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February 16, 2017

Mr. Andrew Greer
Wisconsin Department of Natural Resources
141 NW Barstow Street, Room 180
Waukesha, WI 53188

Re: Fontana-Walworth Water Pollution Control Facilities
WPDES Permit No. WI-0036021-06-0
Final Water Quality Trading Plan

Dear Mr. Greer:

The enclosed Final Water Quality Trading Plan is being submitted to the Wisconsin Department of Natural Resources (WDNR) on behalf of the Fontana-Walworth Water Pollution Control Commission (FWWPCC). The Plan is intended to satisfy the submission requirements for water quality trading as required for reissuance of the FWWPCC's Wisconsin Pollutant Discharge Elimination System (WPDES) permit in 2018. A Notification that Water Quality Trading Will Be Used to Comply with WQBELS (Form 8700-nnn) was submitted in June 2016.

The FWWPCC requests that the compliance schedule related to achieving the final WQBEL remain consistent with the current WPDES permit schedule (achieve compliance by April 30, 2022). The FWWPCC will not only require time for land acquisition and subsequent design and construction of the Water Quality Trading (WQT) alternatives, but will also require time for the FWWPCC to review its sewer utility rates to determine if a rate increase will be necessary for its customers (Village of Walworth, Village of Fontana-on-Geneva Lake, and Kikkoman Foods, Inc.). A potential sewer utility rate increase may be necessary to generate additional annual Operation, Maintenance, and Replacement (O, M, & R) revenue for the WQT improvements.

Should the FWWPCC determine a sewer utility rate increase is necessary for the additional O, M, & R expenses, this rate increase would then need to be conveyed to the two villages for them to determine if a village sewer utility increase would also be necessary to generate revenue for the potential FWWPCC rate increase, as well as the additional debt retirement necessary to construct the WQT alternatives. Maintaining the current compliance schedule will provide the necessary time for studying, budgeting, and potentially implementing a new sewer rate structure by all parties.

Based on discussions with WDNR, the trade ratio will initially be 2.0 for the wet detention basin treating storm runoff from the delineated "North Drainage Basin" as defined in Table 4 of the Guidance for Implementing Water Quality Trading in WPDES Permits. We understand this trade ratio could possibly be reduced to 1.5 or lower if monitoring of the influent and effluent

stormwater from the wet detention basin exhibits a higher removal percentage than predicted within this report.

A trade ratio of 3.0 will also be applied for changing the FWWPCC farmland lease to require a cover crop be planted in lieu of the row-crop farming practices currently being used. This assumes a nutrient management plan will be established for the FWWPCC farmland that will establish soil nutrient concentrations which are stable or dropping. This trade ratio could possibly be reduced to 2.0 or less if filter strips were to be established on critical areas of the FWWPCC farmland along with other criteria

Please call with questions.

Sincerely,

STRAND ASSOCIATES, INC.®

Bradley J. Lake, P.E.

Enclosure

c/enc: Mr. Doug York, FWWPCC
Ms. Torell Geffers, FWWPCC

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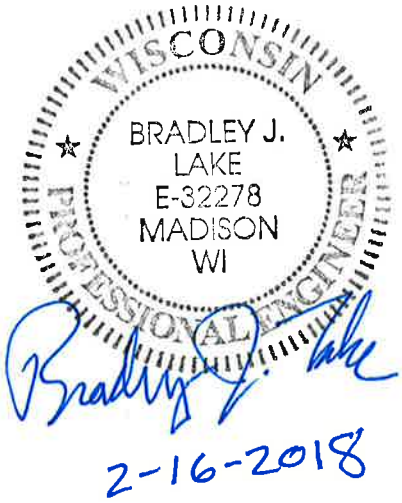
Report for
Fontana-Walworth
Water Pollution Control Commission
Water Pollution Control Facilities
Walworth, Wisconsin

Water Quality Trading Plan



Prepared by:

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February 2018

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BACKGROUND INFORMATION

A. Purpose of Plan

This Water Quality Trading Plan (Plan) was prepared as required to meet the compliance schedule for meeting new, more stringent Total Phosphorus (TP) effluent limits in the Fontana-Walworth Water Pollution Control Commission's (FWWPCC) Wisconsin Pollutant Discharge Elimination System (WPDES) permit (WI-0036021-06-0), and to serve as an ongoing preparatory tool toward ultimately meeting the required phosphorus removal obligations imposed by the Wisconsin Department of Natural Resources (WDNR). Subsequent Plans will be issued to meet upcoming compliance requirements and may supersede the findings, summaries, and conclusions presented in this report.

B. Facility Processes and Operations

The Fontana-Walworth Water Pollution Control Facility (WPCF) serves the Village of Walworth, the Village of Fontana-on-Geneva Lake and Kikkoman Foods, Inc. located in the Town of Walworth. The WPCF is an advanced secondary system providing treatment of domestic and industrial wastewater. The treated final effluent from this WPCF is discharged into a drainage ditch where it flows approximately 500 feet and discharges into the Piscasaw Creek.

The WPCF currently uses chemical phosphorus removal (CPR) to meet its monthly average 1.0 milligram per liter (mg/L) effluent total phosphorus (TP) limit. The future WPCF phosphorus water quality-based effluent limits (WQBELs) include 0.075 mg/L (six-month average) and 0.225 mg/L (monthly average). The current and future WQBELS are presented in Table 1.

Limit	Total Phosphorus Concentration (mg/L)
Current Monthly Average Limit	1.0
Future WQBELs	
Six-Month Average[1]	0.075 (8.76 lb/day)
Monthly Average	0.225

[1]Averaging periods are May to October and November to April.

Table 1 WPDES Permit Phosphorus Effluent Limits

A process schematic of the WPCF is provided in Figure 1. The WPCF design flows and loadings are provided in Table 2.

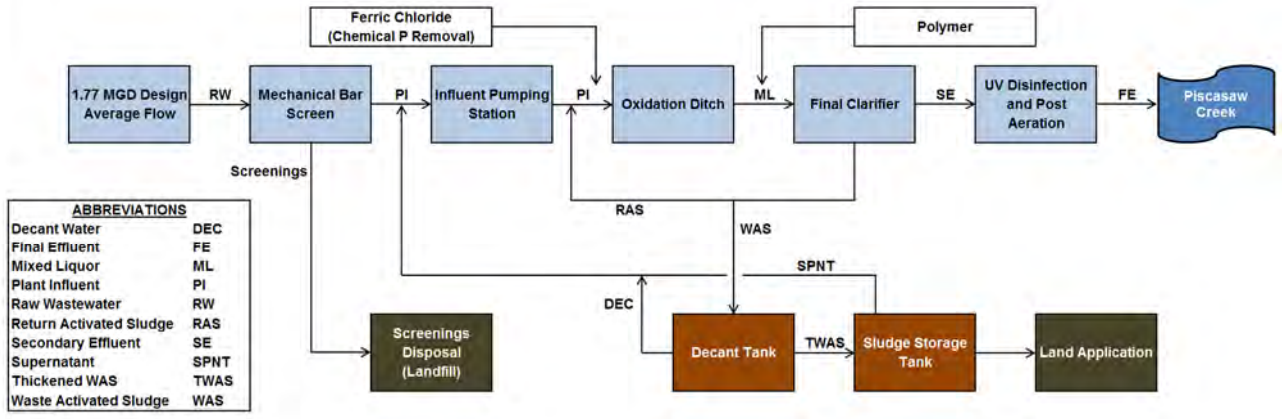


Figure 1 WPCF Process Schematic

Design Flows (mgd)	
Average Day	1.77
Peak Month	2.64
Peak Hour	6.33
Design Average Influent Loadings (lbs/day)	
BOD_5	2,467
TSS	2,970
Peak Monthly Average Influent Loadings (lbs/day)	
BOD_5	4,271
TSS	5,061
Ammonia Nitrogen	353
Total Phosphorus (TP)	165

BOD_5 = five-day biochemical oxygen demand
TSS = total suspended solids

Table 2 WPCF Design Flows and Loadings

WATER QUALITY TRADING

A. Overview

Given the considerable costs associated with advanced treatment technologies as documented in the April 28, 2017 Final Compliance Alternatives Plan, the FWWPCC is establishing Water Quality Trading for meeting the future stringent TP effluent limits while continuing to operate the existing CPR system at the WPCF.

The WPCF is rurally located within an agricultural area within the Town of Sharon. The WPCF property includes the WPCF property itself, as well as agricultural fields adjacent to the WPCF. The FWWPCC uses the agricultural fields it owns to apply biosolids generated as a byproduct of the wastewater treatment process. The agricultural fields are leased to area farmers which predominantly grow row crops, such as corn or soybeans, which are highly vulnerable to erosion. The most recent trend from the leasing farmer is to grow corn for silage feed. This is the leasing farmers plan for the forseeable future.

The agricultural fields owned by the FWWPCC were modeled to determine the potential TP load reductions that would occur if the FWWPCC imposed restrictions on the typical row-cropping practices performed by the leasing farmer and required a more environmentally-friendly cover crop, such as alfalfa, that would reduce runoff potential.

Additionally, there are two agriculturally dominated drainage basins that drain through ditches and grassed waterways that pass through the WPCF property just prior to discharging to the Piscasaw Creek. Theses drainage basins (referred to hereinafter as the north basin and south basin) were delineated and modeled to determine the TP load generated annually that has the potential to run off the farm fields and ultimately reach the Piscasaw Creek. Based upon the preliminary modeling results, the north basin has been identified as a viable Water Quality Trade. The south basin is smaller and would require higher costs to implement and is therefore not being pursued as a WQT alternative at this time. However, the south basin is discussed for purposes of a future potential trade to be implemented as the WPCF flows increase over time.

B. Water Quality Trade No. 1–Drainage Basins

1. North Drainage Basin Description/Trading Concept

The north basin drains from northwest to the southeast through a grassed waterway, enters FWWPCC property, and drains east on the north end of two effluent polishing ponds that are no longer in-service. These ponds retain water year-round and neither cell has ever been drained.

The north basin water quality trading concept generally involves identification of the annual TP load that will run off, capturing this load with a new underground stormwater pipe system for diversion into the west pond, routing the flow into the east pond, and discharging the treated stormwater back into the ditch which carries the treated flow to the Piscasaw Creek.

In order to enhance TP removal within the ponds, two additional chemical metering pumps and associated piping would be installed within the nearby existing CPR Building. Chemical piping would be routed to the new entry point of the west pond to allow stormwater to be dosed with a coagulant to enhance TP removal. Electrical upgrades are included to automatically turn the coagulant feed pumps on during wet weather events.

Additionally, costs are included to reduce the accumulated sediment from both ponds to allow conversion to the planned stormwater wet detention basins.

2. South Drainage Basin Description/Trading Concept (for potential future trading only)

The south basin also drains from the northwest to the southeast, crosses Chilson Road near the WPCF driveway, enters FWWPCC property and flows on the south side of the driveway in an open ditch to the east until it reaches the Piscasaw Creek. This ditch also receives treated WPCF effluent and conveys it to the Piscasaw Creek.

The south basin water quality trading concept generally involves identification of the annual TP load that will runoff, directing this load into a new wet detention basin located on FWWPCC property, and discharging the treated stormwater back into the ditch where it will continue on to the Piscasaw Creek.

A small enclosure would be located near the south basin receiving box to house coagulant storage and chemical metering pumps to meter coagulant into the stormwater for enhanced TP removal. An asphalt driveway is included for accessing the new enclosure. Additional site improvement costs are included with the new wet detention basin, including fencing, a structure to assist in periodic sludge removal, and other items.

The WPCF, portions of the north and south drainage basins, and the wet detention ponds are generally shown in Figure 2. Additionally, a supplemental surface water data viewer map showing the WPCF outfall and the North Drain Basin wet detention pond outfall to the Piscasaw Creek is included in Appendix H.

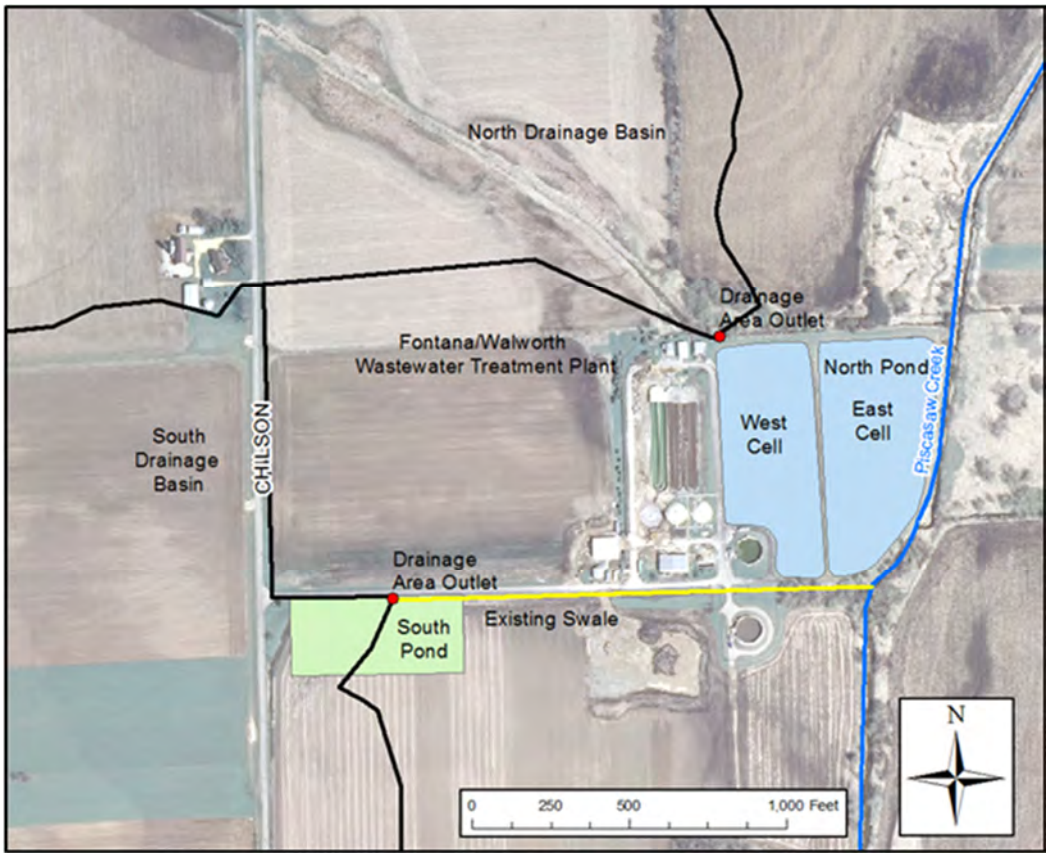


Figure 2 Location Map

3. Drainage Basin Modeling Approach Using Snap Plus and P8 Models for Wet Detention Ponds

A two-step modeling process was conducted, based on feedback from WDNR staff, to estimate the phosphorus removal potential of wet detention ponds used for stormwater treatment on FWWPCC land. The first step of the evaluation involved development of a SnapPlus model to calculate the approximate TP runoff from farm fields from both drainage basins based on local tillage, nutrient application, and cropping practices. The second step of the evaluation involved development of a P8 model to estimate the potential TP reduction achieved by routing the stormwater flow through the wet detention ponds for treatment.

