WATER QUALITY TRADING PLAN

VILLAGE OF SLINGER
WASHINGTON COUNTY, WISCONSIN
DECEMBER 2019

RUEKERT/MIELKE
W233 N2080 Ridgeview Parkway
Waukesha, Wisconsin 53188-1020

TABLE OF CONTENTS

WATER QUALITY TRADING PLAN

INTRODUCTION

The Village of Slinger Wastewater Treatment Facility (WWTF) received its renewed Wisconsin Pollutant Discharge Elimination System (WPDES) permit in July of 2014. The permit contains an ultimate effluent total phosphorus (TP) water quality-based effluent limit (WQBEL) of 0.075 mg/L with an annual averaging period. This reduced phosphorus limit stems from the changes to Wisconsin Administrative Code (WAC) Chapters NR 217 and 102, more commonly referred to as the "Phosphorus Rule". This rule was passed on December 1, 2010. Changes to WAC Chapter 102 establish water quality standards for various surface waters in or adjacent to Wisconsin. WAC NR 217 specifically outlines requirements for wastewater treatment facilities.

The 0.075 mg/L limit is significantly lower than the technology-based monthly limit of 1.0 mg/L that had been in place in previous permits. The Village will have to comply with the ultimate limit by June 30, 2021. To assist the Village with this effort, the permit contains a compliance schedule with various steps the Village must take towards meeting the ultimate phosphorus limit.
Slinger has already completed the first three steps of its phosphorus compliance schedule. These were the Operation Evaluation Report (due June 30, 2015), the Compliance Alternatives, Source Reduction, Improvements, and Modification Status Report (due June 30, 2016), and the Preliminary Compliance Alternatives Plan (due June 30, 2017).

As a result of the analysis conducted in these compliance reports, the Village formulated options for a final compliance strategy. The main component of the compliance strategy is chemical optimization and biological phosphorus removal at the WWTF. Water Quality Trading (WQT) was considered as an option to supplement chemical optimization if it wasn't adequate to meet the WQBEL. Finally, an upgrade to the Slinger WWTF was considered as a tertiary option.

With WQT, point source reductions or specific practices to reduce runoff from nonpoint sources are implemented and modeled with a site-specific model such as SNAP PLUS or the NRCS Streambank Erosion Estimator. The pollutant reductions are then applied to the municipal WPDES permit. The credits from WQT allow a higher (less stringent) effluent phosphorus level from the WWTF. These credits could be valuable in helping Slinger achieve the last required portion of phosphorus removal or used as "insurance" for the Village to mitigate the situation where there is a plant upset and higher levels of phosphorus are temporarily discharged. Since the Preliminary Compliance Alternatives Evaluation report was issued in June of 2017, the Village narrowed in on two potential WQT scenarios. These were trading with the City of Hartford Water Pollution Control Facility in a point-to-point trade and using the pounds of reductions from a streambank stabilization program.

For the Final Compliance Alternatives Plan, the WDNR allowed the Village some flexibility in determining their final compliance strategy. The plan was submitted in August of 2018, and it concluded that the Village would meet the WQBEL using chemical optimization and biological phosphorus removal. It also concluded that if after additional chemical testing over the fall and winter months of 2018-2019 did not show consistent effluent TP levels below the WQBEL, WQT would be used to supplement the Village's compliance strategy. Typically, to use WQT, a trading plan is required to be submitted to the WDNR six months before permit reissuance. In this case, the submittal of a WQT plan was delayed with approval of WDNR staff. The goal of the present report is to present the WDNR with a draft of the Village's Water Quality Trading Plan for review.

Update on Optimization Activities and Pollutant Offset Needed

Figure 1 below summarizes effluent TP calculations at the Slinger WWTF for the past two years. This time period is a good representation of the Village's chemical and biological optimization efforts at the WWTF as continuous chemical dosing started in the middle of April 2017. In the calendar year 2018, the average effluent TP concentration was 0.083 mg/L. From May of 2018 through April of 2019, the average

effluent TP concentration was 0.090 mg/L. Over the period shown in Figure 1, the average effluent TP concentration was also 0.090 mg/L. Based on these results, the Village has determined that WQT is needed to supplement chemical optimization at the WWTF in order to meet the WQBEL.

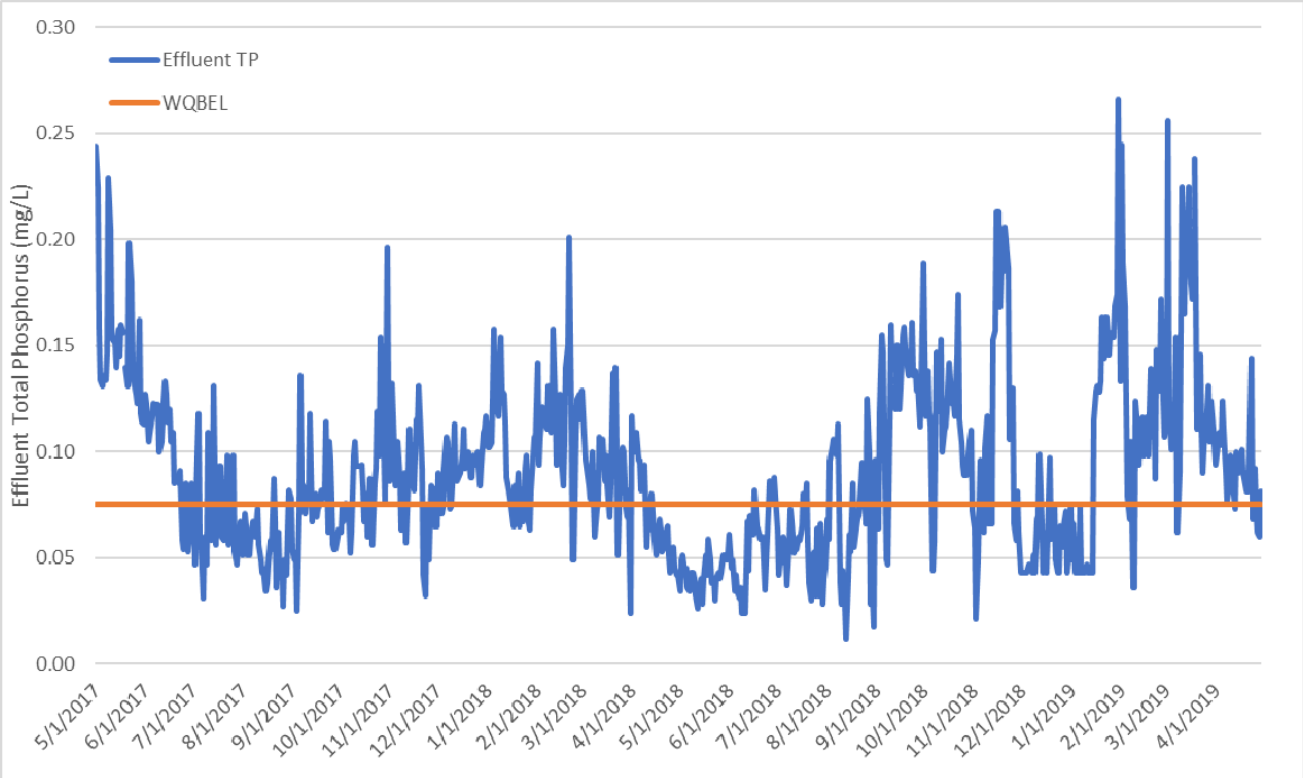


Figure 1. Effluent TP Concentration at the Slinger WWTF from May 2017 through April 2019

In order to quantify the offset need to comply with the Village's WQBEL, the following assumptions were used:

- The current average TP discharge was assumed to be 0.095 mg/L. This assumed value is conservative given the fairly stable average annual effluent TP values discussed previously. In addition, some of the recent elevated phosphorus levels in the effluent can be attributed to repairs to one of the WWTF's final clarifiers and other locations at the facility. The Village is confident that they can maintain an annual average TP concentration below 0.095 mg/L in the future.
- The WWTF's average discharge flow rate was assumed to be 1.0 MGD. The actual average discharge flow rate is approximately 0.81 MGD, but some future growth was assumed as a safety factor.
- The trade ratio was assumed to be 2.4 per discussions with WDNR staff. This value is being used as a planning number, but ongoing discussions are being held to determine the final value of the trade ratio. Further discussion in this regard is included in the following sections of the report.

