CITY OF FORT ATKINSON

Water Quality Trading Plan

September 26, 2022

Prepared By

WATER RESOURCE ASSOCIATES

BACKGROUND

The City of Fort Atkinson is an operator of a municipal separate storm sewer system (MS4) currently regulated by the Wisconsin DNR under General Permit WI-S050075-3 which requires compliance with the standards specified in Administrative Code NR 216.07(6)(b) and NR 151.13. These codes require quantification of annual loads and reductions of Total Suspended Solids (TSS) and Total Phosphorus (TP) in storm water runoff from the City's Municipal Separate Storm Sewer System (MS4).

The standards outlined within NR 151 require that regulated communities achieve a 20% reduction in TSS in runoff that enters waters of the state, relative to no controls. The City's 2009 Citywide Storm Water Management Plan completed by MSA Professional Services identified that the City was achieving a 12.3% TSS reduction and recommended the implementation of several additional storm water quality treatment practices to improve its TSS reduction performance. The City has completed construction of the Larson Lagoon project which brought the estimated TSS reduction achieved by the City's storm water system to approximately 29.6%. This brought the City into compliance with the 20% TSS reduction target.

In September 2011, USEPA approved a Total Maximum Daily Load (TMDL) for the Rock River Watershed which identified reductions of TSS and TP necessary to restore water quality to achieve designated uses for the Rock River and its tributaries. In addition to the requirement for Citywide reductions in TSS loads previously discussed, General Permit WI-S050075-3 requires additional reductions in TSS and TP according to the recommendations of USEPA approved TMDLs. The City of Fort Atkinson is located entirely within the Rock River Watershed and drains to three distinct reaches tributary to the Rock River: Rock River from Mile 213 to Bark River (R60), Bark River (R59) , and Rock River from Bark River to Crawfish River (R54).

In 2018, MSA Professional Services completed the City's Storm Water Quality Plan Update - Rock River TMDL Assessment. Taken from that plan update, Table 1 below summarizes TSS and TP loads within the three reaches within the City.

Table 1 - Current TSS and TP Reduction Performance

Study Area	Regulated Area	TSS Load				TP Load			
	(acres)	Load In (tons/yr)	Trapped (tons/yr)	Reduction	Req.	Load In (lbs/yr)	Trapped (lbs/yr)	Reduction	Req.
Rock River (R60)	2,058	324	119	36.7%	41%	1,999	596	29.8%	48%
Bark River (R59)	150	21	3	15.4%	49%	145	17	11.5%	66%
Rock River (R54)	469	86	6	6.5%	44%	479	26	5.4%	72%

The City's storm water management system was found to not met the TSS and TP reduction requirements identified in the TMDL for all three reaches of the Rock River Watershed, so the City will need to implement additional water quality practices to achieve the required pollutant load reductions.

The City is currently constructing a large improvement project at the Waste Water Treatment Facility

(WWTF) involving installation of ultrafiltration equipment. This project is necessary to achieve different permit requirements for operation of the WWTF and is designed to greatly exceed these requirements.

This Water Quality Trading Plan is intended to apply excess reduction in TSS and TP reduction from the WWTF to the portion of the City's storm water quality management system within Reach 60. Because the WWTF is located within Reach 60, it is understood that the excess TSS and TP treatment can be applied at a 1.1:1 ratio to the storm water quality management system. This will allow the City to completely satisfy the pollutant load reduction requirements for all of Reach 60. The remaining excess treatment will then be reserved for future needs.

ANALYSIS OF CREDIT NEED

MSA Professional Services completed the City's Storm Water Quality Plan Update - Rock River TMDL Assessment in 2018. Tables 2 and 3, below, are from the plan update and summarize the storm water quality treatment performance achieved by the City's MS4. Per the MSA analysis, the City is not currently in compliance with TMDL storm water quality standards for any of the reaches for either TSS or TP reductions.

