Water Quality Trading Plan

Dairy Dreams, LLC

Facility # 20199

This document outlines Dairy Dreams LLC's plan to implement Water Quality Trading to maintain compliance with its Wisconsin Pollution Discharge Elimination System Permit WI - 0062057-03-0

5/5/2023

Table of Contents

Table of Contents

1 Executive Summary 1
2 Project History and Background 2
2.1 History of Project Site 2
2.2 Purpose of Water Quality Trading Plan 2
2.3 Total Phosphorus and Total Suspended Solids Permit Requirements for Outfall #001-Credit Need 2
3 Project and Credit Locations 2
3.1 Project Location 2
3.2 Practice/Credit Locations 2
4 Existing Land Uses 3
5 Credit Need 3
6 Credit Generation Using Perennial Companion Crops 3
6.1 Description and Practice Standard 3
6.1.1 Establishment Plan 3
6.1.2 Operation and Maintenance Plan 4
7 Quantifying Phosphorus and Total Suspended Solids Reductions 4
8 Trade Ratio Calculations 4
8.1 Calculation Factors 4
8.1.1 Delivery Factor (DF) 4
8.1.2 Downstream Factor (DSF) 4
8.1.3 Equivalency Factor (EF) 4
8.1.4 Uncertainty Factor (UF) 5
8.1.5 Habitat Adjustment (HA) 5
8.2 Calculations 5
9 Credit Generation 5
10 Pollutant Reduction Credit Threshold 5
10.1 Credit Threshold Criteria (Long-Term Credits) 5
10.2 Northeast Lakeshore TMDL Load Reductions/Credit Thresholds 5
11 Interim and Long-Term Credits 6
11.1 Interim Credits 6
11.2 Long-Term Credits 6

12 Timeline 6
12.1 Practice and Credit Generation Timeline 6
13 Inspections and Reporting 6
13.1 Practice Registration 6
13.2 Inspections/Verification 6
13.3 Annual Trading Report 7
13.4 Notification of practice failure 7
14 Compliance with Water Quality Trading Checklist 8
15 Certification of Water Quality Trading Plan 9

Tables

Table 1. Interim and long-term total phosphorus and total suspended solids trading credits 1
Table 2. Credit Availability Timeline 9
Table 3. Water Quality Trading Checklist 11

List of Attachments

Attachment A: Map of Project Location
Attachment B: Map of Fields with Practice Implementation
Attachment C: NRCS Technical Standard Code 340 Cover Crops
Attachment D: Maintenance and Inspection Plan
Attachment E: SnapPlus PTP Report and Calculations
Attachment F: SnapPlus Sediment Trade Report and Calculations
Attachment G: TMDL TP Map
Attachment H: TMDL TSS Map
Attachment I: Practice Registration Form 3400-207

Water Quality Trading Plan

Dairy Dreams LLC

1 Executive Summary

This Water Quality Trading Plan summarizes Dairy Dreams LLC's plan to use the Wisconsin Department of Natural Resources (WDNR) water quality trading program, Wis. State. 283.84, to comply with its Total Phosphorus (TP) and Total Suspended Solids (TSS) Water Quality Based Effluent Limits (WQBEL's) in its Wisconsin Pollution Discharge Elimination System (WPDES) permit WI-0062057-03-0 for Outfall #001. Dairy Dreams has been partnering with Aqua Innovations to add a Nutrient Concentration System (NCS) to separate and manage nutrients from the dairy farm's manure waste stream. The farm is projected to have 7231 Animal Units and they plan to generate an average of 206,950 gallons per day of manure, process wastewater, and collected feed pad runoff. The manure is currently processed through an anaerobic digestion system that captures methane to produce Renewable Natural Gas (RNG). Digested manure is sent to a screw press separator to remove biosolids fiber which is dried and used for animal bedding. The screw press effluent will then be sent through vibratory screen separators, ultrafiltration, and then a reverse osmosis system as per the design by Aqua Innovations LLC. This system will allow for segregation of various nutrient streams for strategic cropland applications, thus reducing the addition of commercial fertilizer products and reducing the need for -manure hauling by tanker trucks. The outflow volume from the Aqua System is split into three approximately equal waste streams, Ultra Filtration (UF) Concentrate, Reverse Osmosis (RO) Teawater, and Clean Water (FDA Water) the latter of which is planned to be discharged to a tributary of Silver Creek. The location of Dairy Dreams is depicted in Attachment A. Dairy Dreams has an existing WPDES permit for land application of nutrients from their manure stream. This permit is to be modified to include the discharge of Clean Water (FDA Water from the NCS). The WPDES Permit requires that all discharged pollutants be offset with WQT credits. This trade requires that credits are traded using a trading factor and thus must offset their discharge with a larger amount of offset pollutants than are discharged. To ensure compliance with this permit's total phosphorus (TP) and total suspended solids (TSS) discharge limits; Dairy Dreams LLC will work with Dave LaCrosse (the Farm's Agronomist) to convert an existing cropped field to mowed grass within the same HUC 12 watershed as Outfall #001. The Farm's Agronomist has quantified the total phosphorus and soil losses from the existing field (Attachment E&F). Using a trade ratio of 1.2:1, the Interim Water Quality Trading Credits were calculated (Table 1). Dairy Dreams will use these Interim Credits to demonstrate compliance with its TP and TSS limit in its WPDES permit (WI-0062057-03-0).

Note: For future planning purposes, a Credit Threshold of 90% for TP and 80% for TSS is being used as a placeholder for the estimated long-term credit need.

Table 1. Interim and long-term total phosphorus and total suspended solids trading credits.

	Total Phosphorus (TP) (Pounds per Year)	Total Suspended Solids (TSS) (Pounds per Year)
Credits Needed to Meet Permit Requirements	9.22	230
Pollutant Reduction from Practice Implementation	18.12	1,189
*Interim Credits Generated (*available first 10 years after practice implementation)	15.10	991
*Long-term Credits Generated (*to be used year 11 and onwards)	1.51*	198*

*Estimation, credit thresholds not yet published for this watershed

2 Project History and Background

2.1 History of Project Site

Dairy Dreams LLC is a Dairy Farm located in Kewaunee County WI at E3576 Cardinal Rd, Casco, WI 54205. The farm was started by John Pagel and Dr. Donald Niles. The farm currently breeds and raises Holstein cows to produce clean, safe, and pure protein. As the farm continues to grow, new technologies are being implemented on site to help minimize the environmental impact of the farm. Since 2010, Dairy Dreams LLC has operated a manure digester on site as a method of reducing environmental impact as well as a way to establish animal bedding recycled fiber and another revenue stream. This digester system will be accompanied by an Aqua Innovations Nutrient Concentration System (NCS). This NCS creates clean water from the manure stream which can be discharged into the watershed, and thus must be covered under a WPDES discharge permit and offset with Water Quality Trading. Dairy Dreams LLC is in the Silver Creek watershed (20,923 acres). The Silver Creek Watershed is located within the larger Northeast Shore Watershed and has a Total Maximum Daily Load (TMDL) which is currently under development with nonpoint sources of TP and TSS being the primary source of pollution.

