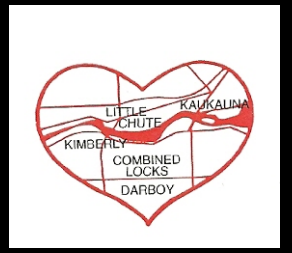
Water Quality Trading in a TMDL Watershed

19th Annual Fox Wolf Watershed Conference

March 6, 2018

Heart of the Valley Metropolitan Sewerage District

- Created in 1972 to design a sewerage system that includes a mainline interceptor sewer and treatment facility
- Heart of the Valley was officially recognized and approved by the DNR in 1974
- Kaukauna WWTF site selected for Heart of the Valley WWTF
- Member communities served include: Combined Locks, Darboy, Kaukauna, Kimberly, and Little Chute

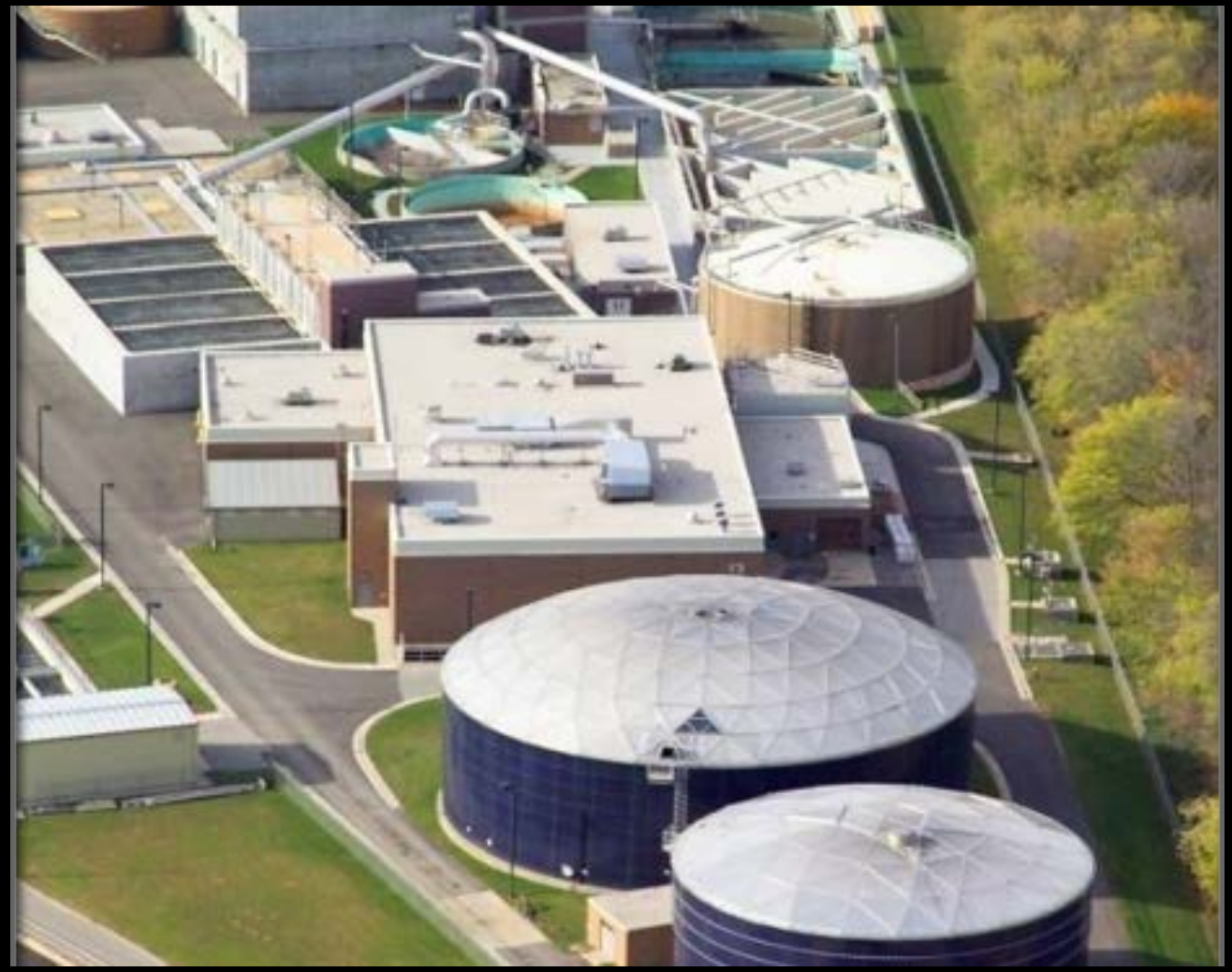


HOVMSD Treatment Facility

- Preliminary treatment – flowmeter and sampling, screening, grit removal
- Primary treatment – unique and proprietary chemically enhanced ballasted sedimentation - Actiflo
- Secondary treatment – Biostyr upflow biological aerated filter
- No secondary clarification
- Disinfection – Liquid sodium hypochlorite and sodium bisulfite added just prior to discharge
- Effluent reuse – Approximately 55% of HOV effluent is reused at Fox Energy Center

HOV Treatment Facility

- Construction/upgraded in 2006 and currently operating as designed
- Designed to maximize forward flow of 60 MGD thru Actiflo within a very small foot print
- Full secondary treatment of 26 MGD from Actiflo thru Biosyr
- Permit requirements of 30 mg/L monthly and 45 mg/L weekly for TSS and BOD and 1 mg/L total phosphorus
- The TMDL did not exist …..
- Site constrictions – no space for construction of a secondary clarifier!



Fast forward…. The TMDL is here!

- Heart of the Valley's allocation for suspended solids is 801 pounds per day monthly average and 1345 pounds per day on a weekly average
- The phosphorus allocation comes with a compliance schedule in our permit giving us time to evaluate source reduction and compliance alternatives (including the monitoring of the sedimentation basin for phosphorus removal)

The transition to TMDL compliance

- The term 30/45 for operators is obsolete! For HOV its been replaced by 801/1345
- Compliance is no longer judged in terms of effluent mg/L
- Mass based compliance includes flow (MGD) as a pillar in determining compliance
- In 2017 HOV processed an average influent daily flow of 5.739 MGD
- TSS weekly compliance - effluent must be less 28.1 mg/L
- TSS monthly compliance – effluent must be less than 16.7 mg/L

Brick and mortar solution – can limits be met and how much is it going to cost?

- Membrane filtration estimated @ $69.5M in 2013 dollars for HOV to meet both suspended solids and phosphorus allocations
- In 2014 HOV contracted for a pilot study using chemical addition and cloth disk filter technology. Effluent results showed compliance was achievable but at a high cost. Capital cost were estimated at $9.5 M for 20 MGD plus annual operating costs of just over $82,000 per year
- Suspended solids compliance became the immediate focus with watershed based approach being preferred over traditional bricks and mortar at the treatment facility

Enter Outagamie county and FWWA

- HOV property was identified by Outagamie county as an optimal location for an engineered sedimentation basin with potential for grants to fund its construction
- After discussions with FWWA and Outagamie county, the HOV Commission approved funding the detention pond, collaborating with FWWA on a suspended solids trade agreement and with Outagamie county on provision of technical design criteria and Snap plus modeling of solids migration and pond solids capture

Sedimentation pond design

- Total drainage area served is 20.7 acres – 16.4 acres are agricultural and 4.3 acres urban
- HOV was required to enter into a secondary agreement with the neighboring property owner whose 12.8 acre field drains to the detention pond. The agreement spells out crop to be grown and tillage practices on the property until crop year 2022
- Pond sized and designed in accordance with NRCS Technical standard 350 with enhancements

Preconstruction overview (Drone footage)

- Site was mowed and shows orientation and location of detention pond
- The browned out area has been taken out of production and is now planted in permanent vegetative cover
- The now constructed detention pond is mowed the mowed area and L shaped
- The backyards of the homes represents the 4.3 acres of urban drainage

Drain tile

- The existing concrete drain tile was located and rerouted around the sedimentation basin

Construction phase-start

- The top soil was stripped from the pond area and stock piled up for reuse on the pond banks and for berm work

Construction phase - midway

- Removing sub soil material and starting to remove material for sediment traps
- Note the conservation cover crop growing in the foreground of photo

Construction phase - end

- Final elevations and contours completed. Top soil put back in place in pond edge
- Between the sediment traps are gravel spreader bars put in place to stop drainage water from short circuiting
- The area between the rock spreader bars is designed as shallow water ponding areas to encourage wetland vegetation growth and maximize dissolved phosphorus uptake
- The pond banks were seeded to establish vegetation on the pond slopes and reduce bank erosion

Overflow diversion and effluent pipe

- The blue arrow shows the pond overflow pipe and represents the normal water level
- The diversion area is rip rapped and was put in place for drainage during major rain events

Sediment trap

- Close up of the front sediment trap incorporated into design. This one located at the head of the pond and the other is situated just prior to discharge
- Flow measurement flume is being installed a head of the pond along with the start of seed germination
- The predicted removal efficiency based on standard design is 80% but we believe design elements incorporated into this design will beat the standard
- The sediment traps should not require sediment removal for 5 years

Project Pros

- HOV avoids major capital infrastructure cost and sewer rate increases required in order to pay for the construction bonds of brick and mortar – at least for this permit duration
- Improved property and soil management with the addition of a Nutrient Management Plan on all HOV owned properties
- Watershed based approach to improved water quality – HOV believes this approach is far more effective than point of pipe regulations
- Project costs – while not complete or fully tabulated we expect the final costs to be in the range of $75,000

Project Cons

- HOV required to implement and pay for a nutrient management plan for all crop land that it owns and leases for crop production
- Biosolids application will now be limited by soil phosphorus content – net effect will be reduced frequency of application and application rates – HOV will need more acreage for disposal
- Permanent loss of rental revenue due to pond construction and vegetative cover acreage
- Labor/Maintenance – monthly inspections, additional mowing, annual inspection by registered PE, dredging sediment traps
- Calculations are not favorable - 2:1 trade ratio, 80% recovery, ect.

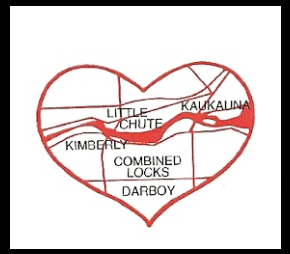
Could a trade be in your future?

- Examine existing relationships – beneficial reuse of biosolids by land application has a decades long history
- Dairy production – milk producers need corn silage and corn silage production is favorable in the calculations versus other crops
- Look for collaboration opportunities - FWWA if located in the Fox/Wolf Watershed, your County Land Conservation office
- Agronomists – producers now realize their bottom line relies on their agronomists
- Trading as it stands now seems to favor rural medium and smaller sized wastewater utilities

But we don’t own any land!

- Trade tillable acres instead – if a suitable site is 10 acres a permittee could long term lease 10 acres in a different location for the owner/producer
- Long term lease -
- Purchase a parcel – chances are a suitable location isn’t going to be high dollar “premium” crop land

Thank you to our partners!