The TP offset was then calculated as follows:

(0.095 mg/L-0.075 mg/L) x 1.0 MGD x 8.34 x 2.4 x 365 days/year = **146 lbs./year**

STREAMBANK STABILIZATION SITE ANALYSIS

In anticipating that the Village may need additional phosphorus credits to meet the WQBEL, Slinger conducted a survey of nonpoint sources of TP in their HUC-12. The results of this survey was communicated in a number of past reports submitted as a part of the Village's compliance schedule. Village staff determined that they would prefer not to work with agricultural partners, instead electing to focus on municipal nonpoint sources and point to point trades within their HUC-12. The Village discussed a point to point trade with the City of Hartford treatment facility, determining that the up to 42.6 lbs./year could be traded directly, effectively increasing the Village's limit to 0.092 mg/L. However, the City expressed some caution in this approach as it would lower their limit in turn. For this reason, the Village explored other trading options, namely streambank stabilization, within the limits of the Village of Slinger and the City of Hartford.

A preliminary survey of streambanks in the area showed that there were several areas in the City of Hartford that could benefit from conservation measures. A preliminary analysis of three of these sites was conducted using the NRCS Streambank Erosion Estimator tool. The results of the analysis showed that one specific section of the Rubicon River adjacent to the City of Hartford DPW showed a potential for significant credit generation. The Village focused their efforts at this site as the primary credit generator for their compliance efforts. An exhibit of the site is include in Appendix A for reference.

The selected site is a section of the Rubicon River in the City of Hartford, approximately 7.0 stream miles downstream of the Slinger WWTF. The site is in the same HUC-12 as the Slinger WWTF (Headwaters Rubicon River – 070900010302). Figure 2 shows the location of the credit user and credit generator within the Headwaters Rubicon River HUC-12. There is a SWIMS Station immediate downstream of the site (ID 673239) which contains minimal data from a statewide sediment analysis conducted in 1995-1996. The Rubicon River is impaired for phosphorus in this location. There are no mapped wetlands on the site, but there are wetland indicators adjacent to the river. The DPW facility south of the river used to be the location of the Hartford wastewater treatment facility before it moved further west, so the 10.77 acres of industrial land adjacent to the river is owned by the City of Hartford. During the most extreme weather events, water level has reportedly rise to the bottom of the bridges on either end of the site limits.

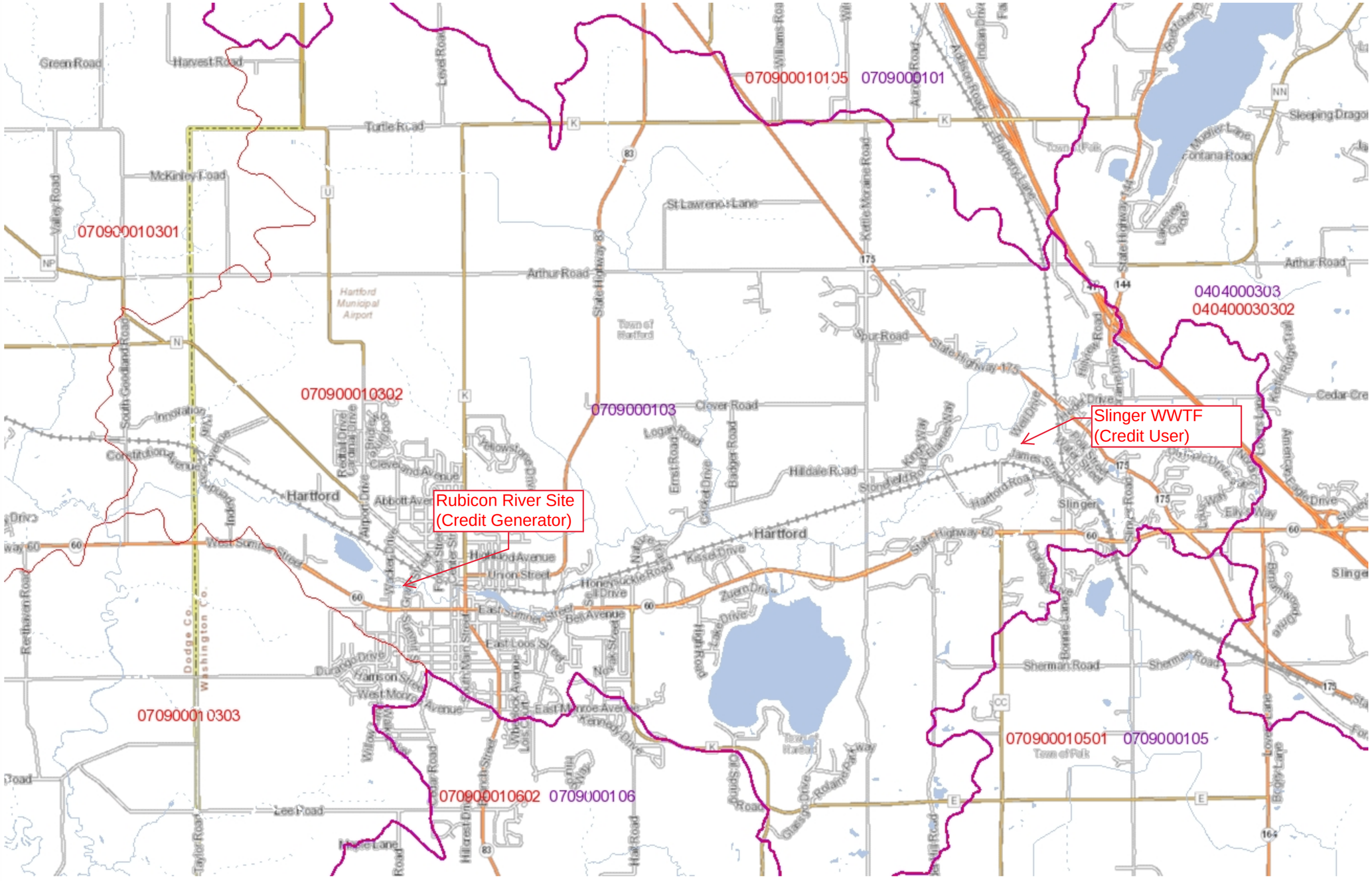
The Village of Slinger received comments from WDNR staff on the preliminary site analysis, and it was determined that an additional site survey was necessary to get a more accurate picture of the potential credits available at the site. The following discussion details the efforts to quantify the credits available at the Harford DPW Site.

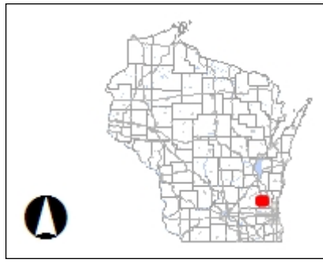
The WDNR requested a comprehensive soil analysis of the site. The total length of the north and south banks of the Rubicon River between N. Wacker Dr. and Grant St. was measured to be 875 ft. In order to meet soil sampling guidance published by UW-Extension, the surveyor collected composite samples for 215-220 ft. sections of the streambank. These sections were labeled as "SB1", "SB2", etc. as shown in Appendix A in order to reflect their relative location along the north or south bank. 6-inch core samples were taken every 20 ft., giving a total of 11 sub-samples per composite. In addition, the surveyor followed the recommended W-shaped sampling pattern in collecting core samples, alternating sampling locations along the height of the bank. The results of the soil analyses are included in Appendix B.

At each of the core sampling locations, the height of the bank was also measured in order to give an average streambank height measurement for each streambank section. The results of the streambank height measurements, including the average height, are shown below in Table 1. For clarification, there is typically a differentiation made between the terms "bank height" and "eroding bank". In this application, the streambank height measurements were made from the approximate normal water level to the crest of the bank. Based on conversations with staff of the City of Hartford, the water level reaches this crest during significant rain events, so the entire measured height was assumed to be a potential "eroding bank". For this reason, these two terms are used interchangeably for the remainder of the report.