2.2 Purpose of Water Quality Trading Plan

The purpose of this Water Quality Trading Plan is to demonstrate how Dairy Dreams LLC will utilize water quality trading to comply with the TP and TSS limits on Outfall #001 according to WPDES permit WI-0062057-03-0. Dairy Dreams LLC plans to use companion crops (perennial vegetation) in a designated field they crop which is parallel to outfall #001, and within the same HUC-12 watershed. The phosphorous and soil runoff reductions and corresponding credits generated from using companion crops in this field are being used by Dairy Dreams LLC to satisfy their credit need.

2.3 Total Phosphorus and Total Suspended Solids Permit Requirements for Outfall #001-Credit Need

Dairy Dreams LLC is the operating company that is seeking to gain approval for their WPDES permit WI-0062057-03-0 for Outfall #001 to discharge clean water to a tributary of Silver Creek. The clean water will be generated as a result of operating a Nutrient Concentration System (NCS) which will be located at the current Dairy Dreams LLC site in the Town of Lincoln, Kewaunee County, Wisconsin. Historically, manure generated on site was stored in lagoons on site then and strategically land applied on surrounding fields.

3 Project and Credit Locations

3.1 Project Location

Outfall #001 is located at approximately: latitude 44.655527, longitude -87.602401, in HUC12 watershed #040301020203 also known as the Silver Creek sub watershed (Attachment A). Silver Creek is part of the larger Ahnapee River Watershed which drains to Lake Michigan. Silver Creek is in the Northeastern part of the Northeast Lakeshore TMDL.

3.2 Practice/Credit Locations

Dairy Dreams LLC plans to implement companion cropping (perennial vegetation) in a field located at 44.659246 N, -87.575544 W. A map of this field is provided (Attachment B). This field was identified as a potential area for companion cropping due to its odd shape making it difficult to be accessed by large

equipment, and for its proximity to a wetland. This field is located approximately 1.0 mile to the northeast of outfall #001. This field is located on a parallel stream but within the same HUC12 watershed as Outfall #001. The field in which credits will be generated is labeled as field DD-9A. This field is currently being used in a forage and row crop rotation. The field is currently a total of 8.6 acres. Additionally, some acreage from the field to the north (field DD-9) will be converted to Field DD-9 to further generate WQT credits. Any acres of field DD-9 used for credit generation will be merged with field DD-9A for clarity and consolidation purposes. Field DD-9 is currently a total of 40.5 acres. This field is also currently being used in a forage and row crop rotation.

4 Existing Land Uses

The predominant land use within the TMDL subbasin in which Outfall #001 is located is agriculture; accounting for 66% (10,204 acres) of the total area (15,385 acres). This is based on the 2020 Northeast Lakeshore TMDL land use maps created by WDNR (Attachment G). An additional 29% of the subbasin is wetland, with a total of 4,386 acres identified as wetland within the subbasin. The remaining 794 acres within the subbasin are broken down as follows: 546 acres forest, 210 acres Non-Permitted Urban, and 39 acres Permitted MS4.

5 Credit Need

The Aqua NCS is planned to discharge 75,628 gallons of treated clean water (FDA Water) per day. Discharge concentrations are expected to be no greater than 0.04 mg/L for TP and 1.00 mg/L for TSS. Using these concentrations to be conservative, the NCS will discharge 9.22 lbs/yr of TP and 230 lbs/yr of TSS. Per the WPDES permit, all discharge pollutants must be offset with this trade.

6 Credit Generation Using Perennial Companion Crops

6.1 Description and Practice Standard

Dairy Dreams LLC will be implementing companion cropping (Perennial Vegetation) according to USDA-NRCS Technical Standard Code 340 (Attachment C). Dairy Dreams LLC and their Agronomist will be responsible for the implementation and oversight of the field management plan. After establishment, NRP Consultants will annually verify that the management plan meets standards and specifications (Attachment D). Dairy Dreams LLC will be responsible for the continued operation and maintenance of the field (Attachment D).

Dairy Dreams LLC will not require a credit broker since all water quality trading credit generation will be done on land that they currently manage. The location where credits will be generated is owned by Dairy Dreams LLC.

6.1.1 Establishment Plan

The perennial companion cropping plan establishment will be in accordance with the following:

1. Site map identifying where the practice will be implemented (Attachment B)
2. The Nutrient Management plan for Dairy Dreams, LLC (Including 13.1 acres of field DD-9A as perennial vegetation)
3. USDA-NRCS Technical Standard Code 340 for perennial companion crops

Established practices are subject to inspection by WDNR or its agents at any time upon giving reasonable notice to Dairy Dreams. In addition, annual reporting to the WDNR is required for compliance with the WQT plan.

6.1.2 Operation and Maintenance Plan

The operation and maintenance plan in Attachment D outlines the requirements on how the companion cropped field will be maintained. This plan has been customized to the site conditions.

7 Quantifying Phosphorus and Total Suspended Solids Reductions

The quantification of phosphorus (TP) and total suspended solids (TSS) from the conversion to perennial companion cropping was calculated by the farm's Agronomist. The Agronomist used SnapPlus to quantify the amount of soil and phosphorous being lost from fields DD-9 and DD9-A (Attachment E & F). Using the PTP report generated in SnapPlus, the Agronomist was able to calculate the future P runoff reduction created from converting field DD-9A to mowed grass. Additionally, Dairy Dreams LLC plans to convert a portion of field DD-9 to field DD-9A (13.1 total acres of mowed grass). It is calculated that converting all of DD-9A (8.6 acres) and 4.5 acres of DD-9 to mowed grass will reduce P runoff by a total of 18.12 lbs/yr. These calculations are provided in Attachment E.

The calculations for total TSS reductions were made using the same method as the TP calculations. Using the Sediment Trade Report from SnapPlus, the Agronomist calculated that converting the expanded total acreage of DD-9A to mowed grass would be sufficient to meet TSS reduction requirements for this plan. Therefore, using the 13.1 acres total which are planned to be converted to mowed grass (All 8.6 acres of DD-9A and 4.50 acres of DD-9), Dairy Dreams, LLC calculated a total TSS reduction of 1,189 lbs/yr. These calculations are provided in Attachment F.

8 Trade Ratio Calculations

8.1 Calculation Factors

8.1.1 Delivery Factor (DF)

The field being managed with perennial companion cropping is located within the same HUC12 watershed 040301020203 (Silver Creek), as Outfall #001. Therefore, a delivery factor of 0 was used in establishing the trade ratio.

8.1.2 Downstream Factor (DSF)

The field that is being managed with perennial companion cropping is located parallel to Outfall #001, and thus reductions from the practice implementation are seen downstream of Outfall #001. Therefore, a downstream trading factor was used. According to the WDNR stream survey performed on 5/16/2022, the TP concentration in the stream was determined to be 0.08 mg/L with an average flow of 0.15 CFS. Discharge from the NCS is expected to have an average TP concentration of 0.04 mg/L at an average flow of 0.12 CFS. This puts the NCS discharge at about 30% of the stream's total phosphorous load, and thus a downstream factor of 0.2 was used to be conservative. Using average watershed TP runoff rates, the outflow would account for 2.16% of the total TP load.