The design details for both the north and south wet detention ponds are summarized in Table 3.

Drainage Basin	Pond	Permanent Storage Area (acres)	Temporary Storage Area (acres)	Bottom Area (acres)	Permanent Storage Volume (acre-ft)	Temporary Storage Volume (acre-ft)	Total Storage Volume (acre-ft)
North	East Cell	5.35	5.77	4.66	25.00	16.67	41.68
	West Cell	4.50	4.92	3.82	20.77	14.12	34.89
South	South	3.16	3.39	2.80	14.87	6.31	21.18

Table 3 Conceptual Detention Pond Design Details

Delineating the drainage basins was accomplished by analyzing available surface contours and hydrologic unit code-12 (HUC) information provided by the WDNR. The total areas were 917.3 acres and 528.7 acres for the north and south basins, respectively. Two SnapPlus models, one for each basin, calculated the TP loading from the basins. Information required for SnapPlus includes field locations, crop rotations, fertilizer and other nutrient applications, downstream slope conditions, and background nutrient concentrations.

Land use values for the basins were taken from the Multi-Resolution Land Characteristics Consortium (MLRC) 2011 National Land Cover Database. This information was then manually enhanced to delineate roads, homesteads, farms, woodlands, and industrial areas. Specific farm fields were separated based on parcel boundaries, crop rotation differences from aerial photographs, and geographic obstacles such as roads and tree lines. SnapPlus uploaded the field spatial information and calculated soil type and slope. The fields were organized into four crop rotations: Corn–Soybeans, Corn–Soybeans–Alfalfa, Corn Silage–Alfalfa, and Tree Farm (north basin only). Figures included in Appendix A and Appendix B show the crop rotations for each basin. The specific crops chosen for each year in the rotations are shown in Table 4. SnapPlus requires two preceding years of obtaining steady-state conditions before it generates a TP load. The model simulated crop years 2020 to 2026, which allowed for five years (2022, 2023, 2024, 2025, and 2026) of runoff information. A tree farm in the northeast section of the north drainage basin was modeled as corn grain because SnapPlus does not recognize commercial landscape tree production. Corn grain was chosen because it most closely represents the heavy tillage and fertilizer application practices of the farm.

Rotation[1,2]	Crop Year						
	2020	2021	2022	2023	2024	2025	2026
Corn–Soybeans	Corn Grain	Soybeans 15-20 Inch Row	Corn Grain	Soybeans 15-20 Inch Row	Corn Grain	Soybeans 15-20 Inch Row	Corn Grain
Corn–Soybeans–Alfalfa	Soybeans 15-20 Inch Row	Corn Grain	Soybeans 15-20 Inch Row	Alfalfa Seeding Spring	Alfalfa	Alfalfa	Alfalfa (grassy, yr 3+)
Corn Silage–Alfalfa	Alfalfa (grassy, yr 3+)	Corn Silage	Alfalfa Seeding Spring	Alfalfa	Alfalfa	Alfalfa (grassy, yr 3+)	Corn Silage
Tree Farm	Corn Grain	Corn Grain	Corn Grain	Corn Grain	Corn Grain	Corn Grain	Corn Grain

[1]Consulted with Susan Porter, Wisconsin Manure Management Advisory System
[2]Consulted with Brian Smetana, Walworth County Agricultural Conservation

Table 4 Crop Rotations

The Wisconsin Soil Test Summary published background phosphorus and potassium levels of 53 and 134 parts per million (ppm), respectively. Manual nutrient applications (fertilizer, biosolids from the WPCF, manure) information was provided by the FWWPCC, as well as Susan Porter (Wisconsin Manure Management Advisory System) and Brian Smetana (Walworth County Agricultural Conservation). The two sources of supplemental nutrients applied within both basins are biosolids and manure. Several dairy operations applied manure to the fields via cow herds. The WPCF applied stabilized biosolids from the wastewater treatment process to fields in both basins. Figures included in Appendix A and Appendix B show the supplementary nutrient application areas for each basin. Crops were uniformly tilled throughout both basins with Fall Chisel, no disk and Spring Cultivation being the major practices. The tillage and fertilizer application practices for each crop are summarized in Table 5.

Crop	Tillage Practice	Fertilizer
Alfalfa	None	None
Alfalfa (grassy, yr 3+)	None	None
Alfalfa Seeding Spring	Fall Chisel, no disk	None
Corn Grain	Spring Cultivation	28%/32% UAN
Corn Silage	Spring Cultivation	28%/32% UAN
Soybeans 15-20 inch row	Fall Chisel, no disk	None

Table 5 Farming Practices for Each Crop

The SnapPlus P trading reports for the north and south basins are included in Appendix A and Appendix B, respectively. The five-year average annual phosphorus TP loading was 4,320 pounds for the north drainage basin and 1,100 pounds for the south drainage basin. This phosphorus was assumed to originate from only the farm fields. Other land uses such as roads, homesteads, and woodlands were modeled separately in P8 while draining into the same ponds.

As with SnapPlus, two P8 models were created, one for the north basin and the other for the south. Climate and particle data for both P8 models included daily mean temperature, hourly

rainfall depths, and particle size distributions, respectively. Predetermined climate data sets were programmed in the model instead of new ones to reduce build time. Climate data for Madison, Wisconsin, was used for both basins with an average year specified by the WDNR. Each model had two watersheds, one for the farm fields with SnapPlus TP loading and the other for extraneous land uses such as roads and homesteads. The P8 phosphorus outflow for the farm watersheds for both basins was calibrated to the SnapPlus output via a pollutant scaling factor. Phosphorus runoff from the nonfarm watershed was calculated in P8 using a curve number and area.

Detention ponds were modeled in P8 using the POND device option. Pond inputs included the permanent and temporary storage volumes and surface areas. The north pond system was two existing ponds modeled in series from the west cell to the east cell, which is then discharged to an existing drainage ditch that conveys to the Piscasaw Creek. The proposed south pond drains to an existing drainage ditch before flow enters the Piscasaw Creek. The pond was modeled as a trapezoidal swale using the SWALE function with 2:1 H:V side slopes, 4-foot bottom width, and a 0.035 Manning's constant. Infiltration for each device was disabled.

The use of a coagulant is planned to enhance TP removal within the wet detention basins to a higher removal rate than that what is predicted by the P8 model. Bench scale testing of stormwater samples dosed with ferric chloride was subsequently conducted by FWWPCC staff as described in the following section

The P8 modeling output is included in Appendix I..

4. Bench Scale Testing of Coagulant Addition

The FWWPCC staff collected stormwater samples from the ditches in both drainage basins during an October 26, 2016 wet weather event. Figure 3 shows where the treated wastewater effluent mixes with the stormwater flowing in the ditch during the October 26, 2016, wet weather event. The wastewater effluent TSS on that day was less than 5 mg/L, while the stormwater exhibited a TSS concentration of approximately 2,000 mg/L.

Figure 3 Treated Wastewater Effluent Mixing with Stormwater

Bench scale testing was conducted by FWWPCC lab staff on both stormwater samples to predict the increase in TP removal efficiency that would result by dosing ferric chloride to the stormwater entering the wet detention basin.

The north drainage basin stormwater sample exhibited TP concentrations ranging from 1.0 to 4.0 mg/L TP. The high end of this range is similar to the TP concentration of raw wastewater. The TSS concentration of the stormwater was also tested and ranged from 395 to 1,406 mg/L. This stormwater was then dosed with 37 to 42 percent ferric chloride solution (0.25, 0.50, and 0.75 mL), mixed thoroughly, and allowed to settle for 180 minutes. A stormwater sample without any ferric chloride dose was also included in the test for comparative purposes. Samples of the supernatant in the test jar were collected at 0, 60, 120, and 180 minutes and analyzed for TP and TSS. In summary, it was generally observed the vast majority of TP and TSS removal occurred in the sample collected at 60 minutes. Additionally, the introduction of ferric chloride substantially enhanced the removal of both TP and TSS from the stormwater sample. After 60 minutes of settling, the stormwater sample without ferric chloride addition had removed 62.5 percent of the TP. In comparison, the stormwater sample dosed with 0.25 mL of ferric chloride removed 97.9 percent of TP after 60 minutes. Therefore, the addition of ferric chloride represents an approximate 57 percent improvement in TP removal when compared to the nondosed sample.

The south drainage basin stormwater sample exhibited TP concentrations ranging from 4.6 to 5.3 mg/L. These concentrations are actually higher than the TP concentrations in the raw wastewater received at FWWPCC. The TSS concentrations ranged from 1,660 to 2,056 mg/L. This stormwater sample underwent the same testing procedure described above and exhibited more definitive trends. Similar to the north drainage basin stormwater, test results, the vast majority of the settling occurred at the 60-minute sample mark. The addition of ferric chloride once

again substantially improved the TP removal. After 60 minutes of settling, the stormwater sample without ferric chloride addition had removed 70.0 percent of the TP. In comparison, the stormwater sample dosed with 0.25 mL of ferric chloride removed 96.7 percent of the TP. Therefore, the addition of ferric chloride represents an approximate 38 percent improvement in TP removal when compared to the nondosed sample.

A summary of the results of this bench scale testing is shown in Table 6. The entire bench scale testing data is shown graphically in Figures 4 through 7. The bench scale testing data is included in Appendix D.

North Drainage Stormwater Sample	
TP Removal without ferric	62.5%
TP Removal with ferric	97.9%
Increase in Removal Efficiency	57%
South Drainage Stormwater Sample	
TP Removal without ferric	70.0%
TP Removal with ferric	96.7%
Increase in Removal Efficiency	38%