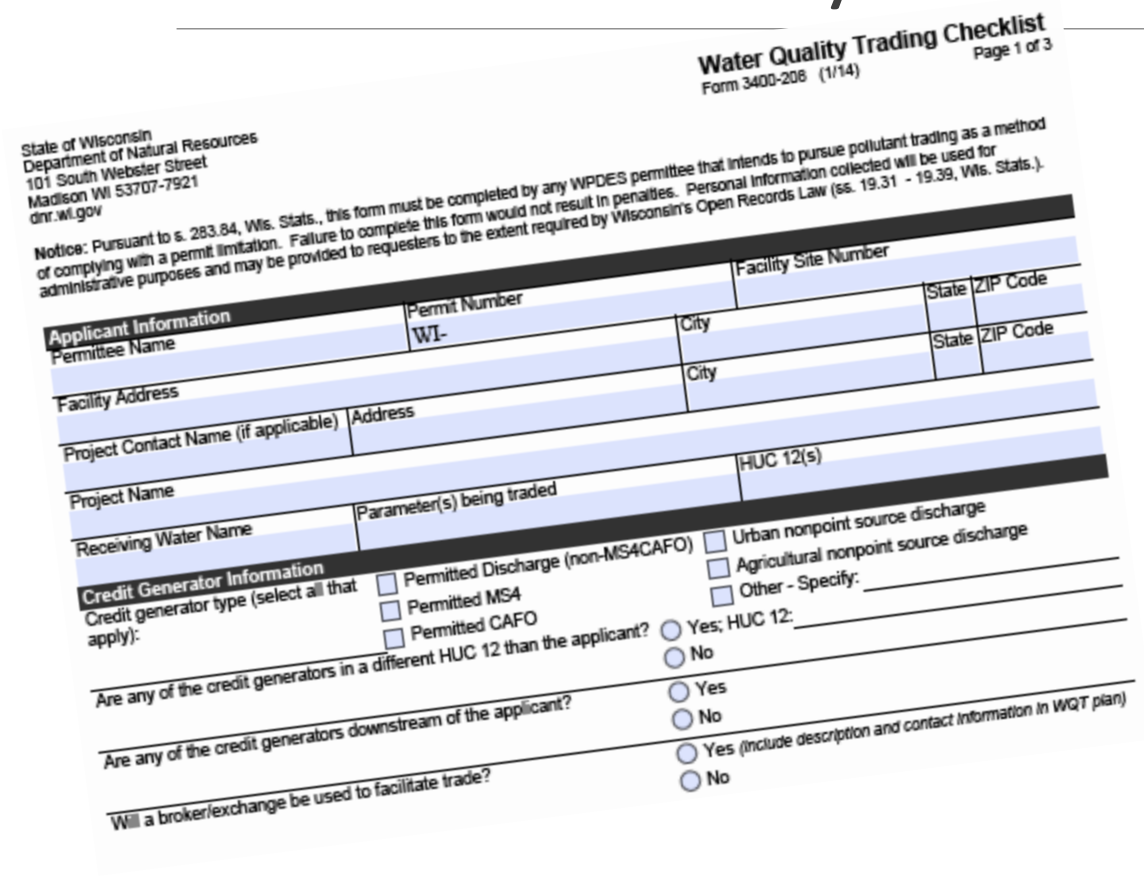


- FWWA – Jessica Schultz, Executive Director
- Outagamie County – Jeremy Freund PE and Wesley Kotila EIT
- Brown county - Nick Peltier, Agronomist
- Tilth Agronomy – Bill Schaumberg
- Wisconsin DNR – Keith Marquardt
- Outagamie County Highway Department
- Glen Guerts – retired HOV District Director

Trading in a TMDL Watershed

JESSICA SCHULTZ
FOX-WOLF WATERSHED ALLIANCE

Water Quality Trading Checklist



Water Quality Trading Checklist
Form 3400-208 (1/14) Page 1 of 3

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

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 WI- | Facility Site Number

Facility Address | City | State | ZIP Code

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

Project Name | HUC 12(s)

Receiving Water Name | Parameter(s) being traded

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

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

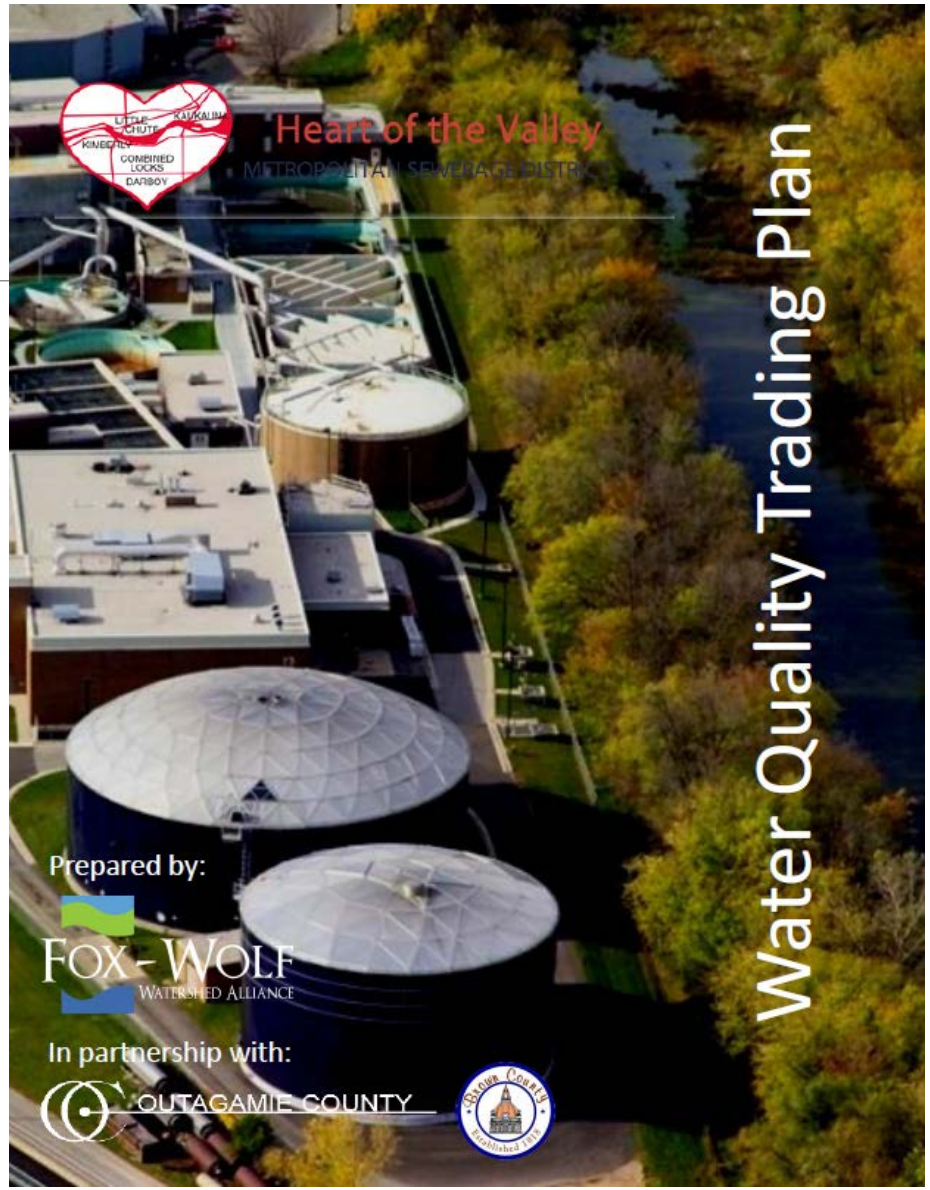
Water Quality Trading Checklist
Form 3400-208 (1/14) Page 3 of 3

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

Screenshots of WDNR Water Quality Trading Checklist Form 3400-208

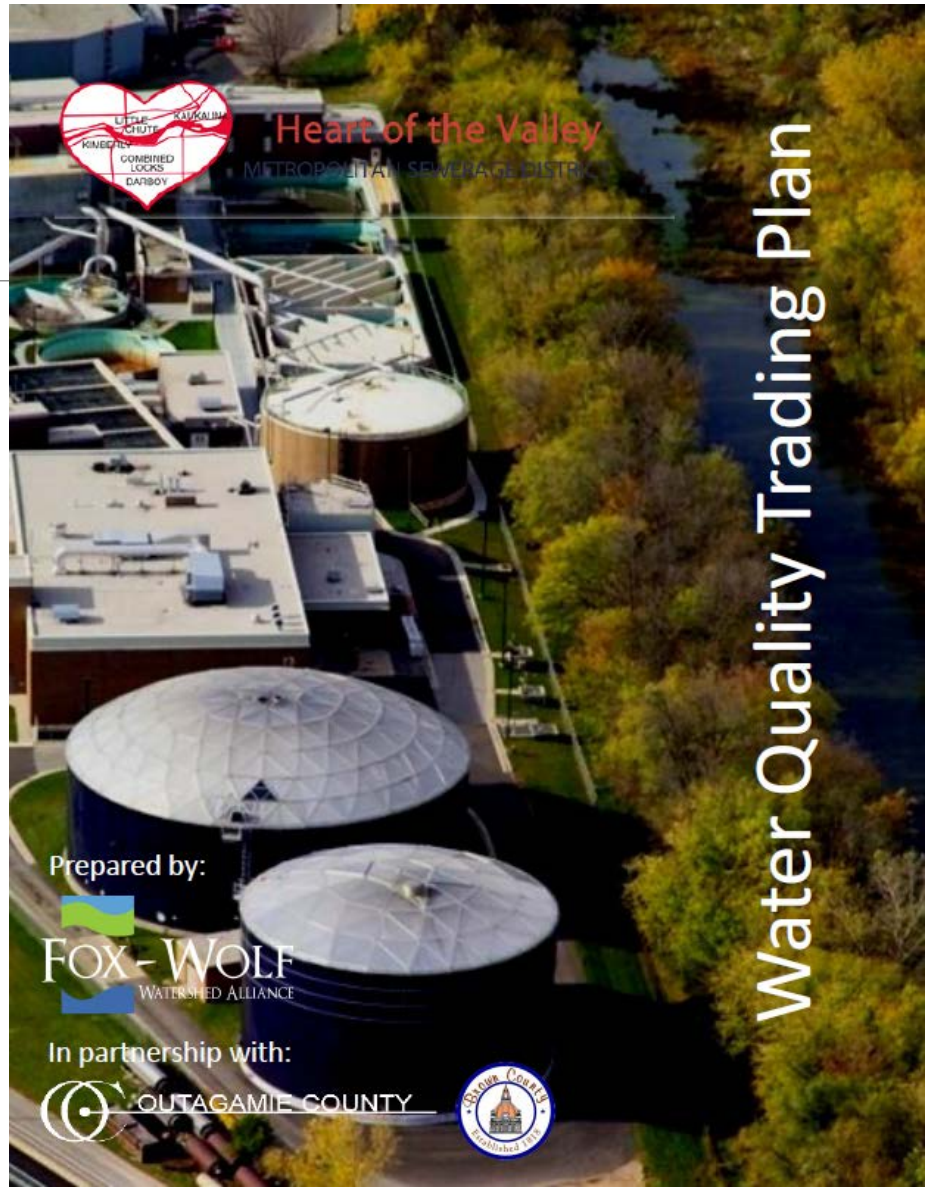
Components of a Water Quality Trading Plan

1. Executive Summary
2. General Information
3. Background
4. Description and Location of Site where Credits will be Generated
5. Methods for Reducing Nonpoint Source Loading
6. Derivation of Water Quality Trading Credits
7. Trade Timeline
8. Inspections and Reporting
9. Certification



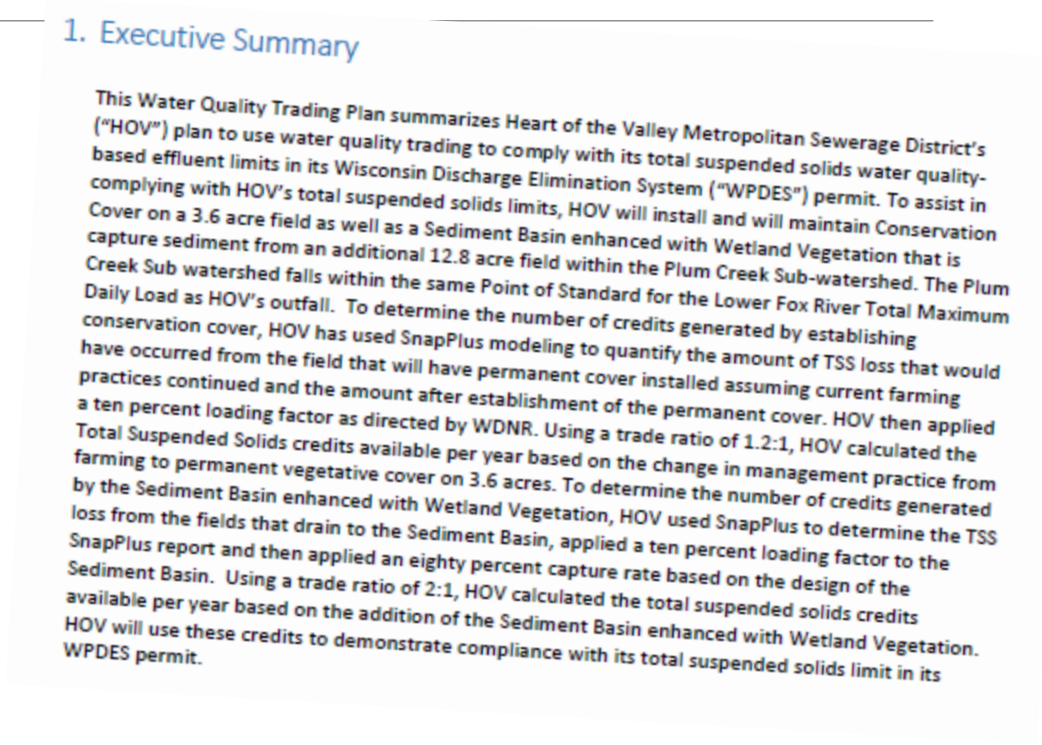
Components of a Water Quality Trading Plan