8.1.3 Equivalency Factor (EF)

As stated in the Guidance for Implementing Water Quality Trading in WPDES Permits (section 2.11.3) provided by WDNR an equivalency factor of 0 has been used since the pollutants being traded under this plan are total phosphorus and total suspended solids.

8.1.4 Uncertainty Factor (UF)

The field in which the companion cropping will be located is included within a 590 Nutrient Management Plan. Using Table 4 from the Guidance for Implementing Water Quality Trading in WPDES Permits, an uncertainty factor of 1 has been used.

8.1.5 Habitat Adjustment (HA)

No habitat adjustment was used in establishing the trade ratio.

8.2 Calculations

Trade Ratio Calculation= (DF + DSF + EF + UF – HA):1 Trade Ratio

= (0 + 0.2 + 0 + 1 – 0):1 = 1.2:1

A trade ratio of 1.2:1 is being used in calculating TP and TSS interim and long-term credits as a result of implementing companion crops.

9 Credit Generation

Dividing the phosphorus and total suspended solids reduction by the trade ratio results in the generation of interim TP and TSS credits to use in demonstrating compliance with WPDES Permit WI-0062057-03-0. A total of 18.12 pounds of phosphorus and 1,189 pounds of soil loss will be reduced through implementation of companion crops. Using a trade ratio of 1.2:1, as calculated above, gives a total of 15.10 pounds per year of TP and 991 pounds per year of TSS is available for interim credits before the credit threshold reduction for long-term credits.

Credit Generation = H ÷ K
H= Phosphorous Reduction (lbs/year)
Or
H = Total Suspended Solids Reduction (lbs/yr)

K = Trade Ratio

Total Phosphorus (TP) Interim Credits generated = 15.10 lbs/year

Total Suspended Solids (TSS) Interim Credits generated = 991 lbs/year

10 Pollutant Reduction Credit Threshold

10.1 Credit Threshold Criteria (Long-Term Credits)

Since Outfall #001 discharges into Silver Creek which is located within the Northeast Lakeshore TMDL which is still under development, a Credit Threshold cannot be determined at this time. A Credit Threshold for long-term credits is described in *WDNR Guidance for Implementing Water Quality Trading in WPDES Permits* as the pollutant loading from a point source or nonpoint source, below which reductions are made to generate credits.

10.2 Northeast Lakeshore TMDL Load Reductions/Credit Thresholds

The Northeast Lakeshore TMDL is still under development, and thus there are no established pollutant

reduction credit thresholds available. For modeling purposes, the highest credit threshold values for both TSS and TP in current existing TMDLs was used as a placeholder in the credit need assessment conducted for this plan. Credit thresholds of 90% for TP and 80% for TSS were used when estimating the number of credits needed to suffice the long-term credit thresholds. See Table 1 for long-term credits generated using these assumed credit thresholds.

11 Interim and Long-Term Credits

11.1 Interim Credits

Interim TP and TSS credits will continue to be available for 10 years after the implementation of companion crops in the designated field and will therefore be able to generate interim credits through the end of 2033. Credit thresholds will not be applied to the interim credits.

11.2 Long-Term Credits

Long-term credits for both TP and TSS will take effect in 2034. At that time, credit thresholds will be applied to the available credits. It is understood that currently the TMDL for the Northeast Lakeshore Watershed is still under development. Therefore, the long-term credits for this water quality trading plan cannot be completely determined.

12 Timeline

12.1 Practice and Credit Generation Timeline

The field that will be converted to perennial companion crops, will be planted in spring of 2023 during planting season. Dairy Dreams, LLC will inspect the field regularly. Table 3 indicates the credit availability timeline for Dairy Dreams, LLC.

Table 2: Credit Availability Timeline

Credit Availability Timeline		
	Interim Credits	Long-Term Credits
Pollutant	2023-2033	2034 & beyond
Total Phosphorous (lbs)	15.10	1.51*
Total Suspended Solids (lbs)	991	198*

*Uses an estimated 80% and 90% credit threshold for TP and TSS respectively

13 Inspections and Reporting

13.1 Practice Registration

Once the companion crop implementation is complete, NRP Consultants will certify that the practice has been implemented, and will notify Dairy Dreams, LLC and WDNR that the implementation was completed according to standards and specifications. Dairy Dreams, LLC will then file a completed Registration Form 3400-207 (Attachment I) for Water Quality Trading Management Practice Registration with the WDNR.

13.2 Inspections/Verification

NRP Consultants will inspect and verify on an annual basis that the permanent vegetation generating credits as part of this water quality trading plan is functioning properly and being maintained according to the operation and maintenance plan. Inspection reports will be included in the Annual Certification Letter sent to Dairy Dreams LLC. Inspection reports will include:

- Date of Inspection,
- Statement of finding indicating that the permanent vegetation is functioning and being, maintained according to the operation and maintenance plan,
- Any deficient items identified in the operation and maintenance plan if applicable,
- Remedies as to how, who, and in what timeframe corrections will be made for identified deficient items,

13.3 Annual Trading Report

Dairy Dreams will report to WDNR by January 31 of each year the following:

- The number of total phosphorus reduction credits (pounds/year) used for the previous year to demonstrate compliance.
- Inspection reports and certification letters for the grassed waterway management practices that generated the total phosphorus credits used to demonstrate compliance.
- Identification of noncompliance or failure to implement any terms or conditions of WPDES permit WI-0062057-03-0 with respect to water quality trading that have not been reported in discharge reports.

13.4 Notification of practice failure

Dairy Dreams will notify WDNR by phone within 48 hours after becoming aware that TP or TSS credits used or intended to be used for compliance with permit WI-0062057-03-0 are not being implemented or generated as is set forth in this Water Quality Trading Plan.

14 Compliance with Water Quality Trading Checklist

This Water Quality Trading Plan complies with the Water Quality Trading Checklist identified in Table 8 on page 37 of the WDNR Guidance for Implementing Water Quality Trading in WPDES Permits. This plan complies with the requirements for Credit Source (item e) in Table 8. Credit Source includes sources where: "Credits are obtained from a constructed project or implementation of a plan undertaken by the credit user for sources other than those covered by the credit user's WPDES permit." Below is a table identifying the required elements for this Water Quality Trading Plan. Corresponding page numbers are also provided in Table 3

Table 3. Water Quality Trading Checklist.

WDNR Content of Water Quality Trading Plan (Table 8 item (c) of WDNR Water Quality Trading Guidance.	Page Number
Permittee's/credit user's WPDES permit number	1
Permittee's/credit user's contact information	9
Pollutant(s) for which credits will be generated	2
Amount of credits available from each location/management practice/local government unit when acting as a broker	6
Location(s) where credits will be generated (e.g./ map of field or site where management practice will be applied including major drainage way(s) from the project)	2, Attachment B
Identification of method(s) including management practice(s) that will be used to generate credits	4
Duration of agreement (e.g., the design life of the management practice) with each credit generator	6
Schedule for installation/construction of each management practice	6
Operation, Maintenance, and Inspection Plan for each management practice used to generate credits	Attachment D
Date when credits become available for each management practice (i.e., when practice is established and effective)	6
Model(s) used to derive the amount of credits and verification of correct modeling inputs	4,5
The applicable trade ratio for each management practice including technical basis	4,5
Certification that the content of the trading application is accurate and correct	9
Signature and date of signature of permittee's/credit user's authorized representative	9

15 Certification of Water Quality Trading Plan

The undersigned hereby certifies that this Water Quality Trading Plan is to the best of his/her knowledge accurate and correct.