Table 6 Bench Scale Testing Results

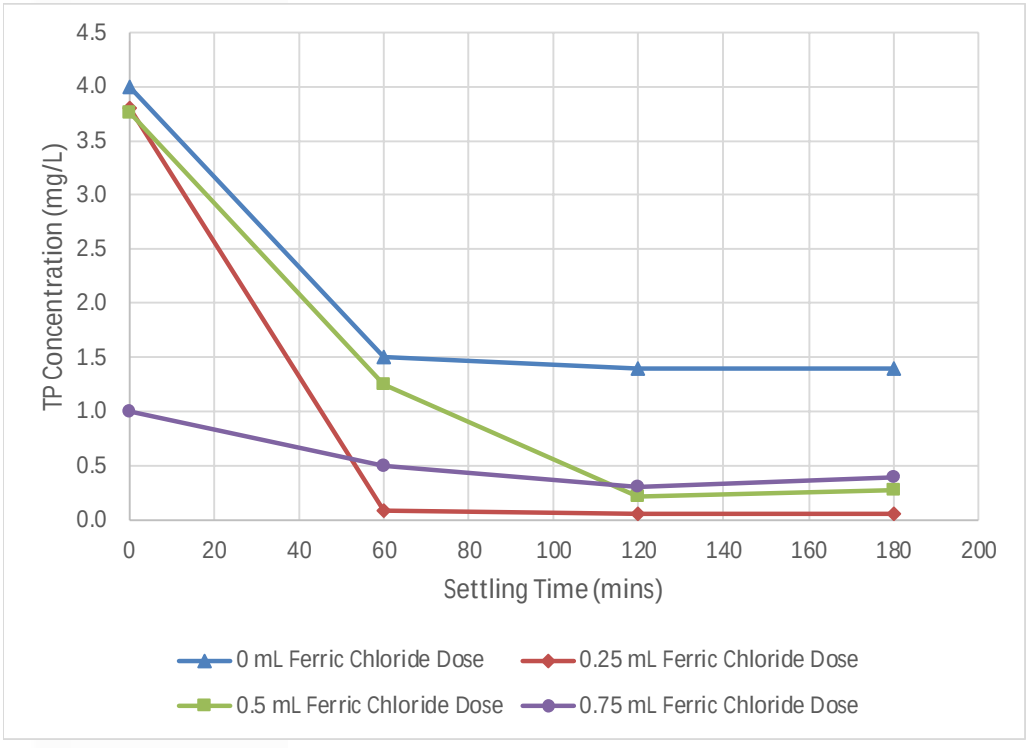


Figure 4 North Drainage Basin TP Settling Results

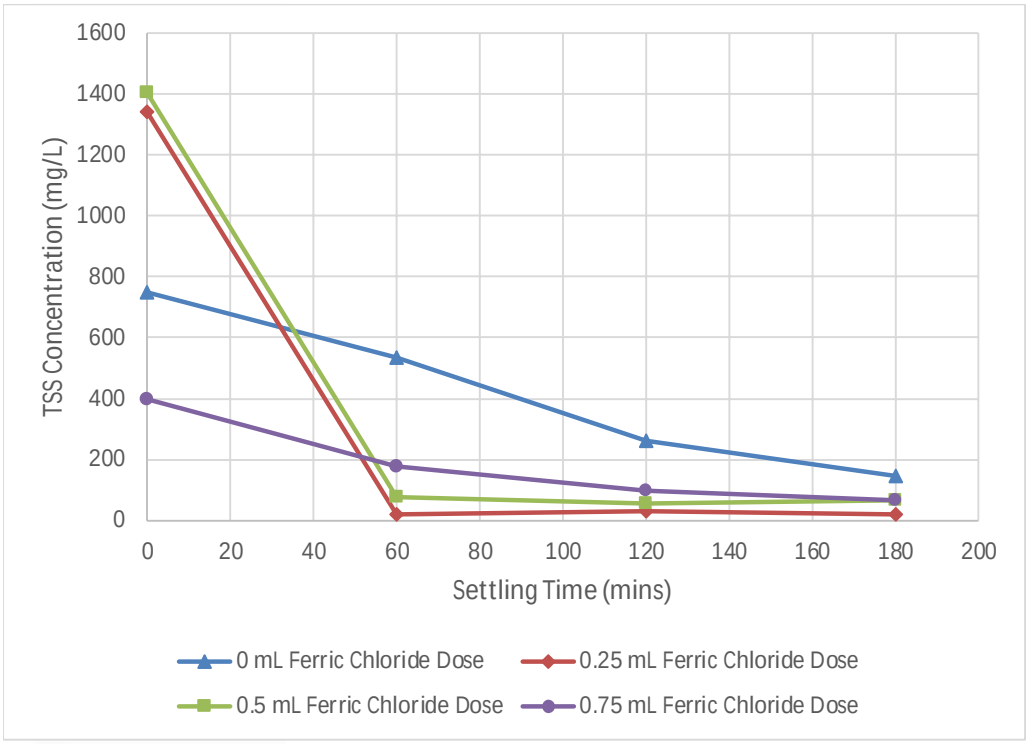


Figure 5 North Drainage Basin TSS Settling Results

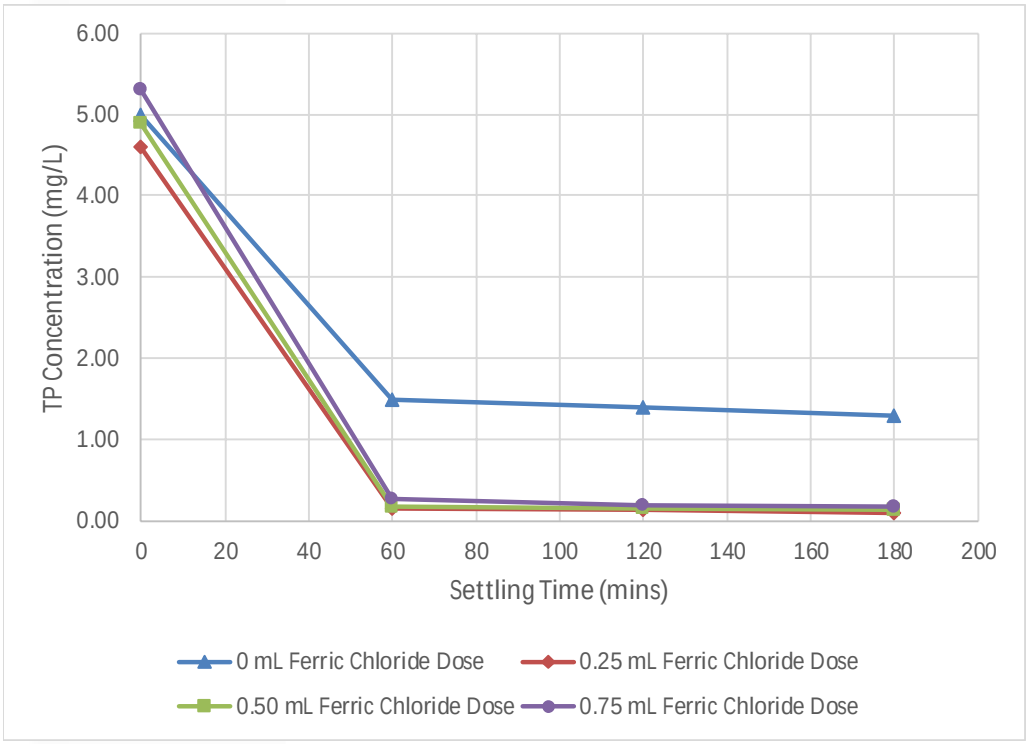


Figure 6 South Drainage Basin TP Settling Results

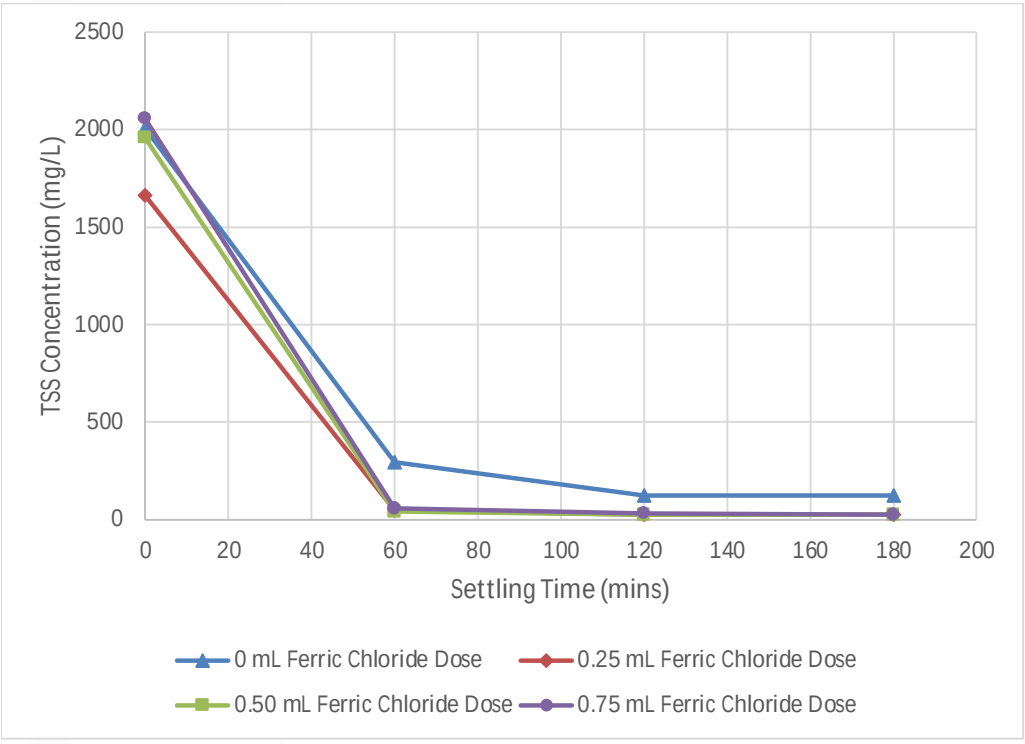


Figure 7 South Drainage Basin TSS Settling Results

C. Water Quality Trade No. 2–FWWPCC-Owned Farmland Modifications

1. FWWPCC-Owned Farmland Description/Trading Concept

The FWWPCC currently owns approximately 211 acres that includes the area occupied by the WPCF. The parcel information for the FWWPCC land is represented on a figure in Appendix C. Stabilized biosolids generated from the wastewater treatment process are applied to the FWWPCC farmland as a soil fertilizer. The FWWPCC farmland is leased to a local farmer who predominantly grows row crops, which are highly vulnerable to erosion. The total acreage currently farmed by the leasing farmer is 156 acres. Each field includes an identification number including 3-1N, 3-1S, 5-1A, 5-1B, 5-1C, 5-1D, 5-1E, 5-1F, 5-2W, 5-2E, 6-1, 6-2, 6-3, and 6-4. The WQT concept involves restricting the leasing farmer to plant only an alfalfa cover crop in lieu of the current row-cropping practices.

2. Modeling Approach Using SnapPlus for FWWPCC-Owned Farmland Modifications

The FWWPCC farmland was modeled to determine the potential TP load reduction that could be generated by changing farming practices from row cropping to an alfalfa cover crop. Alfalfa is a 5-year rotational crop with one seeding year, three years of alfalfa, and one corn silage year. The tillage practices would be changed to match the cropping, with chisel plowing, disking, and field cultivation during corn silage, spring cultivation during the alfalfa seeding, and no till during

established alfalfa years. Sludge practices were unchanged and liquid ammonia fertilizer was applied as needed.

The SnapPlus program was first used to generate the TP load from the current row cropping practices. Information concerning soil tests, crop rotation practices, sludge applications, and field locations were supplied by FWWPCC. Soil tests for fields 3-1, 5-1, and 5-2 were performed by the UW Soil & Analysis Lab in 2011 and 2014 and by the Soil & Forage Analysis Lab in 2015. Soil tests for fields 6-1 through 6-4 were conducted in 2014 by the A&L Great Lakes Laboratories. Soil textures and field topographic information were determined using SnapMaps. The current rotation is exclusively corn silage, with chisel plowing, disking, and field cultivation before planting in the spring. Biosolids nutrient concentrations were averaged using the 2016 and 2017 sample results. Based on historical records of biosolids applied to the farmland, the Commission plans to apply an estimated 1,000,000 gallons of biosolids in 2018 to their farmland. The biosolids volume is expected to increase by an estimated 2 percent annually. The biosolids application was rotated between fields 3-1 and 5-2 in one year and field 5-1 the next. Fields 6-1 to 6-4 were assumed not to receive biosolids applications which is the current typical practice. The FWWPCC has its own biosolids injection equipment for farmland application. The leasing farmer uses supplemental liquid ammonia fertilizer to the farm fields he leases to match the University of Wisconsin recommendation.

The SnapPlus program was then used to generate the TP load assuming the farmland practice was changed to the alfalfa cover crop. The difference between these two SnapPlus modeling results suggested that an estimated 927 lbs/year of TP (based on a 5 year average before trade ratio is applied) could be reduced by switching the FWWPCC farmland to an alfalfa cover crop. If filter strips are established in critical locations along with the cover crop, this TP reduction would increase to 1,027 lbs/year. This is a realistic alternative for the FWWPCC since it does not currently lease its farmland for longer than a 2-year period. Future leases would require a 5- to 10-year lease period for establishment of the alfalfa cover crop for the duration of the lease period.

C. Trade Ratios

Trade Ratios are calculated using the following formula:

$$Trade\ Ratio = (Delivery + Downstream + Equivalency + Uncertainty - Habitat\ Adjustment): 1$$

Each factor is assigned a value based on the WDNR's "Guidance for Implementing Water Quality Trading in WPDES Permits" (Guidance). Because the trades being considered occurs within the same HUC 12 watershed and the properties are upstream and adjacent to the WPCF effluent outfall, both Delivery and Downstream factors are zero. The Equivalency factor is assigned a value of zero for phosphorus trades, while the Uncertainty factor is assigned a value of 2.0 for a wet detention basin and a 3.0 for planting a cover crop according to Table 4 of the Guidance. Habitat Adjustment is assigned a value of zero since there are no known aquatic habitat restoration efforts for either trade. Therefore, the Trade Ratio for the wet detention basin trade and the cover crop trade is calculated as:

$$North\ Basin\ Wet\ Detention\ Pond\ Trade\ Ratio = (0 + 0 + 0 + 2 - 0): 1 = 2: 1$$

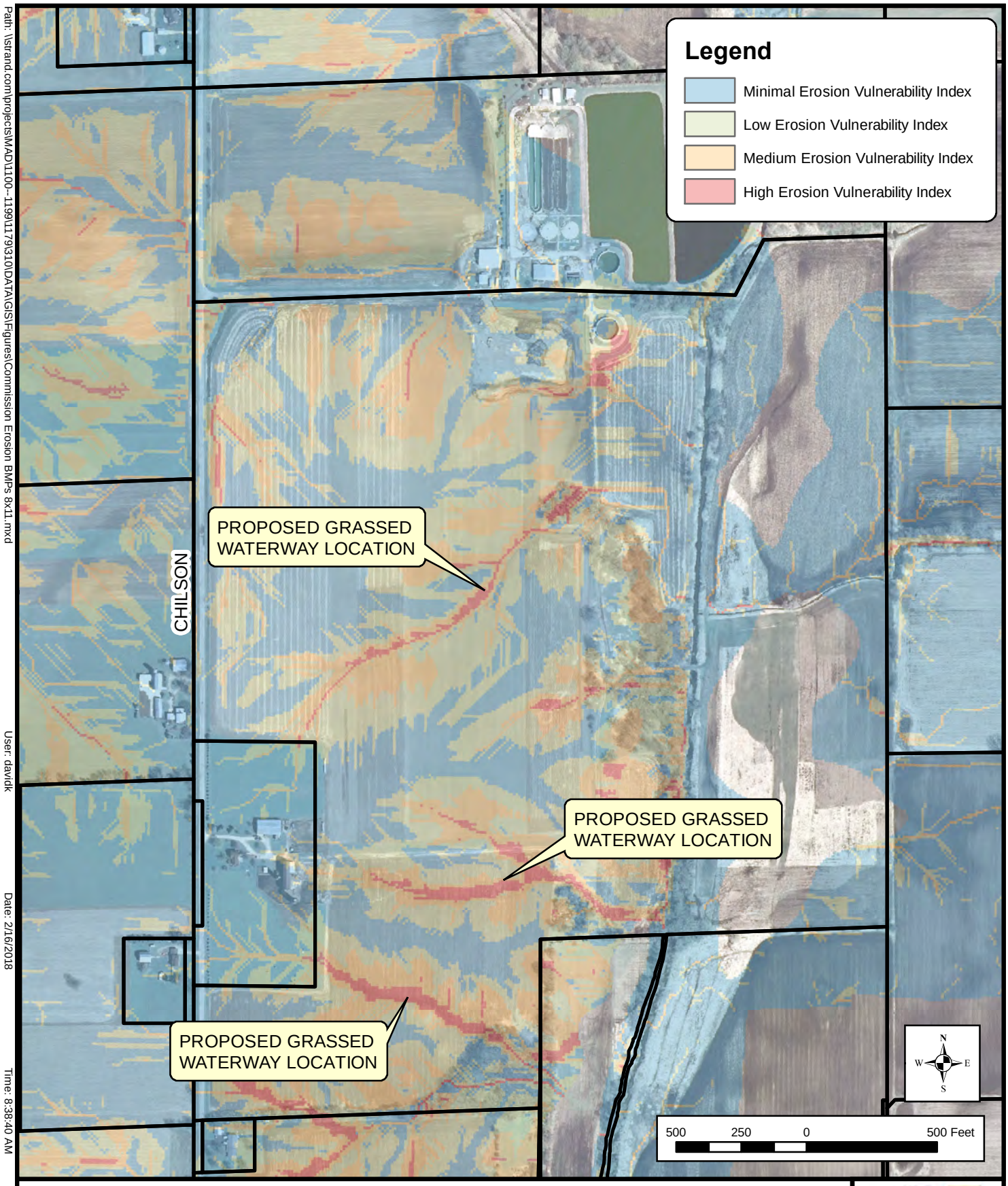
$$FWWPCC - Owned\ Farmland\ Modifications\ Trade\ Ratio = (0 + 0 + 0 + 3 - 0): 1 = 3: 1$$

Discussions with WDNR staff have suggested a lower uncertainty factor may be justified for wet detention ponds where a coagulant is applied to the influent during storm events to promote increased TP (and TSS) removal efficiency. Once a wet detention pond is established, sampling of the influent and treated effluent during storm events and subsequent calculation of removal efficiencies through the basin could be used in justifying a lower uncertainty factor of 1.5 or less.

Additionally, according to the Guidance, an uncertainty factor of 2.0 or lower may be justified if filter strips and/or grassed waterways are used in support of and in compliance with NR 151.02 and NR 151.04, which require fields to have a soil erosion rate equal to, or less than, the tolerable soil erosion rate (T) for the soil and to have an average phosphorus index (PI, in units of pound per acre per year) value of 6 or less and may not exceed an index of 12 in any given year. The WDNR Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) was used to determine the location of best management practices for FWWPCC-owned land as mandated by the WDNR. EVAAL is a python-based GIS toolset which allows the user to find erosion prone areas. Three locations were found on the FWWPCC-owned land, each west of the Piscasaw Creek and south of the WPCF. These locations were verified by the FWWPCC as being high erosion risk. It is recommended that grassed waterways be constructed in these areas to reduce sediment loading into the creek. Figure 8 shows the recommended locations of these proposed waterways.

T is the tolerable soil loss in tons per acre per year (t/ac/yr). It is the maximum rate of soil loss that would permit an indefinite and economical agricultural use. Typical values are between 1 and 5. It is calculated independently for each soil type and the critical soil is used for the Annual Soil Loss Report. The annual soil loss is calculated by the Revised Universal Soil Loss Equation, Version 2 (RUSLE2). RUSLE2 is a Natural Resources Conservation Services (NRCS) and Agricultural Research Service (ARS) program that uses the field's location, slope, slope length, and critical soil type to calculate soil loss.

Soil erosion rates were modeled using SnapPlus. With the installation of filter strips, the soil erosion rate remains consistently below the tolerable soil erosion rate (with the exception of fields 5-1F and 5-2E), thereby satisfying NR 151.02. Soil erosion rates with filter strips for the proposed alternating cover crop rotations during the permit term, are listed in Table 7.



