

A photograph of a streambank stabilization project. The stream is on the left, bordered by a line of large, light-colored rocks. To the right of the rocks, several young, thin trees are planted in a row, supported by stakes. The background shows a grassy bank with more trees. A large blue curved shape is overlaid on the left side of the image, containing white text.

STREAMBANK STABILIZATION FOR WATER QUALITY TRADING FOR WWTP COMPLIANCE

Waukesha County Stormwater Workshop

April 13, 2023

Agenda

- Slinger WWTF
 - Background
 - Phosphorus
 - Optimization
- Watershed Information
- Water Quality Trading
- Shoreline Stabilization
- Summary

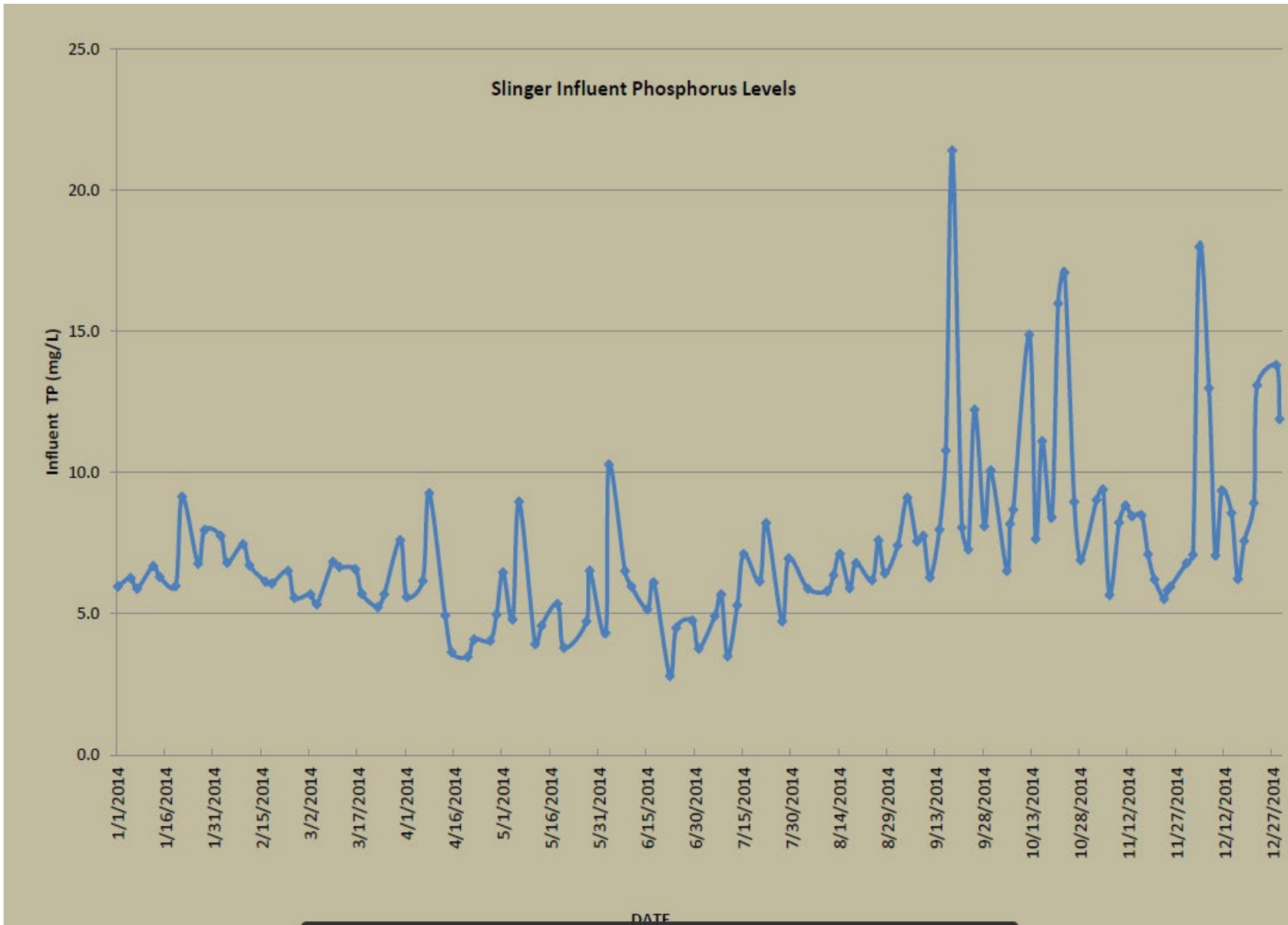


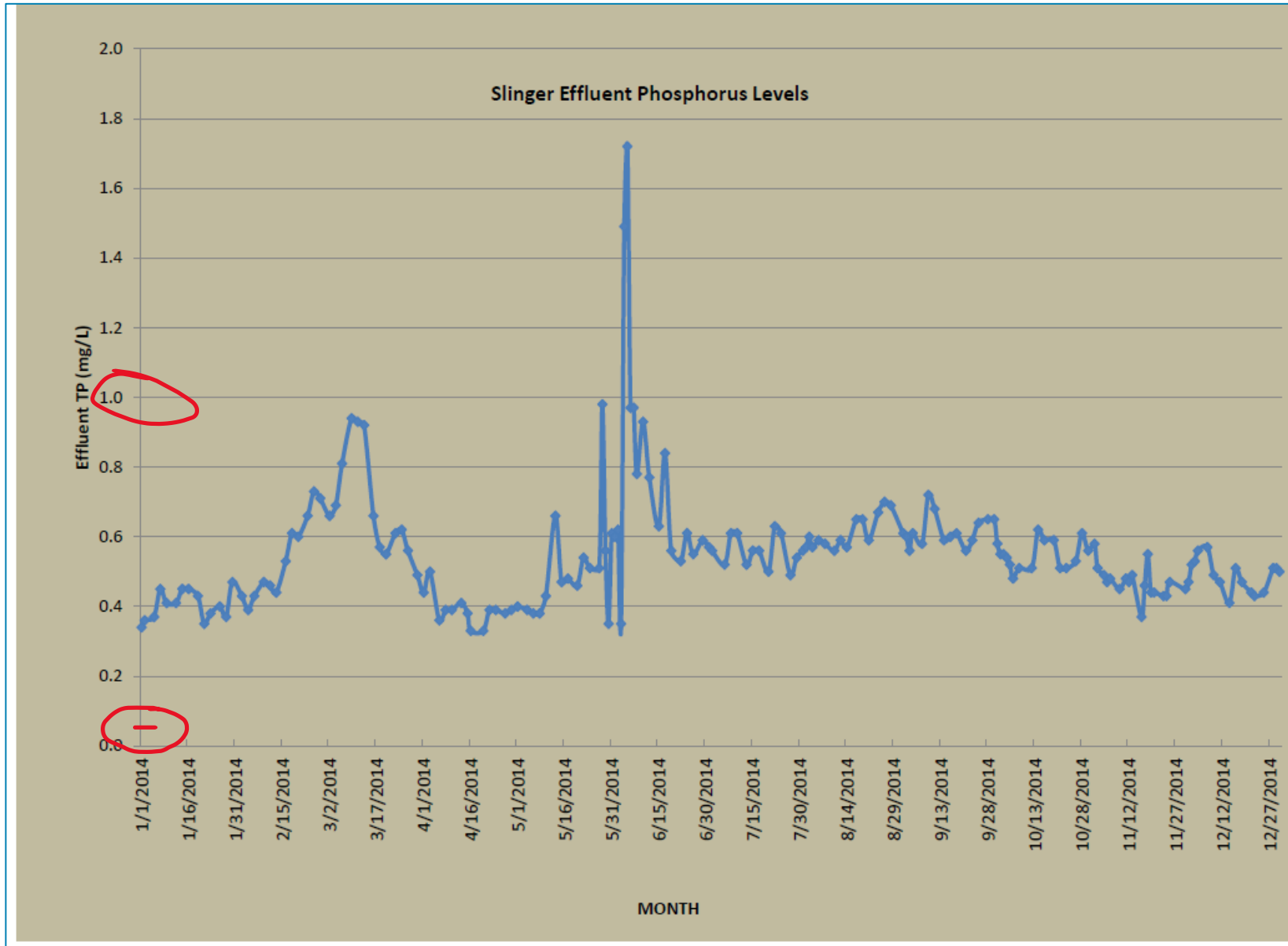
Background - WWTF

- Discharge – Unnamed Tributary of Rubicon River
- Rock River TMDL Limits vs Water Quality Based Effluent Limits (WQBEL)
 - WQBEL not included in TMDL
 - WQBEL deep dive biology & science
 - WQBEL limits govern

