

Permit Fact Sheet

General Information

Permit Number	WI-0030881-10-0
Permittee Name and Address	CITY OF WATERLOO 575 Commercial Ave, Waterloo, WI 53594
Permitted Facility Name and Address	Waterloo Wastewater Treatment Facility 401 Hendricks St, Waterloo, WI 53594
Permit Term	October 01, 2026 to September 30, 2031
Discharge Location	South bank of the Maunesha River at 401 Hendricks Street, Waterloo NE ¼ of the SW ¼ of Section 5, T8N, R13E.
Receiving Water	Maunesha River in Maunesha River Watershed of Upper Rock River Basin in Jefferson County
Stream Flow (Q _{7,10})	2.4 cfs
Stream Classification	Warm water sport fish community, non-public water supply and recreational use
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	0.617 MGD
Industrial or Commercial Contributors	Briess Malting and Van Holten Pickles
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; P - Total Phosphorus; D - Disinfection; L - Laboratory; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Waterloo Wastewater Treatment Facility accepts wastes from both the City of Waterloo and the Portland Sanitary District 1. The facility consists of influent screening, grit removal and dewatering, biological phosphorus removal, activated sludge, final clarification, tertiary disk filtration (previously sand filters), and UV disinfection. Facility also provides supplemental Alum addition for phosphorus removal. Solids treatment consists of aerobic sludge digestion and sludge storage followed by dewatering via screw press before being hauled off by a contractor.

The facility completed an upgrade in January 2026. The upgrade primarily addressed the aging system, increased flows to the plant, planned for growth over the next 20 years, and addressed total phosphorus and total suspended solid limits. The discharge location did not change.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on **6/18/2024**, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Ashley Brechlin on 7/10/2024.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
701	0.41 MGD (2025)	Influent: 24-Hr flow proportional composite samples collected prior to the Hycor Fine Screen just past the flume in the influent channel. Flow meter located above the V notch flume.
001	N/A – flow meter installed recently	Effluent: 24-Hr flow proportional composite samples collected in the sand filter room before the UV disinfection. Grab samples collected past the flume in the effluent channel after UV disinfection. Flow meter is located prior to the UV disinfection.
002		Aerobically digested, Liquid, Class B. Representative sludge samples shall be collected from the aerobic digester.
005	872 dry U.S. tons (per 2026 permit application)	Aerobically digested, Sludge Press, Cake, Class B. Representative sludge sample shall be collected at the end of the screw press.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

1.1.1 Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

1.1.2 Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD5 and total suspended solids is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirements in s. NR 210.05, Wis. Adm. Code, and in the Standard Requirements section of the permit.

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	12 mg/L	3/Week	24-Hr Flow Prop Comp	May - October
BOD5, Total	Weekly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	November - April
BOD5, Total	Monthly Avg	12 mg/L	3/Week	24-Hr Flow Prop Comp	May - October
BOD5, Total	Monthly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	November - April
BOD5, Total	Weekly Avg	46 lbs/day	3/Week	Calculated	May - October
BOD5, Total	Weekly Avg	92 lbs/day	3/Week	Calculated	November - April
Suspended Solids, Total	Weekly Avg	12 mg/L	3/Week	24-Hr Flow Prop Comp	May - October
Suspended Solids, Total	Weekly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	November - April
Suspended Solids, Total	Monthly Avg	12 mg/L	3/Week	24-Hr Flow Prop Comp	May - October
Suspended Solids, Total	Monthly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	November - April
Suspended Solids, Total	Weekly Avg	59 lbs/day	3/Week	Calculated	January, March, October, and December
Suspended Solids, Total	Weekly Avg	70 lbs/day	3/Week	Calculated	February, April and November
Suspended Solids, Total	Weekly Avg	46 lbs/day	3/Week	Calculated	May - September
Suspended Solids, Total	Monthly Avg	42 lbs/day	3/Week	Calculated	January, March, May, July, August, October and December
Suspended Solids, Total	Monthly Avg	50 lbs/day	3/Week	Calculated	February, April, June, September and November

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	6.0 mg/L	5/Week	Grab	
Nitrogen, Ammonia (NH3-N) Total	Daily Max	17 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	8.2 mg/L	3/Week	24-Hr Flow Prop Comp	May - September
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	9.9 mg/L	3/Week	24-Hr Flow Prop Comp	April
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	16 mg/L	3/Week	24-Hr Flow Prop Comp	October - March
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	6.0 mg/L	3/Week	24-Hr Flow Prop Comp	May - September
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	5.7 mg/L	3/Week	24-Hr Flow Prop Comp	April
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	9.4 mg/L	3/Week	24-Hr Flow Prop Comp	October - March
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	May - September.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	May - September. See the E. Coli Percent Limit section. Enter the result in the DMR on the last day of the month.
Chloride		mg/L	4/Month	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.91 lbs/day	3/Week	Calculated	January
Phosphorus, Total	Monthly Avg	1.18 lbs/day	3/Week	Calculated	February
Phosphorus, Total	Monthly Avg	1.1 lbs/day	3/Week	Calculated	March
Phosphorus, Total	Monthly Avg	1.2 lbs/day	3/Week	Calculated	April
Phosphorus, Total	Monthly Avg	1.14 lbs/day	3/Week	Calculated	May
Phosphorus, Total	Monthly Avg	1.26 lbs/day	3/Week	Calculated	June

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Phosphorus, Total	Monthly Avg	0.95 lbs/day	3/Week	Calculated	July and November
Phosphorus, Total	Monthly Avg	0.86 lbs/day	3/Week	Calculated	August
Phosphorus, Total	Monthly Avg	0.83 lbs/day	3/Week	Calculated	September
Phosphorus, Total	Monthly Avg	0.9 lbs/day	3/Week	Calculated	October
Phosphorus, Total	Monthly Avg	0.88 lbs/day	3/Week	Calculated	December
Temperature Maximum		deg F	Daily	Continuous	Monitoring only in 2030
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section below. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Chronic WET	Monthly Avg	1.6 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET Section.

2.1.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

- **Flow-** Reporting of effluent flow added as a flow meter was added with the recent upgrade.
- **Ammonia-** Monthly average limits updated.
- **pH and DO-** Sample frequency increased.
- **E. coli-** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- **Chloride-** Sampling monthly in 2030.
- **WET-** Sampling periods updated and chronic WET limit updated.

2.1.2 Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated May 20, 2026.

Monitoring Frequencies- The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. Sampling for pH and DO set to the minimum for all municipal treatment plants. Sample frequency for other parameters are at appropriate sample frequency because the facility did not have consistent effluent violations, no variable flow and loadings, and is consistent with other similar facilities.

TMDL - A total maximum daily load (TMDL) was developed for the Rock River Basin to determine the maximum amounts of phosphorus and sediment that can be discharged to protect and improve water quality. The Rock River Basin's TMDL was approved by the Environmental Protection Agency (EPA) on September 28, 2011. These final effluent limits were derived from and comply with the applicable water quality criterion and is consistent with the assumptions and requirements of the EPA-approved wasteload allocation (WLA) for the Rock River. The entire report can be found at: <https://dnr.wisconsin.gov/topic/TMDLs/RockRiver/index.html>. The proposed permit includes limitations and requirements necessary to implement the recommendations of the TMDL.