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Time: 8:38:40 AM

COMMISSION OWNED LAND

PROPOSED EROSION CONTROL BEST MANAGEMENT PRACTICES

STORMWATER MODELING FOR WATER QUALITY TRADING

FONTANA WALWORTH WATER POLLUTION CONTROL COMMISSION

WALWORTH COUNTY, WISCONSIN

STRAND ASSOCIATES®

FIGURE 8

1179.310

Field	Tolerable T (t/ac/yr)	Annual Soil Loss (t/ac/yr)						
		2020	2021	2022	2023	2024	2025	2026
	Crop	Corn silage	Alfalfa Seeding Spring	Alfalfa	Alfalfa	Alfalfa (grassy, yr 3+)	Corn silage	Alfalfa Seeding Spring
3-1 N	5	4.3	4.9	1.8	1.3	0.7	2.4	4.5
3-1 S	5	4.3	4.9	1.8	1.3	0.7	2.4	4.5
5-1 A	5	5.3	6.2	1.9	1.8	0.6	2.9	5.2
5-1 B	5	5.3	6.2	1.9	1.8	0.6	2.9	5.2
5-1 C	5	5.3	6.2	1.9	1.8	0.6	2.9	5.2
5-1 D	5	4.3	5.1	1.7	1.6	0.5	2.4	4.4
5-1 E	5	4.3	5.1	1.7	1.6	0.5	2.4	4.4
5-1 F	5	**9.4**	**10.9**	3.5	3.2	1.1	**5.3**	**9.4**
5-2 E	5	**9.3**	**10.6**	3.8	2.8	1.3	**5.3**	**9.7**
5-2 W	5	4.3	4.9	1.8	1.3	0.7	2.4	4.5
6-1	5	1.1	1.2	0.5	0.3	0.1	0.6	1.1
6-2	5	0.9	1.1	0.4	0.3	0.1	0.5	0.9
6-3	5	1.3	1.5	0.5	0.4	0.1	0.7	1.3
6-4	5	0.9	1.1	0.4	0.3	0.1	0.5	0.9

Table 7 Annual Soil Loss on FWWPCC-Owned Land

Current PI values for each field are below 12 for each year (with the exception of 5-1F). There are five fields which exceed a PI value of 6 (Fields 3-1N, 5-1D, 5-1E, 5-1F, and 5-2E) over a full crop rotation (i.e., 5 years). Over the permit term, the combined properties will have an average total PI value between 0.9 and 8.8. Therefore, some of the fields do not currently meet the Wis. NR 151.04 requirement and as a result, a lower uncertainty value of 2.0 may not be justifiable for the cover crop trade (at least for these specific fields). Total PI values are listed in Table 8.

Field	Total Phosphorus Index (lb/ac/yr)						
	2020	2021	2022	2023	2024	2025	2026
Crop	Corn silage	Alfalfa Seeding Spring	Alfalfa	Alfalfa	Alfalfa (grassy, yr 3+)	Corn silage	Alfalfa Seeding Spring
3-1 N	5.9	8.5	4.6	4.0	2.6	4.7	9.4
3-1 S	2.1	4.1	3.4	3.0	2.2	2.0	4.6
5-1 A	2.2	3.6	3.0	2.8	1.9	1.8	4.0
5-1 B	2.6	4.1	3.5	3.2	2.3	2.0	4.4
5-1 C	2.2	3.6	3.0	2.8	1.9	1.7	4.0
5-1 D	5.2	7.0	3.7	3.3	1.9	3.5	7.3
5-1 E	4.6	6.2	3.3	3.0	1.7	3.1	6.5
5-1 F	11.1	**13.9**	6.4	5.8	3.0	7.1	**14.1**
5-2 E	7.3	9.9	4.5	3.9	2.3	5.9	11.3
5-2 W	2.9	4.3	2.2	2.0	1.2	2.6	5.2
6-1	0.9	1.4	1.1	0.9	0.6	0.6	1.2
6-2	1.3	2.4	1.6	1.1	0.6	0.7	2.0
6-3	1.5	2.2	1.8	1.5	1.0	1.0	2.0
6-4	0.8	1.5	1.0	0.7	0.4	0.4	1.3

Table 8 Annual Phosphorus Index on FWWPCC-Owned Land

Another factor in justifying a lower trade ratio is documentation of steady or reducing nutrient soil concentrations. The most recent background soil phosphorus concentrations from sampling conducted by FWWPCC staff are summarized in Table 9. While some of the fields appear to show steady or decreasing phosphorus concentrations, there are also fields that show an increase, as well. Although there is not enough data to definitively identify a trend, it may prove difficult to establish a steady trend or decreasing nutrient concentration trend before a full NMP is established for the FWWPCC-owned land.

Field	Average Soil Test P (ppm)		
	2011	2014	2015
3-1 N	135	143	NA
3-1 S	135	143	NA
5-1 A	99	NA	126
5-1 B	103	NA	161
5-1 C	80	NA	118
5-1 D	111	NA	142
5-1 E	121	NA	121
5-1 F	118	NA	156
5-2 E	66	NA	60
5-2 W	75	NA	57
6-1	NA	39	NA
6-2	NA	13	NA
6-3	NA	72	NA
6-4	NA	11	NA

Table 9 Soil Phosphorus Concentrations

D. WQT Modeling Results/Credit Generation Calculations

Based on the WQT modeling results, the FWWPCC can generate a substantial portion of the 3,000 to 3,500 lb/yr of phosphorus credits by implementing the North Drainage Basin wet detention pond and FWWPCC-owned land modifications trades. The South Drainage Basin wet detention pond could potentially be implemented as a future trade if necessary.

The modeling results for the North Drainage Basin wet detention pond and the FWWPCC-owned land modifications trades are presented separately in Table 10 and Table 11 at the currently identified trade ratios of 2.0 and 3.0, respectively. The annual credits vary each year because of the differences in biosolid applications, tillage practices, and specific crops in any given year.

Table 10 shows the P8 results for each year. The model included both agricultural loading from SnapPlus and nonfarm loading from the homesteads and roadways in the North Drainage Basin. The model showed a 47.5 percent reduction for each year.

Year	2022	2023	2024	2025	2026
Acres Modeled	835	835	835	835	835
Baseline Agricultural Load (lb/yr)	3,975	5,001	3,647	5,520	3,459
Baseline Nonfarm Load (lb/yr)	198	198	198	198	198
Total Baseline Load (lb/yr)	4,173	5,199	3,845	5,718	3,657
Non-Removed Load (lb/yr)	2,193	2,732	2,020	3,004	1,921
Reduction in Ponds (lb/yr)	1,980	2,467	1,825	2,714	1,736
Enhanced Reduction*	3,109	3,874	2,865	4,260	2,725
Trade Ratio	2.0	2.0	2.0	2.0	2.0
Credits Generated (lb/yr)	1,555	1,937	1,432	2,130	1,362

Table 10 North Drainage Basin Wet Detention Pond WQT Credits Generated with a 2.0 Trade Ratio

Year	2022	2023	2024	2025	2026
Baseline Crop	Corn Silage	Corn Silage	Corn Silage	Corn Silage	Corn Silage
Predicted Crop	Alfalfa	Alfalfa	Alfalfa (grassy, 3+ years)	Corn Silage	Alfalfa Seeding (spring)
Acres Modeled	156	156	156	156	156
Baseline load (lb/yr)	1,345	1,374	1,405	1,442	1,476
Predicted Load (lb/yr)	387	342	214	305	659
Reduction (lb/yr)	958	1,032	1,191	1,137	817
Trade Ratio	3.0	3.0	3.0	3.0	3.0
Credits Generated (lb/yr)	319	344	397	379	272

Table 11 FWWPCC-Owned Land Modifications WQT Credits Generated with a 3.0 Trade Ratio

The modeling results indicate 1,635 to 2,509 lb/yr of phosphorus credits will be generated over the 5-year modeling period (2022 to 2026) from the combined North Drainage Basin wet detention pond and the FWWPCC-owned farmland modifications at the prescribed trade ratios. Since these credits do not account for total desired credits of 3,000 to 3,500 lb/yr, the FWWPCC would need to remove the additionally necessary credits by adding more coagulant with the existing CPR system. The amount of additional credits necessary to be removed in any given year with the CPR system would depend on the

average annual flow rate. For example, at the annual average 2016 flow rate of 1.06 mgd, the targeted effluent TP concentration for the CPR system would range from 0.58 to 0.85 mg/L depending on the year. The effluent TP target concentration gets even more stringent as the effluent flow rate increases and ranges from 0.51 to 0.74 mg/L at an average daily flow of 1.25 mgd which can be experienced in a wetter year at FWWPCC. The most stringent effluent TP target concentration at the current WPCF Average Design Flow of 1.77 mgd would range from 0.38 to 0.54 mg/L. These new effluent TP target concentrations are presented in Table 12 as a guide for the FWWPCC operations staff.

Year	2022	2023	2024	2025	2026
Commission Land Credits (lb/yr)	319	344	397	379	272
North Drainage Basin Credits (lb/yr)	1,555	1,937	1,432	2,130	1,362
Total Credits (lb/yr)	1,874	2,281	1,829	2,509	1,635
Necessary Credits @ 1.06 mgd (lb/yr)	3,000	3,000	3,000	3,000	3,000
Resulting TP Target Conc. (mg/L)	**0.65**	**0.78**	**0.64**	**0.85**	**0.58**
Necessary Credits @ 1.25 mgd (lb/yr)	3,500	3,500	3,500	3,500	3,500
Resulting TP Target Conc. (mg/L)	**0.57**	**0.68**	**0.56**	**0.74**	**0.51**
Necessary Credits @ 1.77 mgd (lb/yr)	5,000	5,000	5,000	5,000	5,000
Resulting TP Target Conc. (mg/L)	**0.42**	**0.50**	**0.41**	**0.54**	**0.38**

Table 12 Summary of WQT Annual Credits Generated

A full-scale CPR pilot study was conducted from January to April 2013 by the FWWPCC staff to determine the lowest TP concentration that could be achieved by adding more coagulant with the existing CPR system. This pilot test indicated that although a 0.4 mg/L TP effluent concentration was achieved for a few months, the lowest consistently achievable target concentration would be 0.6 mg/L with the existing CPR system. This would provide some safety factor during periods of sludge bulking which causes higher than normal TSS concentrations in the final effluent and correspondingly higher TP concentrations. Therefore, the strategy will be to avoid having to meet an effluent target concentration more stringent than 0.6 mg/L as flows at the WPCF increase over time. Lower trade ratios for the current trades will be pursued and new trades will be screened, both of which increase phosphorus credits and keep the target concentration attainable.

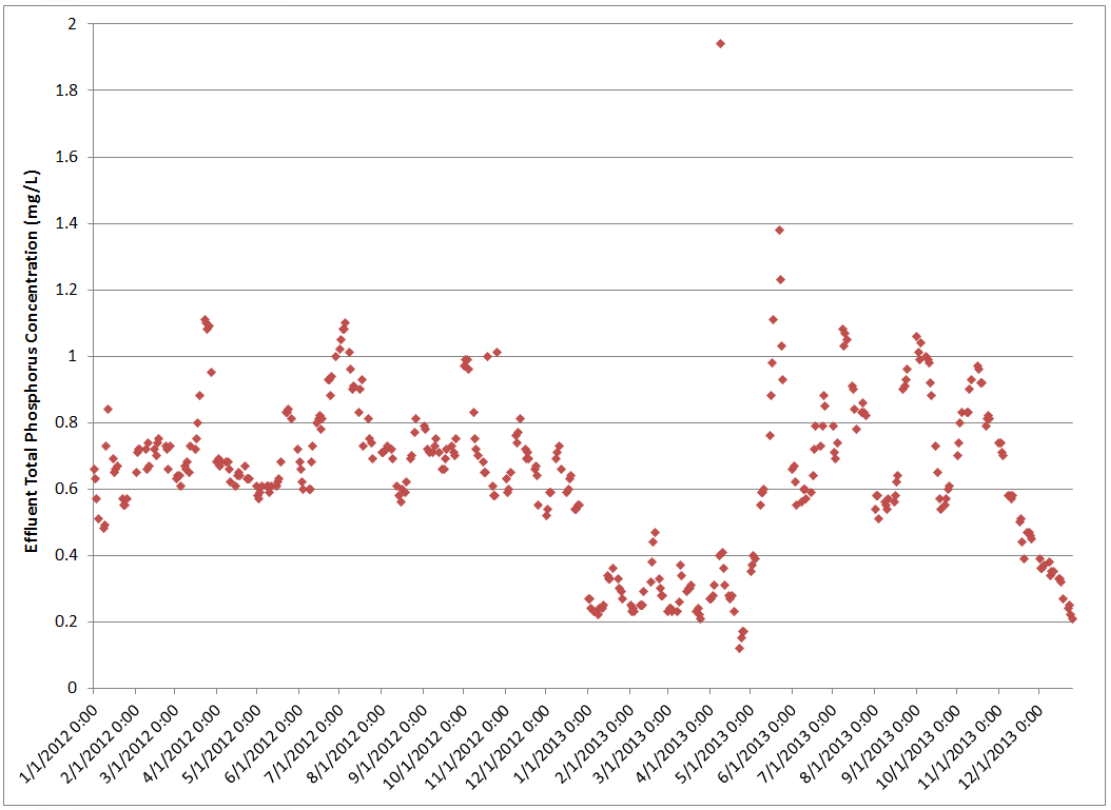

Figure 9 Effluent TP Concentration for 2012 and 2013

Additionally, it is important to note the smallest phosphorus credit (and correspondingly the most stringent effluent target concentration) occurs during Year 2026 which is the reseeding of the alfalfa cover crop. There may be alternative farming practices that could be modelled for that particular year to determine if an alternative approach to the alfalfa reseeding process would result in a higher phosphorus credit to avoid the most stringent limit.

C. Operation and Maintenance (O&M)

The FWWPCC will be responsible for installation and O&M of the north drainage basin wet-detention ponds located on FWWPCC-owned land in accordance with the Natural Resource Conservation Service (NRCS) Code 350. Based on preliminary surveys, it will be necessary for the FWWPCC to acquire property from two adjacent land-owners in order to capture the north drainage basin storm flow to direct it into the wet detention pond for treatment. The FWWPCC intends to apply ferric chloride to enhance the removal of TP and TSS from the stormflow and settle the solids within the wet detention basin. Because the models used in predicting the TP removal within the detention basin cannot account for an enhanced removal realized with the addition of a coagulant, the FWWPCC intends to monitor the stormwater entering the wet detention basin and the treated effluent exiting the basin in order to justify an uncertainty value (trade ratio) less than 2.0 as indicated in Table 4 of the Guidance for Implementing Water Quality Trading in WPDES Permits.