Table 2 - Additional Total Suspended Solids Reductions Necessary to Achieve TMDL Compliance

Reach	TSS			
	Regulated Load (tons/year)	Target Reduction	Actual Reduction	Shortage (tons/year)
Rock River (R54)	86	44%	6.5%	32
Bark River (R59)	21	49%	15.4%	7
Rock River (R60)	324	41%	36.7%	**14**

Table 3 - Additional Total Phosphorus Reductions Necessary to Achieve TMDL Compliance

Reach	TP			
	Regulated Load (lbs/year)	Target Reduction	Actual Reduction	Shortage (lbs/year)
Rock River (R54)	479	72%	5.3%	319
Bark River (R59)	145	66%	11.5%	79
Rock River (R60)	1,999	48%	29.8%	**364**

As indicated in these tables, within Reach 60, the City falls short of the required treatment levels by 14 tons/year for total suspended solids and 364 pounds/year for total phosphorus. The City intends to address these deficiencies by applying excess treatment from the WWTF through this Water Quality Trading Plan. Based on a trading ratio of 1.1: 1 the credits needed to meet the TMDL stormwater requirements are 15.4 tons per year for total suspended solids and 400.4 lbs per year of total

phosphorous.

ANALYSIS OF CREDIT AVAILABILITY

The City has recently completed a significant tertiary improvement project at the Waste Water Treatment Facility (WWTF) involving installation of tertiary filtration equipment. Commissioning of the new tertiary system at the WWTF included a one-month performance test of the completed system. The data from this first month of operation is included in the table below. Average mass of TSS and Tot-P for the 30 days were 63 lbs/d and 2.4 lbs/d respectively, which is well below pending TMDL permit levels. The TMDL permit levels are provided in Tables 5 and 6.

This WWTF project was designed by Donohue & Associates who also collected the data during the commissioning of the new tertiary system. A Donohue memo detailing all WWTF data and the proposed trading limits is attached.

Table 4 - Tertiary Treatment Data from 30 day Performance Test at Start-up

Date	Plant Flow MGD	Secondary Effluent TSS mg/L	Final Effluent TSS mg/L	Final Effluent TSS lbs/d	Secondary Effluent Tot-P mg/L	Final Effluent Tot-P mg/L	Final Effluent Tot-P lbs/d
08/16/22	1.79	15	3.8	57	0.66	0.17	2.54
08/17/22	1.88	14.7	4.6	72	0.83	0.19	2.98
08/18/22	1.92	14.3	3.4	54	0.62	0.16	2.56
08/19/22	1.94	12	4.2	68	0.63	0.18	2.91
08/20/22	1.27	10.7	5.4	57	0.8	0.28	2.97
08/21/22	1.32	11	4	44	0.56	0.24	2.64
08/22/22	1.72	11.7	4	57	0.58	0.13	1.86
08/23/22	1.82	13.3	4.4	67	0.73	0.2	3.04
08/24/22	1.83	17.7	5.6	85	0.91	0.25	3.82
08/25/22	1.84	9.7	3.6	55	0.43	0.16	2.46
08/26/22	1.74	11.7	4.4	64	0.5	0.19	2.76
08/27/22	1.66	5	4	55	0.37	0.19	2.63
08/28/22	1.9	17	6.2	98	0.63	0.17	2.69
08/29/22	1.83	9.3	3.6	55	0.48	0.13	1.98

08/30/22	1.75	9	3.8	55	0.4	0.12	1.75
08/31/22	1.8	12.7	5.4	81	0.44	0.13	1.95
09/01/22	1.7	8.3	4.2	60	0.42	0.17	2.41
09/02/22	1.52	3.3	4.2	53	0.26	0.15	1.90
09/03/22	1.25	3.7	4.6	48	0.3	0.15	1.56
09/04/22	0.89	6.7	3.8	28	0.6	0.27	2.00
09/05/22	1.07	8	3	27	0.6	0.2	1.78
09/06/22	1.57	9.7	2	26	0.55	0.12	1.57
09/07/22	1.6	9.7	4.4	59	0.61	0.14	1.87
09/08/22	1.59	11	3.2	42	0.49	0.13	1.72
09/09/22	1.48	8.7	4.6	57	0.46	0.13	1.60
09/10/22	1.54	9.7	4.6	59	0.68	0.16	2.05
09/11/22	2.34	15.7	5.2	101	0.62	0.17	3.32
09/12/22	3.83	12	3.6	115	0.49	0.11	3.51
09/13/22	2.5	9.3	3.4	71	0.4	0.11	2.29
09/14/22	2.79	10.7	5	116	0.42	0.11	2.56
AVERAGE	**1.79**	**10.7**	**4.2**	**63**	**0.55**	**0.17**	**2.39**