1. Executive Summary



1. Executive Summary

Overview of project

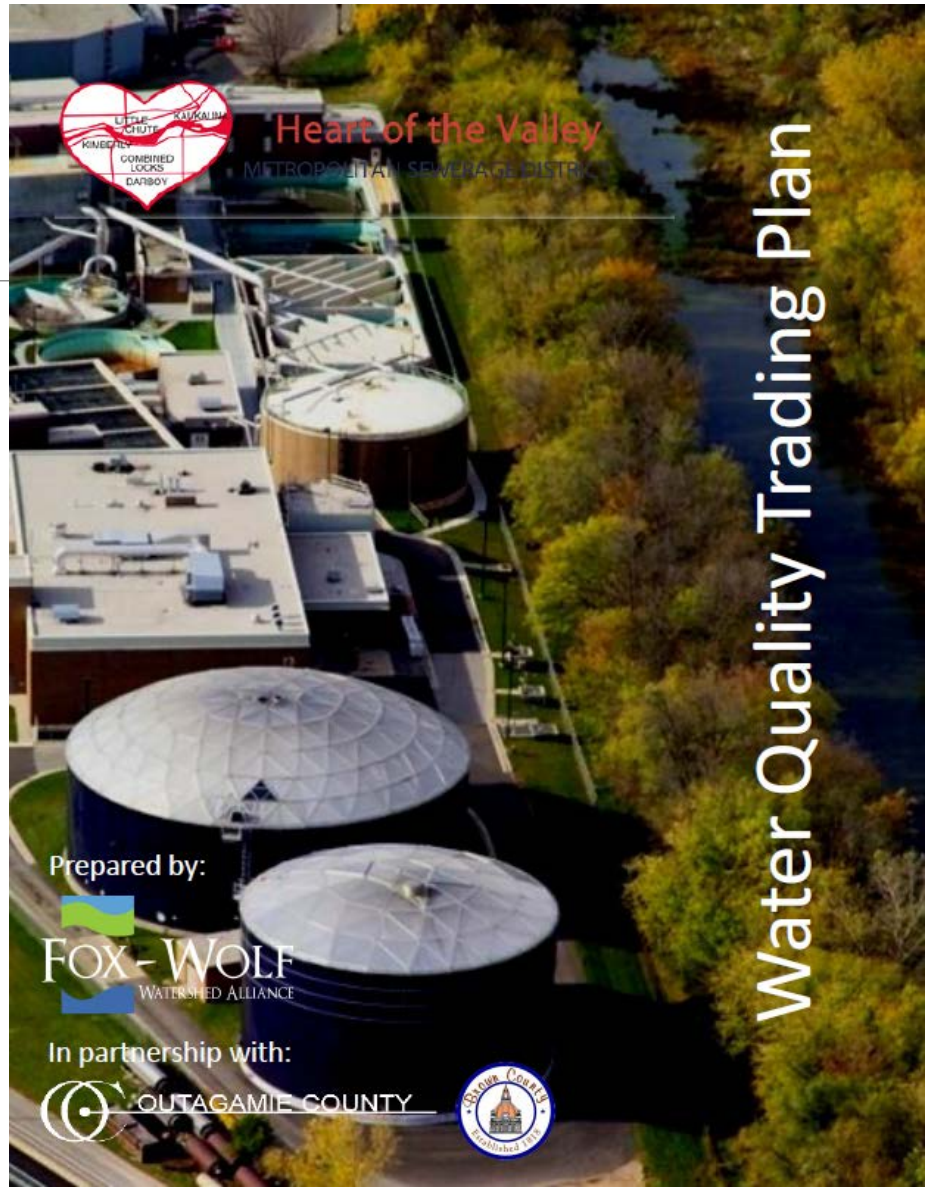


1. Executive Summary

This Water Quality Trading Plan summarizes Heart of the Valley Metropolitan Sewerage District's ("HOV") plan to use water quality trading to comply with its total suspended solids water quality-based effluent limits in its Wisconsin Discharge Elimination System ("WPDES") permit. To assist in complying with HOV's total suspended solids limits, HOV will install and will maintain Conservation Cover on a 3.6 acre field as well as a Sediment Basin enhanced with Wetland Vegetation that is capture sediment from an additional 12.8 acre field within the Plum Creek Sub-watershed. The Plum Creek Sub watershed falls within the same Point of Standard for the Lower Fox River Total Maximum Daily Load as HOV's outfall. To determine the number of credits generated by establishing conservation cover, HOV has used SnapPlus modeling to quantify the amount of TSS loss that would have occurred from the field that will have permanent cover installed assuming current farming practices continued and the amount after establishment of the permanent cover. HOV then applied a ten percent loading factor as directed by WDNR. Using a trade ratio of 1.2:1, HOV calculated the Total Suspended Solids credits available per year based on the change in management practice from farming to permanent vegetative cover on 3.6 acres. To determine the number of credits generated by the Sediment Basin enhanced with Wetland Vegetation, HOV used SnapPlus to determine the TSS loss from the fields that drain to the Sediment Basin, applied a ten percent loading factor to the SnapPlus report and then applied an eighty percent capture rate based on the design of the Sediment Basin. Using a trade ratio of 2:1, HOV calculated the total suspended solids credits available per year based on the addition of the Sediment Basin enhanced with Wetland Vegetation. HOV will use these credits to demonstrate compliance with its total suspended solids limit in its WPDES permit.

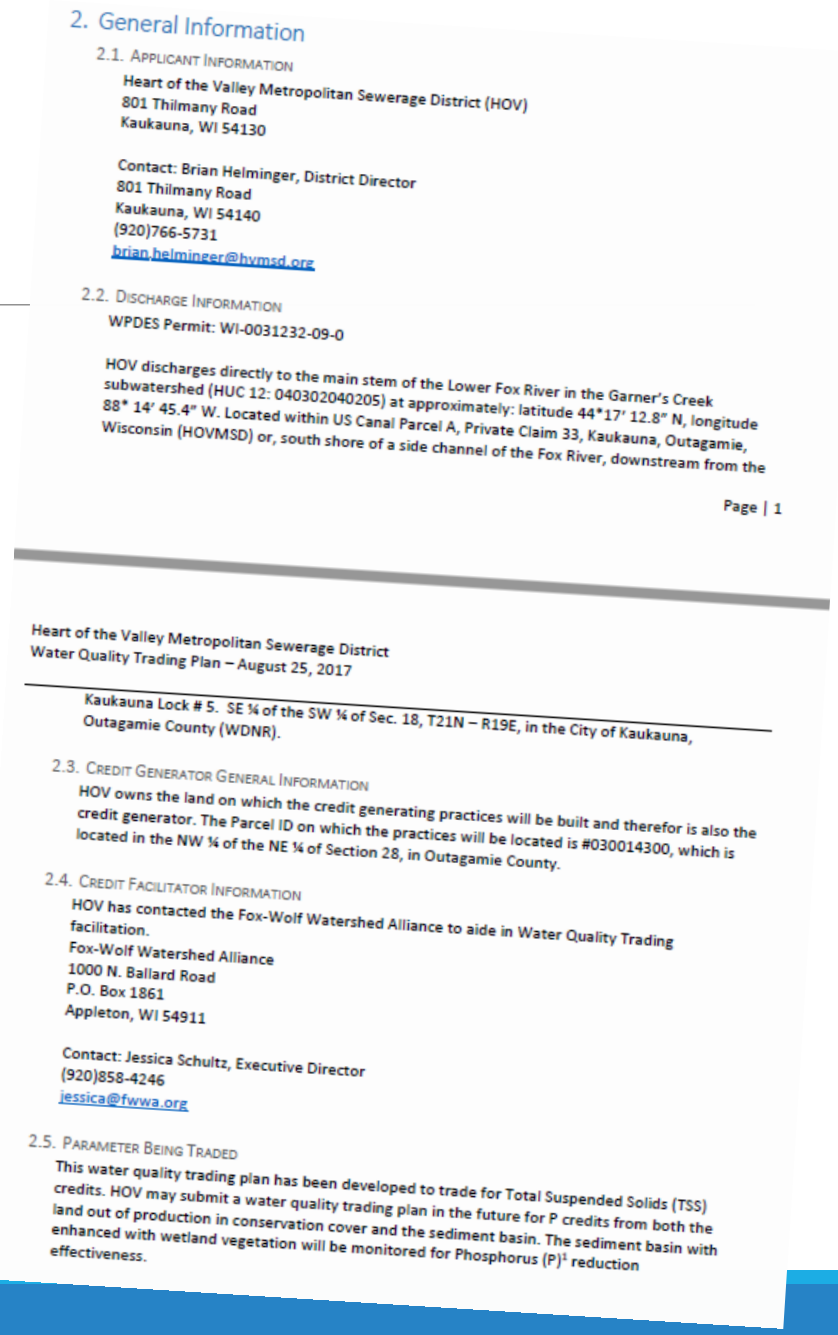
Components of a Water Quality Trading Plan

1. Executive Summary
2. General Information



2. General Information

1. Applicant Information
2. Discharge Information
3. Credit Generator General Information
4. Credit Facilitator Information
5. Parameter Being Traded



2. General Information

2.1. Applicant Information

Heart of the Valley Metropolitan Sewerage District (HOV)
801 Thilmany Road
Kaukauna, WI 54130

Contact: Brian Helminger, District Director
801 Thilmany Road
Kaukauna, WI 54140
(920)766-5731
brian.helminger@hvmsd.org

2.2. Discharge Information

WPDES Permit: WI-0031232-09-0

HOV discharges directly to the main stem of the Lower Fox River in the Garner's Creek subwatershed (HUC 12: 040302040205) at approximately: latitude 44°17' 12.8" N, longitude 88° 14' 45.4" W. Located within US Canal Parcel A, Private Claim 33, Kaukauna, Outagamie, Wisconsin (HOVMSD) or, south shore of a side channel of the Fox River, downstream from the

Kaukauna Lock # 5. SE ¼ of the SW ¼ of Sec. 18, T21N – R19E, in the City of Kaukauna, Outagamie County (WDNR).

2.3. Credit Generator General Information

HOV owns the land on which the credit generating practices will be built and therefor is also the credit generator. The Parcel ID on which the practices will be located is #030014300, which is located in the NW ¼ of the NE ¼ of Section 28, in Outagamie County.