- **Suspended Solids, Total:** The TMDL mass limits are in addition to the concentration limit for suspended solids. The approved total suspended solids TMDL limits for this permittee are expressed as weekly average and monthly average effluent limits and were already effective during the previous permit term.
- **Phosphorus:** Wasteload allocations specified in TMDLs are expressed as WQBELs (water quality based effluent limits). The WLA-derived WQBELs are consistent with the assumptions and requirements of the approved Rock River TMDL. The approved total phosphorus TMDL limits for this permittee are expressed as monthly average effluent limits and were already effective during the previous permit term.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
002	B	Liquid	Fecal Coliform	Injection	Land Application	Not used
005	B	Cake	Hauled to another facility	Hauled to another facility	Hauled to another facility	872
Does sludge management demonstrate compliance? Yes						
Is additional sludge storage required? No						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? No						

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

3.1 Sample Point Number: 002- LIQUID SLUDGE and 005- CAKE SLUDGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	Only required if land application under this permit occurs.
Nitrogen, Ammonium (NH4-N) Total		Percent	Annual	Composite	Only required if land application under this

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					permit occurs.
Phosphorus, Total		Percent	Annual	Composite	Only required if land application under this permit occurs.
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	Only required if land application under this permit occurs.
Potassium, Total Recoverable		Percent	Annual	Composite	Only required if land application under this permit occurs.
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2027.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2027.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

3.1.1 Changes from Previous Permit:

Sludge limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

PCB- Sampling year updated.

PFAS –Monitoring is required annually pursuant to s. NR 204.06(2)(b)9, Wis. Adm. Code.

3.1.2 Explanation of Limits and Monitoring Requirements

Requirements for disposal, including land application of municipal sludge, are determined in accordance with ch. NR 204, Wis. Adm. Code. Ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7), Wis. Adm. Code. for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k), Wis. Adm. Code.

PFAS- The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has developed a draft risk assessment to determine future land application rates and released this risk assessment in January of 2025. The department is evaluating this new information. Until a decision is made, the “Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS” should be followed

Collecting sludge data on PFAS concentrations from a wide range of wastewater treatment facilities will help protect public health from exposure to elevated levels of PFAS and determine the department's implementation of EPA's recommendations. To quantitate this risk, PFAS sampling has been included in this WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9, Wis. Adm. Code.

4 Schedules

4.1 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan Submittal: Submit an update to the management plan to optimize the land application system performance and demonstrate compliance with ch. NR 204, Wis. Adm. Code, by the Due Date. This management plan shall 1) specify information on pretreatment processes (if any); 2) identify land application sites; 3) describe site limitations; 4) address vegetative cover management and removal; 5) specify availability of storage; 6) describe the type of transporting and spreading vehicle(s); 7) specify monitoring procedures; 8) track site loading; 9) address contingency plans for adverse weather and odor/nuisance abatement; and 10) include any other pertinent information. Once approved, all landspreading activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the Department prior to implementing the changes. Plan is due 60 days prior to land application.	

4.1.1 Explanation of Schedule

An up-to-date Land Application Management Plan is required that documents how the permittee will manage the land application of biosolids consistent with ch. NR 204, Wis. Adm. Code

Other Comments

None

Attachments

Water Quality Based Effluent Limits May 20, 2026

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By:

Jennifer Jerich, Wastewater Specialist

Date: 7/16/2026

Date amended post Fact Check:

Date amended post Public Notice:

CORRESPONDENCE/MEMORANDUM**State of Wisconsin**

DATE: May 20, 2026

TO: Jennifer Jerich – SCR/Horicon

FROM: Sarah Luck – SCR/Fitchburg

SUBJECT: Water Quality-Based Effluent Limitations for the Waterloo Wastewater Treatment Facility
WPDES Permit No. WI-0030881-10-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Waterloo Wastewater Treatment Facility in Jefferson County. This municipal wastewater treatment facility (WWTF) discharges to the Mauneshia River, located in the Mauneshia River Watershed in the Upper Rock River Basin. This discharge is included in the Rock River TMDL as approved by EPA on September 28, 2011. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at Outfall 001:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD ₅ May – October November – April			12 mg/L 46 lbs/day 24 mg/L 92 lbs/day	12 mg/L 24 mg/L	2
TSS May – October November - April			12 mg/L 24 mg/L	12 mg/L 24 mg/L	2,3
pH	9.0 s.u.	6.0 s.u.			2
Dissolved Oxygen		6.0 mg/L			2
Ammonia Nitrogen April May – September October – March	17 mg/L 17 mg/L 17 mg/L		9.9 mg/L 8.2 mg/L 16 mg/L	5.7 mg/L 6.0 mg/L 9.4 mg/L	-
<i>E. coli</i> May – September				126 #/100 mL geometric mean	4
Chloride					5
Phosphorus TBEL Final Mass Limit				1.0 mg/L TMDL	3,6
Temperature November			64°F		7
TKN, Nitrate+Nitrite, and Total Nitrogen					8
Chronic WET				1.6 TUc	9

Footnotes:

1. Monitoring only.
2. No changes from the current permit.
3. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL (or that were previously in effect – see note below table).

Month	Monthly Ave TSS Limit lbs/day	Weekly Ave TSS Limit lbs/day	Monthly Ave Total P Limit lbs/day
Jan	42	59	0.91
Feb	50	70	1.18
March	42	59	1.10
April	50	70	1.20
May	42	46*	1.14
June	50	46*	1.26
July	42	46*	0.95
Aug	42	46*	0.86
Sept	50	46*	0.83
Oct	42	59	0.90
Nov	50	70	0.95
Dec	42	59	0.88

* The weekly average mass limit of 46 lbs/day, which went into effect prior to the TMDL approval, is more restrictive than the TMDL limit and therefore replaces the TMDL limit.

4. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
5. Chloride monitoring is recommended to continue at a frequency of four times per month.
6. The concentration limit is a technology-based effluent limit (TBEL) that will remain effective in addition to the final TMDL mass limits.
7. Year-round temperature monitoring is recommended in addition to the limit.
8. Annual total nitrogen monitoring is recommended for all minor municipal permittees per the Department's October 1, 2019 *Guidance for Total Nitrogen Monitoring in Wastewater Permits*. Sections 283.37(5) and 283.55(1)(e), Wis. Stats, and ss. NR 200.065(1)(g) and NR 200.065(1)(h), Wis. Adm. Codes, provide the authority to request this monitoring during the permit term. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total Kjeldahl nitrogen (TKN) (all expressed as N).
9. Annual chronic WET monitoring is recommended. The Instream Waste Concentration (IWC) to assess chronic test results is 61%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5%. The primary control water used in chronic WET tests conducted on Outfall 001 shall be a grab sample collected from the Maunsha River. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

The recommended limits meet the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, and additional limits are not required.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Sarah Luck (Sarah.Luck@wisconsin.gov) or Diane Figiel (Diane.Figiel@wisconsin.gov).