In order to be conservative, the bank height measurements for the southern bank were divided in half to give a reduced eroding bank height that accounts for established grassy vegetation on that bank. This

Figure 2 - Headwaters Rubicon River (070900010302)





Legend

- Intermittent Streams
- 24K Hydrography Streams and Rivers
- 24K Hydrography Lakes and Open Water
- 12-digit HUCs (Subwatersheds)
- 10-digit HUCs (Watersheds)
- 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

1.5 0 0.75 1.5 Miles

1:47,520

NAD_1983_HARN_Wisconsin_TM

Notes

assumption was not made for the northern bank as much of the ground on this bank was bare and there were significantly more visual signs of erosion.

Table 1. Streambank Height Measurements Taken by Section during Site Survey

SB1	SB2	SB3	SB4	NB1	NB2	NB3	NB4
10	10.5	14	15	16	13	11	15.5
10	10	17	14.5	11	12	12.5	15
9	9.5	14	14	12	14	13	16
10	11	15	12	12	15	13	14.5
10	12	15.5	15	14	13	12	15
12	15	16.5	13	13	14	11.5	15.5
10.5	15	20	11	13	15	12	16
9	16	17	10.5	13	14	11	17
8	16	13.5	11	15	12	13	18
8	14	18	14	16	11	14	19.5
8.5	13.5	16	15	13.5	13.5	14	20
9.5	13.0	16.0	13.2	13.5	13.3	12.5	16.5

SSURGO soil maps from the Web Soil Survey were used to determine the predominant soil type at the site. Appendix C includes a soil map of the site, showing that the predominant soil type along the Rubicon River is Pella silt loam.

The following sections include pictures and a summary of notes and observations taken for each of the streambank sections included in the analysis. In addition, discussion of the assumptions made to populate the NRCS Streambank Erosion Estimator are included.

South Bank 1 and North Bank 1

South Bank (SB) 1 and North Bank (NB) 1 are the 220 ft. sections directly west of Grant St. The average streambank height of SB1 is 9.5 ft., and the average streambank height of NB1 is 13.5 ft. The soil TP concentration is 680 ppm and 720 ppm for SB1 and NB1, respectively. Figures 3-5 show various perspectives of the north and south bank for reference. There are three active storm water outlets in this section of the river which contribute storm water flows directly to the Rubicon River. Based on the location of these outlets, no direct scouring of the streambank was assumed to occur as a result of storm water flows.
The southern bank is vegetated but has a fairly steep slope down to the water level. Through the vegetated cover there were signs of soil loss throughout the measured streambank height, but the erodible bank height was divided by two to account for the stabilization provided by the existing vegetation. The lateral recession rate was estimated to be 0.05 ft./year per guidance included in the NRCS Streambank Erosion Estimator. The recession rate was determined to be “slight” due to some patches of bare bank, some rills, but no vegetative overhang or exposed tree roots.

The northern bank is covered with trees and brush but the soil is predominantly bare. There are exposed tree roots and other visual signs of erosion. For this reason, the entire average bank height was considered erodible, and the lateral recession rate was assumed to be 0.20 ft./year, or “moderate”.

Figure 3. SB1/NB1 Streambank Image 1

Figure 4. SB1/NB1 Streambank Image 2

Figure 5. SB1/NB1 Streambank Image 3

South Bank 2 and North Bank 2

South Bank 2 and North Bank 2 are the 220 ft. sections adjacent to businesses that exist north of the site, west of SB1 and NB1. The average streambank height of SB2 is 13.0 ft., and the average streambank height of NB2 is 13.3 ft. The soil TP concentration is 590 ppm and 540 ppm for SB2 and NB2, respectively. Figures 6-8 show various perspectives of the north and south bank for reference.

The southern bank is similarly vegetated to SB1 but has a gentler slope to the water level. Through the vegetated cover, there were still signs of soil loss, so the erodible bank height was again divided by two to account for the stabilization provided by the existing vegetation. The lateral recession rate was estimated to be 0.05 ft./year.

The northern bank has longer sections without trees and brush and the soil is predominantly bare. The erosion in this section was observed to be greater than NB1, with exposed tree roots, trees falling into the river, and notable signs of erosion. Again, the entire average bank height was considered erodible, and the lateral recession rate was assumed to be 0.40 ft./year, or “severe”. Erosion in this section is assumed to occur by scouring from the stream during high flows as well as by overland flow, freezing, and thawing across the entire bank. There was gravel from the parking lots of the adjacent businesses in several segments of NB2, showing that plowing and runoff from the adjacent parking lot may be contributing to the deterioration of the streambank. For this reason, measures beyond the stabilization of the section of the streambank may be required to address all causes of erosion for this section of the streambank. These measures may include the City working with the owners of the businesses adjacent to the streambank to alter their methods of snow plowing during winter months to eliminate gravel and soil being pushed towards the stream location. If working with the business owners is not effective, the Village of Slinger may consider adding a barrier along the property line of sections of the streambank most susceptible to receiving gravel and soil from the adjacent parking lot areas.

Figure 6. SB2/NB2 Streambank Image 1

Figure 7. SB2/NB2 Streambank Image 2

Figure 8. SB2/NB2 Streambank Image 3

South Bank 3 and North Bank 3

South Bank 3 and North Bank 3 are the 220 ft. sections adjacent to businesses that exist north of the site, west of SB2 and NB2. The average streambank height of SB3 is 16.0 ft., and the average streambank height of NB3 is 12.5 ft. The soil TP concentration is 320 ppm and 440 ppm for SB3 and NB3, respectively. Figures 9-11 show various perspectives of the north and south bank for reference.

The southern bank is qualitatively similar to SB2. The erodible bank height was again divided by two to account for the stabilization provided by the existing vegetation. The lateral recession rate was estimated to be 0.05 ft./year. The northern bank is also very similar to the adjacent section NB2. The lateral recession rate was again assumed to be 0.40 ft./year, or “severe”, with the entire bank height showing signs of erosion.

In some areas of the southern bank in SB2-SB4 there are concrete slabs and steel road plates resting on the streambank. The City staff commented that these were placed in the early 1990s in order to help stabilize the streambank. These structures will be evaluated in future project planning to determine the best approach.

Figure 9. SB3/NB3 Streambank Image 1

Figure 10. SB3/NB3 Streambank Image 2

Figure 11. SB3/NB3 Streambank Image 3

South Bank 4 and North Bank 4

South Bank 4 and North Bank 4 are the 215 ft. sections directly east of N. Wacker Dr. The average streambank height of SB4 is 13.2 ft., and the average streambank height of NB4 is 16.5 ft. The soil TP concentration is 420 ppm and 610 ppm for SB4 and NB4, respectively. Figures 12-14 show various perspectives of the north and south bank for reference.

The southern bank is similarly vegetated to past sections of the southern bank; however, there is a concentrated area of bare, eroded soil shown below in Figures 12 and 14. The City of Hartford may want to work with the Village during design and construction of streambank stabilization measures to address this specific area of the southern bank. The erodible bank height was again divided by two to account for the stabilization provided by the existing vegetation. The lateral recession rate was increased to 0.1 ft./year to account for the disrupted area of the bank as well as generally steeper slopes to the river location.

The northern bank section east of N. Wacker Dr. had a greater concentration of brush than sections NB2 and NB3. Also, there is a portion of the northern bank that serves as a depositional area in the eastern half NB4. For these reasons, the proposed length of streambank stabilization measures was reduced from 220 ft. to 130 ft per recommendation of WDNR staff. The 130-foot portion that the Village is planning to stabilize is in the northwestern portion of NB4, extending from the bridge southeast to the start of the depositional area. A lateral recession rate of 0.20 ft./year was assumed for this section of the bank as it is qualitatively similar to NB1. An erodible bank height of 12.4 ft. was assumed for the 130-foot portion of the streambank which is 75% of the average measured bank height.

Figure 12. SB4/NB4 Streambank Image 1

Figure 13. SB4/NB4 Streambank Image 2

Figure 14. SB4/NB4 Streambank Image 3

QUANTIFICATION OF CREDITS

Using the information and assumptions from the survey described above, the NRCS Streambank Erosion Estimator was used to quantify credits. The results of the analysis are shown below in Table 2 and Table 3.