2.4. Credit Facilitator Information

HOV has contacted the Fox-Wolf Watershed Alliance to aide in Water Quality Trading facilitation.
Fox-Wolf Watershed Alliance
1000 N. Ballard Road
P.O. Box 1861
Appleton, WI 54911

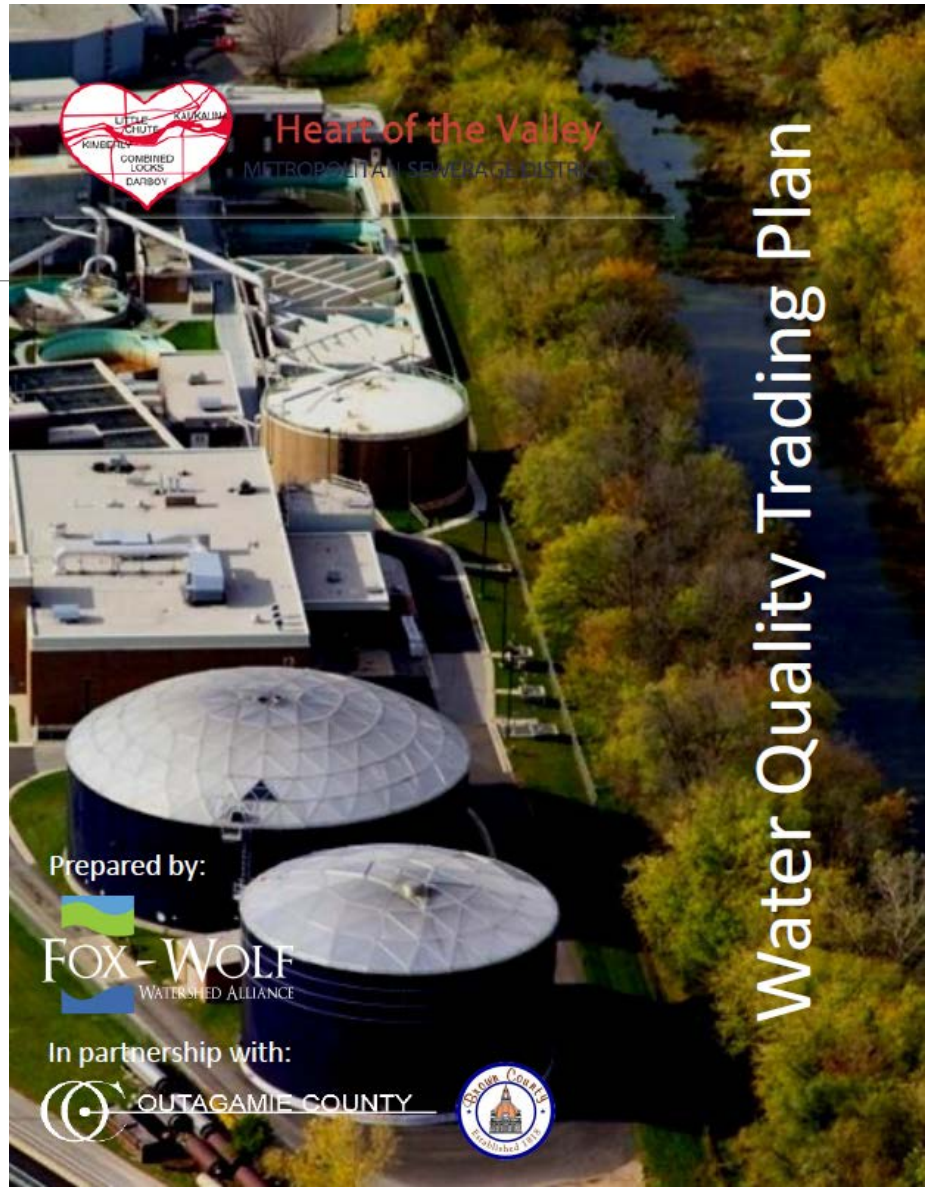
Contact: Jessica Schultz, Executive Director
(920)858-4246
jessica@fwwa.org

2.5. Parameter Being Traded

This water quality trading plan has been developed to trade for Total Suspended Solids (TSS) credits. HOV may submit a water quality trading plan in the future for P credits from both the land out of production in conservation cover and the sediment basin. The sediment basin with enhanced with wetland vegetation will be monitored for Phosphorus (P)[1] reduction effectiveness.

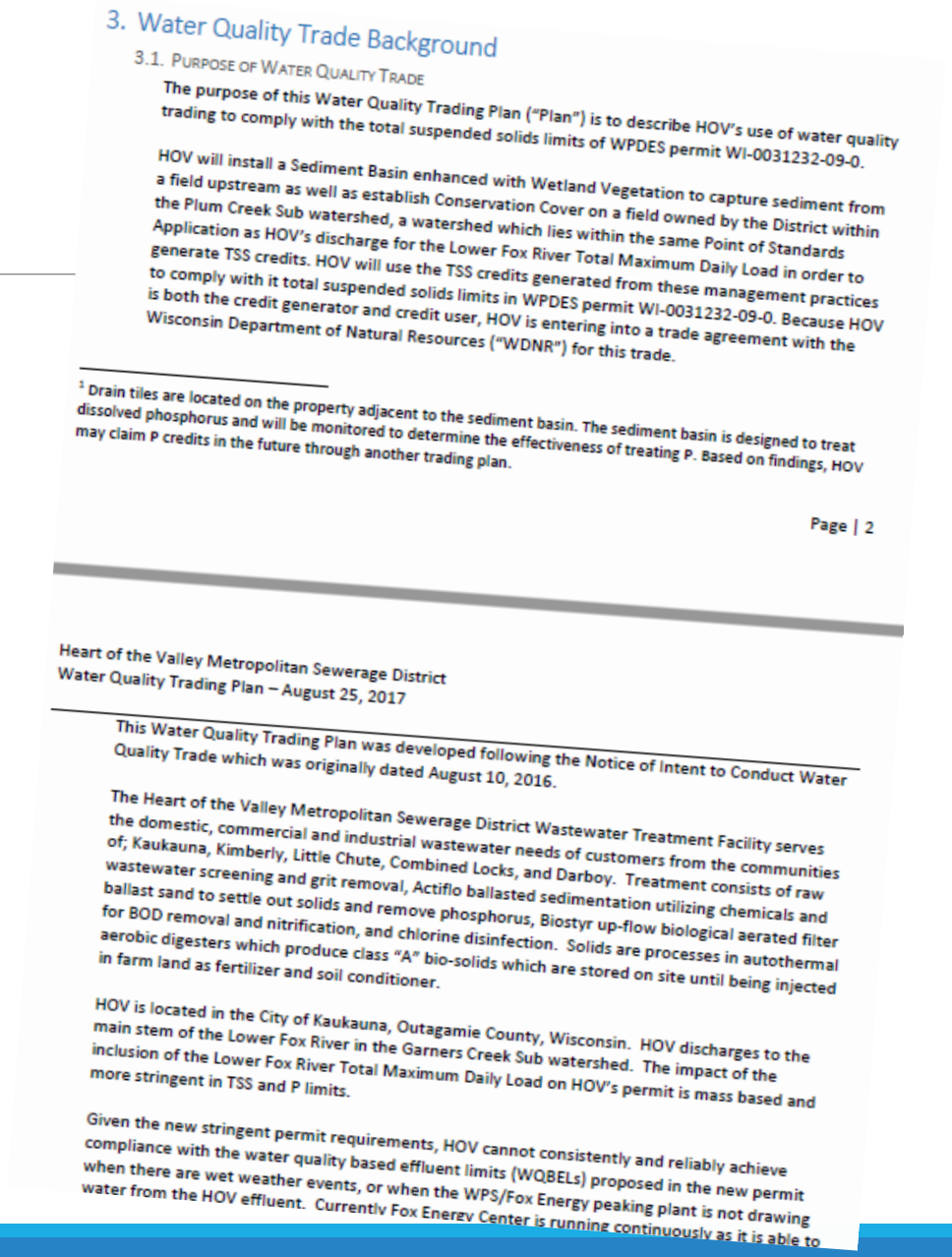
Components of a Water Quality Trading Plan

1. Executive Summary
2. General Information
3. Background



3. Background

1. Purpose of Water Quality Trade
   (how many credits does the facility need and why does the facility need credits)



3. Water Quality Trade Background

3.1. Purpose of Water Quality Trade

The purpose of this Water Quality Trading Plan ("Plan") is to describe HOV's use of water quality trading to comply with the total suspended solids limits of WPDES permit WI-0031232-09-0.

HOV will install a Sediment Basin enhanced with Wetland Vegetation to capture sediment from a field upstream as well as establish Conservation Cover on a field owned by the District within the Plum Creek Sub watershed, a watershed which lies within the same Point of Standards Application as HOV's discharge for the Lower Fox River Total Maximum Daily Load in order to generate TSS credits. HOV will use the TSS credits generated from these management practices to comply with it total suspended solids limits in WPDES permit WI-0031232-09-0. Because HOV is both the credit generator and credit user, HOV is entering into a trade agreement with the Wisconsin Department of Natural Resources ("WDNR") for this trade.

[1] Drain tiles are located on the property adjacent to the sediment basin. The sediment basin is designed to treat dissolved phosphorus and will be monitored to determine the effectiveness of treating P. Based on findings, HOV may claim P credits in the future through another trading plan.

This Water Quality Trading Plan was developed following the Notice of Intent to Conduct Water Quality Trade which was originally dated August 10, 2016.

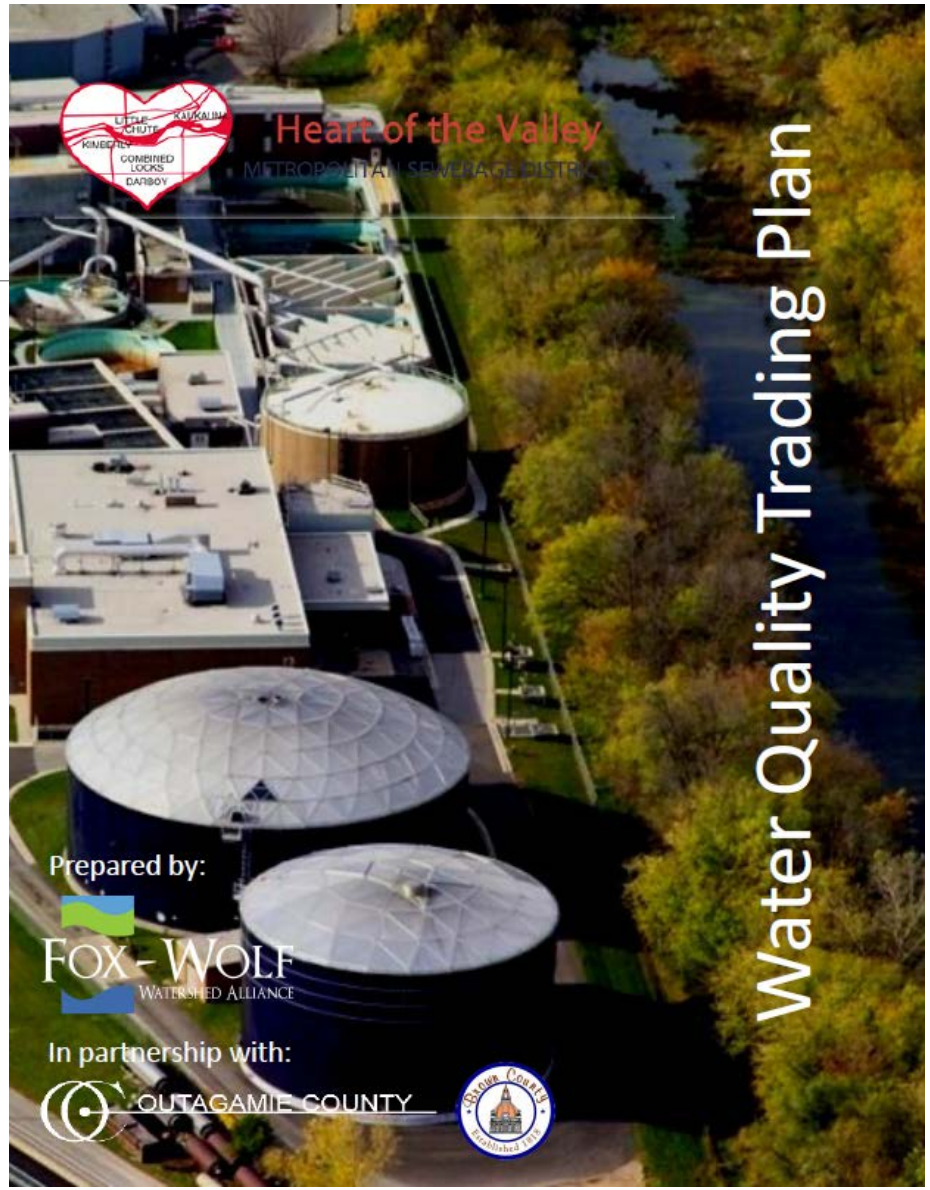
The Heart of the Valley Metropolitan Sewerage District Wastewater Treatment Facility serves the domestic, commercial and industrial wastewater needs of customers from the communities of; Kaukauna, Kimberly, Little Chute, Combined Locks, and Darboy. Treatment consists of raw wastewater screening and grit removal, Actiflo ballasted sedimentation utilizing chemicals and ballast sand to settle out solids and remove phosphorus, Biostyr up-flow biological aerated filter for BOD removal and nitrification, and chlorine disinfection. Solids are processes in autothermal aerobic digesters which produce class "A" bio-solids which are stored on site until being injected in farm land as fertilizer and soil conditioner.