Background - WWTF

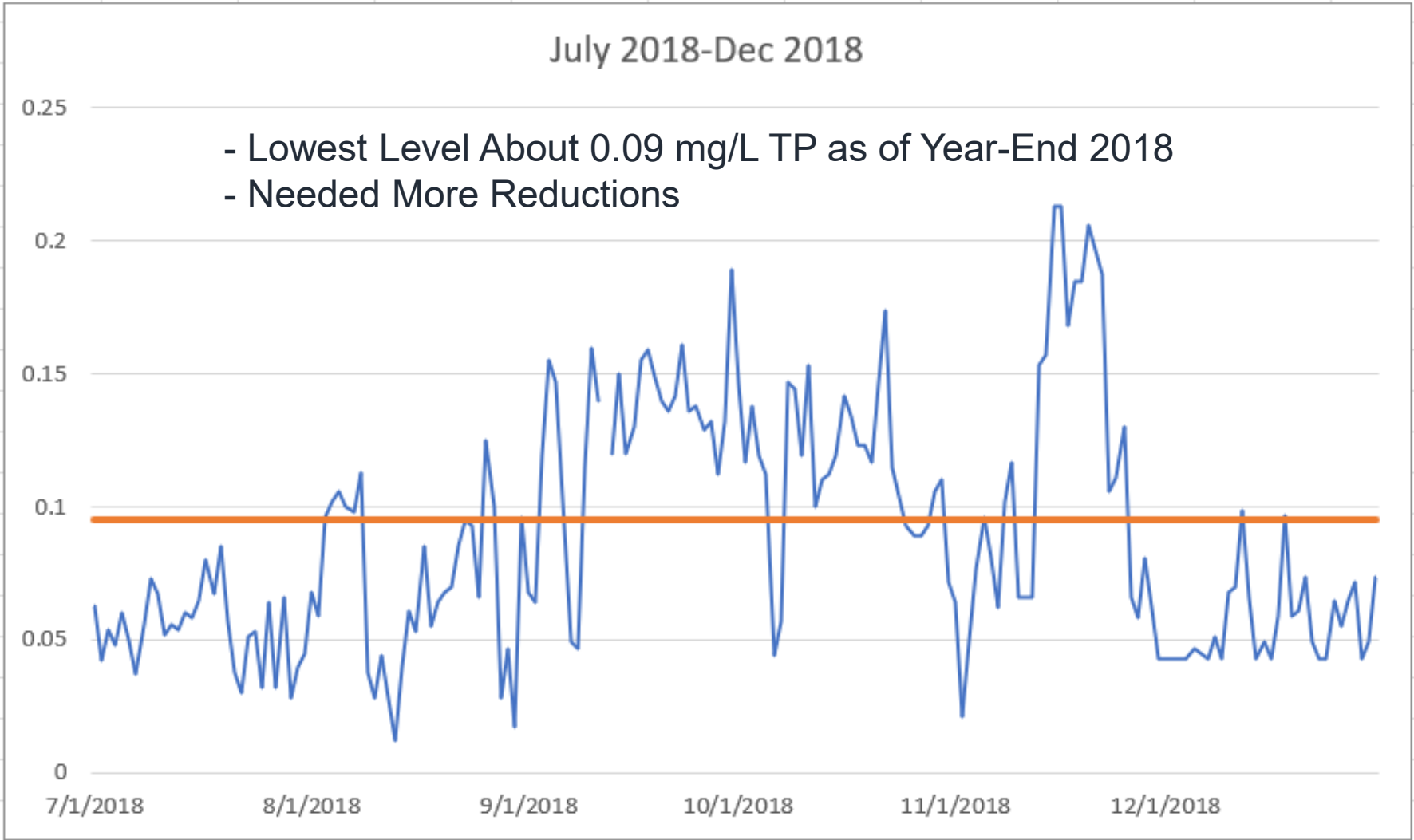
- Previous TP Limit 1.0 mg/L
- Proposed TP Water Quality Based Effluent Limits (WQBEL) = 0.05 mg/L
 - Infrequent Discharge to Pike Lake
- Current WQBEL Total Phosphorus: 0.075 mg/L