Table 2. Estimated Soil Loss per Year

Field Number	*Eroding Streambank Reach Number*	*Eroding Bank Length (Feet)*	*Eroding Bank Height * (Feet)*	*Area of Eroding Streambank (FT^2)*	*Lateral Recession Rate (Estimated) (FT / Year)*	*Estimated Volume (FT^3) Eroded Annually*	*Soil Texture*	*Approximate Pounds of Soil per FT^3*	*Estimated Soil Loss (Tons/Year)*
Rear of DPW Site	SB1	220.0	4.8	1,045	0.05	52.3	Silt Loam	85	2.2
	SB2	220.0	6.5	1,430	0.05	71.5	Silt Loam	85	3.0
	SB3	220.0	8.0	1,760	0.05	88.0	Silt Loam	85	3.7
	SB4	215.0	6.6	1,419	0.10	141.9	Silt Loam	85	6.0
	NB1	220.0	13.5	2,970	0.20	594.0	Silt Loam	85	25.2
	NB2	220.0	13.3	2,926	0.40	1,170.4	Silt Loam	85	49.7
	NB3	220.0	12.5	2,750	0.40	1,100.0	Silt Loam	85	46.8
	NB4	130.0	12.4	1,609	0.20	321.8	Silt Loam	85	13.7
				Total Estimated Annual Streambank Erosion Soil Loss (Tons):					150.4

Table 3. Estimated Phosphorus Loss per Year

Field Number	Eroding Streambank Reach Number	Estimated Soil Loss (Tons/Year)	Estimated Soil Loss (Pounds/Year)	Estimated Soil Loss (Kgs/Year)	Phosphorous Concentration (ppm)	Estimated Phosphorous Loss (Kgs/year)	Estimated Phosphorous Loss (Lbs/year)
Rear of DPW Site	SB1	2.2	4441.25	2019	680	1.4	3.0
	SB2	3.0	6077.5	2763	590	1.6	3.6
	SB3	3.7	7480	3400	620	2.1	4.6
	SB4	6.0	12061.5	5483	420	2.3	5.1
	NB1	25.2	50490	22950	720	16.5	36.4
	NB2	49.7	99484	45220	540	24.4	53.7
	NB3	46.8	93500	42500	440	18.7	41.1
	NB4	13.7	27348.75	12431	610	7.6	16.7
			Total Estimated Annual Phosphorous Loss (Lbs):				164.2

Based on the NRCS Streambank Erosion Estimator, the entire streambank length for both banks yields approximately 164.2 lbs./year in TP loss. However, the north bank shows a greater potential for reducing phosphorus losses to the Rubicon River, totaling 147.9 lbs./year compared to 16.3 lbs./year estimated for the south bank.

TRADE RATIO DISCUSSION

The WQT guidance developed by the WDNR uses trade ratios to ensure that load reductions generated by the implementation of pollutant management measures result in a net water quality improvement at the point of standards application. This ratio takes five factors into account in its calculation:

- Delivery – accounts for the distance between the credit generator and the credit user
- Downstream – accounts for the relative position of the credit generator to the credit user in the watershed
- Equivalency – accounts for different chemical forms of the traded pollutant
- Uncertainty – accounts for modeling inaccuracies when quantifying load reductions
- Habitat Adjustment – accounts for the wildlife habitat benefits of wetland restoration

The trade ratio is then calculated with the following equation:

Trade Ratio = Delivery + Downstream + Equivalency + Uncertainty – Habitat Adjustment : 1

There is no equivalency factor used when trading phosphorus reduction credits, so this factor is negligible in this case. Also, no delivery factor is required for the current project site. All credits generated upstream of the Slinger WWTF receive a downstream factor of 0, while those downstream of the treatment plant receive a downstream factor of 0.1 to 0.8 depending on the difference between the credit user's load and the total load at the credit user's discharge point. It is important to note that downstream credits can only be generated within the same HUC-12 sub-watershed as the credit user. Finally, the uncertainty factor will range from 1 to 4 based on the pollutant management measure implemented by the credit generator. The minimum trade ratio for point to point source trades is 1.1:1, and the minimum trade ratio for point to nonpoint source trades is 1.2:1.

For the proposed streambank project, the two components of the trade ratio calculation are the downstream factor and the uncertainty factor. Based on WQT guidance, the uncertainty factor for streambank stabilization is either 2.0 or 3.0 depending on the inclusion of habitat restoration. The Village plans to partner with an engineering consultant with experience in streambank restoration in order to ensure that habitat restoration is a core consideration of the design and that the uncertainty factor is a maximum of 2.0. The Village plans to fulfill habitat restoration requirements through installing fish habitat structures under the stream habitat general permit. More discussion on habitat restoration is included in the following section.

The downstream factor is calculated by determining the percent difference between the credit user's load (Slinger WWTF) and the total load at the point of the credit user's discharge. Through correspondence with WDNR staff, the Village determined that this percent difference was between 50-75% assuming a level of treatment of 0.12 mg/L TP at the Slinger WWTF. This percent difference corresponds to a downstream factor of 0.4 which was assumed for the purposes of this plan.

Taking these two assumptions together, the total trade ratio applied to the proposed project is 2.4. However, the Village is conducting ongoing discussions with WDNR staff to evaluate the potential of lowering this ratio for the purposes of making their compliance strategy as cost effective as possible.

PRELIMINARY DESIGN AND MAINTENANCE CONSIDERATIONS

The proposed streambank stabilization project is still in conceptual planning stages. For this reason, a complete design of the proposed stabilization measures on the banks of the Rubicon River has not been completed. However, the Village is currently partnering with Ruekert & Mielke, Inc. who has experience in streambank stabilization projects and have discussed conceptual design approaches to stabilization at the current site.

The current aquatic and riparian condition of this segment of the Rubicon River has a degraded stream habitat due to altered hydrologic and thermal regimes coupled with increased sediment and nutrient loading. To help improve the opportunities for better aquatic species diversity (especially macroinvertebrates and fish species), future measures to protect the shoreline, reduce sediment and nutrient inputs, and improve the aquatic habitat will be incorporated into the design phase. If feasible, potential improvements to the deteriorated channel substrate and morphology will be considered to increase the potential for fish and other aquatic species to access connecting, protective wetland and/or riparian areas needed for juvenile life stages. Habitat improvements will help to reverse the beneficial use impairments (BUIs) affecting this stream segment (degraded fish and wildlife populations, degradation of aesthetics, degradation of benthos, and loss of fish and wildlife habitat).

Of the two banks evaluated in the site survey, the Village will focus primary on the north bank which shows a greater need for stabilization work. One of the first goals of the proposed stabilization effort is to conduct a plant survey of the riparian edge of the stream location to determine the extent of invasive species such as reed canary grass or buckthorn. All invasive species will be eradicated and replaced with native plantings as a part of the streambank stabilization design. All existing rocks and natural vegetation along the shoreline would be preserved and utilized for the project.

There are several stabilization techniques being considered for implementation. Some options include brush matting, branch packing, geotextile wrapped soil lifts, and stone toe protection combined with native plantings.

Brush matting (or brush mattresses) involves a combination of live stakes, live fascines, and branch cuttings to cover and stabilization streambanks. An example figure is shown below. A thick mat of dormant cuttings is placed on the bank and held down with stakes. The brush mattress serves as structural reinforcement as well as an area where native plantings can take root and provide vegetative stabilization. For the current project site, this technique would likely be used alongside stone toe protection to a level at or above the ordinary high water level.

In addition to the restoration of riparian vegetation and the reduction of soil erosion, this technique is also able to improve fish habitat by shading the stream, lowering water temperatures, and offering protection from predators. Other means of fish habitat restoration will be accomplished through the arrangement of rip-rap up to the ordinary high water mark and with the installation of intermittent rootwad composites along the streambank. An example rootwad composite detail is shown below. Existing fallen trees and cleared trees along the streambank will be used in the construction of the rootwad composites. The

quantity and location of the fish habitat structures will be finalized during design and permitting of the proposed project.