DAIRY DREAMS LLC

BY: _____

Name: John J. Pagel (JJ)

Title: President

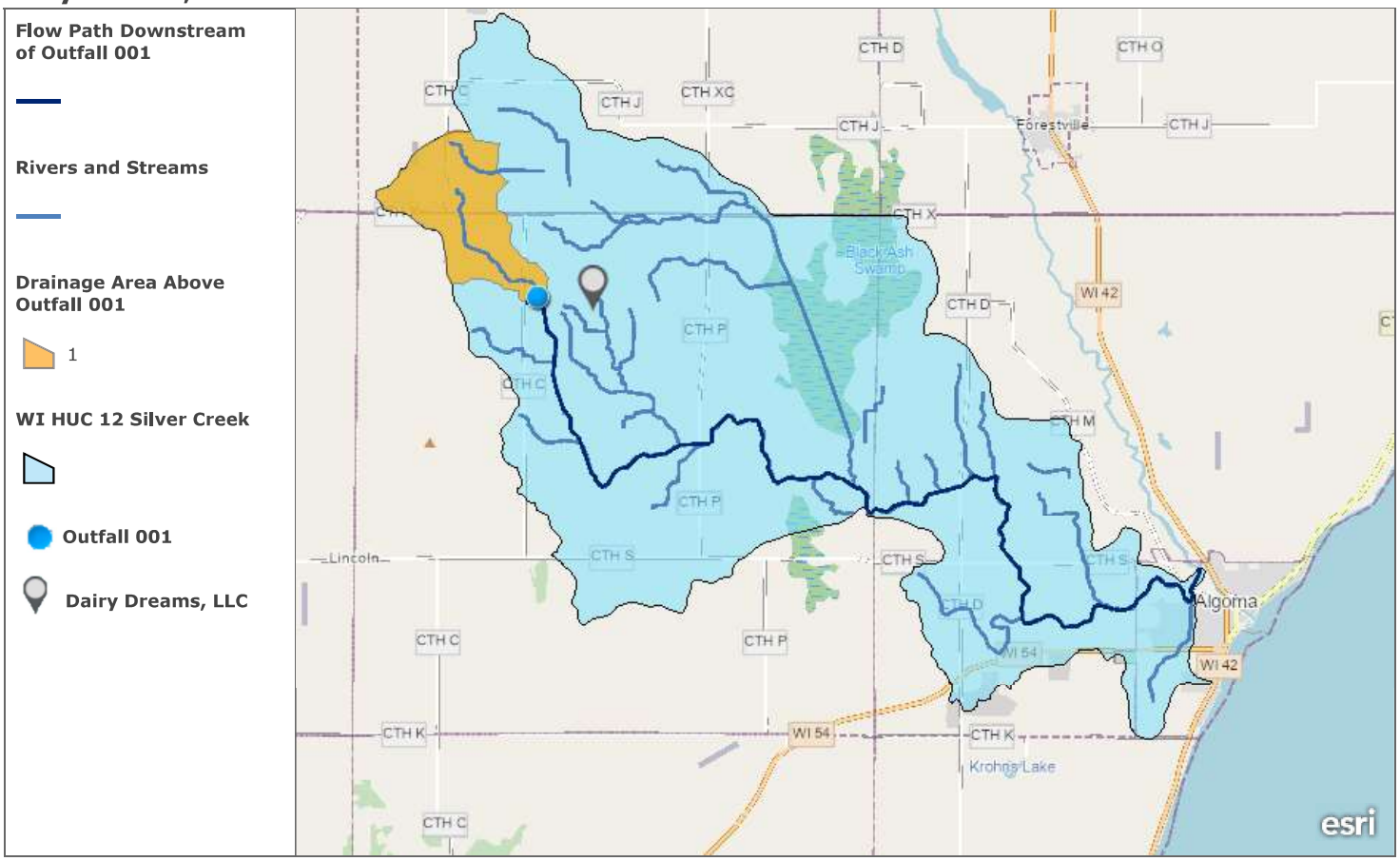
Company: Dairy Dreams LLC

Address: E3576 Cardinal Rd, Casco, WI 54205

Phone Number: 920-493-0879

Attachment A
Map of Project Location

Dairy Dreams, LLC



Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri

Attachment B
Map of Fields with Practice Implementation

proposed DD-9a map

Farm: Dairy Dreams, V20 Generated:4/24/2023, Crop year: 2022, Township Range Section:25N 24E s3



- Counties
- Township/Range
- Nutrient prohibited buffers
- Nutrient prohibited drawn areas
- Nutrient prohibited winter only
- Fields
- Grassed waterway
- Drinking well
- County Defined Karst

Dairy Dreams, LLC



Attachment C
NRCS Technical Standard 340

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

COVER CROP

(Ac.)

CODE 340

DEFINITION

Grasses, legumes, and forbs planted for seasonal vegetative cover.

PURPOSE

This practice is applied to support one or more of the following purposes:

- Reduce erosion from wind and water.
- Maintain or increase soil health and organic matter content.
- Reduce water quality degradation by utilizing excessive soil nutrients.
- Suppress excessive weed pressures and break pest cycles.
- Improve soil moisture use efficiency.
- Minimize soil compaction.

CONDITIONS WHERE PRACTICE APPLIES

All lands requiring seasonal vegetative cover for natural resource protection or improvement.

CRITERIA

General Criteria Applicable to All Purposes

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, fertility requirements, and planting methods will be consistent with applicable local criteria and soil/site conditions.

Select species that are compatible with other components of the cropping system.

Ensure herbicides used with crops are compatible with cover crop selections and purpose(s).

Cover crops may be established between successive production crops, or companion-planted or relay-planted into production crops. Select species and planting dates that will not compete with the production crop yield or harvest.

Do not burn cover crop residue.

Determine the method and timing of termination to meet the grower's objective and the current NRCS Cover Crop Termination Guidelines.

When a cover crop will be grazed or hayed ensure the planned management will not compromise the selected conservation purpose(s).

Do not harvest cover crops for seed.

If the specific rhizobium bacteria for the selected legume are not present in the soil, treat the seed with the appropriate inoculum at the time of planting.

Additional Criteria to Reduce Erosion from Wind and Water

Time the cover crop establishment in conjunction with other practices to adequately protect the soil during the critical erosion period(s).

Select cover crops that will have the physical characteristics necessary to provide adequate erosion protection.

Use the current erosion prediction technology to determine the amount of surface and/or canopy cover needed from the cover crop to achieve the erosion objective.

Additional Criteria to Maintain or Increase Soil Health and Organic Matter Content

Cover crop species will be selected on the basis of producing higher volumes of organic material and root mass to maintain or increase soil

organic matter.

The planned crop rotation including the cover crop and associated management activities will score a Soil Conditioning Index (SCI) value > 0, as determined using the current approved NRCS Soil Conditioning Index (SCI) procedure, with appropriate adjustments for additions to and or subtractions from plant biomass.