Attachments (4) – Narrative, Site Map, Ammonia Nitrogen Calculations, and Thermal Table

PREPARED BY: *Sarah Luck* Date: May 20, 2026
Sarah Luck
Water Resources Engineer

E-cc: Ashley Brechlin, Wastewater Engineer – SCR/Fitchburg
Lisa Creegan, Regional Wastewater Supervisor – SCR/Fitchburg
Diane Figiel, Water Resources Engineer – WY/3
Nate Willis, Wastewater Section Manager – WY/3

Water Quality-Based Effluent Limitations for Waterloo Wastewater Treatment Facility

WPDES Permit No. WI-0030881-10-0

PART 1 – BACKGROUND INFORMATION

Facility Description

The Waterloo Wastewater Treatment Facility accepts wastes from both the City of Waterloo and the Portland Sanitary District 1. The facility consists of influent screening, grit removal and dewatering, biological phosphorus removal, activated sludge, final clarification, tertiary disk filtration (previously sand filters), and UV disinfection. Facility also provides supplemental Alum addition for phosphorus removal. Solids treatment consists of aerobic sludge digestion and sludge storage followed by dewatering via screw press before being hauled off by a contractor.

The facility completed an upgrade in January 2026. The upgrade primarily addressed the aging system, increased flows to the plant, planned for growth over the next 20 years, and addressed total phosphorus and total suspended solid limits. The discharge location did not change.

Attachment #2 is a map of the area showing the approximate location of Outfall 001.

Existing Permit Limitations

The current permit, which expired on March 31, 2025, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
BOD ₅ May – October November – April			12 mg/L 46 lbs/day 24 mg/L 92 lbs/day	12 mg/L 24 mg/L	1
TSS May – October November - April			12 mg/L 46 lbs/day 24 mg/L	12 mg/L 24 mg/L	1,2
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		6.0 mg/L			1
Ammonia Nitrogen April May – September October – March	17 mg/L 17 mg/L 17 mg/L		9.9 mg/L 8.2 mg/L 16 mg/L	6.9 mg/L 7.8 mg/L 11 mg/L	1
Fecal Coliform May – September			656#/100 mL geometric mean	400#/100 mL geometric mean	1,5
Phosphorus				1.0 mg/L	2,3

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Chloride			900 mg/L		4
Temperature					6
TKN, Nitrate+Nitrite, and Total Nitrogen					7
Acute WET					8
Chronic WET				1.9 TU _c	8

Footnotes:

1. No changes from the current permit.
2. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.

Month	Monthly Ave TSS Limit lbs/day	Weekly Ave TSS Limit lbs/day	Monthly Ave Total P Limit lbs/day
Jan	42	59	0.91
Feb	50	70	1.18
March	42	59	1.10
April	50	70	1.20
May	42	59	1.14
June	50	70	1.26
July	42	59	0.95
Aug	42	59	0.86
Sept	50	70	0.83
Oct	42	59	0.90
Nov	50	70	0.95
Dec	42	59	0.88

3. The concentration limit is a technology-based effluent limit (TBEL) that will remain effective in addition to the final TMDL mass limits.
4. This is the interim variance limit for chloride. The calculated WQBELs are 730 mg/L and 2,800 lbs/day as a weekly average, as well as an alternative wet weather weekly average limit of 6,000 lbs/day; these limits go into effect March 31, 2025.
5. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
6. Monitoring in the fourth year of the permit term.
7. Annual monitoring in rotating quarters.
8. Two acute and annual chronic WET tests were required. The IWC for chronic WET was 54%.

Receiving Water Information

- Name: Maunsha River
- Waterbody Identification Code (WBIC): 837500
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply and recreational use.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following updated 7-Q₁₀ and 7-Q₂ values are from Station # UR59, (USGS gaging station # 05425847) near the Waterloo

WWTF.

Annual 7-Q₁₀ = 2.4 cubic feet per second (cfs)

Annual 7-Q₂ = 5.9 cfs

Harmonic Mean Flow = 14.9 cfs using a drainage area of 91.3 mi²

The Harmonic Mean has been estimated based on average flow and the 7-Q₁₀ using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q ₁₀ (cfs)	4.4	5.0	8.5	15	8.2	5.2	3.8	3.1	2.7	3.4	4.4	4.3
7-Q ₂ (cfs)	11	12	25	31	17	12	8.8	7.5	7.5	8.7	12	11

- Hardness = 341 mg/L as CaCO₃. This value represents the geometric mean of data from seven chronic WET tests conducted by Waterloo Wastewater Treatment Facility from 2021 through 2025.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from Koshkonong Creek is used for this evaluation because there is no data available for the Mauneshia River. Koshkonong Creek is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: Marshall Wastewater Treatment Facility discharges to the Mauneshia River approximately seven miles upstream of Outfall 001. The mixing zones do not overlap, and so this does not impact this evaluation.
- Impaired water status: Outfall 001 discharges into the Mauneshia River which is 303(d) listed as impaired (listed 4/1/1998) for phosphorus and sediment/total suspended solids (TSS). The Mauneshia River is in the Rock River basin which has an EPA-approved TMDL that addresses the phosphorus and TSS impairments in the watershed.

Effluent Information

- Flow rate:
 - Design annual average = 0.617 million gallons per day (MGD)
 - Peak daily design = 1.995 MGD
 - Peak weekly design = 1.471 MGD
 - Peak monthly design = 1.359 MGD

The peak design flows are from the *Wastewater Treatment Facility Facilities Planning Document* submitted by Town and Country Engineering, Inc. dated May 2021. The peak weekly flow rate of 1.471 MGD is from the *City of Waterloo Projected Loadings Amendment* memo from Town and Country Engineering, Inc. dated August 26, 2022.

For reference, the actual average flow (measured as influent from April 2020 through March 2026 was 0.38 MGD.
- Hardness = 465 mg/L as CaCO₃. This value represents the geometric mean of four samples collected in March 2024 which were reported on the permit application.
- Wastewater source: Domestic wastewater with one industrial contributor (Van Holten's Pickles). It should be noted that Van Holten's Pickles installed a pretreatment system to reduce chlorides being sent to Waterloo Wastewater Treatment Facility before April 1, 2025.

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- Water supply: Municipality waterworks.
- Additives: Waterloo Wastewater Treatment Facility has included two additives in the permit application that have the potential to be present in the effluent. The additives are listed below:
 - Aluminum Sulfate – phosphorus removal
 - Qwik-zyme L

An additive review is not necessary for any additives where either the toxicity is well documented and understood, can be controlled by a WQBEL, or are not believed to be present in the discharge. This is the case upon initial review of the listed additive.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus hardness.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Copper Effluent Data

Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)
03/20/24	7.0	04/03/24	5.8	04/16/24	5.7
03/23/24	7.6	04/06/24	4.9	04/20/24	5.0
03/27/24	6.7	04/09/24	4.8	04/24/24	5.2
03/30/24	6.8	04/13/24	4.7		
1-day P ₉₉ = 8.6 µg/L					
4-day P ₉₉ = 7.1 µg/L					

Chloride Effluent Data

	Chloride (mg/L)
1-day P ₉₉	1581
4-day P ₉₉	1111
30-day P ₉₉	866
Mean	745
Std	268.65
Sample size	347
Range	380 - 1684

The following table presents the average concentrations and loadings at Outfall 001 from April 2020 through March 2026 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameters with Effluent Limits

	Average Measurement	Average Mass Discharged
BOD ₅	0.7 mg/L*	2.6 lbs/day
TSS	1.4 mg/L*	4.7 lbs/day
pH field	7.4 s.u.	
Dissolved Oxygen	8.8 mg/L	
Ammonia Nitrogen	0.25 mg/L	

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	Average Measurement	Average Mass Discharged
Fecal Coliform	1 #/100 mL**	
Phosphorus	0.30 mg/L	1.03 lbs/day
Chloride	745 mg/L	

*Results below the limit of detection (LOD) were included as zeroes in calculation of average.