WWTP P Optimization

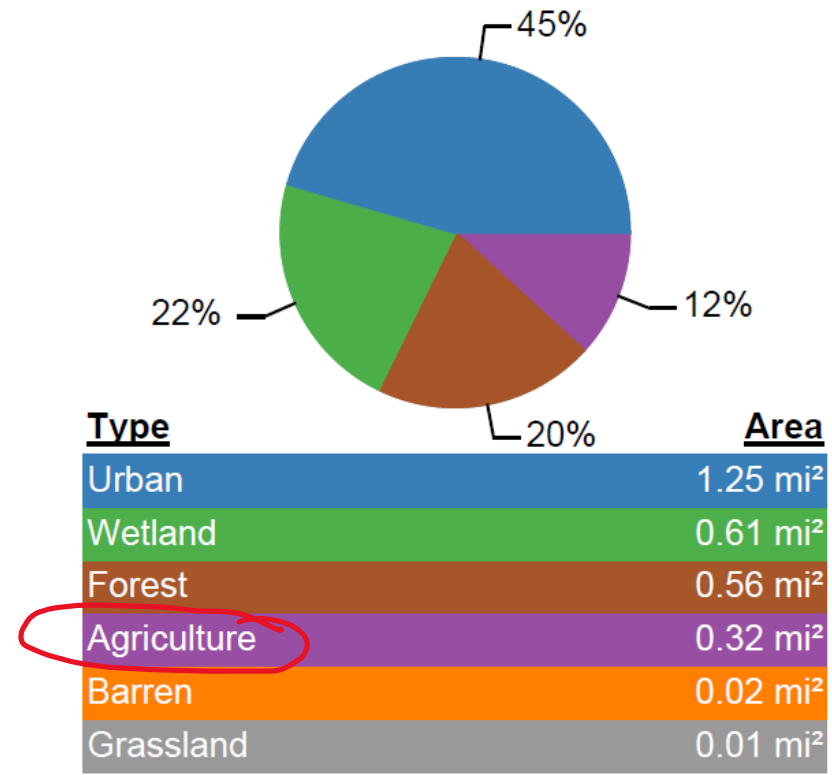
- Biological
 - “bugs”
- Chemical
- Mechanical