HOV is located in the City of Kaukauna, Outagamie County, Wisconsin. HOV discharges to the main stem of the Lower Fox River in the Garners Creek Sub watershed. The impact of the inclusion of the Lower Fox River Total Maximum Daily Load on HOV's permit is mass based and more stringent in TSS and P limits.

Given the new stringent permit requirements, HOV cannot consistently and reliably achieve compliance with the water quality based effluent limits (WQBELs) proposed in the new permit when there are wet weather events, or when the WPS/Fox Energy peaking plant is not drawing water from the HOV effluent. Currently Fox Energy Center is running continuously as it is able to

Components of a Water Quality Trading Plan

1. Executive Summary
2. General Information
3. Background
4. Description and Location of Site where Credits will be Generated



4. Description and Location of Site where Credits will be Generated

1. Location where Credits will be Generated (in comparison to the location of the facilities discharge)

4. Description and Location of Sites where Credits will be Generated

4.1. Location Where Credits will be Generated

HOV discharges directly to the main stem of the Lower Fox River in Kaukauna, between the mid-Appleton Dam and the DePere Dam.

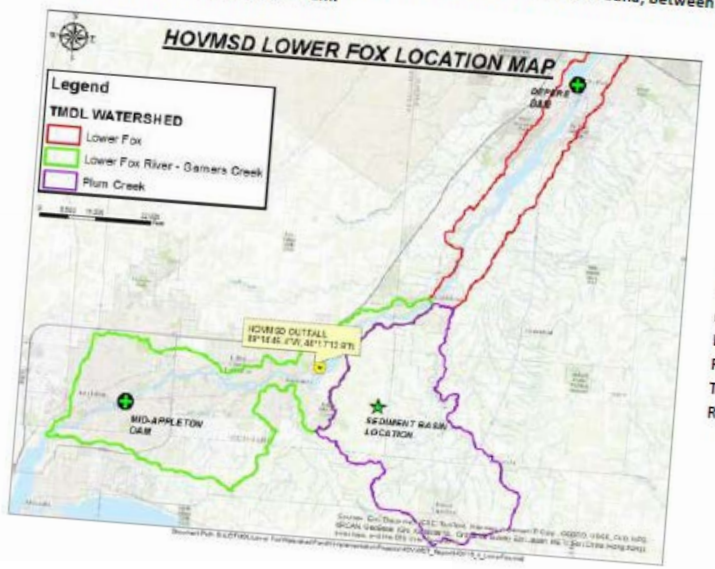


Figure 1: Location of Credit Generating Practices compared to Credit User and the relevant Lower Fox River TMDL Reach.

Flexibility in TMDL Watersheds

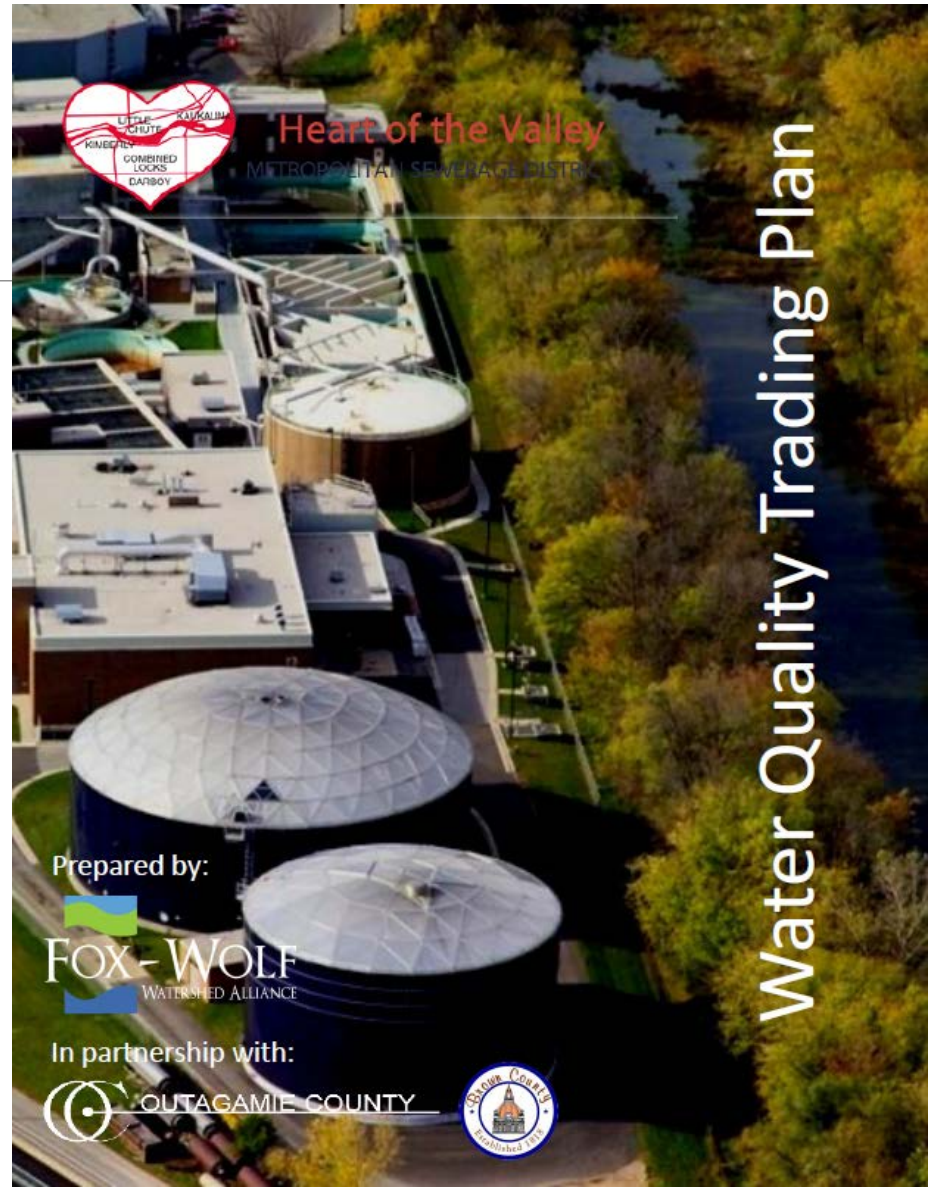
A "TMDL reach" is a waterbody segment used to calculate pollutant allocations for point and nonpoint sources in a TMDL. Typically, TMDL reaches are either impaired themselves or located upstream of an impaired water. Because of how TMDL reaches are delineated TMDL reaches may overlap with HUC 12 watershed boundaries allowing TMDL reaches to be used in lieu of or in addition to the HUC 12 boundary. When trading to meet allocations from a TMDL the trade locations must be hydraulically connected and located upstream of the impaired segment.

o generate total suspended solid
. The field is parcel number
County. This field will have the

Figure 2: Explanation of TMDL reach from WDNR, A Water Quality Trading How to Manual 09/09/13

Components of a Water Quality Trading Plan

1. Executive Summary
2. General Information
3. Background
4. Description and Location of Site where Credits will be Generated
5. Methods for Reducing Nonpoint Source Loading



5. Method for Reducing Nonpoint Source Loading

1. Methods used to Generate Load Reductions (what practices will you use)

Sediment Basin - NRCS Tech Standard 350 (under construction)

Conservation Cover- NRCS Tech Standard 327 (land out of production)

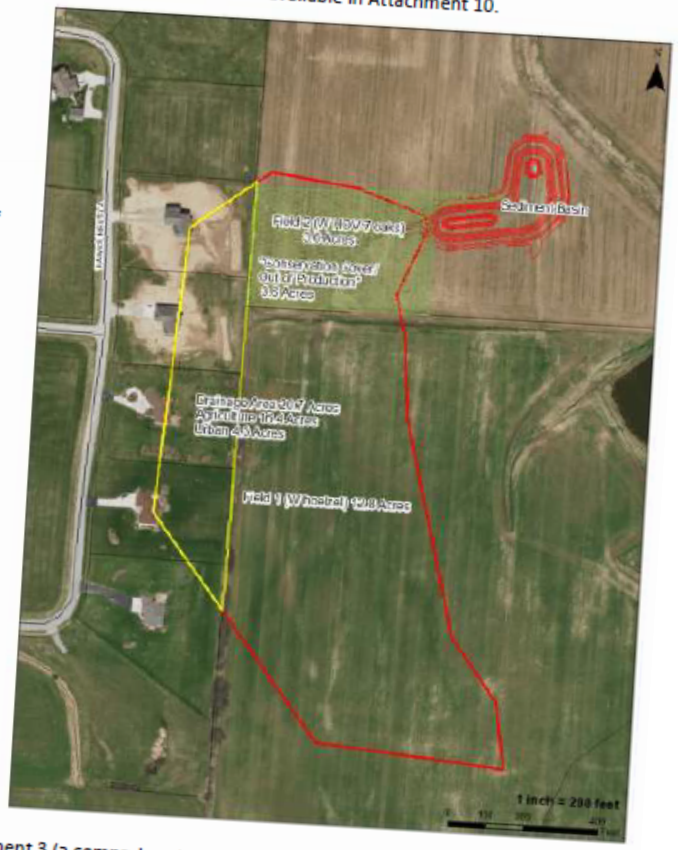
5. Method for Reducing Nonpoint Source Loading

1. Methods used to Generate Load Reductions
2. History of Project Site

5.2. HISTORY OF PROJECT SITE

The Sediment Basin site as well as the fields draining into the site, which include the field that will have conservation cover established (See figure 2 below) have been in agricultural production. The past three years (2015-2017) of agricultural activity have been modeled in SnapPlus to determine historical soil loss and are available in Attachment 10.

Figure 2: Map identifying location of credit generating practices; depicting total drainage area, location of fields and associated acreage of fields draining into Sediment Basin.



As identified in Attachment 3 (a comprehensive list of HOV owned parcels), HOV owns approximately 250 acres of agricultural land in the Town of Buchanan within the Plum Creek Watershed. HOV is currently working to ensure all of the 250 acres including the acres generating credits for this trade are in compliance with NR 151 agricultural performance standards and applicable regulations. The land currently meets all 151 requirements except the nutrient management plan requirement. A letter of non-compliance has been issued by Outagamie County Land Conservation Department (Attachment 4). An updated letter of compliance will be added as an addendum to this plan by April 1, 2018 when HOV will have all fields under nutrient management. The upstream field that is not owned by HOV but drains to

5. Method for Reducing Nonpoint Source Loading

1. Methods used to Generate Load Reductions
2. History of Project Site
3. Model Used to Derive Load Reductions
   - Step 1 - Used SnapPlus to model soil loss prior to practice installation
   - Step 2 - Used SnapPlus to model soil loss after establishment of conservation cover
   - Step 2 - Used engineering design justifications to quantify soil loss leaving sediment basin.
   - Step 3 – Difference from step 1 to step 2 is lbs stopped from leaving the field

SnapPlus Annual Soil Loss Report

Reported For	HOV treatment wetland sites
Printed	2017-10-26
Plan Completion/Update Date	2001-01-01
SnapPlus Version 16.3 built on 2016-10-31	
D:\HOV\HOV treatment wetland sites.snapDb	

Prepared for:
HOV treatment wetland sites
attn:HOV treatment wetland sites

Field	Soil Series & Symbol (critical)	Slope	Slope Len	Contour/ Filters	Rotation	Tillage	Field "T" t/ac/yr	Rot Avg Soil Loss t/ac/yr	Rot Avg Sed Del t/ac/yr *	Annual Soil Loss t					
										2014	2015	2016	2017	2018	20
W hoelzel	KEWAUNEE KhB	3	1200	No / No	Csl-As-A-A-A-A-Csl-Csl	FCND-FCND-None-None-None-None-NT-FCND	3	2.4		6.9	3.9	1.3	0.9	0.6	0.3
W HOV (7 oaks)	KEWAUNEE KhB	5	275	No / No	As-A-A-A+cv-Csl-[Rwf-Cs30]-[Rwf-Cs30]-[Rwf-Cs30]	FCND-None-None-None/NTcvr-NT-Fcult-NT-NT	3	3.0		5.5	1.8	1.3	0.9	1.5	4.7

* This column shows estimated sediment delivery through a designed field edge grass filter area when that field management option is select

Crop Abbreviations

Abbreviation	Crop
[Rwf-Cs30]	Winter Rye (forage) to Corn silage, 30 inch row
A	Alfalfa
A+cv	Alfalfa to small grain cover crop
As	Alfalfa Seeding Spring

Tillage Abbreviations

Abbreviation	Tillage
FCND	Fall Chisel, no disk
Fcult	Field Cultivation
None	None
None/NTcvr	Cover crop no till

**Modeling Limitations for TSS*

Not all soil loss from the field is delivered to the stream. WDNR has determined that for this plan we shall assume that 10% of the soil loss is delivered and can be counted as potentially tradable TSS.