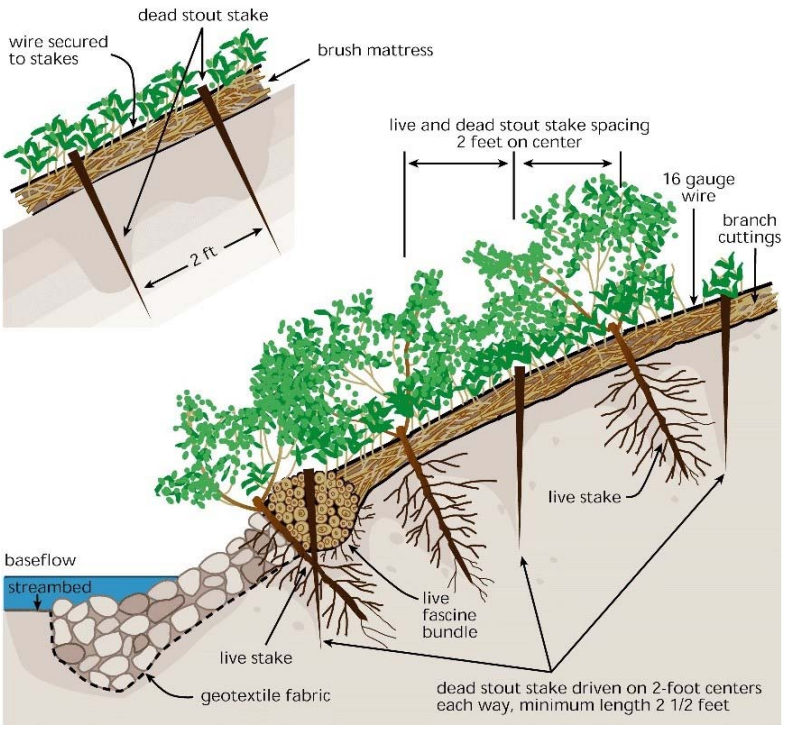


Figure 15. Example of Brush Matting Streambank Technique. Image Credit: Stream Corridor Restoration: Principles, Processes and Practices, 10/98, by the Federal Interagency Stream Restoration Working Group (FISRWG).

Figure 16. Typical Rootwad Composite Detail.

In addition to all design and implementation responsibilities, the Village of Slinger would also develop and implement a regular operation and maintenance (O&M) plan for ensuring adequate performance and long life of the practice. The plan will be consistent with NRCS Code 580, which is included in Appendix D for reference.

Per NRCS guidance, the streambank stabilization O&M plan will define the set intervals at which the practice will be inspected, including after every flood event. Maintenance activities will include:

- Removal of debris in the stream that diverts flow to the streambank causing increased scouring and erosion.
- Monitoring and maintaining the establishment of native planting and control of invasive species if necessary.
- Repair of any damaged structural sections of the practice.
- Revegetation of areas affected by erosion.
- Photographic documentation of inspection and maintenance activities conducted at each O&M visit.

Appendix D also includes an example streambank stabilization O&M plan being considered by the Village for use in the proposed project. In this plan, more frequent inspections are called out during the first year of practice implementation to ensure proper establishment. Once proper establishment is ensured, the Village would commit to annual inspections with additional inspections after flood events greater than 10-year flood level..

The Village's O&M plan will also involve ensuring that no gravel or other materials are entering the stabilized section of the streambank from upland areas including the businesses along the north bank that were discussed in previous sections of this report. As previously mentioned, the Village of Slinger and the City of Hartford will work with these property owners to mitigate these concerns and the Village O&M plan will include provisions to monitor these sources of upland pollutants.

In order to ensure proper tracking of the use of credits to meet the WQBEL, the Village would maintain coordination with the WDNR. Among WQT-related logistics, the Village will be responsible for management practice registration forms, submitting annual reports, and if necessary, notice of the termination of the practice.

The purpose of management practice registration is to ensure the management practice has been properly installed in accordance with the intended design and final Water Quality Plan of the Village. Once the project has been registered, the WDNR is able to more easily review information related to the maintenance of the practice for trade verification and auditing. An example Management Practice Registration Form is included in Appendix E for review and use by the Village at the applicable time. In addition to management practice registration, an annual report will be completed by the Village to verify the proper maintenance of the streambank stabilization practice. The report would also notify the WDNR about any changes to the trade agreement or compliance-related issues. Should the practice permanently fail, the Village will complete a Notice of Termination form along with additional coordination with WDNR staff.

WATER QUALITY TRADING PLAN IMPLEMENTATION AND TIMELINE

The estimated 164.2 lbs./year TP exceeds the amount of credits required by the Village WWTF to meet its WQBEL (146 lbs./year including an assumed trade ratio of 2.4). In fact, the estimated reduction from

the north bank alone exceeds the threshold. For this reason, the Village will proceed with plans to implement streambank stabilization measures concentrating on the entire length of the north bank (with the exception of the depositional area of NB4) surveyed in this report.

The Village understands that there is currently a difference between interim and long term credits as defined by the Rock River TMDL. The current project is located in Reach 20 of the Rubicon River, which required a nonpoint source reduction of 27%. For this reason, 27% of the credits generated as a result of this project (approximately 40 pounds of TP per year) will be considered interim credits, having a five-year duration. The Village will account for the loss of these credits by continuing to optimized their effluent quality at the treatment facility. To make up for this loss in credits generated at the five-year mark, the Village would have to maintain a slightly lower effluent TP concentration of approximately 0.089 mg/L at 1.0 MGD. Village staff have shown a capacity to maintain such a concentration, so efforts will continue over the next five year to ensure the feasibility of this option. In addition, there are pending WQT guidance updates which may increase the interim credit duration up to 10 years, which would alleviate this concern altogether.

The in-depth design process will commence after the contents of the present report are reviewed and approved by WDNR staff. Assuming that the present report is approved by the end of the calendar year 2019, design will occur immediately after approval during 2020.

There are also several key pieces of information that need to be finalized by the Village with the WDNR and the City of Hartford in the coming months. First, the value of the trade ratio is currently being discussed by the Village and the WDNR. The final value of the trade ratio will determine the scope of the work done by the Village in the proposed project site. For this reason, the Village will seek to resolve discussion in this regard by the end of calendar year 2019.

In addition, the Village of Slinger needs to finalize negotiations and reach a trade agreement with the City of Hartford in order to proceed with the proposed streambank stabilization project. The City of Hartford will act as the sole partner in the proposed trade agreement. The City of Hartford has been in communication with the Village throughout the evaluation process and has shown support for the project. However, final details of an agreement have not been determined. Finalization of the trade agreement will proceed after the approval of the present report, simultaneously with the design process.

A Chapter 30 Waterways permit may also be required for the proposed streambank stabilization project. The Village has established preliminary correspondence with appropriate WDNR in this regard already, but next steps in the permitting process will occur in the coming months to ensure that the permits are in place prior to construction. In addition, Village will need to coordinate with the City of Hartford to ensure that they have access to all areas of the northern bank proposed for stabilization. The property lines in some portions of the northern bank are close to the bank crest. A thorough review of the City's property in this area will be conducted to determine if an easement will be necessary for proposed stabilization work.

The Village's goal is to complete design, agreements, and permitting logistics by the end of May 2020 with the intent to bid the project for construction in 2020. The goal will be to have the practice implemented by the end of the June 2021. The Village will maintain communication with the WDNR throughout the proposed timeline and make adjustments to the anticipated dates as necessary.

As a contingency plan, the Village of Slinger will consider additional phosphorus credit generation through point to point trading with the City of Harford wastewater treatment facility. The City has expressed that they may be willing to trade some level of phosphorus as a backup plan used by the Village. If the Village finds that the restoration of the entire north bank of the project site is not adequate due to unforeseen circumstances, they may wish to augment the existing Water Quality Trading Plan with point-to-point credits with the City of Hartford.