The cover crop shall be planted as early as possible and be terminated as late as practical for the producer's cropping system to maximize plant biomass production, considering crop insurance criteria, the time needed to prepare the field for planting the next crop, and soil moisture depletion.

Additional Criteria Reduce Water Quality Degradation by Utilizing Excessive Soil Nutrients

Establish cover crops as soon as practical prior to or after harvest of the production crop. (i.e. before or after harvest)

Select cover crop species for their ability to effectively utilize nutrients.

Terminate the cover crop as late as practical to maximize plant biomass production and nutrient uptake. Practical considerations for termination date may include crop insurance criteria, the amount of time needed to prepare the field for planting the next crop, weather conditions, and cover crop effects on soil moisture and nutrient availability to the following crop.

If the cover crop will be harvested for feed (hay/balage/etc.), choose species that are suitable for the planned livestock, and capable of removing the excess nutrients present.

Additional Criteria to Suppress Excessive Weed Pressures and Break Pest Cycles

Select cover crop species for their life cycles, growth habits, and other biological, chemical and or physical characteristics to provide one or more of the following:

- To suppress weeds, or compete with weeds.
- Break pest life cycles or suppress of plant pests or pathogens.
- Provide food or habitat for natural enemies of pests.
- Release compounds such as glucosinolates that suppress soil borne pathogens or pests.

Select cover crop species that do not harbor pests or diseases of subsequent crops in the rotation.

Additional Criteria to Improve Soil Moisture Use Efficiency

In areas of limited soil moisture, terminate growth of the cover crop sufficiently early to conserve soil moisture for the subsequent crop. Cover crops established for moisture conservation shall be left on the soil surface.

In areas of potential excess soil moisture, allow the cover crop to grow as long as possible to maximize soil moisture removal.

Additional Criteria to Minimize Soil Compaction

Select cover crop species that have the ability to root deeply and the capacity to penetrate or prevent compacted layers.

CONSIDERATIONS

Plant cover crops in a timely matter and when there is adequate moisture to establish a good stand.

When applicable, ensure cover crops are managed and are compatible with the client's crop insurance criteria.

Maintain an actively growing cover crop as late as feasible to maximize plant growth, allowing time to prepare the field for the next crop and to optimize soil moisture.

Select cover crops that are compatible with the production system, well adapted to the region's

climate and soils, and resistant to prevalent pests, weeds, and diseases. Avoid cover crop species that harbor or carry over potentially damaging diseases or insects.

Cover crops may be used to improve site conditions for establishment of perennial species.

When cover crops are used for grazing, select species that will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.

Use plant species that enhance forage opportunities for pollinators by using diverse legumes and other forbs.

Cover crops may be selected to provide food or habitat for natural enemies of production crop pests.

Cover crops residues should be left on the soil surface to maximize allelopathic (chemical) and mulching (physical) effects.

Seed a higher density cover crop stand to promote rapid canopy closure and greater weed suppression. Increased seeding rates (1.5 to 2 times normal) can improve weed-competitiveness.

Cover crops may be selected that release biofumigation compounds that inhibit soil-borne plant pests and pathogens.

Species can be selected to serve as trap crops to divert pests from production crops.

Select a mixture of two or more cover crop species from different plant families to achieve one or more of the following: (1) species mix with different maturity dates, (2) attract beneficial insects, (3) attract pollinators, (4) increase soil biological diversity, (5) serve as a trap crop for insect pests, or (6) provide food and cover for wildlife habitat management.

Plant legumes or mixtures of legumes with grasses, crucifers, and/or other forbs to achieve biological nitrogen fixation. Select cover crop species or mixture, and timing and method of termination that will maximize efficiency of nitrogen utilization by the following crop, considering soil type and conditions, season and weather conditions, cropping system, C:N ratio of the cover crop at termination, and anticipated nitrogen needs of the subsequent crop. Use LGU- recommended nitrogen credits from the legume and reduce nitrogen applications to the subsequent crop accordingly. “If the specific rhizobium bacteria for the selected legume are not present in the soil, treat the seed with the appropriate inoculum at the time of planting.

Time the termination of cover crops to meet nutrient release goals. Termination at early vegetative stages may cause a more rapid release compared to termination at a more mature stage.

Both residue decomposition rates and soil fertility can affect nutrient availability following termination of cover crops

Allelopathic effects to the subsequent crop should be evaluated when selecting the appropriate cover crop.

Legumes add the most plant-available N if terminated when about 30% of the crop is in bloom.

Additional Considerations to Reduce Erosion by Wind or Water

To reduce erosion, best results are achieved when the combined canopy and surface residue cover attains 90 percent or greater during the period of potentially erosive wind or rainfall.

Additional Considerations to Reduce Water Quality Degradation by Utilizing Excessive Soil Nutrients

Use deep-rooted species to maximize nutrient recovery.

When appropriate for the crop production system, mowing certain grass cover crops (e.g., sorghum-sudangrass, pearl millet) prior to heading and allowing the cover crop to regrow can enhance rooting depth and density, thereby increasing their subsoiling and nutrient-recycling efficacy.

Additional Considerations to Increase Soil Health and Organic Matter Content

Increase the diversity of cover crops (e.g., mixtures of several plant species) to promote a wider diversity of soil organisms, and thereby promote increased soil organic matter.

Plant legumes or mixtures of legumes with grasses, crucifers, and/or other forbs to provide nitrogen through biological nitrogen fixation.

Legumes add the most plant-available N if terminated when about 30% of the crop is in bloom.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or treatment unit according to the planning criteria and operation and maintenance requirements of this standard. Specifications shall describe the requirements to apply the practice to achieve the intended purpose for the practice site. Plans for the establishment of cover crops shall, as a minimum, include the following specification components in an approved Cover Crop, 340, Implementation Requirements document:

- Field number and acres
- Species of plant(s) to be established.
- Seeding rates.
- Seeding dates.
- Establishment procedure.
- Rates, timing, and forms of nutrient application (if needed).
- Dates and method to terminate the cover crop.
- Other information pertinent to establishing and managing the cover crop e.g., if haying or grazing is planned specify the planned management for haying or grazing.

OPERATION AND MAINTENANCE

Evaluate the cover crop to determine if the cover crop is meeting the planned purpose(s). If the cover crop is not meeting the purpose(s) adjust the management, change the species of cover crop, or choose a different technology.

REFERENCES

A. Clark (ed.). 2007. Managing cover crops profitably. 3rd ed. Sustainable Agriculture Network Handbook Series; bk 9.

Hargrove, W.L., ed. Cover crops for clean water. SWCS, 1991.

Magdoff, F. and H. van Es. Cover Crops. 2000. p. 87-96 *In* Building soils for better crops. 2nd ed. Sustainable Agriculture Network Handbook Series; bk 4. National Agriculture Library. Beltsville, MD.

Reeves, D.W. 1994. Cover crops and erosion. p. 125-172 *In* J.L. Hatfield and B.A. Stewart (eds.) Crops Residue Management. CRC Press, Boca Raton, FL.

NRCS Cover Crop Termination Guidelines: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/?cid=stelprdb1077238

Revised Universal Soil Loss Equation Version 2 (RUSLE2) website: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/rusle2/

Wind Erosion Prediction System (WEPS) website: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/weps/

USDA, Natural Resources Conservation Service, National Agronomy Manual, 4th Edition, Feb. 2011. Website: http://directives.sc.egov.usda.gov/ Under Manuals and Title 190.