The FWWPCC (or the leasing farmer) will be responsible for establishing a nutrient management plan (NMP) and installation and O&M of the filter strips on FWWPCC-owned land, in accordance with NRCS Code 393. The responsible party will be identified in the future lease to be drafted by the FWWPCC and signed by the leasing farmer. The leasing farmer will be responsible for establishing an alfalfa cover crop on the Commission-owned farmland in accordance with NRCS 340. The filter strips will be inspected at least once a year during the month of May by a third party selected by the FWWPCC that has applicable knowledge and is licensed or certified to practice in Wisconsin, or is otherwise accepted by WDNR to verify proper installation, and O&M. The inspector will inspect the fields generating the total phosphorus credits to confirm proper maintenance of the filter strips. The inspector will take note of ecological health of plantings, confirm that the filter strips remain in compliance with appropriate standards, and identify potential problems, such as erosion. The FWWPCC (or the leasing farmer) will be responsible for correcting any problems, in accordance with NRCS standards and the trade agreement. Inspection reports will be included in the Annual Water Quality Trading Report.

D. Inspections and Reporting

A new 5- to 10-year lease will be drafted that will contain the necessary language to constitute a Water Quality Trading Agreement between the FWWPCC and the leasing farmer. This lease would begin early in the year 2020 and would require the leasing farmer to prepare and plant a cover crop (alfalfa) on all fields previously identified in this report. The leasing farmer will be responsible for establishing the alfalfa cover crop in accordance with NRCS 340.

The FWWPCC will file a completed Registration Form 3400-207 for Water Quality Trading Management Practice Registration separately from this WQT Plan for both the FWWPCC-owned farmland modifications trade as well as the North Drainage Basin wet detention pond trade. A partially-completed unsigned form is included in Appendix G for each trade.

Each month, the FWWPCC will certify that each trade is being operated and maintained according to the WQT Plan or provide a statement noting noncompliance with the plan. This certification of compliance will be included as a comment in the monthly discharge monitoring report:

> *I certify that management practices identified in the approved water quality trading plan as the source of pollutant reduction credits are installed, established, and properly maintained.*

The FWWPCC will submit an *Annual Water Quality Treatment Report* to the WDNR by January 31 of each year. This report will reference the approved WQT Plan and include the number of TP credits (lbs/month) used each month of the previous year to demonstrate compliance, O&M inspection reports from the past year, and identification of noncompliance or failure to implement any terms or conditions of WPDES permit WI-0036021-06-0 with respect to WQT that have not been reported in discharge monitoring reports.

In the event that the phosphorus reduction credits used or intended for use by the FWWPCC are not being generated as defined in the approved WQT Plan, the FWWPCC will notify the WDNR in writing within seven days.

Any duly authorized officer, employee, or representative of the WDNR shall have the right to access and inspect the FWWPCC as per Wis. Stat. 283.55(2) as long as the approved Water Quality Trading Plan remains in effect.

CONCLUSIONS/RECOMMENDATIONS AND TIMELINE

The FWWPCC intends to pursue the WQT described within this report. Although the WQT options described will not generate all of the necessary phosphorus credits, the resulting more stringent WPCF effluent target concentration that would result is typically achievable at the FWWPCC with the existing CPR system. The WQT phosphorus credits are expected to be generated starting in 2022 based on the modeling contained within this report and the schedule following.

1. October 2017–Apply for WPDES permit reissuance. Request this compliance schedule for establishment of the WQT plan described within this report.

2. June 2018–Receive new WPDES permit. Continue process of acquiring necessary land for converting the existing ponds into a wet detention basin for stormwater treatment.

3. June 2019–Prepare a progress report on WQT plans and specifications for conversion of the existing ponds to a wet detention basin (and other necessary modifications) and submit to WDNR.

4. June 2019–Prepare a new 5- to 10-year lease containing the necessary language to constitute a WQT Agreement between the FWWPCC and the leasing farmer. Submit to the WDNR for review/approval. Review lease language with leasing farmer.

5. November 2019–Farmer signs lease. Submit signed lease to WDNR.

6. April 2020 (Model Year 1)–Leasing farmer prepares FWWPCC land and plants cover crop (alfalfa) and filter strips.

7. October 2020–Submit WQT plans and specifications for conversion of the existing ponds to a wet detention basin (and other necessary modifications) to WDNR.

8. December 2020–WDNR approves WQT plans and specifications.

9. April 2021 (Model Year 2)–Begin construction of WQT project.

10. November 2021–Complete construction.

11. January 2022 (Model Year 3)–Begin generating WQT total phosphorus credits. Monitor influent and effluent of wet detention basins during storm events.

12. November 2023–Analyze wet detention basin monitoring data for removal efficiency of total phosphorus and total suspended solids. Submit a request for a lower trade ratio for both the wet detention basin the FWWPCC-owned farmland, as applicable. Continue to evaluate the potential for lower trade ratios or need for additional credits as the FWWPCF flows/loads increase.

APPENDIX A
NORTH DRAINAGE BASIN
FIGURES AND SNAP PLUS MODELING OUTPUT

SnapPlus Narrative and Crops Report

Starting Year	**2020**
Reported For	**Fontana/Walworth North Drainage Basin**
Printed	**2017-09-08**
Plan Completion/Update Date:	**2001-01-01**
SnapPlus Version 16.3 built on 2016-10-31	
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Prepared for:
Fontana/Walworth North Drainage Basin
attn:Fontana/Walworth
N840 Chilson Road
Walworth, 53184

Farm has 17 fields totalling 834.9 acres
Farm Narrative: None
Concentrated Flow Notes: None

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
Corn - Soybeans - Alfalfa 1	42.3	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
Corn - Soybeans - Alfalfa 2	38.2	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
Corn - Soybeans - Alfalfa 3	48.5	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
Corn - Soybeans 1	11.6	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 10	130	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
Corn - Soybeans 11	18.5	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 12	114.1	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 2	114.8	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 3	72.4	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 4	57.6	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 5	4.9	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 6	38.3	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 7	30.8	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
Corn - Soybeans 8	2.9	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn - Soybeans 9	27	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre	Corn grain Spring Cultivation 71-90 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 15-25 bu/acre
Corn Silage - Alfalfa 1	10.9	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Cultivation 15.1-20 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 2.6-3.5 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 3.6-4.5 ton/acre	Corn silage Spring Cultivation 20.1-25 ton/acre
Tree Farm	72.2	Corn grain Fall Chisel, no disk 71-90 bu/acre	Corn grain Fall Chisel, no disk 71-90 bu/acre	Corn grain Fall Chisel, no disk 71-90 bu/acre	Corn grain Fall Chisel, no disk 71-90 bu/acre	Corn grain Fall Chisel, no disk 71-90 bu/acre	Corn grain Fall Chisel, no disk 71-90 bu/acre	Corn grain Fall Chisel, no disk 71-90 bu/acre

Summary by Crop:
NOTE: Yields calculated using the midpoint of the SnapPlus yield goal range for each crop.

Crops Grouped By Category		2020	2021	2022	2023	2024	2025	2026
Alfalfa	Acres ton	129 0	129 0	129 0	11 34	11 0		
Alfalfa (grassy, yr 3+)	Acres ton	11 0			129 0		11 45	
Alfalfa Seeding Spring	Acres ton			11 0				129 0
Corn grain	Acres bu	72 5,796	695 55,948	72 5,796	695 55,948	201 16,181	695 55,948	72 5,796
Soybeans 15-20 inch row	Acres bu	623 31,462		623 12,460		623 12,460	129 2,580	623 12,460
Corn silage	Acres ton		11 193					11 248

SnapPlus P Trade Report

Reported For	Fontana/Walworth North Drainage Basin
Printed	2017-09-08
Plan Completion/Update Date	2001-01-01
SnapPlus Version 16.3 built on 2016-10-31	
S:\MAD\1100--1199\1179\310\DATA\Snap Plus\North Drainage Area.snapDb	

Prepared for:
Fontana/Walworth North Drainage Basin
attn:Fontana/Walworth
N840 Chilson Road
Walworth, 53184

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	2022	2023	2024	2025	2026
Corn - Soybeans - Alfalfa 1	MIAMI	DdA	42	16	12	26	71	83
Corn - Soybeans - Alfalfa 2	DODGE	DdA	38	14	11	23	64	75
Corn - Soybeans - Alfalfa 3	MIAMI	MyB	48	18	13	60	181	208
Corn - Soybeans 1	MIAMI	MyB	12	46	62	46	62	45
Corn - Soybeans 10	MIAMI	MyB	130	692	1,191	683	1,188	682
Corn - Soybeans 11	MIAMI	DdA	19	44	85	43	85	43
Corn - Soybeans 12	MIAMI	MyB	114	607	1,046	600	1,043	599

P Trade Report				PTP				
Field Name	Soil Series	Soil Symbol	Acres	2022	2023	2024	2025	2026
Corn - Soybeans 2	MIAMI	DdA	115	263	349	258	343	255
Corn - Soybeans 3	MIAMI	MyB	72	866	679	489	1,153	513
Corn - Soybeans 4	MIAMI	MyB	58	820	770	861	569	408
Corn - Soybeans 5	MIAMI	MyB	5	34	45	33	45	33
Corn - Soybeans 6	MIAMI	DdA	38	108	142	105	140	104
Corn - Soybeans 7	MIAMI	MyB	31	198	341	195	340	195
Corn - Soybeans 8	MIAMI	DdA	3	7	9	7	9	7
Corn - Soybeans 9	MIAMI	DdA	27	63	83	61	82	61
Corn Silage - Alfalfa 1	MIAMI	MyB	11	36	21	15	7	12
Tree Farm	MIAMI	DdA	72	144	141	140	139	137
Total			**835**	**3,975**	**5,001**	**3,647**	**5,520**	**3,459**

N

Crop Rotation

- Corn (Tree Farm)
- Corn - Soybeans
- Corn - Soybeans - Alfalfa
- Corn Silage - Alfalfa

1,000 500 0 1,000 Feet

Corn - Soybeans 9

Corn - Soybeans 8

Corn - Soybeans - Alfalfa 2

Corn - Soybeans 10

Tree Farm

BELOIT

TOWN HALL

Corn - Soybeans 11

Corn - Soybeans - Alfalfa 3

Corn - Soybeans 6

Corn - Soybeans 7

Corn - Soybeans 4

Corn - Soybeans 5

Corn - Soybeans 1

Corn - Soybeans 2

Corn - Soybeans 12

Corn - Soybeans 3

Drainage Area Outlet

Corn - Soybeans - Alfalfa 1

Corn Silage - Alfalfa 1

Piscasaw Creek

PETERS

KOCH

CTY TK K

CHILSON

CROP ROTATION ASSUMPTIONS

STORMWATER MODELING FOR WATER QUALITY TRADING
FONTANA WATER POLLUTION CONTROL COMMISSION
WALWORTH COUNTY, WISCONSIN

STRAND ASSOCIATES®

FIGURE A1

Path: S:\MAD\1100--1199\1179\310\DATA\GIS\Figures\A North Field Crop Rotation Assumptions 11x17.mxd User: davidk Date: 4/29/2016 Time: 9:35:27 AM

N

Supplementary Nutrient Application

- Biosolid
- Manure
- None

1,000 500 0 1,000 Feet

Corn - Soybeans 9

Corn - Soybeans 8

Corn - Soybeans - Alfalfa 2

Corn - Soybeans 10

Tree Farm

TOWN HALL

Corn - Soybeans 11

Corn - Soybeans - Alfalfa 3

Corn - Soybeans 6

Corn - Soybeans 7

Corn - Soybeans 4

Corn - Soybeans 5

Corn - Soybeans 1

Corn - Soybeans 2

Corn - Soybeans 12

Corn - Soybeans 3

Corn - Soybeans - Alfalfa 1

Corn Silage - Alfalfa 1

Drainage Area Outlet

Piscasaw Creek

PETERS

KOCH

CTY TK K

CHILSON

BELOIT

SUPPLEMENTARY NUTRIENT APPLICATION ASSUMPTIONS

STORMWATER MODELING FOR WATER QUALITY TRADING
FONTANA WALWORTH WATER POLLUTION CONTROL COMMISSION
WALWORTH COUNTY, WISCONSIN

STRAND ASSOCIATES®

FIGURE A2

Path: S:\MAD\1100--1199\1179\310\DATA\GIS\Figures\B North Supplementary Nutrient Application 11x17.mxd User: davidk Date: 4/29/2016 Time: 9:35:34 AM

APPENDIX B
SOUTH DRAINAGE BASIN
FIGURES AND SNAP PLUS MODELING OUTPUT

SnapPlus Narrative and Crops Report

Starting Year	**2010**
Reported For	**Fontana-Walworth South Drainage Basin**
Printed	**2017-09-08**
Plan Completion/Update Date:	**2001-01-01**
SnapPlus Version 16.3 built on 2016-10-31	
S:\MAD\1100--1199\1179\310\DATA\Snap Plus\South Drainage Area.snapDb	

Prepared for:
Fontana-Walworth South Drainage Basin
attn:Fontana-Walworth
N840 Chilson Road
Walworth, 53184

Farm has 19 fields totalling 483.8 acres
Farm Narrative: None
Concentrated Flow Notes: None

Field Name	Acres	2010	2011	2012	2013	2014	2015	2016
Corn - Soybeans - Alfalfa 1	88.2	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Alfalfa Seeding Spring Fall Chisel, no disk 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre
Corn - Soybeans 1	46.2	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 10	12.3	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 11	45.8	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 12	4.9	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre

Field Name	Acres	2010	2011	2012	2013	2014	2015	2016
Corn - Soybeans 13	35.6	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 14	9	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 15	11.8	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 2	61.2	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 3	31.8	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 4	2.6	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 5	30.3	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 6	0.2	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre

Field Name	Acres	2010	2011	2012	2013	2014	2015	2016
Corn - Soybeans 7	33.8	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 8	15.9	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn - Soybeans 9	33.2	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre	Soybeans 15-20 inch row Fall Chisel, no disk 46-55 bu/acre	Corn grain Spring Cultivation 171-190 bu/acre
Corn Silage - Alfalfa 1	6.8	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Cultivation 20.1-25 ton/acre	Alfalfa Seeding Spring Fall Chisel, no disk 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Corn silage Spring Cultivation 25.1-30 ton/acre
Corn Silage - Alfalfa 2	9.5	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Cultivation 20.1-25 ton/acre	Alfalfa Seeding Spring Fall Chisel, no disk 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre
Corn Silage - Alfalfa 3	5	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Cultivation 20.1-25 ton/acre	Alfalfa Seeding Spring Fall Chisel, no disk 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre

Summary by Crop:
NOTE: Yields calculated using the midpoint of the SnapPlus yield goal range for each crop.

Crops Grouped By Category		2010	2011	2012	2013	2014	2015	2016
Alfalfa	Acres ton				21 0	109 0	109 0	
Alfalfa (grassy, yr 3+)	Acres ton	21 0						103 0

Crops Grouped By Category		2010	2011	2012	2013	2014	2015	2016
Alfalfa Seeding Spring	Acres ton			21 0	88 0			
Corn grain	Acres bu	374 67,507	88 15,884	374 67,507		374 67,507		374 67,507
Soybeans 15-20 inch row	Acres bu	88 4,444	374 18,887	88 4,444	374 18,887		374 18,887	
Corn silage	Acres ton		21 474					7 193

SnapPlus P Trade Report

Reported For	Fontana-Walworth South Drainage Basin
Printed	2016-04-28
Plan Completion/Update Date	2001-01-01
SnapPlus Version 15.1 built on 2015-12-18	
S:\MAD\1100--1199\1179\310\DATA\Snap Plus\South Drainage Area.snapDb	

Prepared for:
Fontana-Walworth South Drainage Basin
attn:Fontana-Walworth
N840 Chilson Road
Walworth, 53184

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.