** The average measurement for bacteria is calculated as a geometric mean. Values reported below the LOD are replaced with a value of 1 for the calculation of the geometric mean.

PART 2 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P₉₉) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q₁₀

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Adm. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q₁₀ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

$$\text{Limitation} = \frac{(\text{WQC}) (Q_s + (1-f) Q_e) - (Q_s - f Q_e) (C_s)}{Q_e}$$

Where:

WQC = Acute toxicity criterion or secondary acute value according to ch. NR 105, Wis. Adm. Code.

Q_s = average minimum 1-day flow which occurs once in 10 years (1-day Q₁₀)
if the 1-day Q₁₀ flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q₁₀).

Q_e = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

C_s = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Waterloo Wastewater Treatment Facility, and the limits are set based on two times the acute toxicity criteria.

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The following tables list the calculated WQBELs for this discharge along with the results of effluent sampling. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness (mg/L) and chloride (mg/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 1.9 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Arsenic		340	679.6	135.9	<0.14		
Cadmium	457	58.9	117.8	23.6	<0.098		
Chromium	301	4,446	8,891.7	1,778	<3.3		
Copper	465	66.1	132.3			8.6	7.6
Lead	356	365	729.3	145.9	<5.4		
Nickel	268	1,080	2,160.6	432	<4.7		
Zinc	333	345	689.4	137.9	13		
Chloride (mg/L)		757	1,514.0			556***	575***

* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

** The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q₁₀ flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

*** These values are from effluent chloride data from April 2025 through March 2026 when the final chloride limits and Van Holten's Pickles pretreatment system went into effect in April 2025. See chloride discussion below tables.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0.60 cfs (¼ of the 7-Q₁₀), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK- GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P ₉₉	4-day Max
Arsenic		152.2		248	49.6	<0.14		
Cadmium	175	3.82	0.0165	6.21	1.2	<0.098		
Chromium	301	325.75		530	106.1	<3.3		
Copper	341	29.55	1.23	47.3			7.1	
Lead	341	91.55	0.37	148.9	29.8	<5.4		
Nickel	268	120.18		196	39.1	<4.7		
Zinc	333	344.68	1.9	560	112.0	13		
Chloride (mg/L)		395		643			503**	561**

* The indicated hardness may differ from the receiving water hardness because the receiving water hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the chronic criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

** These values are from effluent chloride data from April 2025 through March 2026 when the final chloride limits and Van Holten's Pickles pretreatment system went into effect in April 2025. See chloride discussion below tables.

Monthly Average Limits based on Wildlife Criteria (WC)

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 3.7 cfs ($\frac{1}{4}$ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK- GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.0165	1,809.93	361.99	<0.098
Chromium (+3)	3,818,000		18,677,226.42	3,735,445.28	<3.3
Lead	140	0.37	683	136.7	<5.4
Nickel	43,000		210,351	42,070	<4.7

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 3.7 cfs ($\frac{1}{4}$ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	65.1	13.01	<0.14

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, **no effluent limitations are required**. Monitoring recommendations are made in the paragraphs below.

Chloride – The current permit contains chloride effluent limits that went into effect April 1, 2025. The only industrial contributor, Van Holten's Pickles, was considered to be a major source of chlorides at Waterloo Wastewater Treatment Facility. Van Holten's Pickles recently implemented a pretreatment system to reduce chlorides sent to the wastewater treatment facility which was completed prior to the chloride limits becoming effective.

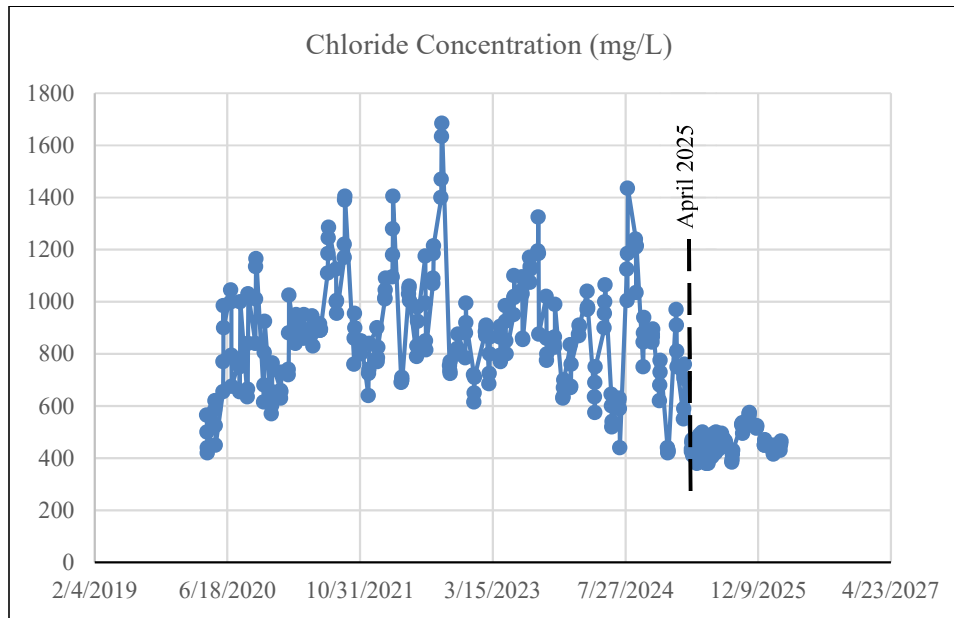
The following table and graph summarize effluent chloride monitoring data from April 2020 through March 2026 and effluent data since the final chloride limits and Van Holten's Pickles pretreatment system went into effect in April 2025.

Chloride Effluent Data

	April 2020 through March 2026		April 2025 through March 2026 (data since final chloride limits went into effect)	
	Concentration (mg/L)	Mass (lbs/day)	Concentration (mg/L)	Mass (lbs/day)
1-day P ₉₉	1,581	4,703	556	2,454
4-day P ₉₉	1,111	3,408	503	2,032

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	April 2020 through March 2026		April 2025 through March 2026 (data since final chloride limits went into effect)	
	Concentration (mg/L)	Mass (lbs/day)	Concentration (mg/L)	Mass (lbs/day)
30-day P ₉₉	866	2,723	471	1,793
Mean	745	2,379	453	1,666
Std	268.65	766.07	40.90	290
Sample size	347	347	107	107
Range	380 – 1,684	713 – 4,396	380 - 575	713 – 2,605



Considering effluent data since April 2025, the effluent concentrations are below the calculated WQBELs for chloride. Therefore, **no effluent limits are needed. Chloride monitoring is recommended to continue at the current frequency of four times per month on consecutive days** to ensure chloride levels do not increase and to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Antidegradation and Antibacksliding

Since the current treatment capability and the pretreatment measures at Van Holten's Pickles are expected to remain in place, the removal of the weekly and monthly average limits will not increase the concentration, level, or loading of chloride to the Mauneshia River. Therefore, antidegradation would not be applicable. To be consistent with antibacksliding requirements, the current limit may be removed in accordance with s. NR 207.12(3)(b)2., Wis. Adm. Code.