Watershed

PRESTO Analysis

Landcover

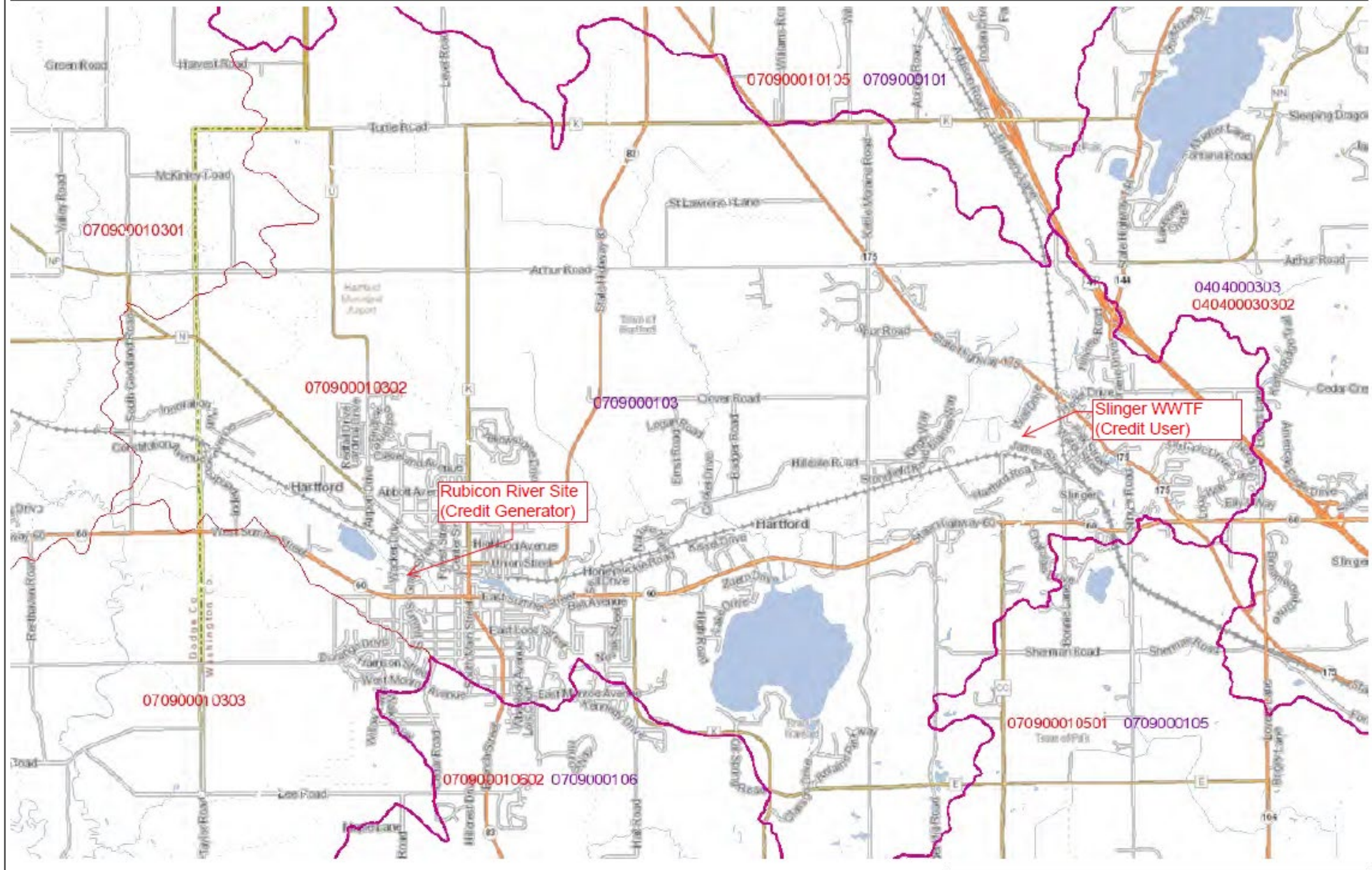


PRESTO Phosphorus Load Estimate

Avg. Annual Nonpoint Phosphorous Load (80% Confidence Interval)	108 (55 - 212) lbs
Number of Facilities (Individual Facility Information below)	1
Avg. Annual Point-source Phosphorous Load (2010 - 2012 total of all facilities)	932lbs
Most Likely Point : Nonpoint Phosphorous Ratio	90% : 10%
Low Estimate Point : Nonpoint Phosphorous Ratio (Adaptive Management)	94% : 6%



Figure 2 - Headwaters Rubicon River (070900010302)