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Questions? Please contact DNRphosphorus@wisconsin.gov

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P Trade Report				PTP				
Field Name	Soil Series	Soil Symbol	Acres	2012	2013	2014	2015	2016
Corn - Soybeans - Alfalfa 1	MIAMI	DdA	88	93	192	98	77	41
Corn - Soybeans 1	MIAMI	DdA	46	78	47	74	45	70
Corn - Soybeans 10	MIAMI	MyB	12	64	45	70	41	58
Corn - Soybeans 11	MIAMI	MyB	46	198	147	239	143	199
Corn - Soybeans 12	MIAMI	MyA	5	11	5	8	7	8
Corn - Soybeans 13	MIAMI	MyB	36	195	91	148	111	148
Corn - Soybeans 14	MIAMI	MyB	9	38	23	36	22	35

P Trade Report				PTP				
Field Name	Soil Series	Soil Symbol	Acres	2012	2013	2014	2015	2016
Corn - Soybeans 15	FLAGG VARIANT	DdA	12	20	12	19	12	18
Corn - Soybeans 2	MIAMI	DdA	61	103	62	98	60	93
Corn - Soybeans 3	MIAMI	MyB	32	133	80	128	77	124
Corn - Soybeans 4	MIAMI	DdA	3	4	3	4	3	4
Corn - Soybeans 5	MIAMI	DdA	30	51	31	48	30	46
Corn - Soybeans 6	DODGE	DdA	0	0	0	0	0	0
Corn - Soybeans 7	MIAMI	DdA	34	57	34	54	33	51
Corn - Soybeans 8	MIAMI	MyB	16	67	40	64	39	62
Corn - Soybeans 9	MIAMI	MyB	33	139	83	134	81	130
Corn Silage - Alfalfa 1	MIAMI	MyB	7	35	16	12	9	24
Corn Silage - Alfalfa 2	MIAMI	MyB	10	49	23	17	12	9
Corn Silage - Alfalfa 3	MIAMI	MyB	5	26	12	9	6	4
Total			**484**	**1,361**	**946**	**1,262**	**807**	**1,125**

CROP ROTATION ASSUMPTIONS

STORMWATER MODELING FOR WATER QUALITY TRADING
FONTANA WALWORTH WATER POLLUTION CONTROL COMMISSION
WALWORTH COUNTY, WISCONSIN

Corn - Soybeans 12
Corn - Soybeans 13
Corn - Soybeans 11
Drainage Area Outlet
Corn - Soybeans 10
Corn - Soybeans 15
Corn - Soybeans 14
Corn Silage - Alfalfa 3
Corn - Soybeans 9
Corn - Soybeans 8
Corn - Soybeans 7
Corn - Soybeans 5
Corn - Soybeans 6
Corn - Soybeans 2
Corn - Soybeans 1
Corn - Soybeans 3
Corn - Soybeans 4
Corn Silage - Alfalfa 1
Corn - Soybeans - Alfalfa 1
Corn Silage - Alfalfa 2
Piscasaw Creek
KOCH
CTY TK K
CHILSON
HY 67

750 375 0 750 Feet

N

Crop Rotation

- Corn - Soybeans
- Corn - Soybeans - Alfalfa
- Corn Silage - Alfalfa

STRAND ASSOCIATES®

FIGURE B1

Path: S:\MAD\1100--1199\1179\310\DATA\GIS\Figures\C South field rotation assumptions 11x17.mxd User: davidk Date: 4/29/2016 Time: 9:41:49 AM

SUPPLEMENTARY NUTRIENT APPLICATION ASSUMPTIONS

STORMWATER MODELING FOR WATER QUALITY TRADING
FONTANA WALWORTH WATER POLLUTION CONTROL COMMISSION
WALWORTH COUNTY, WISCONSIN

Corn Silage - Alfalfa 1
Corn Silage - Alfalfa 2
Corn - Soybeans - Alfalfa 1
Corn - Soybeans 1
Corn - Soybeans 2
Corn - Soybeans 3
Corn - Soybeans 4
Corn - Soybeans 5
Corn - Soybeans 6
Corn - Soybeans 7
Corn - Soybeans 8
Corn - Soybeans 9
Corn - Soybeans 10
Corn - Soybeans 11
Corn - Soybeans 12
Corn - Soybeans 13
Corn - Soybeans 14
Corn - Soybeans 15
Corn Silage - Alfalfa 3

Drainage Area Outlet

KOCH
CTY TK K
CHILSON
HY 67
Piscasaw Creek

750 375 0 750 Feet

N

Supplementary Nutrient Application

- Biosolid
- Manure
- None

STRAND ASSOCIATES®

FIGURE B2

Path: S:\MAD\1100--1199\1179\310\DATA\GIS\Figures\D South Supplementary Nutrient Application 11x17.mxd User: davidk Date: 4/29/2016 Time: 9:45:26 AM

APPENDIX C
COMMISSION-OWNED LAND
FIGURE AND SNAP PLUS MODELING OUTPUT

Path: S:\MAD\1100--1199\1179\310\DATA\GIS\Figures\Commission SnapPlus Fields 8x11.mxd

User: davidk

Date: 9/8/2017

Time: 1:23:08 PM

COMMISSION OWNED LAND

STORMWATER MODELING FOR WATER QUALITY TRADING
FONTANA WALWORTH WATER POLLUTION CONTROL COMMISSION
WALWORTH COUNTY, WISCONSIN

STRAND ASSOCIATES®

FIGURE C-1
1179.310

SnapPlus Narrative and Crops Report

Starting Year	**2020**
Reported For	**Commission Land**
Printed	**2017-09-08**
Plan Completion/Update Date:	**2001-01-01**
SnapPlus Version 16.3 built on 2016-10-31	
S:\MAD\1100--1199\1179\310\DATA\Snap Plus\Commission land_Exist.snapdb	

Prepared for:
Commission Land
attn:fwwpcc

Farm has 14 fields totalling 156.1 acres
Farm Narrative: This farm is commission owned land with existing rotations.
Concentrated Flow Notes: None

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
3-1 N	8.9	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
3-1 S	9.1	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
5-1A	10.9	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
5-1B	13.7	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
5-1C	10.8	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
5-1D	6	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
5-1E	13	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
5-1F	10.9	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
5-2E	8.7	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
5-2W	12.6	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
6-1	6.8	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
6-2	19.7	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre
6-3	4.1	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
6-4	20.9	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre

Summary by Crop:

NOTE: Yields calculated using the midpoint of the SnapPlus yield goal range for each crop.

Crops Grouped By Category		2020	2021	2022	2023	2024	2025	2026
Corn silage	Acres ton	156 1,950	156 1,950	156 1,950	156 1,950	156 1,950	156 1,950	156 1,950

SnapPlus P Trade Report

Reported For	Commission Land
Printed	2017-09-08
Plan Completion/Update Date	2001-01-01
SnapPlus Version 16.3 built on 2016-10-31	
S:\MAD\1100--1199\1179\310\DATA\Snap Plus\Commission land_Exist.snapdb	

Prepared for:
Commission Land
attn:fwwpcc

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	2022	2023	2024	2025	2026
3-1 N	MIAMI	MyB	9	117	129	125	139	135
3-1 S	MIAMI	MyB	9	119	132	128	143	138
5-1A	DODGE	MyB	11	127	125	133	130	139
5-1B	DODGE	MyB	14	172	168	178	175	187
5-1C	DODGE	MyB	11	127	125	133	130	139
5-1D	MIAMI	MyB	6	68	67	71	70	74
5-1E	MIAMI	MyB	13	131	129	137	135	144
5-1F	MIAMI	MyB	11	139	136	145	142	151

P Trade Report				PTP				
Field Name	Soil Series	Soil Symbol	Acres	2022	2023	2024	2025	2026
5-2E	MIAMI	MyB	9	75	85	82	94	91
5-2W	MIAMI	MyB	13	85	98	95	109	105
6-1	NAVAN	Na	7	24	23	23	22	22
6-2	DRUMMER	Dt	20	133	131	130	128	127
6-3	RADFORD	Ph	4	18	18	17	17	17
6-4	DRUMMER	Ht	21	10	9	9	8	7
Total			**156**	**1,345**	**1,374**	**1,405**	**1,442**	**1,476**

SnapPlus Narrative and Crops Report

Starting Year	**2020**
Reported For	**Commission Land**
Printed	**2017-09-08**
Plan Completion/Update Date:	**2001-01-01**
SnapPlus Version 16.3 built on 2016-10-31	
S:\MAD\1100--1199\1179\310\DATA\Snap Plus\Commission land_BMP_Grass swales.snapdb	

Prepared for:
Commission Land
attn:fwwpcc

Farm has 14 fields totalling 156.1 acres
Farm Narrative: This farm is commission owned land with existing rotations.
Concentrated Flow Notes: None

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
3-1 N	8.9	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
3-1 S	9.1	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
5-1A	10.9	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
5-1B	13.7	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
5-1C	10.8	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
5-1D	6	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
5-1E	13	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
5-1F	10.9	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
5-2E	8.7	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
5-2W	12.6	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
6-1	6.8	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
6-2	19.7	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre
6-3	4.1	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre

Field Name	Acres	2020	2021	2022	2023	2024	2025	2026
6-4	20.9	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa None 0-0 ton/acre	Alfalfa (grassy, yr 3+) None 0-0 ton/acre	Corn silage Spring Chisel, disked 10-15 ton/acre	Alfalfa Seeding Spring Spring Cultivation 0-0 ton/acre

Summary by Crop:

NOTE: Yields calculated using the midpoint of the SnapPlus yield goal range for each crop.

Crops Grouped By Category		2020	2021	2022	2023	2024	2025	2026
Alfalfa	Acres ton			156 0	156 0			
Alfalfa (grassy, yr 3+)	Acres ton					156 0		
Alfalfa Seeding Spring	Acres ton		156 0					156 0
Corn silage	Acres ton	156 1,950					156 1,950	

SnapPlus P Trade Report

Reported For	Commission Land
Printed	2017-09-08
Plan Completion/Update Date	2001-01-01
SnapPlus Version 16.3 built on 2016-10-31	
S:\MAD\1100--1199\1179\310\DATA\Snap Plus\Commission land_BMP_Grass swales.snapdb	

Prepared for:
Commission Land
attn:fwwpcc

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	2022	2023	2024	2025	2026
3-1 N	MIAMI	MyB	9	41	36	23	42	83
3-1 S	MIAMI	MyB	9	31	27	20	18	42
5-1A	DODGE	MyB	11	30	27	18	16	40
5-1B	DODGE	MyB	14	43	39	26	23	55
5-1C	DODGE	MyB	11	30	27	17	15	39
5-1D	MIAMI	MyB	6	22	20	12	21	44
5-1E	MIAMI	MyB	13	43	39	22	41	85
5-1F	MIAMI	MyB	11	46	42	24	43	89

P Trade Report				PTP				
Field Name	Soil Series	Soil Symbol	Acres	2022	2023	2024	2025	2026
5-2E	MIAMI	MyB	9	25	22	14	28	56
5-2W	MIAMI	MyB	13	27	25	16	33	65
6-1	NAVAN	Na	7	7	6	4	4	8
6-2	DRUMMER	Dt	20	31	23	11	13	40
6-3	RADFORD	Ph	4	7	6	4	4	7
6-4	DRUMMER	Ht	21	5	5	3	4	5
Total			**156**	**387**	**342**	**214**	**305**	**659**

APPENDIX D
BENCH SCALE TESTING OF STORMWATER SAMPLES

North Drainage Basin
Stormwater Settling Results (from Oct 26, 2016 Rain Event)
(with increasing coagulant dosages)

	Ferric Chloride Dose (mL)							
	0		0.25		0.5		0.75	
Settling Time	TP (mg/L)	Removal (%)	TP (mg/L)	Removal (%)	TP (mg/L)	Removal (%)	TP (mg/L)	Removal (%)
0	4.0	0	3.8	0	3.8	0	1.0	0
60	1.5	62.5%	0.08	97.9%	1.25	66.8%	0.50	50.0%
120	1.4	65.0%	0.06	98.4%	0.22	56.0%	0.30	70.0%
180	1.4	65.0%	0.05	98.7%	0.28	44.0%	0.40	60.0%

	Ferric Chloride Dose (mL)							
	0		0.25		0.5		0.75	
Settling Time	TSS (mg/L)	Removal (%)	TSS (mg/L)	Removal (%)	TSS (mg/L)	Removal (%)	TSS (mg/L)	Removal (%)
0	750	0	1341	0	1406	0	395	0
60	536	28.5%	21	98.4%	78	94.5%	177	55.2%
120	260	65.3%	28	97.9%	57	95.9%	97	75.4%
180	144	80.8%	18	98.7%	67	95.2%	68	82.8%

South Drainage Basin
Stormwater Settling Results (from Oct 26, 2016 Rain Event)
(with increasing coagulant dosages)

	Ferric Chloride Dose (mL)							
	0		0.25		0.5		0.75	
Settling Time	TP (mg/L)	Removal (%)	TP (mg/L)	Removal (%)	TP (mg/L)	Removal (%)	TP (mg/L)	Removal (%)
0	5.00	0	4.60	0	4.90	0	5.30	0
60	1.50	70.0%	0.15	96.7%	0.18	96.3%	0.27	94.9%
120	1.40	72.0%	0.13	97.2%	0.15	96.9%	0.19	96.4%
180	1.30	74.0%	0.10	97.8%	0.13	97.3%	0.17	96.8%

	Ferric Chloride Dose (mL)							
	0		0.25		0.5		0.75	
Settling Time	TSS (mg/L)	Removal (%)	TSS (mg/L)	Removal (%)	TSS (mg/L)	Removal (%)	TSS (mg/L)	Removal (%)
0	2010	0	1660	0	1961	0	2056	0
60	296	85.3%	47	97.2%	35	98.2%	57	97.2%
120	120	94.0%	23	98.6%	22	98.9%	32	98.4%
180	120	94.0%	19	98.9%	24	98.8%	24	98.8%

APPENDIX E
NOTICE OF INTENT TO CONDUCT WATER QUALITY TRADING

State of Wisconsin
Department of Natural Resources
101 South Webster Street
Madison, WI 53707

Notification that Water Quality Trading Will Be Used to Comply with WQBELs
Form 8700-nnn (R10/12)

Applicant Information

Permittee Name	Permit Number	Facility Site Number
Fontana/Walworth Water Pollution Control Commission	WI- 0036021-06-0	unknown

Facility Address	City	State	ZIP Code
N840 Chilson Rd	Walworth	WI	53184

Project Contact Name(if applicable)	*Address*	*City*	*State*	*Zip Code*
Doug York, Superintendent	N840 Chilson Rd	Walworth	WI	53184

Project Name: Preliminary Compliance Alternatives Plan

Receiving Water Name	Parameter(s) being traded	HUC 12
Piscasaw Creek	Phosphorus + possibly others	unknown

Is the permittee in a point or nonpoint source dominated watershed? *(See PRESTO results- http://dnr.wi.gov/topic/surfacewater/presto.html)*
- ☐ Point source dominated
- ☒ Nonpoint source dominated

Credit Generator Information

Credit generator type (check all that apply):
- ☒ Permitted Discharge (non-MS4)
- ☐ Permitted MS4
- ☐ CAFOs
- ☐ Non-permitted urban discharge
- ☐ Agricultural nonpoint source discharge
- ☐ Other- Specify: _____

Are any of the credit generators in a different HUC 12 than the applicant?
- ☐ Yes; HUC 12: _____
- ☒ No
- ☐ Unsure

Are any of the credit generators downstream of the applicant?
- ☐ Yes
- ☒ No
- ☐ Unsure

Will a broker/exchange be used to facilitate trade?
- ☐ Yes; Broker Name: _____
- ☐ No
- ☒ Unsure

Permitted Discharge Information (Traditional Municipal/Industrial Discharge, MS4, CAFO):

Discharge Type	Permit Number	Name	Contact Address	Is the PS currently in compliance with their permit requirements?
☒ Traditional ☐ MS4 ☐ CAFO	WI-0036021-06-0	Fontana/Walworth Water Pollution Control Commission	N840 Chilson Rd Walworth, WI 53184	☒ Yes ☐ No ☐ Unsure
☐ Traditional ☐ MS4 ☐ CAFO				☐ Yes ☐ No ☐ Unsure
☐ Traditional ☐ MS4 ☐ CAFO				☐ Yes ☐ No ☐ Unsure
☐ Traditional ☐ MS4 ☐ CAFO				☐ Yes ☐ No ☐ Unsure
☐ Traditional ☐ MS4 ☐ CAFO				☐ Yes ☐ No ☐ Unsure

Other Information:

Will other improvements be made to improve effluent quality towards permit compliance?