Mercury – The permit application did not require monitoring for mercury because Waterloo Wastewater Treatment Facility is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3, Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, “there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5), Wis. Adm. Code.” A review of the past five years of sludge characteristics

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data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from October 2020 through February 2025 (n=6) was 0.41 mg/kg, with a maximum reported concentration of 1.5 mg/kg. Therefore, **no mercury monitoring is recommended at Outfall 001.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code.

Available monitoring sample data from Waterloo Waterworks (PWS ID: 12801151) is provided in the table below:

Water Supply PFAS Data				
Sample Date	Sample ID	Well #	PFOS (ng/L)	PFOA (ng/L)
5/24/2023	CB05551-05	BG015	ND	ND
5/24/2023	CB05551-02	BG016	ND	ND
5/10/2023	CB04915-01	BG014	ND	ND

The data above shows the municipal water supply is below one-fifth of the applicable PFOS and PFOA criteria.

Based on the type of discharge, the effluent flow rate, type of indirect discharger contributing to the collection system, and absence of PFOS/PFOA in the source water, **PFOS and PFOA monitoring is not recommended.** The Department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BOD₅, DISSOLVED OXYGEN, AND PH

BOD₅ and DO

Updated weekly and monthly average biochemical oxygen demand (BOD₅) limits were calculated in the facility planning WQBEL memo dated September 12, 2022 and account for the increased design flow rate of 0.617 MGD. Based on the newly calculated limits, the conclusion was that the BOD₅ limits already in effect were more restrictive than the updated limits. Therefore, without a demonstration of need for higher limits under ch. NR 207, Wis. Adm. Code, **the limits of 12 mg/L and 46 lbs/day in May through October and 24 mg/L and 92 lbs/day November through April are recommended to continue, along with the dissolved oxygen (DO) limit of 6.0 mg/L.**

pH

In accordance with s. NR 102.04(4)(c), Wis. Adm. Code, **pH shall be within the range of 6.0 s.u. to 9.0 s.u.** for fish and aquatic life.

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum, weekly average, and monthly average

limits.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation:

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - \text{pH})})] + [B \div (1 + 10^{(\text{pH} - 7.204)})]$$

Where:

A = 0.411 and B = 58.4 for a Warm Water Sport fishery, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 2191 sample results were reported from April 2020 through March 2026. The maximum reported value was 8.0 s.u. (Standard pH Units). The effluent pH was 7.8 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.8 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.7 s.u. Therefore, a value of 7.8 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.8 s.u. into the equation above yields an ATC = 12.14 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the the 1-Q₁₀ receiving water low flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit (mg/L)
2×ATC	24
1-Q ₁₀	36

The 2×ATC method yields the most stringent limits for Waterloo Wastewater Treatment Facility.

The limit of 24 mg/L, calculated above, is greater than the current daily maximum limit of 17 mg/L. If Waterloo Wastewater Treatment Facility would like to request an increase to the existing permit limits, an assessment of effluent data consistent with the requirements of s. NR 207.031, Wis. Adm. Code, must be provided. This evaluation is on a parameter-by-parameter basis and includes consideration of operations, maintenance, and temporary upsets. **Without a demonstration of need for a higher limit in accordance with s. NR 207.031, Wis. Adm. Code, the current daily maximum limit of 17 mg/L must be continued in the reissued permit.**

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Presented below is a table of daily maximum limitations corresponding to various effluent pH values. Use of this table is not necessarily recommended in the permit, but it is presented herein for informational purposes.

Daily Maximum Ammonia Nitrogen Limits – WWSF

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq \text{pH} \leq 6.1$	108	$7.0 < \text{pH} \leq 7.1$	66	$8.0 < \text{pH} \leq 8.1$	14
$6.1 < \text{pH} \leq 6.2$	106	$7.1 < \text{pH} \leq 7.2$	59	$8.1 < \text{pH} \leq 8.2$	11
$6.2 < \text{pH} \leq 6.3$	104	$7.2 < \text{pH} \leq 7.3$	52	$8.2 < \text{pH} \leq 8.3$	9.4
$6.3 < \text{pH} \leq 6.4$	101	$7.3 < \text{pH} \leq 7.4$	46	$8.3 < \text{pH} \leq 8.4$	7.8
$6.4 < \text{pH} \leq 6.5$	98	$7.4 < \text{pH} \leq 7.5$	40	$8.4 < \text{pH} \leq 8.5$	6.4
$6.5 < \text{pH} \leq 6.6$	94	$7.5 < \text{pH} \leq 7.6$	34	$8.5 < \text{pH} \leq 8.6$	5.3
$6.6 < \text{pH} \leq 6.7$	89	$7.6 < \text{pH} \leq 7.7$	29	$8.6 < \text{pH} \leq 8.7$	4.4
$6.7 < \text{pH} \leq 6.8$	84	$7.7 < \text{pH} \leq 7.8$	24	$8.7 < \text{pH} \leq 8.8$	3.7
$6.8 < \text{pH} \leq 6.9$	78	$7.8 < \text{pH} \leq 7.9$	20	$8.8 < \text{pH} \leq 8.9$	3.1
$6.9 < \text{pH} \leq 7.0$	72	$7.9 < \text{pH} \leq 8.0$	17	$8.9 < \text{pH} \leq 9.0$	2.6

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)

Weekly and monthly average ammonia nitrogen limits were calculated in the facility planning WQBEL memo dated and account for the increased design flow rate of 0.617 MGD. The calculations from the facility planning WQBEL memo are shown in Attachment #3. The daily maximum and weekly average limits did not change, and the monthly average limits decreased slightly.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from April 2020 through March 2026.

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen (mg/L)	April	May – September	October – March
1-day P ₉₉	2.32	1.89	4.03
4-day P ₉₉	1.54	1.33	2.79
30-day P ₉₉	0.64	0.58	1.19
Mean	0.21	0.15	0.34
Std	0.68	0.62	1.28
Sample size	78	393	468
Range	0.02 - 4.11	0.02 - 7.62	0.01 - 17.3

Reasonable Potential

The need to include ammonia limits in Waterloo Wastewater Treatment Facility's permit is determined by calculating 99th upper percentile (or P₉₉) values for ammonia and comparing those to the calculated limits. Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. However, since the permit currently has daily, weekly, and monthly average limits year-round, **the limits must be retained regardless of reasonable potential**, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

(b) If a permittee is subject to an ammonia limitation in an existing permit, the limitation shall be included in any reissued permit. Ammonia limitations shall be included in the permit if the permitted facility will be providing treatment for ammonia discharges.