Attachment D
Maintenance and Inspection Plan/ Log for Practice Implementation

Operation and Maintenance Plan
Perennial Companion Crop (Mowed Grass)

Land Owner: _____ Date: _____

By: _____ Title: _____

Project Location: ____Dairy Dreams LLC – Field DD-9A____Town 25N, Range 24E, Section 10, NW 1/4 of NW 1/4_____

This plan is to be following for a minimum of the next 10 years, starting Spring 2023 (interim credit life). This plan is to be applied to field DD-9A (13.1 acres minimum).

1. Field DD-9A (13.1 acres minimum) is to be converted from a forage and row crop rotation to be permanent mowed vegetation in accordance with NRCS 340 (Cover Crop).

2. During the first year of the seeding establishment growing season, vegetation must be clipped by August 1 to allow seeded grasses to compete with weed species.

3. Vegetation height should be maintained between _____inches and _____inches.

4. Chemicals which kill grass will not be sprayed onto or allowed to drain into the perennial companion crop area.

5. After vegetation has been established one or more years, delay mowing until after August 1 to allow nesting birds to complete nesting. Haying when conditions are dry enough is allowed and planned for.

6. Evaluate the vegetation to determine if the vegetation is meeting the planned purpose(s). If the vegetation is not meeting the purpose(s) adjust the management, change the species of cover crop, or choose a different technology.

7. A maintenance program as designated by the Agronomist shall be established to maintain vegetative cover and stability. Vegetation damaged by machinery, herbicides, or erosion must be repaired promptly.

8. Landowner should be advised to avoid areas where forbs have been established when applying herbicides. Avoid using waterways as turn-rows during tillage and cultivation operations. Prescribed burning and mowing may be appropriate to enhance wildlife values but must be conducted to avoid peak nesting seasons and reduced winter cover.

Land Owner Signature: _____ Date: _____

Annual Inspection and Maintenance Log

Table 1. Annual Inspection Report and Maintenance Log

Practice ID	Acres In Practice	Installation Date	Date of Inspection	Statement of Finding	Deficient Items	Number of Credits	Verifier & Company

*Include Dated Pictures from Inspection with this Log

Attachment E
SnapPlus PTP Report and Reduction Calculations

WQ1: P Trade Report

Reported For	Dairy Dreams
Printed	2023-05-05
Plan Completion/Update Date	2023-03-29
SnapPlus Version 20.4 built on 2021-06-03	
C:\Users\davel\Dropbox\NMP Tools & Info\Backups\Dairy Dreams.snapDb	

Prepared for:
Dairy Dreams
attn:Dairy Dreams

The P Trade Report estimates the annual pounds of phosphorus (P) in surface runoff from cropland entering surface waters. These P loss calculations are based on a field's soil test P concentration, crops, tillage, nutrient management practices and estimates of average runoff and sheet and rill erosion for the predominant soil type. Losses from concentrated flow channel or gully erosion with a field are not included in these calculations. Field runoff losses are calculated for each year as **PTP** (lb P/field/yr). Fields are only included if there are at least 2 years of crops before the selected start year. Before using this report as part of a Water Quality Trade activity, phosphorus losses (PTP) must be converted into 'P credits' according to DNR guidance.

For more information go to **http://dnr.wi.gov/** and type keyword: **Water Quality Trading**

Questions? Please contact DNRphosphorus@wisconsin.gov

This report was developed for Wisconsin DNR Water Quality Trading and Adaptive Management purposes and cannot be used to demonstrate compliance with NR 151 or NRCS 590 NM plan requirements.

P Trade Report				PTP								
Field Name	Soil Series	Soil Symbol	Acres	2019	2020	2021	2022	2023	2024	2025	2026	2027
DD-9	HORTONVILLE	HrB	41	113	212	39	64	124	207	181	250	94
DD-9A	BONDUEL	Bn	9	10	6	9	7	2	1	1	1	0
Total			**49**	**122**	**218**	**48**	**71**	**126**	**208**	**182**	**250**	**95**

Phosphorous Trade Report (TP)												
				lbs of P loss/field/Yr								
Field Name	Soil Series	Soil Symbol	Acres/Field	2019	2020	2021	2022	2023	2024	2025	2026	2027
DD-9	Hortonville	Hrb	40.5	113	212	39	64	124	207	181	250	94
DD9-A	Bonduel	Bn	8.6	9	6	9	7	2	1	1	1	0
		TOTAL	49.1	122	218	48	71	126	208	182	251	94

Phosphorous Runoff Loss Per Acre (PTP) (lbs/acre/Yr)												
	Pre Implementation					Post Implementation						
Field Name	2019	2020	2021	2022	Average (P Loss) (lbs/yr)	2023	2024	2025	2026	2027	Average (P Loss) (lbs/yr)	Reduction Per Acre (lbs/yr)
DD-9	2.79	5.23	0.96	1.58	2.64	-	-	-	-	-	-	NA
DD-9A	1.05	0.70	1.05	0.81	0.90	0.23	0.12	0.12	0.12	0.00	0.12	0.78

Converted Acres	4.50	acres	<--Number of Acres from DD-9 Converted to DD-9A (Mowed Grass)

PTP Total Reduction/Yr			
DD-9	11.37	lbs	<--4.5 Acres of Field DD-9 converted to DD-9A (Mowed Grass) ((Average P loss/acre/yr Existing DD-9 - Average P loss/acre/ yr Future DD-9A)*Total Acres Converted from DD-9 to DD-9A) (2.64-0.12)*4.50
DD-9A	6.75	lbs	<-- Conversion of DD-9A to Mowed Grass for existing 8.6 acres (Total Acres Converted * Future TP Loss Reduction Per Acre (lbs/yr)) (8.6*0.47)
TOTAL Reduction (DD-9 & DD-9A Modification)	18.12	lbs/yr	<--4.5 Acres of Field DD-9 converted to DD-9A (Mowed Grass) <-- Conversion of DD-9A to Mowed Grass for existing 8.6 acres

Attachment F
SnapPlus Sediment Trade Report and Reduction Calculations

WQ2: Sediment Trade Report

Reported For	Dairy Dreams
Printed	2023-05-05
Plan Completion/Update Date	2023-03-29
SnapPlus Version 20.4 built on 2021-06-03	
C:\Users\davel\Dropbox\NMP Tools & Info\Backups\Dairy Dreams.snapDb	

Prepared for:
Dairy Dreams
attn:Dairy Dreams

The Sediment Trade Report estimates the annual tons of sediment in surface runoff from cropland entering surface waters. These sediment delivery calculations are based on RUSLE2 estimates of sheet and rill erosion for the predominant soil. Sediment losses from concentrated flow channel or gully erosion within a field are not included in these calculations. Field sediment yields are calculated for each year as US tons/field/year. Fields are only included if there at least 2 years of crops before the selected start year. Before using this report as part of a Water Quality Trade activity, sediment losses must be converted into 'credits' according to DNR guidance.