Table 5 - Monthly TSS Limits from WPDES Permit

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
Jan	659	870
Feb	732	966
March	659	870
April	683	902
May	659	870
June	683	902
July	659	870
Aug	659	870
Sept	683	902
Oct	659	870
Nov	683	902
Dec	659	870

Table 6 - Monthly TP Limits from WPDES Permit

Month	Monthly Ave TP Effluent Limit (lbs/day)
Jan	13.7
Feb	19.5
March	20.7
April	23.5
May	22.4
June	20.8
July	16.2
Aug	12.8
Sept	11.2
Oct	10.4
Nov	10.6
Dec	11.5

The proposed Trade Agreement TSS and TP Limits are provided in tables 7 and 8. These are based on the WWTF operating data, the TMDL permit limits, and the goal to minimize chemical usage.

Table 7 - Trade Agreement TSS Limits for WWTF

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
January	587	870

February	587	966
March	587	870
April	587	902
May	587	870
June	587	902
July	587	870
August	587	870
September	587	902
October	587	870
November	587	902
December	587	870

Table 8 - Trade Agreement TP Limits for WWTF

Month	Monthly Ave TP Effluent Limit (lbs/day)
January	13.7
February	18.7
March	18.7
April	18.7
May	18.7
June	18.7
July	16.2
August	12.8
September	11.2
October	10.4
November	10.6

Month	Monthly Ave TP Effluent Limit (lbs/day)
January	13.7
February	18.7
March	18.7
April	18.7
May	18.7
June	18.7
July	16.2
August	12.8
September	11.2
December	11.5

The proposed WWTP effluent limits for the Trade Agreement would result in annual credits as shown in Table 9. These credits exceed the city's TMDL storm water treatment requirements within Reach 60.