- ☐ Yes *(if yes, please attach a description of these improvements)*
- ☐ No
- ☒ Unsure

Practices that will be used to generate credits:

There will be potentially three practices that will generate water quality trading credits for phosphorus (and possibly other) parameters. These potential practices were identified in the April, 2016 Preliminary Compliance Alternatives Plan submitted to WDNR. The feasibility of Water Quality Trading to the Fontana/Walworth WPCC will depend on the ultimate trade ratio among other factors. The three WQT practices are generally described as follows:

1) North Drainage Basin – This is a 917 acre drainage basin that drains thru Commission property and into the Piscasaw Creek. Stormwater will be captured in a grassed waterway and routed by gravity to two existing wastewater ponds that are no longer utilized. These ponds will be modified to act as sedimentation basins for phosphorus and solids removal.

Method for quantifying credits generated:

- ☐ Monitoring
- ☒ Modeling, Names: SnapPlus for generating phosphorus load from farmland ~~P8 Model for predicting phosphorus removal in new sedimentation basins.~~
- ☐ Other: _____

Projected date credits will be available: Year 2022

The preparer and owner certify all of the following:

- I am familiar with the specifications submitted for this application, and I believe all applicable items in this checklist have been addressed.
- 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
Bradley D. Tate	6-3-2016

2) South Drainage Basin – This is a 529 acre drainage basin that drains thru Commission property and into the Piscasaw Creek. Stormwater in a ditch will be routed to a new sedimentation basin designed to remove phosphorus and suspended solids. A coagulant could be added to the stormwater entering the sedimentation basins to enhance removal.

3) Modification of Farm Practices on Commission-owned Land – The Commission owns farmland adjacent to the WWTP upon which biosolids are applied as a fertilizer. The Commission leases this land to interested farmers annually who have traditionally farmed highly erodable row crops. The Commission could require a cover crop be farmed by the renter resulting in substantially less erodable land.

APPENDIX F
WATER QUALITY TRADING CHECKLIST (FORM 3400-208)

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

Water Quality Trading Checklist

Form 3400-208 (1/14)

Notice: Pursuant to s. 283.84, Wis. Stats., this form must be completed by any WPDES permittee that intends to pursue pollutant 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	Facility Site Number
Fontana-Walworth WPCC	WI- 0036021-06-0	6530

Facility Address	City	State	ZIP Code
N840 Chilson Road	Walworth	WI	53184

Project Contact Name (if applicable)	Address	City	State	ZIP Code
Doug York	N840 Chilson Road	Walworth	WI	53184

Project Name
Final Phosphorus Compliance Alternatives Plan

Receiving Water Name	Parameter(s) being traded	HUC 12(s)
Piscasaw Creek	Phosphorus and TSS	070900060303

Credit Generator Information

Credit generator type (select all that apply):
- ☐ Permitted Discharge (non-MS4CAFO)
- ☐ Permitted MS4
- ☐ Permitted CAFO
- ☐ Urban nonpoint source discharge
- ☒ Agricultural nonpoint source discharge
- ☐ Other - Specify: _____

Are any of the credit generators in a different HUC 12 than the applicant?
- ○ Yes; HUC 12: _____
- ◉ No

Are any of the credit generators downstream of the applicant?
- ○ Yes
- ◉ No

Will a broker/exchange be used to facilitate trade?
- ○ Yes *(include description and contact information in WQT plan)*
- ◉ No

Point to Point Trades (Traditional Municipal / Industrial, MS4, CAFO)

Are each of the point source credit generators identified in this section in compliance with their WDPES permit requirements?
- ○ Yes
- ○ No

Discharge Type	Permit Number	Name	Contact Information	Trade Agreement Number
○ Traditional ○ MS4 ○ CAFO				
○ Traditional ○ MS4 ○ CAFO				
○ Traditional ○ MS4 ○ CAFO				
○ Traditional ○ MS4 ○ CAFO				
○ Traditional ○ MS4 ○ CAFO				

Point to Point Trades (Traditional Municipal / Industrial, MS4, CAFO) *cont.*

Does plan have a narrative that describes:			Plan Section
a. Summary of discharge and existing treatment including optimization	◯ Yes	◯ No	
b. Amount of credit being generated	◯ Yes	◯ No	
c. Timeline for credits and agreements	◯ Yes	◯ No	
d. Method for quantifying credits	◯ Yes	◯ No	
e. Tracking and verification procedures	◯ Yes	◯ No	
f. Location of credit generator in proximity to receiving water and credit user	◯ Yes	◯ No	
g. Other: _____	◯ Yes	◯ No	

Point to Nonpoint Trades (Non-Permitted Urban, Agricultural, Other)

Discharge Type	Practices Used to Generate Credits	Method of Quantification	Trade Agreement Number	Have the practice(s) been formally registered?
◯ Urban NPS ◉ Agricultural NPS ◯ Other	Wet Detention Pond (WDNR Tech Standard 1001)	Modeling: SnapPlus P Trade Report/P8		◯ Yes ◉ No ◯ Only in part
◯ Urban NPS ◉ Agricultural NPS ◯ Other	Crop Practices/Filter Strips (NRCS Code 393)	Modeling: SnapPlus P Trade Report		◯ Yes ◉ No ◯ Only in part
◯ Urban NPS ◉ Agricultural NPS ◯ Other				◯ Yes ◉ No ◯ Only in part
◯ Urban NPS ◯ Agricultural NPS ◯ Other				◯ Yes ◯ No ◯ Only in part
◯ Urban NPS ◯ Agricultural NPS ◯ Other				◯ Yes ◯ No ◯ Only in part
◯ Urban NPS ◯ Agricultural NPS ◯ Other				◯ Yes ◯ No ◯ Only in part
◯ Urban NPS ◯ Agricultural NPS ◯ Other				◯ Yes ◯ No ◯ Only in part
◯ Urban NPS ◯ Agricultural NPS ◯ Other				◯ Yes ◯ No ◯ Only in part

Does plan have a narrative that describes:			Plan Section
a. Description of existing land uses	◉ Yes	◯ No	Other Alter.
b. Management practices used to generate credits	◉ Yes	◯ No	Other Alter.
c. Amount of credit being generated	◉ Yes	◯ No	Other Alter.
d. Description of applicable trade ratio per agreement/management practice	◉ Yes	◯ No	Other Alter.
e. Location where credits will be generated	◉ Yes	◯ No	Other Alter.
f. Timeline for credits and agreements	◉ Yes	◯ No	Other Alter.
g. Method for quantifying credits	◉ Yes	◯ No	Other Alter.

Does plan have a narrative that describes:			Plan Section
h. Tracking procedures	◉ Yes	○ No	Other Alter.
i. Conditions under which the management practices may be inspected	◉ Yes	○ No	Other Alter.
j. Reporting requirements should the management practice fail	◉ Yes	○ No	Other Alter.
k. Operation and maintenance plan for each management practice	◉ Yes	○ No	Other Alter.
l. Location of credit generator in proximity to receiving water and credit user	◉ Yes	○ No	Other Alter.
m. Practice registration documents, if available	◉ Yes	○ No	Other Alter.
n. History of project site(s)	◉ Yes	○ No	Other Alter.
o. Other: _____	○ Yes	◉ No	

The preparer certifies all of the following:

- I am familiar with the specifications submitted for this application, and I believe all applicable items in this checklist have been addressed.
- 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

APPENDIX G–WATER QUALITY TRADING MANAGEMENT PRACTICE REGISTRATION FORMS (NOT COMPLETED)

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	Facility Site Number
Fontana-Walworth WPCC	WI- 0036021-06-0	6530

Facility Address	City	State	ZIP Code
N840 Chilson Road	Walworth	WI	53184

Project Contact Name (if applicable)	Address	City	State	ZIP Code
Doug York	N840 Chilson Road	Walworth	WI	53184

Project Name
Final Phosphorus Compliance Alternatives Plan

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		Crop Practices/Filter Strips (NRCS Code 393)	1,027	2	Modeling: SnapPlus P Trade Report

County	Closest Receiving Water Name	Land Parcel ID(s)	Parameter(s) being traded
Walworth	Piscasaw	AS 2500001	Phosphorus

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

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	Facility Site Number
Fontana-Walworth WPCC	WI- 0036021-06-0	6530

Facility Address	City	State	ZIP Code
N840 Chilson Road	Walworth	WI	53184

Project Contact Name (if applicable)	Address	City	State	ZIP Code
Doug York	N840 Chilson Road	Walworth	WI	53184

Project Name
Final Phosphorus Compliance Alternatives Plan

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		North Drainage Basin Wet Detention Pond (WDNR Tech Standard 1001)	3,757	2	Modeling: SnapPlus P Trade Report/P8

County	Closest Receiving Water Name	Land Parcel ID(s)	Parameter(s) being traded
Walworth	Piscasaw	AS 2500001	Phosphorus

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.

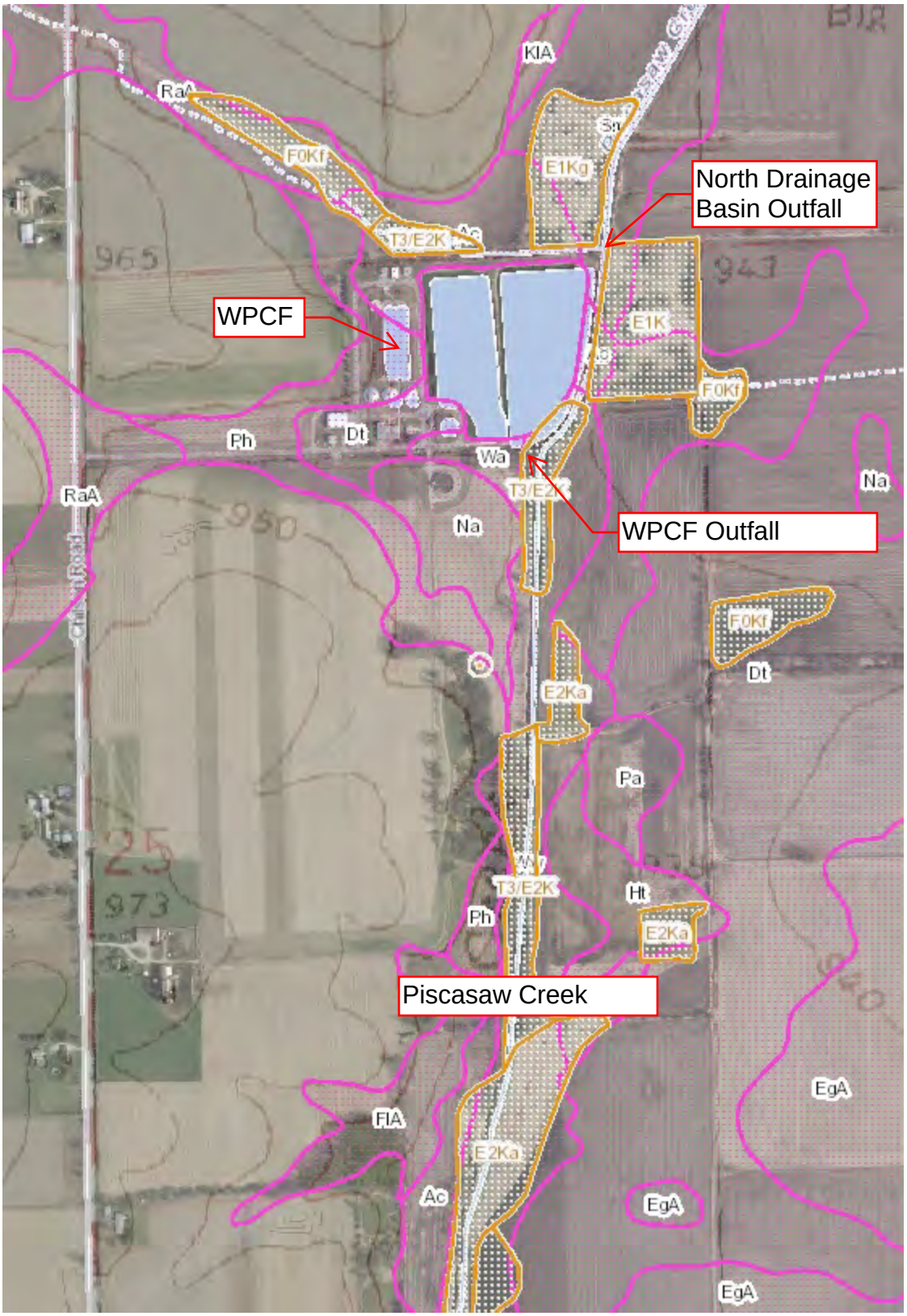
Signature of Authorized Representative	Date Signed

Leave Blank – For Department Use Only

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

APPENDIX H
SURFACE WATER DATA REVIEWER MAP

Surface Water Data Viewer Map



Legend

- Wetland Class Points
  - Dammed pond
  - Excavated pond
  - Filled excavated pond
  - Filled/drained wetland
  - Wetland too small to delineate
- Filled Points
- Wetland Class Areas
  - Wetland
  - Upland
- Filled Areas
- NRCS Wetspots
- Wetland Indicators
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water
- Index to EN_Image_Basemap_Leaf_Off