For more information go to **http://dnr.wi.gov** and type keyword: **Water Quality Trading**

Questions? Please contact DNRphosphorus@wisconsin.gov

This report was developed for Wisconsin DNR Water Quality Trading and Adaptive Management purposes and cannot be used to demonstrate compliance with NR 151 or NRCS 590 NM plan requirements.

Sediment Trading

Field Name	Soil Series	Soil Symbol	Acres	Sediment (US Tons)						
				2019	2020	2021	2022	2023	2024	2025
DD-9	HORTONVILLE	HrB	40.5	5.1	5.9	3.4	2.7	6.7	10.7	8.0
DD-9A	BONDUEL	Bn	8.6	0.2	0.1	0.2	0.1	0.1	0.0	0.0
Total				5.3	6.0	3.5	2.8	6.8	10.7	8.0

Sediment (US Tons)	
2026	2027
13.3	5.1
0.0	0.0
13.3	5.1

Sediment Trade Report												
				Sediment Loss (US Tons/Field)								
Field Name	Soil Series	Soil Symbol	Acres/Field	2019	2020	2021	2022	2023	2024	2025	2026	2027
DD-9	Hortonville	Hrb	40.5	5.1	5.9	3.4	2.7	6.7	10.7	8.0	13.3	5.1
DD9-A	Bonduel	Bn	8.6	0.2	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0
		TOTAL	49.1	5.3	6.0	3.6	2.8	6.8	10.7	8.0		
				Sediment Loss (Lbs/Field)								
				10,200	11,800	6,800	5,400	13,400	21,400	16,000	26,600	10,200
				400	200	400	200	200	-	-	-	-

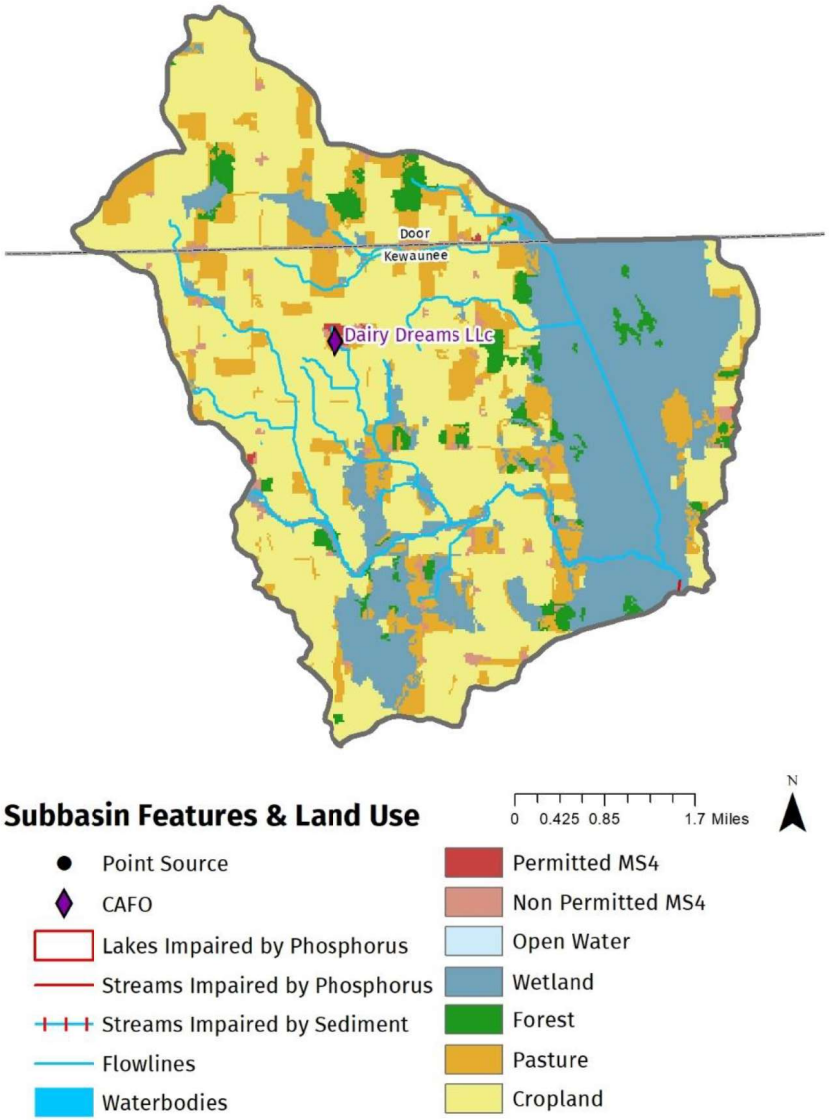
Sediment Loss (lbs/acre/yr)												
	Pre Implementation					Post Implementation						
Field Name	2019	2020	2021	2022	Average Sediment Loss (lbs/yr)	2023	2024	2025	2026	2027	Average Sediment Loss (lbs/yr)	Reduction Per Acre (lbs/yr)
DD-9	251.9	291.4	167.9	133.3	211.1	-	-	-	-	-	-	NA
DD-9A	46.5	23.3	46.5	23.3	34.9	23.3	0.0	0.0	0.0	0.0	4.7	30.2

Converted Acres	4.50	acres	<--Number of Acres from DD-9 Converted to DD-9A (Mowed Grass)
TSS Total Reduction/Yr			
DD-9	929	lbs	<--4.5 Acres of Field DD9 converted to DD-9A (Mowed Grass) ((Average TSS loss/acre/Yr Existing DD-9 - Average TSS loss/acre/Yr Future DD-9A)*Total Acres Converted from DD-9 to DD9-A) (211.1-4.7)*4.5
DD-9A	260	lbs	<-- Conversion of DD-9A to Mowed Grass for existing 8.6 acres (Reduction of TP Loss Per Acre (lbs/yr) *Total Existing Acres of DD9-A) (30.2*8.6)
TOTAL Reduction (DD-9+DD-9A Modification)	1,189	lbs/yr	<--4.5 Acres of Field DD-9 converted to DD-9A (Mowed Grass) <-- Conversion of DD-9A to Mowed Grass for existing 8.6 acres

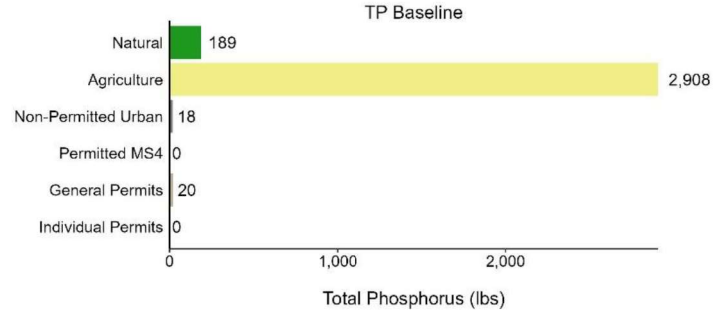
Attachment G
TMDL TP Map

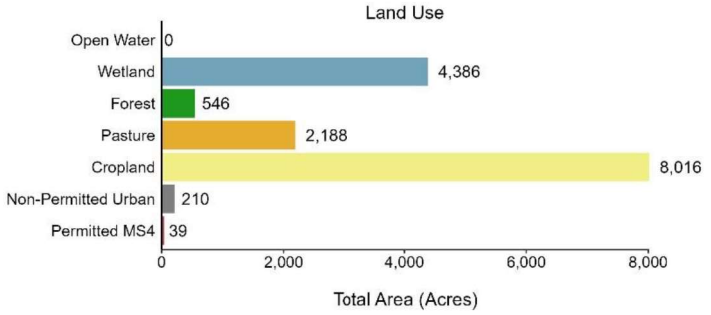
Northeast Lakeshore TMDL – Kewaunee Total Phosphorus