Conclusions and Recommendations

In summary, after rounding to two significant figures, the following ammonia nitrogen limitations are recommended. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Final Ammonia Nitrogen Limits

	Daily Maximum (mg/L)	Weekly Average (mg/L)	Monthly Average (mg/L)
April & May	17	9.9	5.7*
June – September	17	8.2	6.0*
October – March	17	16	9.4*

*These limits are the only values that decreased based on the ammonia nitrogen calculation; all others are carried over from the current permit and cannot be increased unless the conditions in ch. NR 207, Wis. Adm. Code, are satisfied.

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Code, became effective which replace fecal coliform limits with new *Escherichia coli* (*E. coli*) limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.
2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Since Waterloo Wastewater Treatment Facility's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

These limits are required from May through September. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data

Waterloo Wastewater Treatment Facility has monitored effluent *E. coli* from May 2024 through September 2024, and a total of 21 results are available. A geometric mean of 126 counts/100 mL was not exceeded, and the maximum monthly geometric mean was 1.8 counts/100 mL. Effluent data did not exceed 410 counts/100 mL; the maximum reported value was 7 counts/100 mL. Based on this effluent data **it appears that the facility can meet new *E. coli* limits, and a compliance schedule is not needed in the reissued permit.**

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PART 6 – PHOSPHORUS

Technology-Based Effluent Limit

Wisconsin Administrative Code, ch. NR 217, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of Total Phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.

Since Waterloo Wastewater Treatment Facility currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent water quality-based concentration limit is given.

In addition, the need for a WQBEL for phosphorus must be considered.

Water-Quality Based Effluent Limit

Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These rule revisions include additions to ch. NR 102, Wis. Adm. Code (s. NR 102.05, Wis. Adm. Code), which establish phosphorus standards for surface waters. Revisions to ch. NR 217, Wis. Adm. Code (s. NR 217, Subchapter III) establish procedures for determining water quality-based effluent limits for phosphorus, based on the applicable standards in ch. NR 102.

The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices can be found at: <https://dnr.wisconsin.gov/topic/TMDLs/RockRiver/index.html>.

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality-based effluent limit (WQBEL) for phosphorus in addition to, or in lieu of, a s. NR 217.13, Wis. Adm. Code, WQBEL in a WPDES permit. The Rock River Basin TMDL was developed to protect and improve the water quality of phosphorus impaired waters within the basin. Since the discharge from the Waterloo Wastewater Treatment Facility flows directly into the Mauneshia River, which was listed as phosphorus impaired prior to the TMDL development, the TMDL limit can be included in the WPDES permit absent the s. NR 217.13, Wis. Adm. Code, WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13, Wis. Adm. Code, WQBEL unless these reductions are likely to occur.

TMDL Limits

The monthly average total phosphorus effluent limits in pounds per day (lbs/day) are calculated based on the monthly phosphorus wasteload allocation (WLA) given in pounds per month as suggested in the Draft Guidance for Implementing TMDLs in Wisconsin dated February 12, 2013. These limits are equivalent to concentrations ranging from 0.16 mg/L to 0.24 mg/L at the facility design flow of 0.617 MGD. **Monthly average mass effluent limits with accordance to the following table are recommended for this discharge.**

Total Phosphorus Effluent Limitations

Month	Monthly Total P WLA ¹ lbs/month	Days Per Month	Monthly Ave Total P Effluent Limit ² lbs/day
Jan	28.15	31	0.91
Feb	33.15	28	1.18
March	33.98	31	1.10
April	35.9	30	1.20
May	35.28	31	1.14
June	37.66	30	1.26
July	29.44	31	0.95
Aug	26.59	31	0.86
Sept	24.98	30	0.83
Oct	28.02	31	0.90
Nov	28.37	30	0.95
Dec	27.24	31	0.88

Footnotes:

1- Rock River TMDL Appendix P. Monthly Total Phosphorus Allocations by Wastewater Treatment Facility (p. 147)

2- Monthly average Total P effluent limit (lbs/day) = monthly Total P WLA (lbs/month) ÷ days per month

Effluent Data – Phosphorus

The following table summarizes effluent total phosphorus monitoring data from April 2020 through March 2026.

Total Phosphorus Effluent Data

	Concentration (mg/L)	Mass (lbs/day)
1-day P ₉₉	1.22	4.63
4-day P ₉₉	0.69	2.56
30-day P ₉₉	0.42	1.49
Mean	0.30	1.03
Std	0.24	0.93
Sample size	1.22	4.63
Range	0.69	2.56

Phosphorus Conclusion

Monthly average mass limits based on the TMDL WLA are recommended. Since the receiving water is an impaired segment covered under an approved TMDL, no s. NR 217.13, Wis. Adm. Code, WQBELs are recommended at this time. **The concentration limit of 1.0 mg/L is recommended to continue.**

PART 7 – TOTAL SUSPENDED SOLIDS**Concentration Limits**

Total suspended solids (TSS) limitations are primarily given to maintain or improve water clarity and are not water quality based. Water quality concerns from TSS are addressed through the Rock River TMDL. TSS concentration limits are typically established as the same concentration as the BOD₅ limits. Therefore, **weekly and monthly average TSS concentration limits of 12 mg/L from May through**

October and 24 mg/L from November through April are recommended.

Mass Limits

TMDL Mass Limits

The Rock River TMDL has wasteload allocations (WLA) for TSS. For a municipal facility, the limits for TSS must be expressed as weekly and monthly averages.

Monthly average and weekly average mass effluent limitations should be included in the permit. For reference, the mass limits shown are equivalent to concentrations ranging from 8.2 – 9.7 mg/L as a monthly average and 11.5 – 13.6 mg/L as a weekly average at the design flow of 0.617 MGD.

Total Suspended Solids Effluent Limitations

Month	Monthly TSS WLA ¹ (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit ² (lbs/day)	Weekly Ave TSS Effluent Limit ³ (lbs/day)
Jan	0.65	31	42	59
Feb	0.7	28	50	70
March	0.65	31	42	59
April	0.75	30	50	70
May	0.65	31	42	59
June	0.75	30	50	70
July	0.65	31	42	59
Aug	0.65	31	42	59
Sept	0.75	30	50	70
Oct	0.65	31	42	59
Nov	0.75	30	50	70
Dec	0.65	31	42	59

Footnotes:

1- Rock River TMDL Appendix Q. Monthly Total Suspended Solids Allocations by Wastewater Treatment Facility (p. 149)

2- Monthly average TSS effluent limit (lbs/day) = maximum monthly TSS WLA (tons/month) ÷ days per month x 2,000 lbs/ton

3- Weekly average effluent limit (lbs/day) = monthly average limit (lbs/day) x multiplier

Weekly average TMDL mass limits were calculated in 2014. At that time, the coefficient of variation (CV) (the standard deviation divided by the mean) was assumed to be 0.6, and the monitoring frequency was 3x/week. Given these two factors, a multiplier of 1.41 was used. **Since Waterloo Wastewater Treatment Facility is meeting the TSS wasteload allocation, as demonstrated in the table below, the TMDL mass limits are not recalculated.**

Estimated Total TSS Mass by Month

Average Mass (lbs/month)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2021	218	243	293	254	100	0	0	197	283	0	193	181
2022	190	305	472	268	197	233	196	176	0	222	195	206
2023	231	202	269	268	193	160	212	156	0	164	164	150
2024	184	278	209	243	241	311	288	292	0	179	232	220
2025	209	196	276	413	395	210	334	906	681	641	322	418
Overall avg	206	245	304	289	225	229	257	346	482	301	221	235

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Average Mass (lbs/month)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
WLA	1,300	1,400	1,300	1,500	1,300	1,500	1,300	1,300	1,500	1,300	1,500	1,300

Note: This data was not reported directly. Loading per month was estimated by taking the average TSS concentration and multiplying that by the total flow (MG) and a multiplier (8.34) to generate a value of pounds per month. Over the five years, this average was averaged and compared to the monthly wasteload allocation (WLA) (which was converted from tons/month to pounds/month).