5. Method for Reducing Nonpoint Source Loading

1. Methods used to Generate Load Reductions
2. History of Project Site
3. Model Used to Derive Load Reductions
4. Credit Threshold and Method for Derivation
   - Interim Credits
   - Long Term Credits

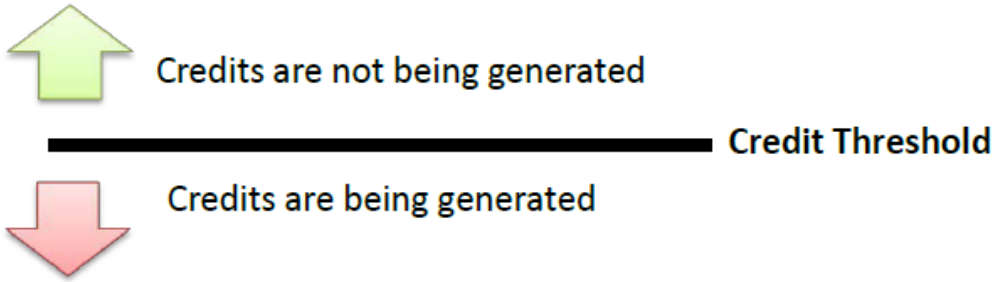
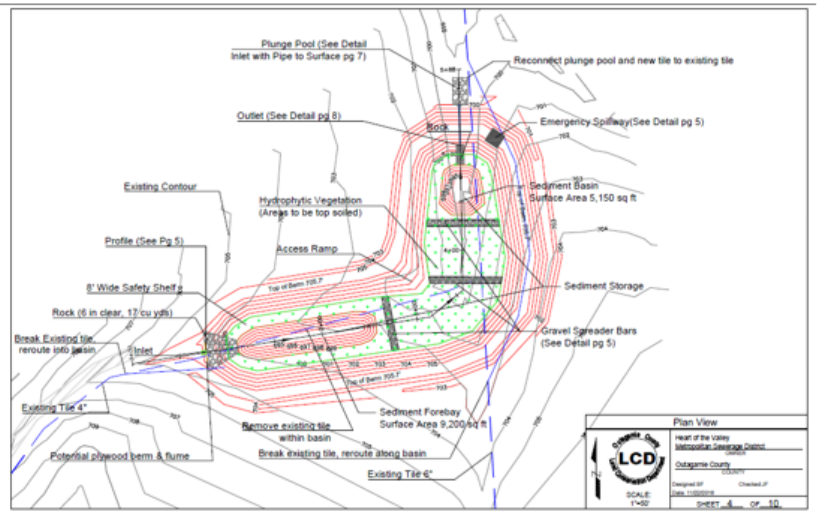


Image from WDNR WQT Guidance

5. Method for Reducing Nonpoint Source Loading

1. Methods used to Generate Load Reductions
2. History of Project Site
3. Model Used to Derive Load Reductions
4. Credit Threshold and Method for Derivation
5. Establishment

Figure 3: The Plan View of the Sediment Basin is a part of the overall Design/ Construction Plan found in Attachment 6.



The Establishment Plan for the Conservation Cover (Attachment 9) describes in detail how the 3.6 acres of land, formerly used to grow agricultural crops was taken out of production and planted with a seed mix that includes Smooth Bromegrass, Timothy Grass and Red Clover. The seeding plan was developed using the NRCS Wisconsin Seed Mix Calculator. A minimum plant density of 4-5 plants/ft^2 as set in the NRCS 327 Conservation Cover Technical Standard (Attachment 8) will be used as the threshold to determine stand adequacy.

5. Method for Reducing Nonpoint Source Loading

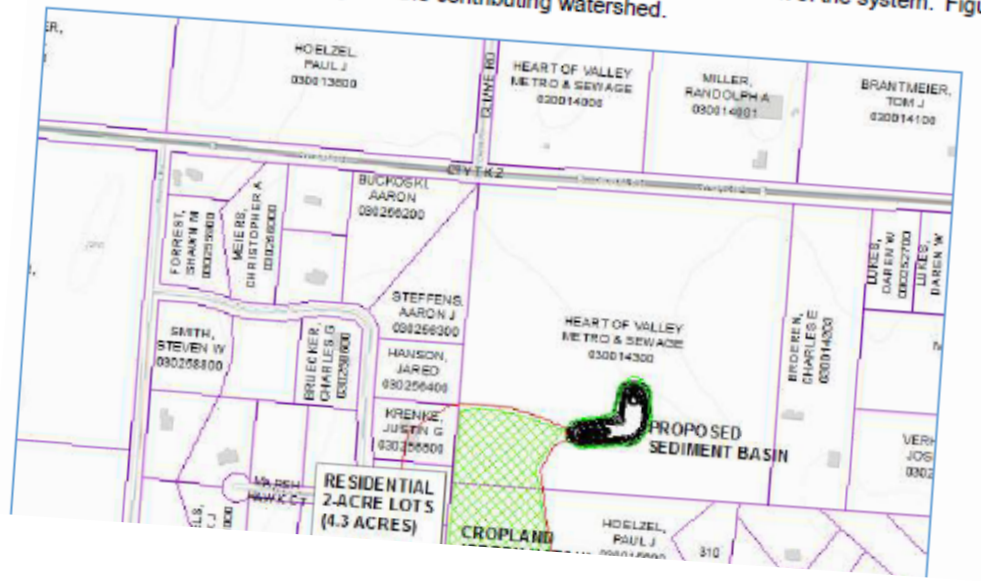
1. Methods used to Generate Load Reductions
2. History of Project Site
3. Model Used to Derive Load Reductions
4. Credit Threshold and Method for Derivation
5. Establishment
6. Operation & Maintenance

Operation and Maintenance Plan
for
Sediment Basin Enhanced with Wetland Vegetation

Owner: Heart of the Valley Metropolitan Sewerage District
Date: 11/28/16
WrittenBy: Jeremy Freund, P.E.
Title: Environmental Engineer
Project Location: Parcel ID # 030014300; NW 1/4 of NE 1/4 of Section 28, Outagamie C

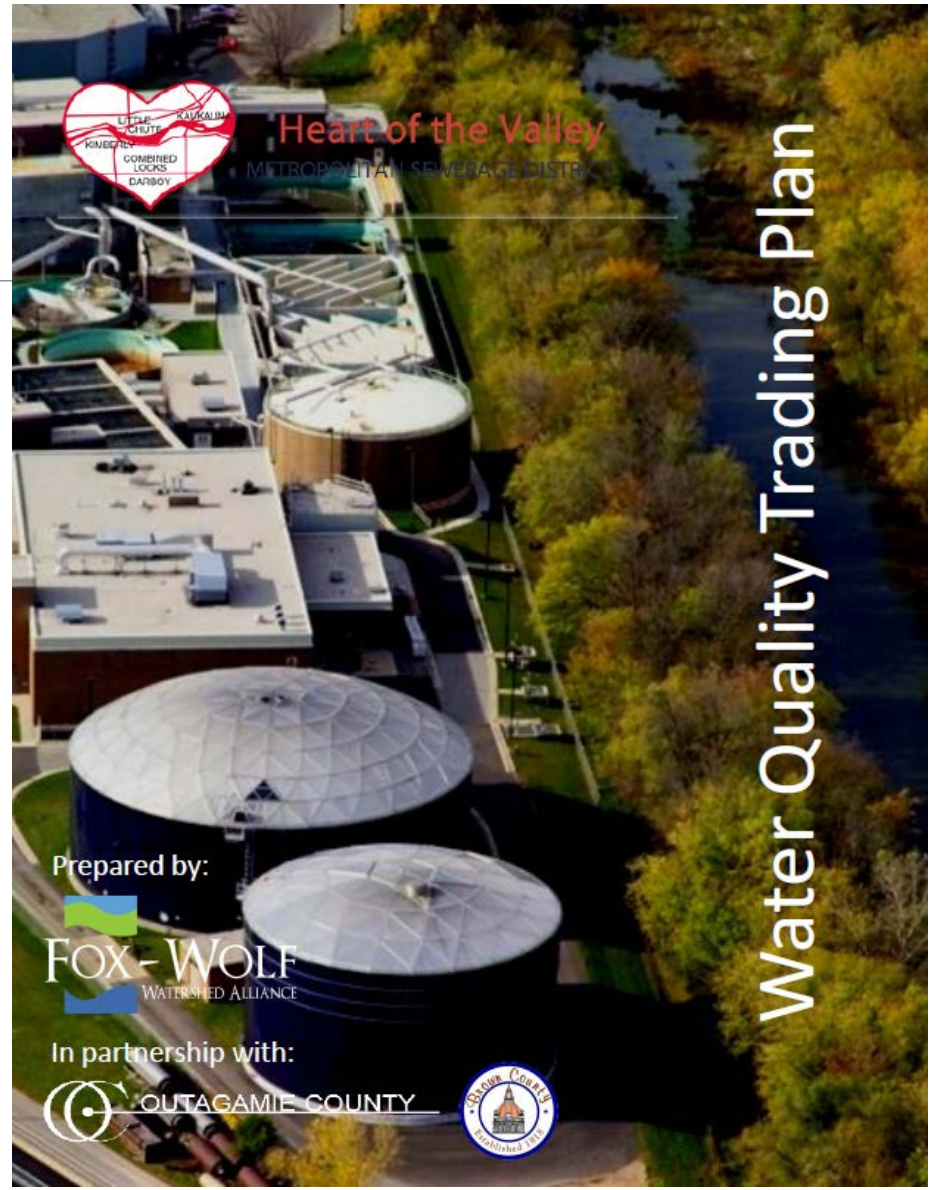
Introduction

The purpose of this plan is to provide an Operation and Maintenance Plan (Plan) for the proposed Sed Basin Enhanced with Wetland Vegetation (Basin) constructed by the Heart of the Valley Metrop Sewerage District (HOVMSD). The Basin was designed to meet the NRCS Technical Standard Sediment Basin, however, the Basin has been enhanced with an area dedicated to shallow water po for the establishment of wetland vegetation to maximize the dissolved phosphorus removal capabilit the Basin. This plan details the measures taken once the Basin has been constructed and certified. to the Water Quality Trading Plan for details relating to the intended function of the system. Figure 1 sh the location of the Basin along with the contributing watershed.