Appendix A

Streambank Stabilization Site Exhibit

Rubicon River Streambank Stabilization Site

City of Hartford, WI

Legend

- Soil Sample Sites
- Streambank Reach Boundary
- 5' Index Contour
- 1' Intermediate Contour

N
W E
S

0 50 100 200

Feet

Ruekert · Mielke

DATE: April 2019

I:\Projects\18_Slinger\100101TopoExhibit.mxd

Appendix B

Soil Lab Analysis

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 319262
NLS Customer: 88946

Client: **Ruekert-Mielke Inc**
Attn: David Arnott
W233 N2080 Ridgeview Parkway
Waukesha, WI 53188

Fax: 262 542 5631 Phone: 262 542 5733

Project: Waterford Streambank

SB 1 NLS ID: 1114644
COC: 218400:1 Matrix: SO
Collected: 04/09/19 13:30 Received: 04/12/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Phosphorus, total recoverable as P by ICP	0.068	% DWB	5	0.00025*	0.00082*	04/17/19	SW846 6010B	721026460
Solids, total on solids	79.2	%	1	0.10*		04/12/19	SM 2540-G 20ed	721026460
Metals digestion - tot. recov (solid) ICP	yes					04/16/19	SW846 3050M	721026460

SB 2 NLS ID: 1114645
COC: 218400:2 Matrix: SO
Collected: 04/09/19 14:00 Received: 04/12/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Phosphorus, total recoverable as P by ICP	0.059	% DWB	5	0.00024*	0.00080*	04/17/19	SW846 6010B	721026460
Solids, total on solids	76.6	%	1	0.10*		04/12/19	SM 2540-G 20ed	721026460
Metals digestion - tot. recov (solid) ICP	yes					04/16/19	SW846 3050M	721026460

SB 3 NLS ID: 1114646
COC: 218400:3 Matrix: SO
Collected: 04/09/19 14:30 Received: 04/12/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Phosphorus, total recoverable as P by ICP	0.062	% DWB	5	0.00026*	0.00086*	04/17/19	SW846 6010B	721026460
Solids, total on solids	76.6	%	1	0.10*		04/12/19	SM 2540-G 20ed	721026460
Metals digestion - tot. recov (solid) ICP	yes					04/16/19	SW846 3050M	721026460

SB 4 NLS ID: 1114647
COC: 218400:4 Matrix: SO
Collected: 04/09/19 15:00 Received: 04/12/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Phosphorus, total recoverable as P by ICP	0.042	% DWB	5	0.00020*	0.00068*	04/17/19	SW846 6010B	721026460
Solids, total on solids	78.5	%	1	0.10*		04/12/19	SM 2540-G 20ed	721026460
Metals digestion - tot. recov (solid) ICP	yes					04/16/19	SW846 3050M	721026460

NB 1 NLS ID: 1114648
COC: 218400:5 Matrix: SO
Collected: 04/09/19 15:30 Received: 04/12/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Phosphorus, total recoverable as P by ICP	0.072	% DWB	5	0.00031*	0.0011*	04/17/19	SW846 6010B	721026460
Solids, total on solids	62.9	%	1	0.10*		04/12/19	SM 2540-G 20ed	721026460
Metals digestion - tot. recov (solid) ICP	yes					04/16/19	SW846 3050M	721026460

NB 2 NLS ID: 1114649
COC: 218400:6 Matrix: SO
Collected: 04/09/19 16:00 Received: 04/12/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Phosphorus, total recoverable as P by ICP	0.054	% DWB	5	0.00021*	0.00072*	04/17/19	SW846 6010B	721026460
Solids, total on solids	76.5	%	1	0.10*		04/12/19	SM 2540-G 20ed	721026460
Metals digestion - tot. recov (solid) ICP	yes					04/16/19	SW846 3050M	721026460

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 319262
NLS Customer: 88946

Client: **Ruekert-Mielke Inc**
Attn: David Arnott
W233 N2080 Ridgeview Parkway
Waukesha, WI 53188

Fax: 262 542 5631 Phone: 262 542 5733

Project: Waterford Streambank

NB 3 NLS ID: 1114650
COC: 218400:7 Matrix: SO
Collected: 04/09/19 16:30 Received: 04/12/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Phosphorus, total recoverable as P by ICP	0.044	% DWB	5	0.00020*	0.00067*	04/17/19	SW846 6010B	721026460
Solids, total on solids	83.4	%	1	0.10*		04/12/19	SM 2540-G 20ed	721026460
Metals digestion - tot. recov (solid) ICP	yes					04/16/19	SW846 3050M	721026460

NB 4 NLS ID: 1114651
COC: 218400:8 Matrix: SO
Collected: 04/09/19 17:00 Received: 04/12/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Phosphorus, total recoverable as P by ICP	0.061	% DWB	5	0.00034*	0.0012*	04/17/19	SW846 6010B	721026460
Solids, total on solids	64.1	%	1	0.10*		04/12/19	SM 2540-G 20ed	721026460
Metals digestion - tot. recov (solid) ICP	yes					04/16/19	SW846 3050M	721026460

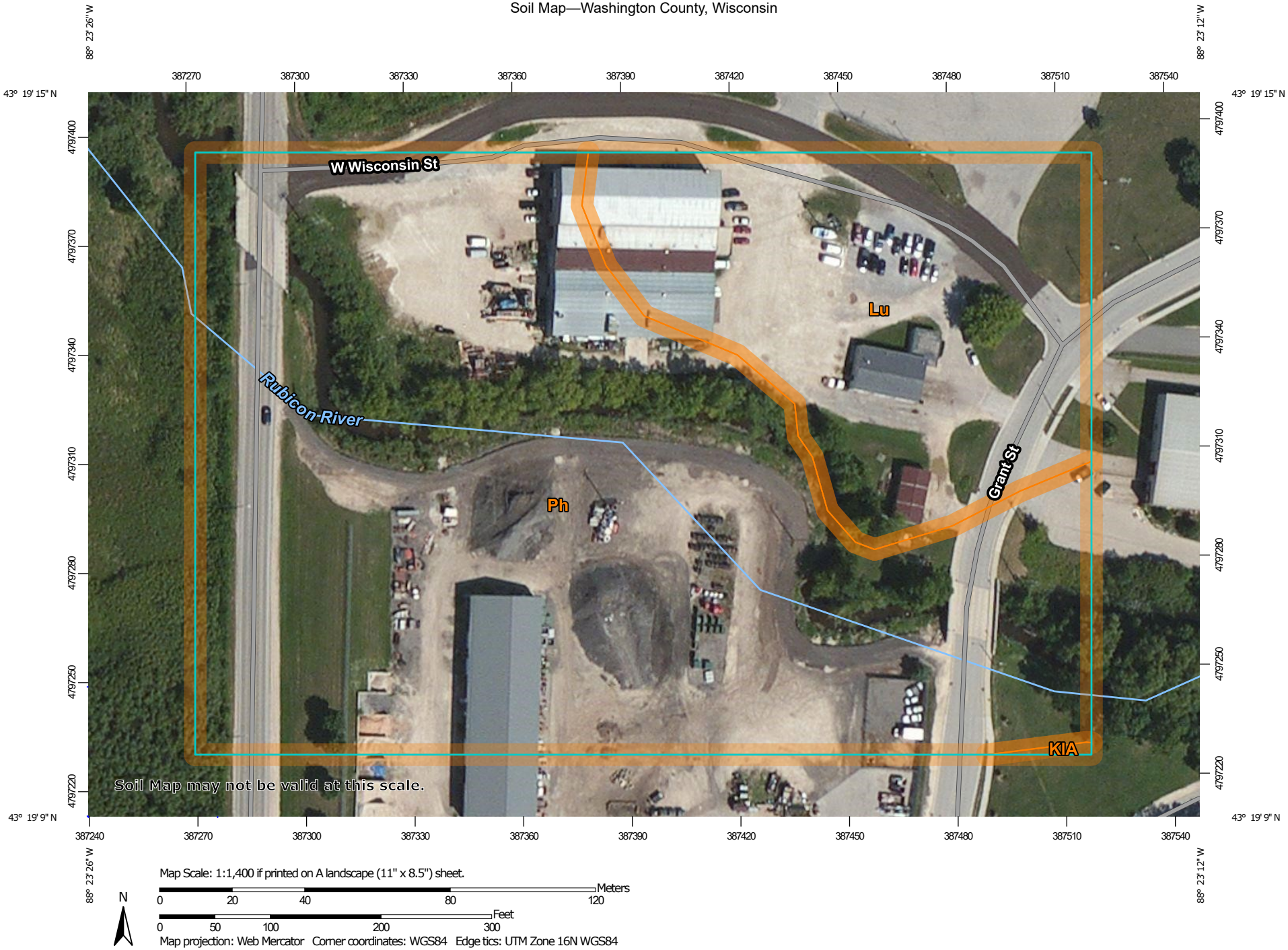
Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

Appendix C

Soil Type Map



Map Scale: 1:1,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Washington County, Wisconsin
Survey Area Data: Version 18, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 29, 2011—Sep 6, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
KlA	Kendall silt loam, 1 to 3 percent slopes	0.0	0.1%
Lu	Loamy land	2.7	26.4%
Ph	Pella silt loam, 0 to 2 percent slopes	7.5	73.5%
Totals for Area of Interest		**10.2**	**100.0%**

Appendix D

Operation and Maintenance Plan Documents

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

STREAMBANK AND SHORELINE PROTECTION

(Ft.)