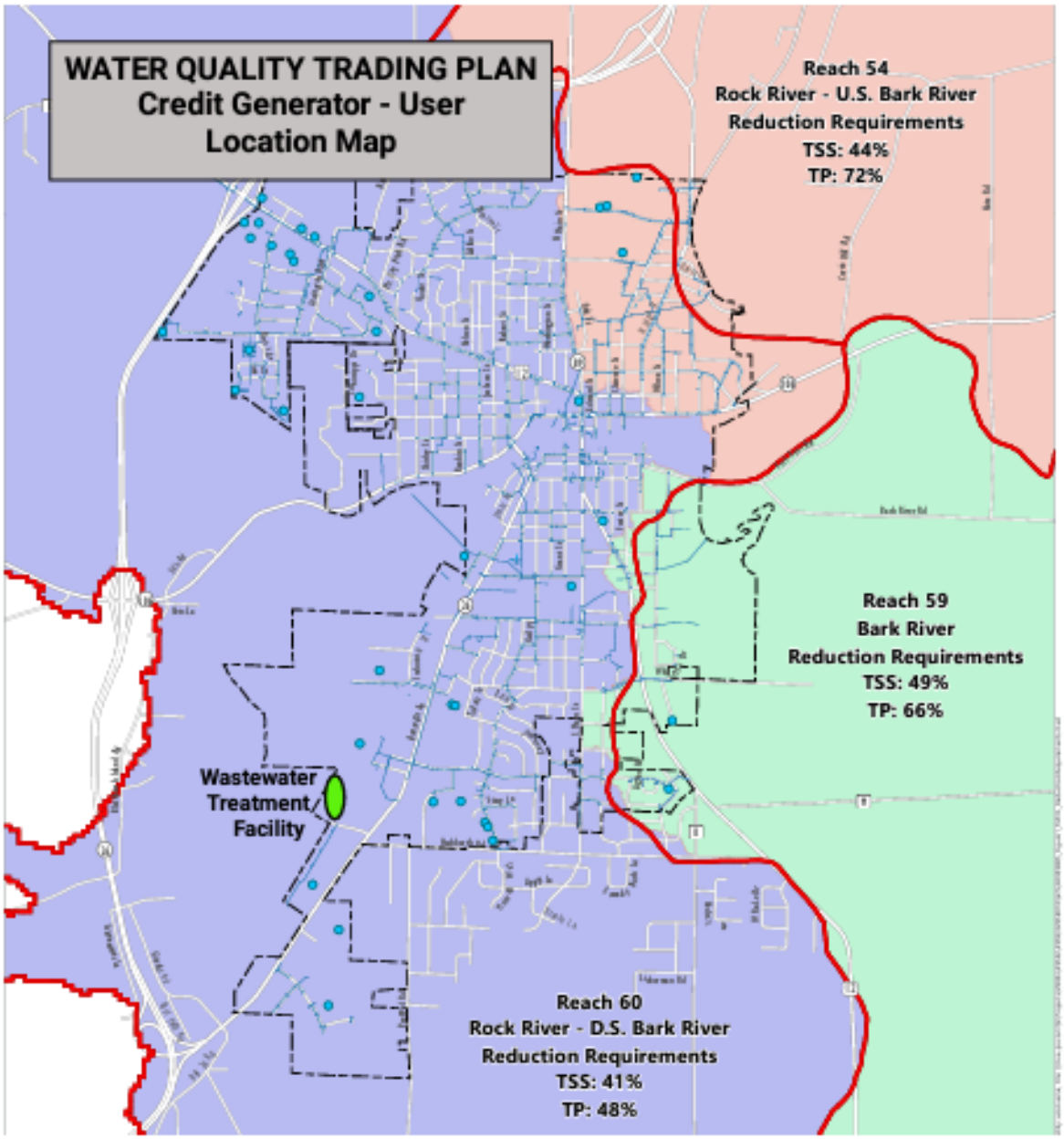
Table 9 - Trade Agreement WWTF Generated Credits

TSS credits generated	15.6 tons/year
TP credits generated	406 lbs/year

CONCLUSION

With completion of the current improvement project, the City of Fort Atkinson's Waste Water Treatment Facility provides high levels of Total Suspended Solids and Total Phosphorous treatment. This treatment allows the City to apply excess treatment to the City's MS4 storm water requirements under the Rock River TMDL through pollutant trading. The WWTF lies within Reach 60 as defined by the TMDL.

Through this Water Quality Trading Plan, the City will apply 14.1 tons/year of TSS and 376 lbs/years of TP from the WWTF to the MS4. These values are both below the credits generated a the WWTF. In doing so the City will meet the MS4 requirements for Reach 60 while continuing to meet the WWTF effluent limits.


WATER QUALITY TRADING PLAN
Credit Generator - User
Location Map
Reach 54
Rock River - U.S. Bark River
Reduction Requirements
TSS: 44%
TP: 72%
Reach 59
Bark River
Reduction Requirements
TSS: 49%
TP: 66%
Wastewater
Treatment
Facility
Reach 60
Rock River - D.S. Bark River
Reduction Requirements
TSS: 41%
TP: 48%

Memorandum

Date: September 22, 2022

To: Timothy Whittaker, Water Resource Associates

Copy: Andy Selle, Fort Atkinson
Paul Christensen, Fort Atkinson

From: Nathan Cassity P.E., Donohue & Associates

Re: Pollutant Trading Plan – WWTF to MS4

Donohue Recommended Trade Agreement Limits for the WWTF

The below provides information for the Pollutant Trading Plan from the perspective of the wastewater treatment facility (WWTF) WPDES permit limits.

