , T 145 , R 50	0.2	Leased		2.6				14		9	Olsen	144	4.3%	7.8	0.66	0.99	10/16/24
201								Sec. , T , R																	
202								Sec. , T , R																	
203								Sec. , T , R																	
204								Sec. , T , R																	
205								Sec. , T , R																	
206								Sec. , T , R																	
207								Sec. , T , R																	
208								Sec. , T , R																	
209								Sec. , T , R																	
210								Sec. , T , R																	
211								Sec. , T , R																	
212								Sec. , T , R																	
213								Sec. , T , R																	
214								Sec. , T , R																	
215								Sec. , T , R																	
216								Sec. , T , R																	
217								Sec. , T , R																	
218								Sec. , T , R																	
219								Sec. , T , R																	
220								Sec. , T , R																	
221								Sec. , T , R																	
222								Sec. , T , R																	
223								Sec. , T , R																	
224								Sec. , T , R																	
225								Sec. , T , R																	

Total: 31,967.1

Comments:

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #1

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #2

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #3

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I119A Bearden silty clay loam, 0 to 2 percent slopes\Bearden Silty clay loam 70%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

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

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #4

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #5

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #6

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I383A Overly silty clay loam, 0 to 2 percent slopes\Overly Silty clay loam 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #7

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #8

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #13

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #14

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #15

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #16

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #17

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #18

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #19

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #20

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #21

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I237A Fargo-Enloe complex, 0 to 1 percent slopes\Fargo Silty clay 55%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #22

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #24

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #25

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #26

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #27

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #28

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #29

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #30

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #31

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #32

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #37

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #38

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #39

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #41

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #42

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #44

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #45

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #46

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #47

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #48

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #49

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #50

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #51

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #54

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #55

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #56

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #59

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #60

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #62

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #67

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #68

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #69

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #72

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #73

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I181A Glyndon-Perella silt loams, 0 to 2 percent slopes\Glyndon Silt loam 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #74

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #75

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #80

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #83

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #85

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #86

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #87

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #88

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #89

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I237A Fargo-Enloe complex, 0 to 1 percent slopes\Fargo Silty clay 55%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #90

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #91

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #93

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #94

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #96

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #97

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I237A Fargo-Enloe complex, 0 to 1 percent slopes\Fargo Silty clay 55%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #98

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #100

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #101

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #102

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #103

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #104

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #107

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #108

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #109

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #110

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #111

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #112

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #113

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I181A Glyndon-Perella silt loams, 0 to 2 percent slopes\Glyndon Silt loam 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #114

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #120

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #123

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #124

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #125

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #126

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #127

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #128

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #129

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #133

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #134

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #135

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #141

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #151

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #152

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #153

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #156

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #157

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #158

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*

4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #160

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #161

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #162

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #164

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #165

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #166

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #167

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #168

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #169

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #170

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #171

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #172

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #173

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #174

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #175

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #176

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #177

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #178

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Norman County, Minnesota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #179

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I181A Glyndon-Perella silt loams, 0 to 2 percent slopes\Glyndon Silt loam 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #180

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #181

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I238A Fargo-Hegne silty clays, 0 to 1 percent slopes\Fargo Silty clay 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #182

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #183

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #184

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #185

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #186

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #187

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #188

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #189

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #190

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Norman County, Minnesota\I627A Bearden-Fargo complex, 0 to 2 percent slopes\Bearden Silty clay loam 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #191

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Norman County, Minnesota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #192

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Norman County, Minnesota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #193

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Norman County, Minnesota\I627A Bearden-Fargo complex, 0 to 2 percent slopes\Bearden Silty clay loam 50%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #194

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Norman County, Minnesota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #195

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Norman County, Minnesota\I130A Hegne-Fargo silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #196

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #197

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.41 t/ac/yr
Detachment on slope: 0.41 t/ac/yr
Soil loss for cons. plan: 0.41 t/ac/yr
Sediment delivery: 0.41 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #198

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I229A Fargo silty clay, 0 to 1 percent slopes\Fargo Silty clay 80%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.12 t/ac/yr
Detachment on slope: 0.12 t/ac/yr
Soil loss for cons. plan: 0.12 t/ac/yr
Sediment delivery: 0.12 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #199

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Herberg Dairy Field #200

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I461A Hegne-Enloe silty clays, 0 to 1 percent slopes\Hegne Silty clay 45%
Slope length (horiz): 150 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Wheat, spring 7in rows	bushels	80.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Sugarbeet, sugar	tons	30.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Soybean, mw 15 - 20 in rows	bu	40.000
managements\CMZ 01\c.Other Local Mgt Records\NDZone1HerbergDairy	vegetations\Corn, grain	bushels	170.00