CODE 580

DEFINITION

Treatment(s) used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries.

PURPOSE

- To prevent the loss of land or damage to land uses, or facilities adjacent to the banks of streams or constructed channels, shoreline of lakes, reservoirs, or estuaries including the protection of known historical, archeological, and traditional cultural properties.
- To maintain the flow capacity of streams or channels.
- Reduce the offsite or downstream effects of sediment resulting from bank erosion.
- To improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, recreation.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to streambanks of natural or constructed channels and shorelines of lakes, reservoirs, or estuaries where they are susceptible to erosion. It does not apply to erosion problems on main ocean fronts, beaches or similar areas of complexity.

CRITERIA

General Criteria Applicable to All Purposes

Treatments shall be in accordance with all applicable local, state and federal laws and regulations.

Treatments applied shall seek to avoid adverse effects to endangered, threatened, and candidate species and their habitats, whenever possible.

Treatments applied shall seek to avoid adverse effects to archaeological, historic, structural, and traditional cultural properties, whenever possible.

An assessment of unstable streambank or shoreline sites shall be conducted in sufficient detail to identify the causes contributing to the instability (e.g. livestock access, watershed alterations resulting in significant modifications of discharge or sediment production, in channel modifications such as gravel mining, head cutting, water level fluctuations, boat-generated waves, etc.).

Proposed protective treatments to be applied shall be compatible with improvements being planned or installed by others.

Protective treatments shall be compatible with the bank or shoreline materials, water chemistry, channel or lake hydraulics, and slope characteristics above and below the water line.

End sections of treatment areas shall be adequately anchored to existing treatments, terminate in stable areas, or be otherwise stabilized to prevent flanking of the treatment.

Protective treatments shall be installed that result in stable slopes. Design limitations of the bank or shoreline materials and type of measure installed shall determine steepest permissible slopes.

Designs will provide for protection of installed treatments from overbank flows resulting from upslope runoff and flood return flows.

Internal drainage for bank seepage shall be provided when needed. Geotextiles or properly

designed filter bedding shall be incorporated with structural measures where there is the potential for migration of material from behind the measure.

Treatments shall be designed to account for any anticipated ice action, wave action, and fluctuating water levels.

All disturbed areas around protective treatments shall be protected from erosion. Disturbed areas that are not to be cultivated shall be protected as soon as practical after construction.

Vegetation shall be selected that is best suited for the site conditions and achieves the intended purpose(s).

In order to ensure plant community establishment and integrity, a vegetative management plan shall be prepared in accordance with NRCS conservation practice standard Critical Area Planting, Code 342.

Additional Criteria for Streambanks

Stream segments to be protected shall be classified according to a system deemed appropriate by the state. Segments that are incised or that contain the 5-year return period (20 percent probability) or greater flows shall be evaluated for further degradation or aggradation.

A site assessment shall be performed to determine if the causes of instability are local (e.g. poor soils, high water table in banks, alignment, obstructions deflecting flows into bank, etc.) or systemic in nature (e.g. aggradation due to increased sediment from the watershed, increased runoff due to urban development in the watershed, degradation due to channel modifications, etc.). The assessment need only be of the extent and detail necessary to provide a basis for design of the bank treatments and reasonable confidence that the treatments will perform adequately for the design life of the measure.

Changes in channel alignment shall not be made without an assessment of both upstream and downstream fluvial geomorphology that evaluates the affects of the proposed alignment. The current and future discharge-sediment regime shall be based on an assessment of the watershed above the proposed channel alignment.

Bank protection treatment shall not be installed in channel systems undergoing rapid and extensive changes in bottom grade and/or alignment unless the treatments are designed to control or accommodate the changes. Bank treatment shall be constructed to a depth at or below the anticipated lowest depth of streambed scour.

If the failure mechanism is a result of the degradation or removal of riparian vegetation, stream corridor restoration shall be implemented, where feasible, (see Additional Criteria for Stream Corridor Improvement) as well as treating the banks.

Toe erosion shall be stabilized by treatments that redirect the stream flow away from the toe or by structural treatments that armor the toe. Additional design guidance is found in the EFH Part 650, Chapter 16, Streambank and Shoreline Protection.

Where toe protection alone is inadequate to stabilize the bank, the upper bank shall be shaped to a stable slope and vegetated, or shall be stabilized with structural or soil-bioengineering treatments.

Channel clearing to remove stumps, fallen trees, debris, and sediment bars shall only be performed when they are causing or could cause unacceptable bank erosion, flow restriction, or damage to structures. Habitat forming elements that provide cover, food, pools, and water turbulence shall be retained or replaced to the extent possible.

Treatments shall be functional and stable for the design flow and sustainable for higher flow conditions.

Treatments shall not induce an increase in natural erosion.

Treatments shall not limit stream flow access to the floodplain.

Where flooding is a concern, the effects of protective treatments shall not increase flow levels above those that existed prior to installation.

Additional Criteria for Shorelines

All revetments, bulkheads or groins are to be no higher than 3 feet (1 meter) above mean high tide, or mean high water in non-tidal areas

Structural shoreline protective treatments shall be keyed to a depth to prevent scour during low water.

For the design of structural treatments, the site characteristics below the waterline shall be evaluated for a minimum of 50 feet (15 meters) horizontal distance from the shoreline measured at the design water surface.

The height of the protection shall be based on the design water surface plus the computed wave height and freeboard. The design water surface in tidal areas shall be mean high tide.

When vegetation is selected as the protective treatment, a temporary breakwater shall be used during establishment when wave run up would damage the vegetation.

Additional Criteria for Stream Corridor Improvement

Stream corridor vegetative components shall be established as necessary for ecosystem functioning and stability. The appropriate composition of vegetative components is a key element in preventing excess long-term channel migration in re-established stream corridors. The establishment of vegetation on channel banks and associated areas shall also be in accordance with conservation practice standard Critical Area Planting, Code 342.

Treatments shall be designed to achieve habitat and population objectives for fish and wildlife species or communities of concern as determined by a site-specific assessment or management plan. Objectives shall be based on the survival and reproductive needs of populations and communities, which include habitat diversity, habitat linkages, daily and seasonal habitat ranges, limiting factors and native plant communities. The type, amount, and distribution of vegetation shall be based on the requirements of the fish and wildlife species or communities of concern to the extent possible.

Treatments shall be designed to meet aesthetic objectives as determined by a site-specific assessment or management plan. Aesthetic objectives shall be based on human needs, including visual quality, noise control, and microclimate control. Construction materials, grading practices, and other site development elements shall be selected and designed to be compatible with adjacent land uses.

Treatments shall be designed to achieve recreation objectives as determined by a site-specific assessment or management plan. Safety requirements shall be based on type of human use and recreation objectives.

CONSIDERATIONS

When designing protective treatments, consider should be given to the changes that may occur in the watershed hydrology and sedimentation over the design life of the treatments.

Consider utilizing debris removed from the channel or streambank into the treatment design when it is compatible with the intended purpose to improve benefits for fish, wildlife and aquatic systems.

Use construction materials, grading practices, vegetation, and other site development elements that minimize visual impacts and maintain or complement existing landscape uses such as pedestrian paths, climate controls, buffers, etc. Avoid excessive disturbance and compaction of the site during installation.

Utilize vegetative species that are native and/or compatible with local ecosystems. Avoid introduced, invasive, noxious or exotic species that could become nuisances. Consider species that have multiple values such as those suited for biomass, nuts, fruit, browse, nesting, aesthetics and tolerance to locally used herbicides. Avoid species that may be alternate hosts to disease or undesirable pests. Species diversity should be considered to avoid loss of function due to species-specific pests. Species on noxious plant lists should not be used.

Select plant materials that provide habitat requirements for desirable wildlife and pollinators. The addition of native forbs and legumes to grass mixes will increase the value of plantings for both wildlife and pollinators.

Treatments that promote beneficial sediment deposition and the filtering of sediment, sediment-attached, and dissolved substances should be considered.

Consider maintaining or improving the habitat value for fish and wildlife by including treatments that provide aquatic habitat in the treatment

design and that may lower or moderate water temperature and improve water quality.