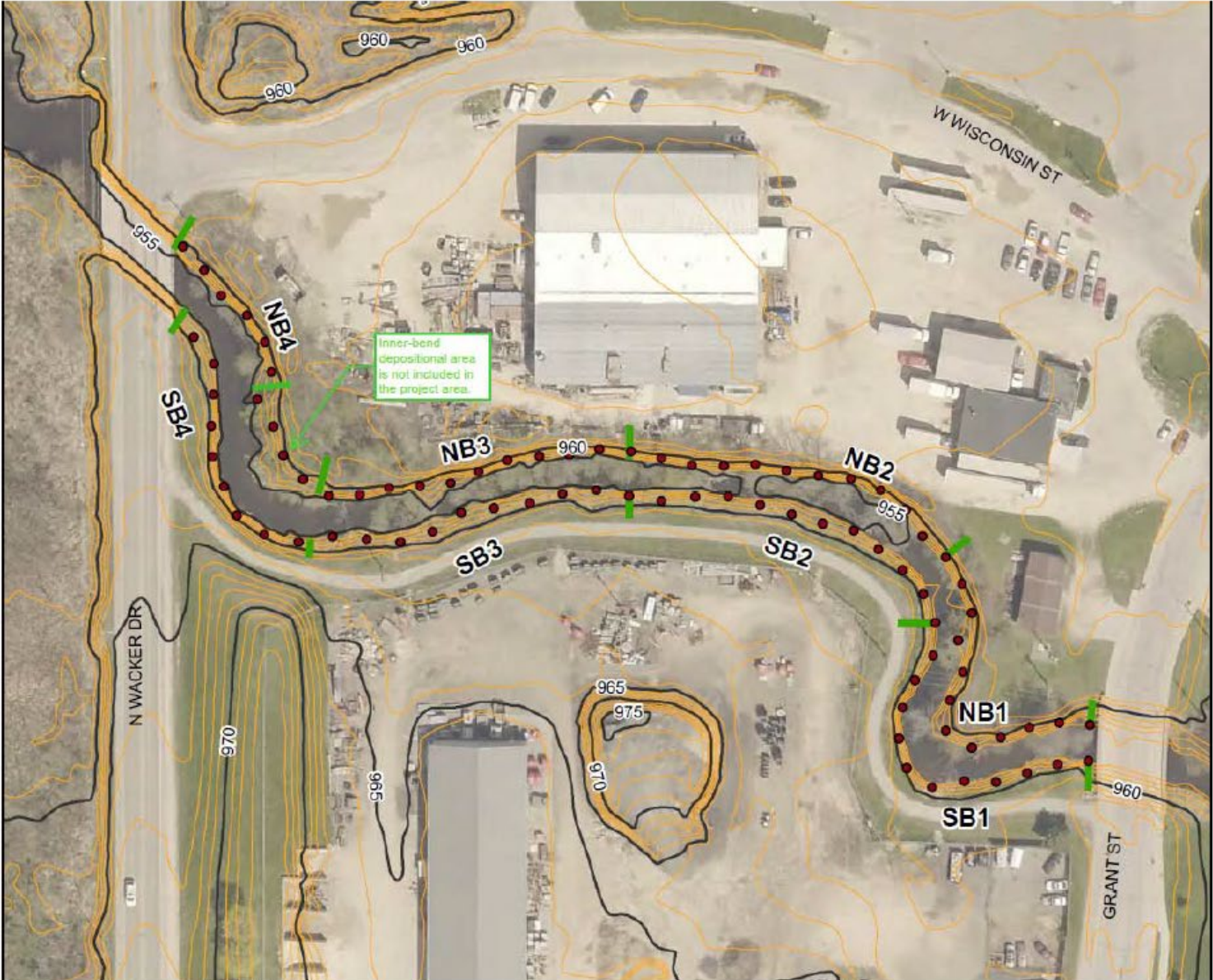
Water Quality Trade –Streambank Info

- Bank Height
- Soil Type
- Phosphorus Content
 - Follow UW Extension Guidance
 - Sections of 220 Feet Length
 - Samples Every 20 ft, “W” Shape”, 6-inch Deep
 - Make Composite per Section



FIGURE 2. Streambank Installation

Water Quality Trade – Streambank Info

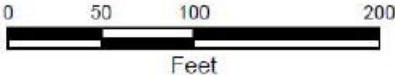


Rubicon River Streambank Stabilization Site

City of Hartford, WI

Legend

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



Water Quality Trade – Streambank Info

<i>Field Number</i>	<i>Eroding Streambank Reach Number</i>	<i>Eroding Bank Length (Feet)</i>	<i>Eroding Bank Height * (Feet)</i>	<i>Area of Eroding Streambank (FT²)</i>	<i>Lateral Recession Rate (Estimated) (FT / Year)</i>	<i>Estimated Volume (FT³) Eroded Annually</i>	<i>Soil Texture</i>	<i>Approximate Pounds of Soil per FT³</i>	<i>Estimated Soil Loss (Tons/Year)</i>
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

Water Quality Trade – Streambank Info

<i>Field Number</i>	<i>Eroding Streambank Reach Number</i>	<i>Estimated Soil Loss (Tons/Year)</i>	<i>Estimated Soil Loss (Pounds/Year)</i>	<i>Estimated Soil Loss (Kgs/Year)</i>	<i>Phosphorous Concentration (ppm)</i>	<i>Estimated Phosphorous Loss (Kgs/year)</i>	<i>Estimated Phosphorous Loss (Lbs/year)</i>
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