Effluent Data

Limits based on the WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the following table lists the statistics for TSS discharge, as both a concentration and a mass, from January 2021 through December 2025.

Overall TSS Effluent Data

	Concentration (mg/L)	Mass (lbs/day)
1-day P ₉₉	8.8	34.9
4-day P ₉₉	5.0	19.3
30-day P ₉₉	2.5	8.9
Mean*	1.4	4.7
Std	2.1	7.7
Sample Size	939 (552 ND)	939
Range	<2 - 16.4	0 - 50.2

*“<” means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected (ND) result.

Mass Limits Prior to TMDL

Prior to TMDL development, weekly average TSS mass limits of 46 lbs/day from May through October and 92 lbs/day from November through April were effective in the permit and matched BOD₅ mass limits. With the introduction of TMDL limits, the most restrictive mass limit must be retained. Therefore, **a weekly average TSS mass limit of 46 lbs/day from May through October is recommended in place of the weekly average TMDL mass limits during those months; monthly average mass limits from the TMDL are not affected since monthly mass limits were not in effect prior to the TMDL.**

TSS Conclusion

The following TSS concentration and mass limits are recommended:

Month	Weekly Ave & Monthly Ave TSS Conc. Limit (mg/L)	Monthly Ave TSS Mass Limit (lbs/day)	Weekly Ave TSS Mass Limit (lbs/day)
Jan	24	42	59
Feb	24	50	70
March	24	42	59
April	24	50	70
May	12	42	46*
June	12	50	46*
July	12	42	46*

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Month	Weekly Ave & Monthly Ave TSS Conc. Limit (mg/L)	Monthly Ave TSS Mass Limit (lbs/day)	Weekly Ave TSS Mass Limit (lbs/day)
Aug	12	42	46*
Sept	12	50	46*
Oct	12	42	59
Nov	24	50	70
Dec	24	42	59

* The weekly average mass limit of 46 lbs/day, which went into effect prior to the TMDL approval, is more restrictive than the TMDL limits and therefore replaces the TMDL limit.

PART 8 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from April 2020 through March 2026.

The table below summarizes the maximum temperatures reported during monitoring from January 2024 through December 2024.

Temperature Effluent Data & Limits by Month

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	53	54	75	120
FEB	52	53	79	120
MAR	53	54	90	120
APR	55	59	85	120
MAY	63	66	81	120
JUN	67	69	90	103
JUL	71	73	93	98
AUG	79	80	91	95
SEP	76	79	84	95
OCT	72	73	72	108

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Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
NOV	67	69	64	120
DEC	58	61	74	120

Reasonable Potential

Permit limits for temperature are recommended based on the procedures in s. NR 106.56, Wis. Adm. Code.

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute WQBEL. The representative daily maximum effluent temperature is the greater of the following:
 - (a) The highest recorded representative daily maximum effluent temperature
 - (b) The projected 99th percentile of all representative daily maximum effluent temperatures
- A sub-lethal limitation for temperature is recommended for each month in which the representative weekly average effluent temperature for that month exceeds the weekly average WQBEL. The representative weekly average effluent temperature is the greater of the following:
 - (a) The highest weekly average effluent temperature for the month.
 - (b) The projected 99th percentile of all representative weekly average effluent temperatures for the month

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The month in which a limitation is recommended is shown in bold. Based on this analysis, **a weekly average temperature maximum limit is necessary for November. In addition to this limit, year-round monitoring is also recommended.** The complete thermal table can be found in Attachment #4.

The following general options are available for a facility to explore potential relief from the temperature limits:

- Effluent monitoring data: Verification or additional effluent monitoring (flow and/or temperature) may be appropriate if there were questions on the representativeness of the current effluent data.
- Mixing zone studies: A demonstration of rapid and complete mixing may allow for the use of a mixing zone other than the default 25%.
- Dissipative cooling demonstration: Effluent limitations based on sub-lethal criteria may be adjusted based on the potential for heat dissipation from municipal treatment plants as described in s. NR 106.59(4), Wis. Adm. Code.
- Collection of site-specific ambient temperature: default background temperatures for streams in Wisconsin, so actual data from the direct receiving water may provide for relaxed thermal limits but only if the site-specific temperatures are lower than the small stream defaults used in the above tables

- A variance to the water quality standard: This is typically considered to be the least preferable and most complex option as it requires the evaluation of the other alternatives.

These options are explained in additional detail in the August 15, 2013 Department *Guidance for Implementation of Wisconsin's Thermal Water Quality Standards*
<https://dnr.wisconsin.gov/topic/Wastewater/Thermal.html>.

PART 9 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document* (2022).

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC₅₀ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC₂₅ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The **IWC of 61%**, shown in the WET Checklist summary below, was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$\text{IWC (as \%)} = Q_e \div \{(1 - f) Q_e + Q_s\} \times 100$$

Where:

Q_e = annual average flow = 0.617 MGD = 0.955 cfs

f = fraction of the Q_e withdrawn from the receiving water = 0

Q_s = $\frac{1}{4}$ of the 7- Q_{10} = 2.4 cfs $\div$ 4 = 0.6 cfs

- The new IWC of 61% is greater (more restrictive) than the previous IWC of 54% since the design flow rate increased from 0.458 MGD to 0.617 MGD. The new IWC did not affect any of the pass/fail of WET tests.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR

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106.08(3), Wis. Adm. Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

Tests conducted prior to 2005 are not presented in the table below due to significant changes that were made to WET test methods in 2004. These changes were assumed to be fully implemented by certified labs by no later than June 2005. Data collected before July 1, 2005 do not show repeated toxicity that was never resolved and is not the only data that is available.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ % (% survival in 100% effluent)				Chronic Results IC ₂₅ %				Footnotes or Comments
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Pass or Fail?	Use in RP?	
11/14/2006	>100	>100	Pass	No	>100	>100	Pass	No	1
03/12/2007	>100	>100	Pass	No	---	---	---	---	1
05/10/2007	---	---	---	---	>100	>100	Pass	No	1
03/11/2008	---	---	---	---	>100	>100	Pass	No	1
02/24/2009	---	---	---	---	>100	>100	Pass	No	2
03/09/2010	---	---	---	---	>100	>100	Pass	No	2
03/15/2011	---	---	---	---	>100	>100	Pass	No	2
10/07/2014	---	---	---	---	97.7	>100	Pass	No	1
06/24/2015	>100	>100	Pass	No	---	---	---	---	1
01/12/2016	---	---	---	---	>100	>100	Pass	No	1
09/27/2017	>100	>100	Pass	No	---	---	---	---	1
05/15/2018	---	---	---	---	>100	>100	Pass	No	1
11/06/2019	>100	>100	Pass	No					1
10/20/2020	---	---	---	---	77.3	>100	Pass	No	1
02/16/2021	>100	>100	Pass	No	>100	>100	Pass	No	1
04/26/2022	---	---	---	---	>100	>100	Pass	No	1
09/12/2023	---	---	---	---	70.5	>100	Pass	No	1
10/15/2024	>100	>100	Pass	No	72.1	>100	Pass	No	1
02/11/2025	---	---	---	---	>100	48.1	Fail	No	1
07/15/2025	---	---	---	---	>100	>100	Pass	No	1
07/29/2025	---	---	---	---	72.0	>100	Pass	No	1