Components of a Water Quality Trading Plan

1. Executive Summary
2. General Information
3. Background
4. Description and Location of Site where Credits will be Generated
5. Methods for Reducing Nonpoint Source Loading
6. Derivation of Water Quality Trading Credits



Derivation o
Quality Tradi

1. Individual Trade Ratio Fac
   - Determine Potentially Tr
   - Apply Trade Ratio

Sediment Basin

Trade Ratio = Delivery + Downstrea

2:1 = 0 + 0

6. Derivation of Water Quality Trading

Management Practice	Uncertainty Factor[1]	Applicable Technical Standard	Method for Calculating Pollutant Load Reductions	Notes
Agricultural Practices				
Whole Field Management: Requires an approved nutrient management plan, filter strips/buffer strips, grassed waterways, conservation or no till, and cover crops. Additional practices as deemed by NRCS or County Conservationist may be required to protect against mobilization and delivery of pollutants.	1	NRCS 590, 393, 332, 412, 345 329, 340 and 330	SNAP-Plus or equivalent model results compared to baseline	Requires an approved NRCS 590 nutrient management plan (NMP) that meets both the soil test-P and PI requirements. Requires a draw down strategy for nutrient concentrations that are above University of Wisconsin-Extension soil fertility recommendations. No application of manure, biosolids, or industrial wastes on snow covered or frozen ground or on fields with high groundwater or tile drainage. A crop or livestock producer engaged in a trade agreement must have all fields under an approved NMP, not just fields engaged in the trade.
Companion Crops (perennial vegetation)	1	NRCS 340	SNAP-Plus or equivalent model results compared to baseline Model as perennial cover	Companion crops must be established to provide continuous protection to soil surface and placed in support of Nutrient Management and supporting practices outlined below.
Conservation Easement	1	NRCS 327	SNAP-Plus or equivalent model results compared to baseline	Land in perennial vegetation.
Sediment Control Basin	2	NRCS 350	RUSLE2	For agricultural runoff control.

Conservation Cover

Trade Ratio = Delivery + Downstream + Equivalency + Uncertainty - Habitat Adjustment

1.2:1 = 0 + 0 + 0 + 1 + 0

Delivery Factor

According to the WDNR Water Quality Trading Guidance "2.11.1 Delivery Factor – When TMDLs do not include fate and transport, pollutant loads are assumed to move through the system in a conservative fashion with no losses due to settling of other processes. This results in downstream allocations being lower with an implicit margin of safety because there are no pollutant losses assumed to have occurred in the system." The Lower Fox River/ Lower Green Bay TMDL does not have fate and transport factors. Therefore, there is no delivery factor that needs to be accounted for in the trade ratio calculation.

Example of year when credit generating thresholds are not met

Year 2022

Field 1 (W hoelzel)				
12.8 Acre Field				
Credits being generated from Conventional Farming with drainage entering a Sediment Basin enhanced with Wetland Vegetation				
	Trade Ratio:	2:1	Sediment Control Basin (further justification in plan)	
Annual Soil Loss				
Conventional Farming	7.048	tns/ac/yr	14096	lbs/ac/yr
10% Delivery Factor	0.7048	tns/ac/yr	1409.6	lbs/ac/yr
80% Reduction				
(captured in Sediment Basin)	0.56384	tns/ac/yr	1127.68	lbs/ac/yr
Sediment loss after practice	0.14096	tns/ac/yr	281.92	lbs/ac/yr
Plum Creek TMDL Threshold	**0.024**	**tns/ac/yr**	**48**	**lbs/ac/yr**
Does loss after practice meet TMDL Threshold	**No**			
Reductions do not qualify to generate credits because TMDL threshold is not met (per guidance				
Total sediment delivery reduced from practice = (annual soil loss conventional farming with 10% delivery factor - Sediment loss after practice)				
	0.56384	tns/ac/yr	1127.68	lbs/ac/yr
Total Reductions (*12.8 acres)	7.217152	tns/yr	14434.3	lbs/yr
	Trade Ratio 2:1		**0 credits**	
HOV can utilize interim credits for five years (from 2018 - 2022)				
Field 1 - 2022 TSS Credits	**0 credits**			

Field 2 (W HOV - 7 oaks)				
3.6 Acre Field				
Credits generated from going from Conventional Farming to Permanent Vegetative Cover consistent with NRCS Standard 327				
	Trade Ratio:	1.2:1	Minimum Point to Nonpoint Trade Ratio (further justification in plan)	
Annual Soil Loss				
Conventional Farming	3.834	tns/ac/yr	7668	lbs/ac/yr
10% Delivery Factor	0.3834	tns/ac/yr	766.8	lbs/ac/yr
Annual Soil Loss grasslands	0.004	tns/ac/yr	8	lbs/ac/yr
10% Delivery Factor	0.0004	tns/ac/yr	0.8	lbs/ac/yr
Plum Creek TMDL Threshold	**0.024**	**tns/ac/yr**	**48**	**lbs/ac/yr**
Does loss after practice meet TMDL Threshold	**Yes**			
All reductions qualify as interim credits.				
Sediment delivery reduced from practice = (annual soil loss conventional farming with 10% delivery factor - annual soil loss grasslands with 10% delivery factor)				
	0.383	tns/ac/yr	766	lbs/ac/yr
Total Reductions (*3.6 acres)	1.3788	tns/yr	2757.6	lbs/yr
	Trade Ratio 1.2:1		**2298 credits**	
HOV can utilize interim credits for five years (from 2018 - 2022)				
Field 2 - 2022 TSS Credits	**2298 credits**			

Total 2022 TSS Credits available: 2298

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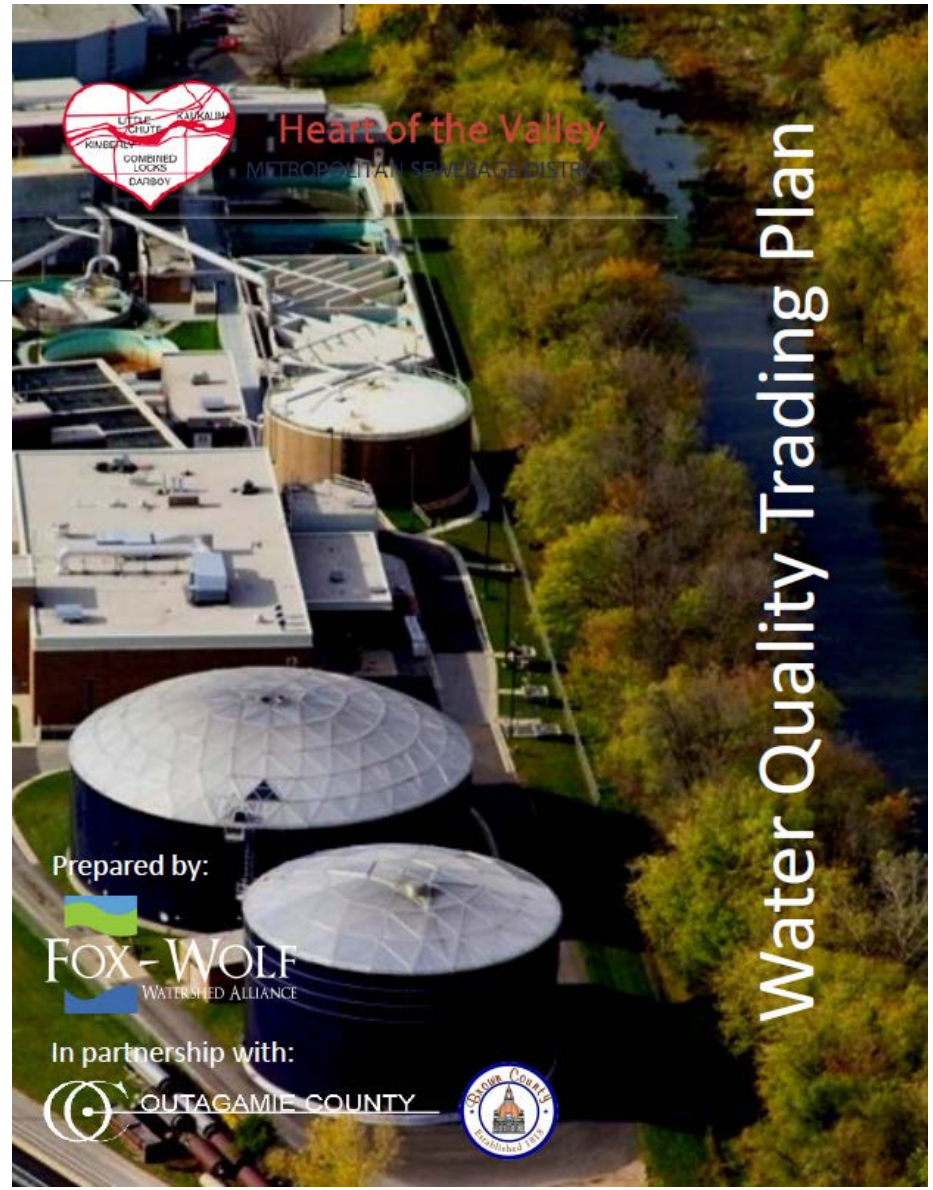
7. Trade Timeline



7. Trade Timeline

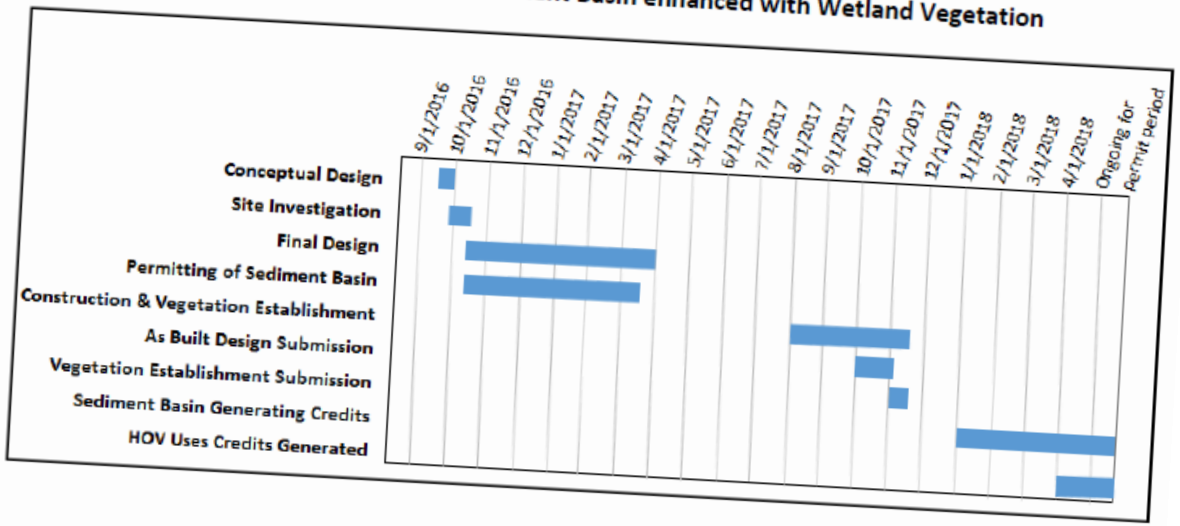
1. Timing of Trade Agreement, Management Practice Installation and Credit Generation

7. Trade Timeline

7.1. Timing of Trade Agreement, Management Practice Installation and Credit Generation

Schedule for Installation of Sediment Basin enhanced with Wetland Vegetation for Total Suspended Solids Credit Generation for TSS compliance can be seen in figure 5 below.

Figure 5: Schedule for Installation of Sediment Basin enhanced with Wetland Vegetation



HOV anticipates credits to be ready to use beginning 4/1/2018. Determination of credit availability will be made by WDNR. Interim credits will expire 3/28/2022. Long term credits continue pending operation and maintenance of practice is followed as outlined in this WQT Plan and practices is still generating credits based on upland land use.