Consider the need to stabilize side channel inlets and outlets and outlets of tributary streams from erosion.

Consider aquatic habitat when selecting the type of toe stabilization.

Consider maximizing adjacent wetland functions and values with the project design and minimize adverse effects to existing wetland functions and values.

Livestock exclusion shall be considered during establishment of vegetative treatments and appropriate grazing practices applied after establishment to maintain plant community integrity. Wildlife may also need to be controlled during establishment of vegetative treatments. Temporary and local population control methods should be used with caution and within state and local regulations.

When appropriate, establish a buffer strip and/or diversion at the top of the bank or shoreline protection zone to help maintain and protect installed treatments, improve their function, filter out sediments, nutrients, and pollutants from runoff, and provide additional wildlife habitat.

Consider conservation and stabilization of archeological, historic, structural and traditional cultural properties when applicable.

Consider safety hazards to boaters, swimmers, or people using the shoreline or streambank when designing treatments.

Protective treatments should be self-sustaining or require minimum maintenance.

PLANS AND SPECIFICATIONS

Plans and specifications for streambank and shoreline protection shall be prepared for specific field sites and based on this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Plans shall include treatments to minimize erosion and sediment production during construction and provisions necessary to comply with conditions of any environmental agreements, biological opinions or other terms of applicable permits.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be prepared for use by the owner or others responsible for operating and maintaining the system. The plan shall provide specific instructions for operating and maintaining the system to insure that it functions properly. It shall also provide for periodic inspections and prompt repair or replacement of damaged components or erosion.

REFERENCES

NEH Part 650, Chapter 16, Streambank and Shoreline Protection..

United States Department of Agriculture
Natural Resources Conservation Service
Montana

Operation and Maintenance Guide to Stabilize and Protect Your Stream Channel and Streambank

(For Practice Standards 322, 326, 395, 580, 582, and 584)

Operator:_____

Project:_____

Location:_____Sec._____, T._____, R._____

NRCS Office_____Phone_____

Your stream channel and bank protection plan was designed and installed to reduce stream erosion. Like crops or livestock, its success depends on your good care. Finding and treating problems early is vital to avoiding major repair costs and alternatives. Inspections need to be done on a regular basis and immediately after big flows. The inspection schedule on the back of this worksheet is your responsibility. It helps to remind you to document dates on your calendar. Contact us, NRCS, if you need assistance or have questions.

INSPECTION AND MAINTENANCE CHECKLIST

✓

- ☐ Repair any eroded areas and re-plant with suitable seed or plant material(s).
- ☐ Maintain desirable vegetation and control weeds and invasive trees/shrubs.
- ☐ Manage grazing to keep vegetation healthy according to a management plan.
- ☐ Repair damage caused by vehicles or machinery.
- ☐ Control beaver cutting, browse damage, burrowing, and other damage by wildlife.
- ☐ Check structures for anchoring and soundness. Repair weaknesses immediately.
- ☐ Remove any debris that hinders operation of the system.
- ☐ Maintain fences.
- ☐ Remove large trees species that grow in lower bank areas. If they fall, large trees might rip apart a streambank. Leave small tree species for added protection.
- ☐ After the stream and bank stabilization practices are all satisfactorily established, inspect the site at least once a year and/or after major flow events.
- ☐ **See back of this form for more details specific to your site.**

Operation and Maintenance Agreement for Your Stream Channel and Streambank Project

Narrative for Site-Specific Requirements:

The left-hand column (below) lists the suggested intervals between successive Operation and Maintenance inspections. Use it as a guide to develop an inspection schedule with the cooperator, and list the planned dates in the third column. Adjust the intervals to fit the installation.

Standard Inspection Interval	Inspection Number	Original Planned Date	Person Responsible	Date Completed	Completed by (Signature)	Revised Date of Next Inspection
2 Weeks	1					
4 Weeks	2					
6 Weeks	3					
2 Months	4					
3 Months	5					
4 Months	6					
5 Months	7					
6 Months	8					
12 Months	9					
18 Months	10					
24 Months	11					
30 Months	12					

For each inspection, check the items listed on front of this sheet and in the notes above. Look for bank or scour erosion; plant survival and vigor; amounts and species of weeds and competition effects; damage from browse, beaver cutting, or insects; that are undesirable.

Practice or Concern	Condition of Vigor; the Practice Needs to be Added: or N/A	Extent and Type of Repairs or Maintenance Required	Date Completed
Channel Stability			
Bank Stability; Erosion, Burrows, Etc.			
Weed Competition			
Grass/Sedge Seeding			
Shrub/Tree Planting			
Brush Mattress			
Live Fascines			
Live Stakes			
Mulching			
Erosion Control Fabric			

Appendix E

Water Quality Trading Management Practice Registration Form

Appendix 4. Management Practice Registration

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

Water Quality Trading
Management Practice Registration
Form 8700-nnn (R10/12)

Notice: Any personally identifiable information submitted on this form will be used for program purposes only, but is available for inspection and copying under Wisconsin's public records laws. This form should be completed by any permittee that intends to pursue pollutant trading as a method for complying with a permit limitation. Failure to complete this form would not result in penalties.

Permittee Information

Permittee Name	Permit Number **WI-**	Facility Site Number

Facility Address	City	State	ZIP Code

Project Contact Name(if applicable)	*Address*	*City*	*State*	*Zip Code*

Project Name

Broker/Exchange Information

Was a broker/exchange be used to facilitate trade?	☐ Yes ☐ No
Broker/Exchange Organization Name:	Contact:
Address:	Phone/E-mail:

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

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

County:	Closest Receiving Water Name:	HUC 12:	Parameter(s) Traded:

The preparer and owner certify 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

For Department Use Only

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

NOTE: The *Authorized Representative* is someone who is authorized to sign all applications, reports or other information submitted to the DNR. This person may be; for a corporation, a responsible corporate officer including a president, secretary, treasurer, vice president or manager; and for a municipality, a ranking elected official; for a corporation or a municipality, another person authorized by one of those officers or officials and who has responsibility for the overall operation of the facility or activity regulated by the permit. This is the person to whom we will send information regarding the application, the draft permit and permit reissuance.

Attachment 1

Water Quality Trading Plan Checklist

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
Slinger Wastewater Treatment Facility	WI- 0020290	5823

Facility Address	City	State	ZIP Code
120 MBW Road	Slinger	WI	53086

Project Contact Name (if applicable)	Address	City	State	ZIP Code
Greg Moser	300 Slinger Rd.	Slinger	WI	53086

Project Name
Village of Slinger Water Quality Trading Plan

Receiving Water Name	Parameter(s) being traded	HUC 12(s)
Unnamed Trib to Rubicon River	Total Phosphorus	070900010302

Credit Generator Information

Credit generator type (select all that apply):
- ☐ Permitted Discharge (non-MS4CAFO)
- ☒ Urban nonpoint source discharge
- ☐ Permitted MS4
- ☐ Agricultural nonpoint source discharge
- ☐ Permitted CAFO
- ☐ 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	Streambank Stabilization	NRCS Streambank Erosion Estimator	TBD	◯ 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
◯ 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	Section 2
b. Management practices used to generate credits	◉ Yes	◯ No	Section 2
c. Amount of credit being generated	◉ Yes	◯ No	Section 3
d. Description of applicable trade ratio per agreement/management practice	◉ Yes	◯ No	Section 4
e. Location where credits will be generated	◉ Yes	◯ No	Section 2
f. Timeline for credits and agreements	◉ Yes	◯ No	Section 6
g. Method for quantifying credits	◉ Yes	◯ No	Section 2-3

Does plan have a narrative that describes:			Plan Section
h. Tracking procedures	(●) Yes	( ) No	Section 5
i. Conditions under which the management practices may be inspected	(●) Yes	( ) No	Section 5
j. Reporting requirements should the management practice fail	(●) Yes	( ) No	Section 5
k. Operation and maintenance plan for each management practice	(●) Yes	( ) No	Section 5
l. Location of credit generator in proximity to receiving water and credit user	(●) Yes	( ) No	Section 2
m. Practice registration documents, if available	( ) Yes	(●) No	
n. History of project site(s)	(●) Yes	( ) No	Section 2
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
[signature]	05/03/2019

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
[signature]	5/3/19