Subbasin K49: Silver Creek—mile 6.9 to headwaters





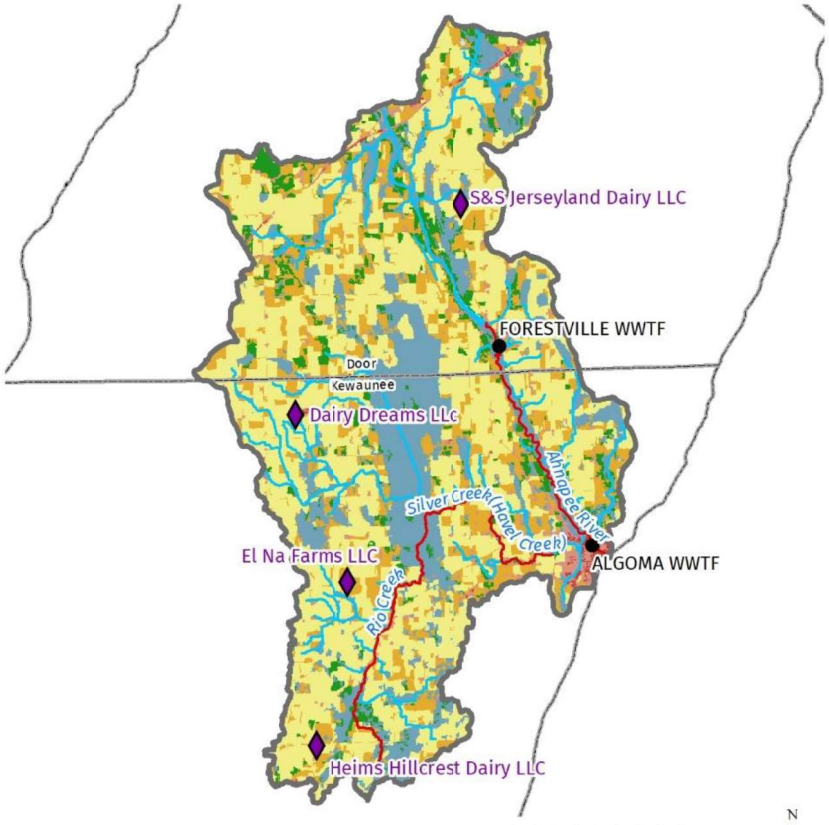


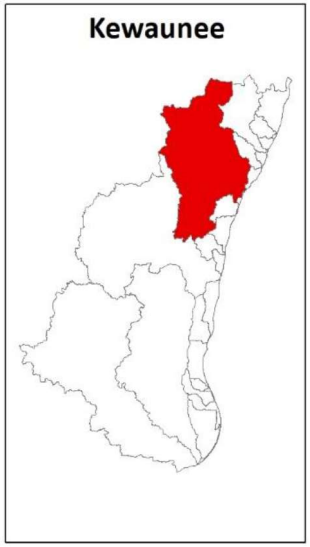


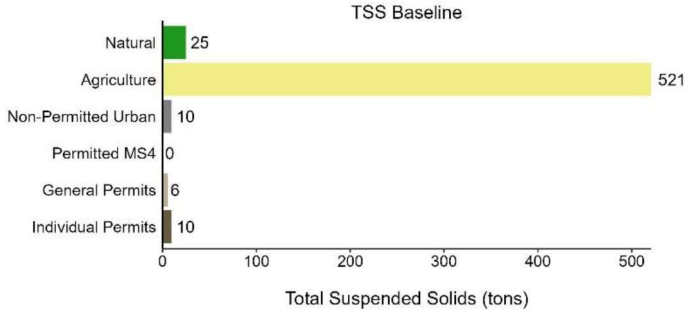
Attachment H
TMDL TSS Map

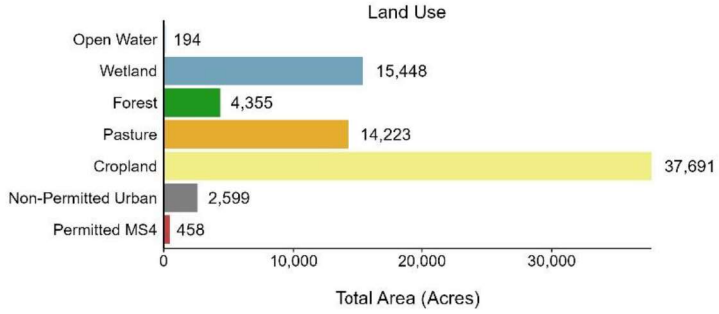
Northeast Lakeshore TMDL – Kewaunee Total Suspended Solids

Subbasin K44: Ahnapee









Subbasin Features & Land Use

- Point Source
- CAFO
- Lakes Impaired by Phosphorus
- Streams Impaired by Phosphorus
- Streams Impaired by Sediment
- Flowlines
- Waterbodies
- Permitted MS4
- Non Permitted MS4
- Open Water
- Wetland
- Forest
- Pasture
- Cropland

Attachment I
Practice Registration
Form 3400-207

State of Wisconsin
Department of Natural Resources
101 South Webster Street
Madison WI 53707-7921
dnr.wi.gov

Water Quality Trading Management Practice Registration

Form 3400-207 (R 1/14)

Notice: Pursuant to s. 283.84, Wis. Stats., this form must be completed by any WPDES permittee that is using water quality trading as a method of complying with a permit limitation. Failure to complete this form would not result in penalties. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31 - 19.39, Wis. Stats.).

Applicant Information

Permittee Name	Permit Number WI-	Facility Site Number

Facility Address	City	State	ZIP Code

Project Contact Name (if applicable)	Address	City	State	ZIP Code

Project Name

Broker/Exchange Information (if applicable)

Was a broker/exchange be used to facilitate trade? ◯ Yes ◯ No

Broker/Exchange Organization Name	Contact Name

Address	Phone Number	Email

Trade Registration Information (Use a separate form for each trade agreement)

Type	Trade Agreement Number	Practices Used to Generate Credits	Anticipated Load Reduction	Trade Ratio	Method of Quantification
◯ Urban NPS ◯ Agricultural NPS ◯ Other					

County	Closest Receiving Water Name	Land Parcel ID(s)	Parameter(s) being traded

The preparer certifies all of the following:

- I have completed this document to the best of my knowledge and have not excluded pertinent information.
- I certify that the information in this document is true to the best of my knowledge.

Signature of Preparer	Date Signed

Authorized Representative Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. Based on my inquiry of those persons directly responsible for gathering and entering the information, the information is, to the best of my knowledge and belief, 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.

Signature of Authorized Representative	Date Signed

Leave Blank – For Department Use Only

Date Received		Trade Docket Number
Entered in Tracking System ☐ Yes	Date Entered	Name of Department Reviewer