0.3 0 0.13 0.3 Miles

1: 7,920

NAD_1983_HARN_Wisconsin_TM

DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: http://dnr.wi.gov/legal/

Notes

APPENDIX I
P8 MODEL OUTPUT

P8 Urban Catchment Model, Version 3.5				Run Date	02/14/18
Case	North_watershed_proposed_Year1.p8c	FirstDate	10/01/80	Precip(in)	31.0
Title	Proposed Conditions	LastDate	09/30/81	Rain(in)	28.84
PrecFile	Mdsn6095.pcp	Events	79	Snow(in)	2.20
PartFile	NURP50.PAR	TotalHrs	8723	TotalYrs	1.00

Mass Balances by Device and Variable

Device: OVERALL Type: NONE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	4172.6	4193.2	0.68
06 normal outlet	928.99	1.29	691.3	694.8	0.27
07 spillway outlet	1303.56	1.81	1431.1	1438.2	0.40
08 sedimen + decay	0.00	0.00	1980.2	1989.9	
09 total inflow	2256.63	3.13	4172.6	4193.2	0.68
10 surface outflow	2232.55	3.10	2122.5	2132.9	0.35
12 total outflow	2232.55	3.10	2122.5	2132.9	0.35
13 total trapped	0.00	0.00	1980.2	1989.9	
14 storage increase	24.08	0.03	70.0	70.3	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	47.5	47.5	

Device: existing outlet Type: SWALE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
Reduction (%)	0.00	0.00	0.0	0.0	

Device: west pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	4172.6	4193.2	0.68
06 normal outlet	652.82	0.91	587.6	590.5	0.33
07 spillway outlet	1591.92	2.21	2258.1	2269.2	0.52
08 sedimen + decay	0.00	0.00	1287.2	1293.5	
09 total inflow	2256.63	3.13	4172.6	4193.2	0.68
10 surface outflow	2244.74	3.11	2845.7	2859.8	0.47
12 total outflow	2244.74	3.11	2845.7	2859.8	0.47
13 total trapped	0.00	0.00	1287.2	1293.5	
14 storage increase	11.90	0.02	39.7	39.9	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	30.8	30.8	

Device: East Pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
02 upstream device	2244.74	3.11	2845.7	2859.8	0.47
06 normal outlet	928.99	1.29	691.3	694.8	0.27
07 spillway outlet	1303.56	1.81	1431.1	1438.2	0.40
08 sedimen + decay	0.00	0.00	693.0	696.4	
09 total inflow	2244.74	3.11	2845.7	2859.8	0.47
10 surface outflow	2232.55	3.10	2122.5	2132.9	0.35
12 total outflow	2232.55	3.10	2122.5	2132.9	0.35
13 total trapped	0.00	0.00	693.0	696.4	
14 storage increase	12.18	0.02	30.3	30.4	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	24.4	24.4	

P8 Urban Catchment Model, Version 3.5				Run Date	02/14/18
Case	North_watershed_proposed_Year2.p8c	FirstDate	10/01/80	Precip(in)	31.0
Title	Proposed Conditions	LastDate	09/30/81	Rain(in)	28.84
PrecFile	Mdsn6095.pcp	Events	79	Snow(in)	2.20
PartFile	NURP50.PAR	TotalHrs	8723	TotalYrs	1.00

Mass Balances by Device and Variable

Device: OVERALL Type: NONE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	5198.8	5224.5	0.85
06 normal outlet	928.99	1.29	861.4	865.6	0.34
07 spillway outlet	1303.56	1.81	1783.1	1791.9	0.50
08 sedimen + decay	0.00	0.00	2467.2	2479.3	
09 total inflow	2256.63	3.13	5198.8	5224.5	0.85
10 surface outflow	2232.55	3.10	2644.5	2657.5	0.44
12 total outflow	2232.55	3.10	2644.5	2657.5	0.44
13 total trapped	0.00	0.00	2467.2	2479.3	
14 storage increase	24.08	0.03	87.2	87.6	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	47.5	47.5	

Device: existing outlet Type: SWALE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
Reduction (%)	0.00	0.00	0.0	0.0	

Device: west pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	5198.8	5224.5	0.85
06 normal outlet	652.82	0.91	732.1	735.7	0.41
07 spillway outlet	1591.92	2.21	2813.5	2827.4	0.65
08 sedimen + decay	0.00	0.00	1603.7	1611.6	
09 total inflow	2256.63	3.13	5198.8	5224.5	0.85
10 surface outflow	2244.74	3.11	3545.6	3563.1	0.58
12 total outflow	2244.74	3.11	3545.6	3563.1	0.58
13 total trapped	0.00	0.00	1603.7	1611.6	
14 storage increase	11.90	0.02	49.5	49.7	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	30.8	30.8	

Device: East Pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
02 upstream device	2244.74	3.11	3545.6	3563.1	0.58
06 normal outlet	928.99	1.29	861.4	865.6	0.34
07 spillway outlet	1303.56	1.81	1783.1	1791.9	0.50
08 sedimen + decay	0.00	0.00	863.4	867.7	
09 total inflow	2244.74	3.11	3545.6	3563.1	0.58
10 surface outflow	2232.55	3.10	2644.5	2657.5	0.44
12 total outflow	2232.55	3.10	2644.5	2657.5	0.44
13 total trapped	0.00	0.00	863.4	867.7	
14 storage increase	12.18	0.02	37.7	37.9	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	24.4	24.4	

P8 Urban Catchment Model, Version 3.5				Run Date	02/16/18
Case	North_watershed_proposed_Year3.p8c	FirstDate	10/01/80	Precip(in)	31.0
Title	Proposed Conditions	LastDate	09/30/81	Rain(in)	28.84
PrecFile	Mdsn6095.pcp	Events	79	Snow(in)	2.20
PartFile	NURP50.PAR	TotalHrs	8723	TotalYrs	1.00

Mass Balances by Device and Variable

Device: OVERALL Type: NONE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	3840.6	3859.5	0.63
06 normal outlet	928.99	1.29	636.3	639.5	0.25
07 spillway outlet	1303.56	1.81	1317.2	1323.7	0.37
08 sedimen + decay	0.00	0.00	1822.6	1831.6	
09 total inflow	2256.63	3.13	3840.6	3859.5	0.63
10 surface outflow	2232.55	3.10	1953.6	1963.2	0.32
12 total outflow	2232.55	3.10	1953.6	1963.2	0.32
13 total trapped	0.00	0.00	1822.6	1831.6	
14 storage increase	24.08	0.03	64.4	64.7	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	47.5	47.5	

Device: existing outlet Type: SWALE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
Reduction (%)	0.00	0.00	0.0	0.0	

Device: west pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	3840.6	3859.5	0.63
06 normal outlet	652.82	0.91	540.9	543.5	0.30
07 spillway outlet	1591.92	2.21	2078.4	2088.7	0.48
08 sedimen + decay	0.00	0.00	1184.7	1190.6	
09 total inflow	2256.63	3.13	3840.6	3859.5	0.63
10 surface outflow	2244.74	3.11	2619.3	2632.2	0.43
12 total outflow	2244.74	3.11	2619.3	2632.2	0.43
13 total trapped	0.00	0.00	1184.7	1190.6	
14 storage increase	11.90	0.02	36.5	36.7	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	30.8	30.8	

Device: East Pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
02 upstream device	2244.74	3.11	2619.3	2632.2	0.43
06 normal outlet	928.99	1.29	636.3	639.5	0.25
07 spillway outlet	1303.56	1.81	1317.2	1323.7	0.37
08 sedimen + decay	0.00	0.00	637.8	641.0	
09 total inflow	2244.74	3.11	2619.3	2632.2	0.43
10 surface outflow	2232.55	3.10	1953.6	1963.2	0.32
12 total outflow	2232.55	3.10	1953.6	1963.2	0.32
13 total trapped	0.00	0.00	637.8	641.0	
14 storage increase	12.18	0.02	27.9	28.0	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	24.4	24.4	

P8 Urban Catchment Model, Version 3.5				Run Date	02/14/18
Case	North_watershed_proposed_Year4.p8c	FirstDate	10/01/80	Precip(in)	31.0
Title	Proposed Conditions	LastDate	09/30/81	Rain(in)	28.84
PrecFile	Mdsn6095.pcp	Events	79	Snow(in)	2.20
PartFile	NURP50.PAR	TotalHrs	8723	TotalYrs	1.00

Mass Balances by Device and Variable

Device: OVERALL Type: NONE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	5712.0	5740.1	0.93
06 normal outlet	928.99	1.29	946.4	951.1	0.37
07 spillway outlet	1303.56	1.81	1959.1	1968.8	0.55
08 sedimen + decay	0.00	0.00	2710.7	2724.0	
09 total inflow	2256.63	3.13	5712.0	5740.1	0.93
10 surface outflow	2232.55	3.10	2905.5	2919.8	0.48
12 total outflow	2232.55	3.10	2905.5	2919.8	0.48
13 total trapped	0.00	0.00	2710.7	2724.0	
14 storage increase	24.08	0.03	95.8	96.3	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	47.5	47.5	

Device: west pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	5712.0	5740.1	0.93
06 normal outlet	652.82	0.91	804.4	808.4	0.45
07 spillway outlet	1591.92	2.21	3091.2	3106.4	0.71
08 sedimen + decay	0.00	0.00	1762.0	1770.7	
09 total inflow	2256.63	3.13	5712.0	5740.1	0.93
10 surface outflow	2244.74	3.11	3895.6	3914.8	0.64
12 total outflow	2244.74	3.11	3895.6	3914.8	0.64
13 total trapped	0.00	0.00	1762.0	1770.7	
14 storage increase	11.90	0.02	54.4	54.6	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	30.8	30.8	

Device: East Pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
02 upstream device	2244.74	3.11	3895.6	3914.8	0.64
06 normal outlet	928.99	1.29	946.4	951.1	0.37
07 spillway outlet	1303.56	1.81	1959.1	1968.8	0.55
08 sedimen + decay	0.00	0.00	948.7	953.3	
09 total inflow	2244.74	3.11	3895.6	3914.8	0.64
10 surface outflow	2232.55	3.10	2905.5	2919.8	0.48
12 total outflow	2232.55	3.10	2905.5	2919.8	0.48
13 total trapped	0.00	0.00	948.7	953.3	
14 storage increase	12.18	0.02	41.4	41.6	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	24.4	24.4	

P8 Urban Catchment Model, Version 3.5				Run Date	02/14/18
Case	North_watershed_proposed_Year5.p8c	FirstDate	10/01/80	Precip(in)	31.0
Title	Proposed Conditions	LastDate	09/30/81	Rain(in)	28.84
PrecFile	Mdsn6095.pcp	Events	79	Snow(in)	2.20
PartFile	NURP50.PAR	TotalHrs	8723	TotalYrs	1.00

Mass Balances by Device and Variable

Device: OVERALL Type: NONE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	3649.4	3667.4	0.59
06 normal outlet	928.99	1.29	604.7	607.6	0.24
07 spillway outlet	1303.56	1.81	1251.7	1257.9	0.35
08 sedimen + decay	0.00	0.00	1731.9	1740.4	
09 total inflow	2256.63	3.13	3649.4	3667.4	0.59
10 surface outflow	2232.55	3.10	1856.3	1865.5	0.31
12 total outflow	2232.55	3.10	1856.3	1865.5	0.31
13 total trapped	0.00	0.00	1731.9	1740.4	
14 storage increase	24.08	0.03	61.2	61.5	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	47.5	47.5	

Device: west pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	2256.63	3.13	3649.4	3667.4	0.59
06 normal outlet	652.82	0.91	513.9	516.5	0.29
07 spillway outlet	1591.92	2.21	1975.0	1984.7	0.46
08 sedimen + decay	0.00	0.00	1125.8	1131.3	
09 total inflow	2256.63	3.13	3649.4	3667.4	0.59
10 surface outflow	2244.74	3.11	2488.9	2501.2	0.41
12 total outflow	2244.74	3.11	2488.9	2501.2	0.41
13 total trapped	0.00	0.00	1125.8	1131.3	
14 storage increase	11.90	0.02	34.7	34.9	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	30.8	30.8	

Device: East Pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
02 upstream device	2244.74	3.11	2488.9	2501.2	0.41
06 normal outlet	928.99	1.29	604.7	607.6	0.24
07 spillway outlet	1303.56	1.81	1251.7	1257.9	0.35
08 sedimen + decay	0.00	0.00	606.1	609.1	
09 total inflow	2244.74	3.11	2488.9	2501.2	0.41
10 surface outflow	2232.55	3.10	1856.3	1865.5	0.31
12 total outflow	2232.55	3.10	1856.3	1865.5	0.31
13 total trapped	0.00	0.00	606.1	609.1	
14 storage increase	12.18	0.02	26.5	26.6	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	24.4	24.4	

P8 Urban Catchment Model, Version 3.5				Run Date	02/16/18
Case	Nonfarm_Watershed.p8c	FirstDate	10/01/80	Precip(in)	31.0
Title	Proposed Conditions	LastDate	09/30/81	Rain(in)	28.84
PrecFile	Mdsn6095.pcp	Events	79	Snow(in)	2.20
PartFile	NURP50.PAR	TotalHrs	8723	TotalYrs	1.00

Mass Balances by Device and Variable

Device: OVERALL Type: NONE Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	202.53	0.28	198.4	199.4	0.36
06 normal outlet	198.42	0.28	52.8	53.1	0.10
08 sedimen + decay	0.00	0.00	138.0	138.6	
09 total inflow	202.53	0.28	198.4	199.4	0.36
10 surface outflow	198.42	0.28	52.8	53.1	0.10
12 total outflow	198.42	0.28	52.8	53.1	0.10
13 total trapped	0.00	0.00	138.0	138.6	
14 storage increase	4.12	0.01	7.6	7.7	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	69.5	69.5	

Device: west pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	202.53	0.28	198.4	199.4	0.36
06 normal outlet	195.16	0.27	66.4	66.8	0.13
07 spillway outlet	4.61	0.01	1.8	1.8	0.14
08 sedimen + decay	0.00	0.00	125.7	126.4	
09 total inflow	202.53	0.28	198.4	199.4	0.36
10 surface outflow	199.77	0.28	68.3	68.6	0.13
12 total outflow	199.77	0.28	68.3	68.6	0.13
13 total trapped	0.00	0.00	125.7	126.4	
14 storage increase	2.76	0.00	4.4	4.4	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	63.4	63.4	

Device: East Pond Type: POND Variable: tp

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
02 upstream device	199.77	0.28	68.3	68.6	0.13
06 normal outlet	198.42	0.28	52.8	53.1	0.10
08 sedimen + decay	0.00	0.00	12.2	12.3	
09 total inflow	199.77	0.28	68.3	68.6	0.13
10 surface outflow	198.42	0.28	52.8	53.1	0.10
12 total outflow	198.42	0.28	52.8	53.1	0.10
13 total trapped	0.00	0.00	12.2	12.3	
14 storage increase	1.36	0.00	3.2	3.2	
15 mass balance check	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	17.9	17.9	