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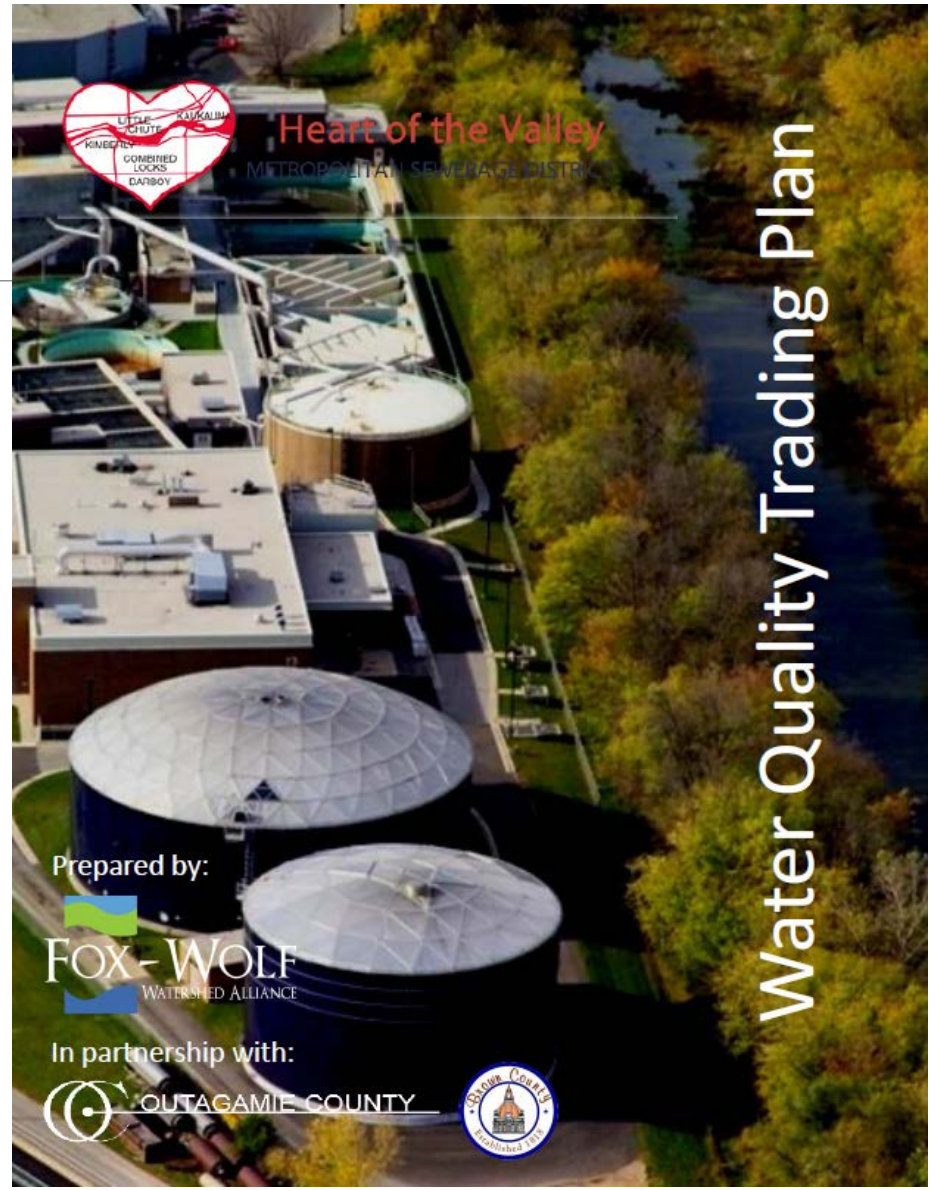
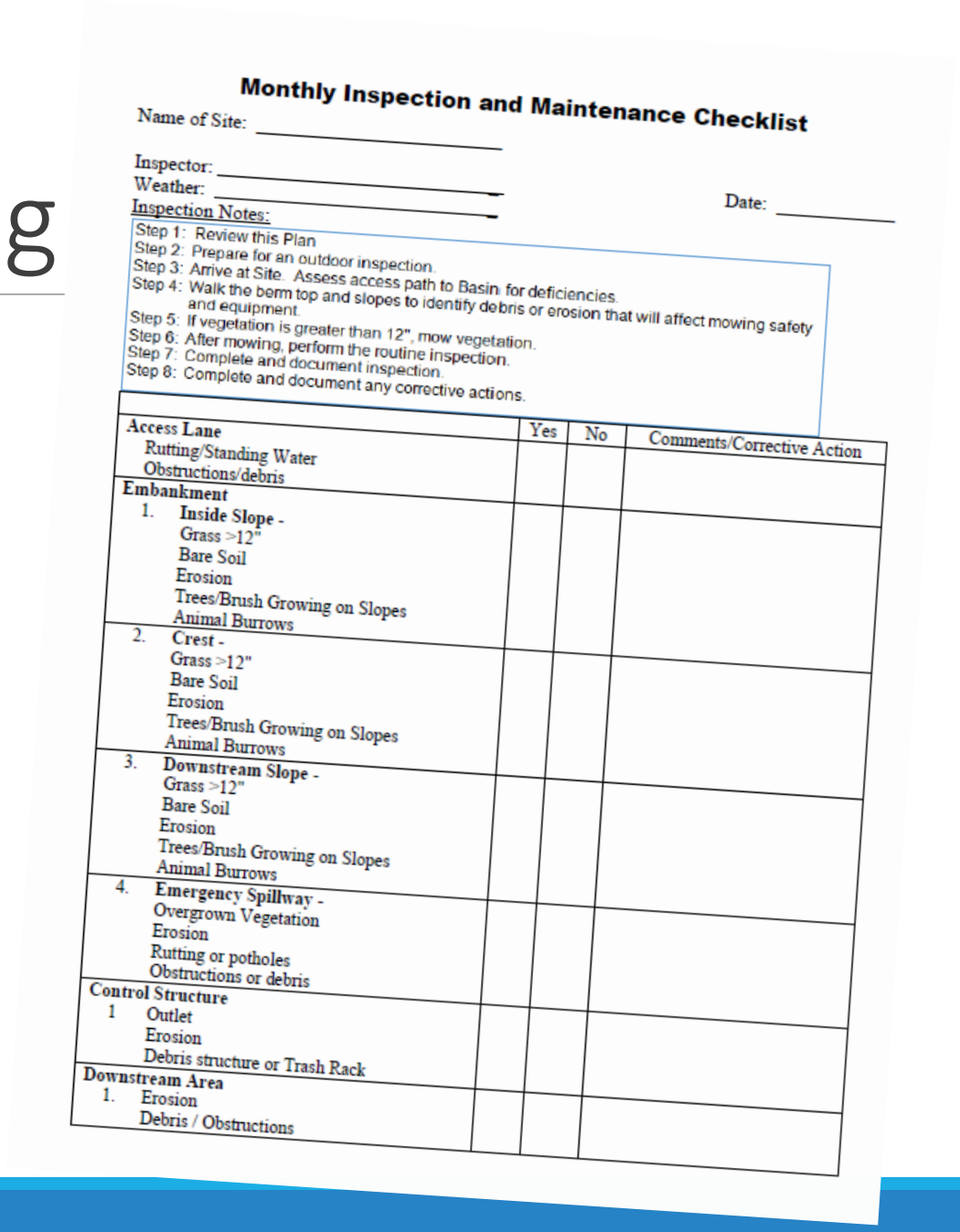
8. Inspections and Reporting



8. Inspections & Reporting

1. Tracking Procedures
2. Inspection
3. Management Practice Registration Form
4. Annual Water Quality Trading Report Submittal
5. Monthly Certification of Management Practices
6. Notification of Failure to Generate Credits
7. Conditions under which Management Practices May be Inspected



Monthly Inspection and Maintenance Checklist

Name of Site: _____

Inspector: _____

Weather: _____ Date: _____

Inspection Notes:

Step 1: Review this Plan
Step 2: Prepare for an outdoor inspection.
Step 3: Arrive at Site. Assess access path to Basin for deficiencies.
Step 4: Walk the berm top and slopes to identify debris or erosion that will affect mowing safety and equipment.
Step 5: If vegetation is greater than 12", mow vegetation.
Step 6: After mowing, perform the routine inspection.
Step 7: Complete and document inspection.
Step 8: Complete and document any corrective actions.

	Yes	No	Comments/Corrective Action
Access Lane Rutting/Standing Water Obstructions/debris			
Embankment 1. **Inside Slope -** Grass >12" Bare Soil Erosion Trees/Brush Growing on Slopes Animal Burrows			
2. **Crest -** Grass >12" Bare Soil Erosion Trees/Brush Growing on Slopes Animal Burrows			
3. **Downstream Slope -** Grass >12" Bare Soil Erosion Trees/Brush Growing on Slopes Animal Burrows			
4. **Emergency Spillway -** Overgrown Vegetation Erosion Rutting or potholes Obstructions or debris			
Control Structure 1 Outlet Erosion Debris structure or Trash Rack			
Downstream Area 1. Erosion Debris / Obstructions			

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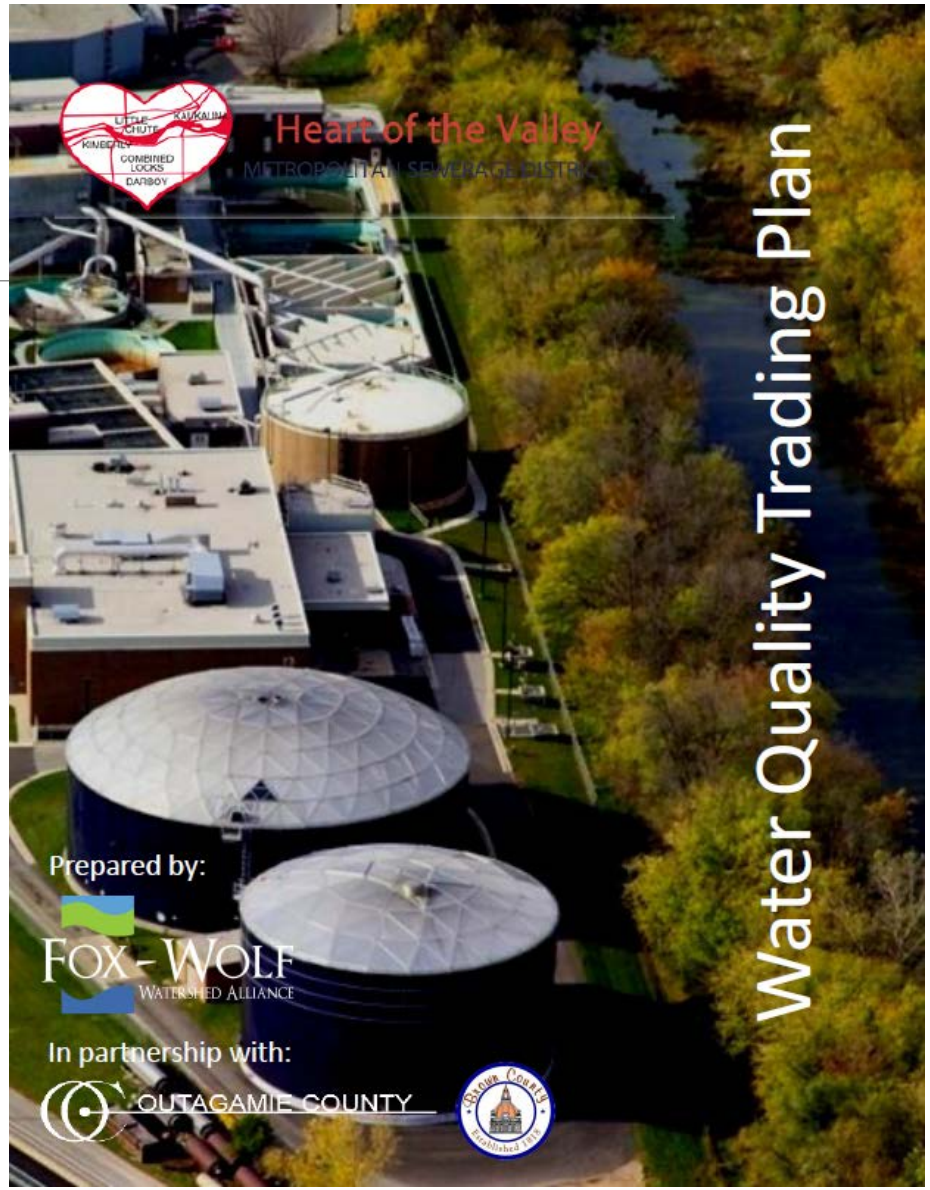
9. Certification



9. Certification

1. Verification of Trade Agreement

9. Certification

9.1. Verification of Trade Agreement

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

Heart of the Valley Metropolitan Sewerage District

By: Brian Helminger

Brian Helminger
District Director
Heart of the Valley Metropolitan Sewerage District
801 Thilmany Road
Kaukauna, WI 54130
Telephone: (920)766-5731
Email: brian.helminger@hvmsd.org

Questions?

JESSICA SCHULTZ
FOX-WOLF WATERSHED ALLIANCE
JESSICA@FWWA.ORG
(920)858-4246