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.17 t/ac/yr
Detachment on slope: 0.17 t/ac/yr
Soil loss for cons. plan: 0.17 t/ac/yr
Sediment delivery: 0.17 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/16/2	Cultivator, field 6-12 in sweeps		80
5/1/2	Sprayer, pre-emergence		79
5/10/2	Drill or airseeder, double disk	Wheat, spring 7in rows	80
7/1/2	Sprayer, post emergence		76
9/1/2	Harvest, killing crop 50pct standing stubble		93
10/30/2	Stalk chopper, rolling		75
10/31/2	Disk, tandem heavy primary op.		33
11/1/2	Plow, moldboard 10 inch depth		8.9
4/20/3	Fert applic. surface broadcast		8.4
4/25/3	Cultivator, field 6-12 in sweeps		6.3
4/25/3	Planter, double disk opnr	Sugarbeet, sugar	6.3
5/15/3	Sprayer, post emergence		19
5/25/3	Sprayer, post emergence		28
6/5/3	Fert applic. side-dress, liquid		25
6/10/3	Sprayer, post emergence		34
6/15/3	Sprayer, post emergence		41
7/15/3	Sprayer, fungicide		30
7/30/3	Sprayer, insecticide post emergence		25
8/15/3	Sprayer, fungicide		22
10/2/3	Shredder, flail or rotary		96
10/10/3	Harvest, dig root crops res. buried		18
11/1/3	Manure injector, low disturb.30 inch		20
5/25/4	Cultivator, field 6-12 in sweeps		15
5/25/4	Sprayer, pre-emergence		15
5/25/4	Planter, double disk opnr	Corn, grain	15
7/5/4	Sprayer, post emergence		20
8/1/4	Sprayer, insecticide post emergence		14
10/10/4	Harvest, killing crop 50pct standing stubble		84
10/16/4	Fert applic. surface broadcast		87
5/10/5	Cultivator, field 6-12 in sweeps		79
5/10/5	Sprayer, pre-emergence		79
5/10/5	Drill or airseeder, double disk	Soybean, mw 15 - 20 in rows	79
6/17/5	Sprayer, post emergence		76
10/15/5	Harvest, killing crop 20pct standing stubble		88
11/1/5	Manure injector, low disturb.30 inch		85
5/25/6	Cultivator, field 6-12 in sweeps		54
5/25/6	Sprayer, pre-emergence		54
5/25/6	Planter, double disk opnr	Corn, grain	54
7/5/6	Sprayer, post emergence		45
8/1/6	Sprayer, insecticide post emergence		36
10/10/6	Harvest, killing crop 50pct standing stubble		86

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RUSLE2 Profile Erosion Calculation Record

Info: Example Alfalfa Rotation

File: profiles\NorthDakotaZone1TraillCounty

Inputs:
Location: USA\North Dakota\Traill County
Soil: SSURGO\Traill County, North Dakota\I492A Bearden-Lindaas silty clay loams, 0 to 2 percent slopes\Bearden Silty clay loam 40%
Slope length (horiz): 150 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, spring seed	Tons	1.5000
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, spring seed regrowth after cutting	tons	1.5000
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, spring seed senes to y2 regrowth	tons	2.5000
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, yr2 regrowth after cutting	tons	1.5000
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, yr2 regrowth after cutting	tons	1.5000
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, yr2 senes to yr3 regrowth	tons	2.5000
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, yr3 regrowth after cutting	tons	1.6500
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, yr3 regrowth after cutting	tons	1.6500
managements\CMZ 01\a.Single Year/Single Crop Templates\Alfalfa spring direct seed\3 years alfalfa\Alfalfa; Spring Direct, 3x, FC, st pt, disk, z1	vegetations\Alfalfa, yr3 senes to yr4 regrowth	tons	2.5000

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

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.24 t/ac/yr

Detachment on slope: 0.24 t/ac/yr
Soil loss for cons. plan: 0.24 t/ac/yr
Sediment delivery: 0.24 t/ac/yr

Crit. slope length: 150 ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
10/20/1	Chisel, st. pt.		31
4/20/2	Disk, tandem light finishing		22
4/20/2	Drill or airseeder, double disk	Alfalfa, spring seed	22
4/20/2	Fert applic. surface broadcast		22
7/15/2	Harvest, hay, legume	Alfalfa, spring seed regrowth after cutting	29
7/15/2	Sprayer, insecticide post emergence		29
9/1/2	Harvest, hay, legume	Alfalfa, spring seed senes to y2 regrowth	39
6/1/3	Harvest, hay, legume	Alfalfa, yr2 regrowth after cutting	58
6/1/3	Fert applic. surface broadcast		58
7/15/3	Harvest, hay, legume	Alfalfa, yr2 regrowth after cutting	56
7/15/3	Sprayer, insecticide post emergence		56
9/1/3	Harvest, hay, legume	Alfalfa, yr2 senes to yr3 regrowth	56
6/1/4	Harvest, hay, legume	Alfalfa, yr3 regrowth after cutting	63
6/1/4	Fert applic. surface broadcast		63
7/15/4	Harvest, hay, legume	Alfalfa, yr3 regrowth after cutting	60
7/15/4	Sprayer, insecticide post emergence		60
9/1/4	Harvest, hay, legume	Alfalfa, yr3 senes to yr4 regrowth	60