Water Quality Trade

Trade Ratio

- 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:

$$\text{Trade Ratio} = \text{Delivery} + \text{Downstream} + \text{Equivalency} + \text{Uncertainty} - \text{Habitat Adjustment} : 1$$

↓
0.4

↓
2

Trade Ratio 2.4:1

Water Quality Trade

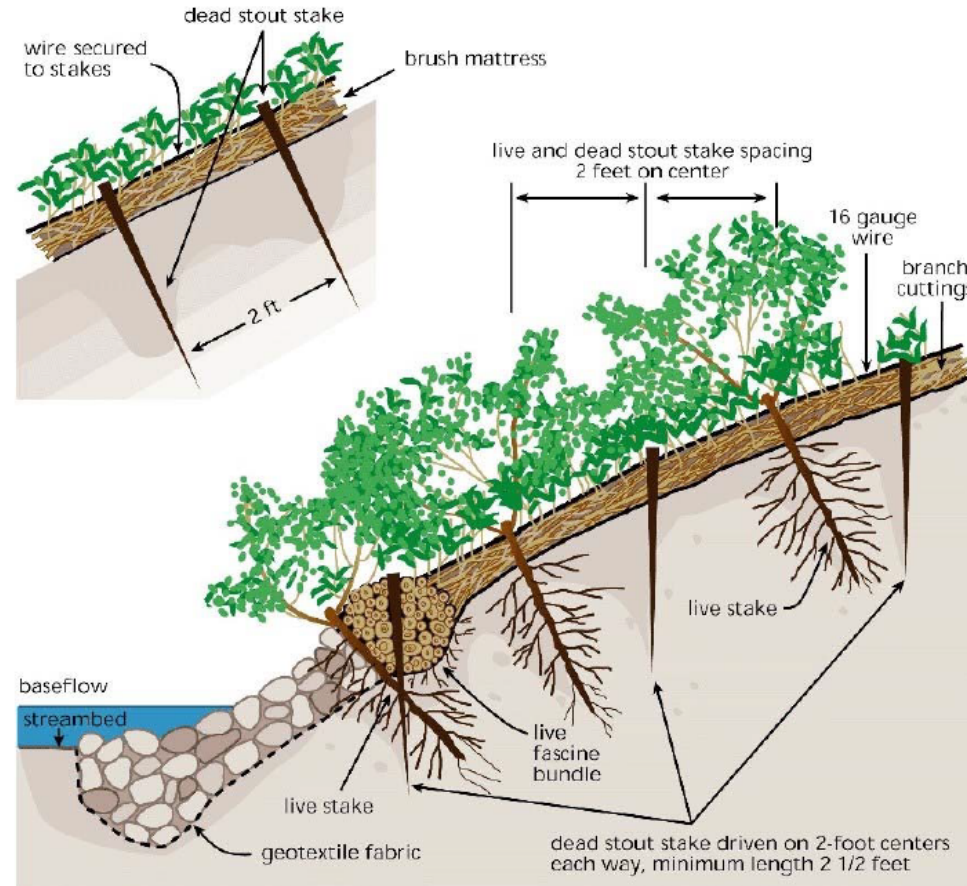


Figure 15. Example of Brush Matting Streambank Technique. Image Credit: Stream Corridor Restoration: Principles, Processes and Practices, 10/98, by the Federal Interagency Stream Restoration Working Group (FISRWG).

Water Quality Trade O&M

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

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

Water Quality Trade

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)

Page 1 of 3

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):				
<input type="checkbox"/> Permitted Discharge (non-MS4CAFO)		<input checked="" type="checkbox"/> Urban nonpoint source discharge		
<input type="checkbox"/> Permitted MS4		<input type="checkbox"/> Agricultural nonpoint source discharge		
<input type="checkbox"/> Permitted CAFO		<input type="checkbox"/> Other - Specify: _____		
Are any of the credit generators in a different HUC 12 than the applicant? <input type="radio"/> Yes; HUC 12: _____				

Water Quality Trade

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
<input type="checkbox"/> Urban NPS <input type="checkbox"/> Agricultural NPS <input type="checkbox"/> 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.