1. TSS and Tot-P permitted WWTF effluent limits for the Rock River TMDL:

Monthly TSS Limits from WPDES Permit

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
Jan	659	870
Feb	732	966
March	659	870
April	683	902
May	659	870
June	683	902
July	659	870
Aug	659	870
Sept	683	902
Oct	659	870
Nov	683	902
Dec	659	870

Monthly Tot-P Limits from WPDES Permit

Month	Monthly Ave TP Effluent Limit (lbs/day)
Jan	13.7
Feb	19.5
March	20.7
April	23.5
May	22.4
June	20.8
July	16.2
Aug	12.8
Sept	11.2
Oct	10.4
Nov	10.6
Dec	11.5

2. Donohue recommended reduced effluent limits for TSS & Tot-P:

Commissioning of the new tertiary system at the WWTF included a one month performance test of the completed system. The data from this first month of operation is included in the table below. Average mass of TSS and Tot-P for the 30 days were 63 lbs/d and 2.4 lbs/d respectively, well below pending TMDL permit levels. Please note this performance is with relatively high ferric chloride dosing and no focus on minimizing chemical usage. This performance demonstrates the ability of the new tertiary system to meet reduced effluent limits for the trade agreement.

Tertiary Treatment Data from 30 day Performance Test at Start-up

Date	Plant Flow MGD	Secondary Effluent TSS mg/L	Final Effluent TSS mg/L	Final Effluent TSS lbs/d	Secondary Effluent Tot-P mg/L	Final Effluent Tot-P mg/L	Final Effluent Tot-P lbs/d
08/16/22	1.79	15	3.8	57	0.66	0.17	2.54
08/17/22	1.88	14.7	4.6	72	0.83	0.19	2.98
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08/26/22	1.74	11.7	4.4	64	0.5	0.19	2.76
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08/30/22	1.75	9	3.8	55	0.4	0.12	1.75
08/31/22	1.8	12.7	5.4	81	0.44	0.13	1.95
09/01/22	1.7	8.3	4.2	60	0.42	0.17	2.41
09/02/22	1.52	3.3	4.2	53	0.26	0.15	1.90
09/03/22	1.25	3.7	4.6	48	0.3	0.15	1.56
09/04/22	0.89	6.7	3.8	28	0.6	0.27	2.00
09/05/22	1.07	8	3	27	0.6	0.2	1.78
09/06/22	1.57	9.7	2	26	0.55	0.12	1.57
09/07/22	1.6	9.7	4.4	59	0.61	0.14	1.87

09/08/22	1.59	11	3.2	42	0.49	0.13	1.72
09/09/22	1.48	8.7	4.6	57	0.46	0.13	1.60
09/10/22	1.54	9.7	4.6	59	0.68	0.16	2.05
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09/13/22	2.5	9.3	3.4	71	0.4	0.11	2.29
09/14/22	2.79	10.7	5	116	0.42	0.11	2.56
AVERAGE	**1.79**	**10.7**	**4.2**	**63**	**0.55**	**0.17**	**2.39**

The below limit values are recommended by Donohue based on minimizing chemical usage to meet performance utilizing the new tertiary treatment system at the WWTF. They are conservative since the new tertiary system has recently started up and long term performance data is not available. Since the new tertiary treatment is sized for future flows and loads to 2035, the City will be able to meet these recommended permit limits through the next 10 years.

Recommended Trade Agreement TSS Limits for the WWTF

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)
January	587	870
February	587	966
March	587	870
April	587	902
May	587	870
June	587	902
July	587	870
August	587	870
September	587	902

October	587	870
November	587	902
December	587	870

Recommended Trade Agreement Tot-P Limits for the WWTF

Month	Monthly Ave TP Effluent Limit (lbs/day)
January	13.7
February	18.7
March	18.7
April	18.7
May	18.7
June	18.7
July	16.2
August	12.8
September	11.2
October	10.4
November	10.6
December	11.5

You'll notice the Tot-P limits do not change for the months of January, July, August, September, October, November, and December since the permit limits are below Donohue's recommendation. During these months chemical usage will be increased in the new tertiary treatment system to achieve compliance.

3. The proposed WWTP effluent limits for the Trade Agreement would result in the following annual credits being generated.

TSS credits generated per year	15.6 tons/year
Tot-P credits generated per year	406 lbs-P/year