Shoreline Protection



Shoreline Protection



Shoreline Protection - Habitat



Shoreline Protection - Habitat



Shoreline Protection



Shoreline Protection



Shoreline Protection



Shoreline Protection



WQT – 2021 Credits Used

- July – December median TP conc. 0.081 mg/L
- ADF: 0.64 MGD
- Credits Used $(0.081 \text{ mg/L} - 0.075 \text{ mg/L}) \times 8.34 \times 0.641 \text{ MGD} \times 2.4$ (trade ratio) $\times (365/2) = 14$ pounds per six-month period.
- Credits Available : 73 pounds per 6-month period, 146 pounds per year
- Construction Cost : \$241,000
 - Cost Per Foot: \$366
 - Cost Per Lb. of P Removed per year: \$2,040

Summary

- Start Early
- Control What You Can To Optimize at WWTF
- Use Regulators as a Resource
- Regulators Review WQT Plan and Soil Sampling Very Closely
- Annual Report Trading Plan
- Long Term Maintenance
- Educational Signage

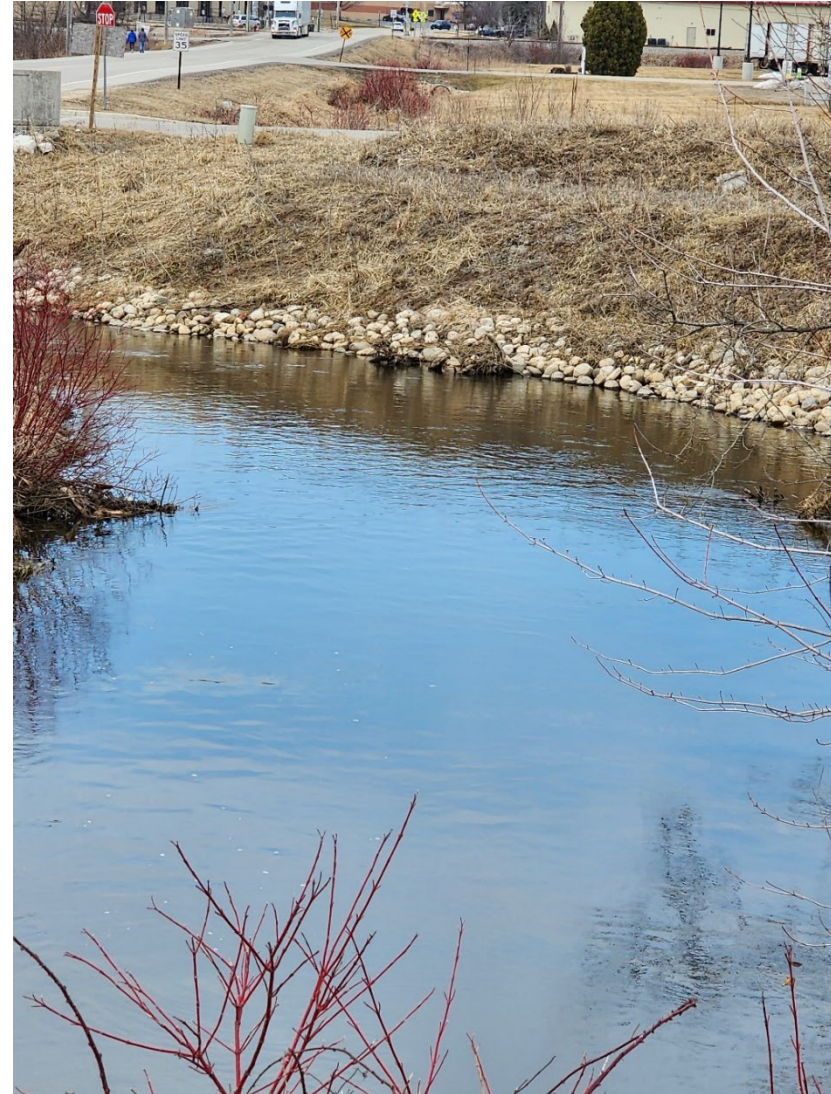


Acknowledgements

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 - Jim Haggerty

- City of Hartford



Questions?

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