Footnotes:

1. *Data Not Representative.* WWTP, industrial processes or contributions, or other significant changes have occurred which renders data unrepresentative. The facility underwent a major upgrade that was considered completed by January 1, 2026. Changes included the addition of grit removal, implementation of biological phosphorus removal, and tertiary disk filtration. Additionally, the industrial contributor, Van Holten's Pickles, installed a pretreatment system which was completed by April 1, 2025.
 2. *Tests done by S-F Analytical, July 2008 – March 2011.* The DNR has reason to believe that WET tests completed by SF Analytical Labs from July 2008 through March 31, 2011 were not performed using proper test methods. Therefore, WET data from this lab during this period has been disqualified and was not included in the analysis.
- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the

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likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. **WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.**

According to s. NR 106.08(6)(d), Wis. Adm. Code, TU_a and TU_c effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC₅₀, IC₂₅ or IC₅₀ ≥ 100%).

Acute Reasonable Potential = 0 < 1.0, reasonable potential is not shown, and **an acute WET limit is not required.**

Chronic Reasonable Potential

Since there is currently a chronic WET limit and since the source of toxicity has not been identified, **a chronic WET limit must be retained.**

Expression of WET Limit

Chronic WET limit = $[100/IWC] TU_c = [100/61] = 1.6 TU_c$ **expressed as a monthly average**

The chronic WET limit of 1.6 TU_c, calculated above, is lower than the current WET limit of 1.9 TU_c. This is due to the decrease in IWC which was a result of the increase in design flow rate. Antidegradation and antibacksliding are not applicable since the new chronic WET limit is more restrictive.

The WET checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET checklist, see Chapter 1.3 of the WET Guidance Document: <https://dnr.wisconsin.gov/topic/Wastewater/WET.html>.

WET Checklist Summary

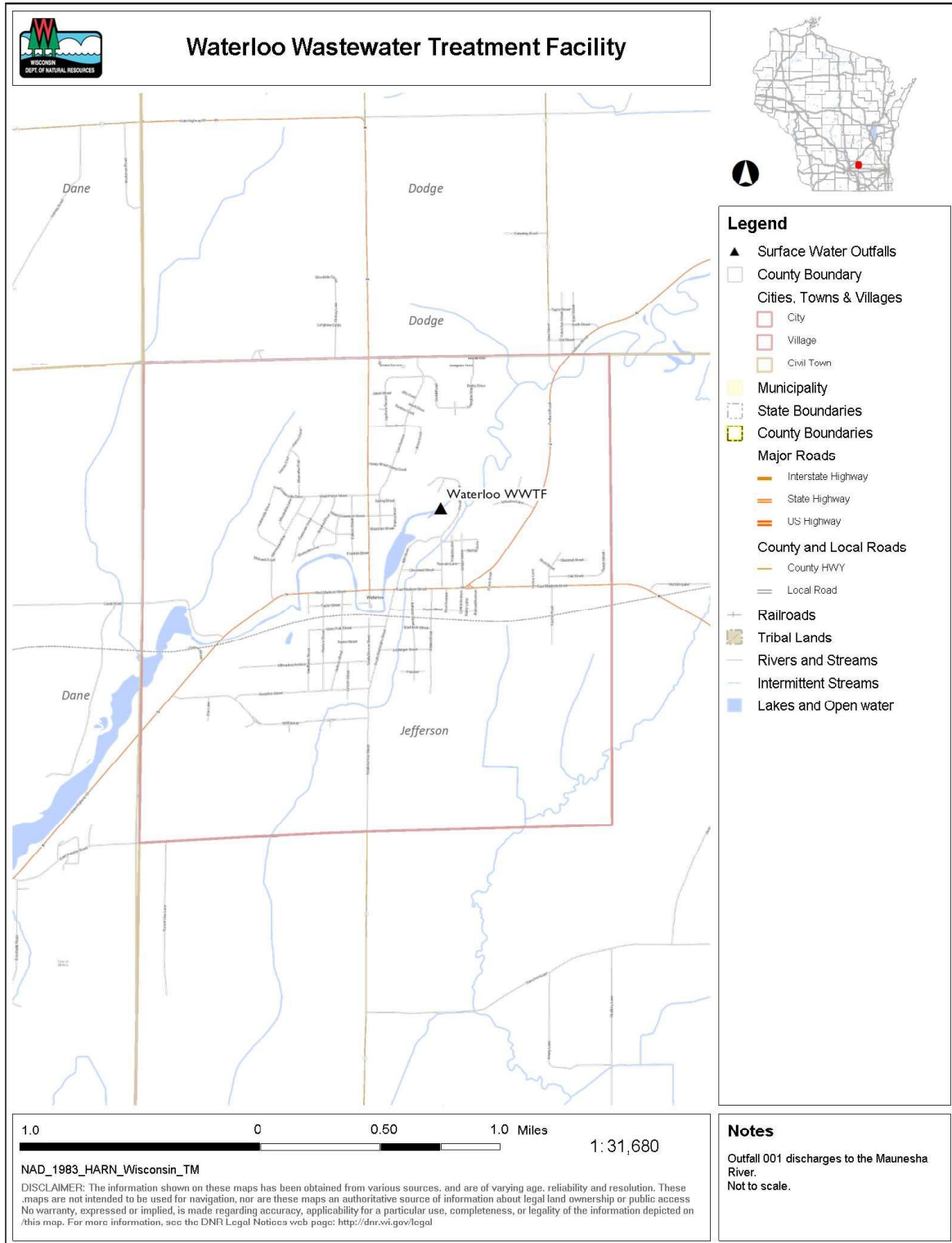
	Acute	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 61% 10 Points
Historical Data	No tests failed, and tests conducted within the last five years. 0 Points	Chronic WET limit retained, and tests conducted within the last five years. 0 Points
Effluent Variability	Little variability, no upsets or significant violations, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	WWSF 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	No reasonable potential for limits based on ATC.	No reasonable potential for limits based on CTC.

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	Acute	Chronic
	Ammonia nitrogen limit carried over from the current permit. Chloride, copper, and zinc detected. Additional Compounds of Concern: None. 3 Points	Ammonia nitrogen limit carried over from the current permit. Chloride, copper, and zinc detected. Additional Compounds of Concern: None. 3 Points
Additives	No biocides and one water quality conditioner (alum) added. Permittee has proper P chemical SOP in place. 1 Point	All additives used more than once per 4 days. 1 Point
Discharge Category	One industrial contributor (Van Holten's Pickles). 5 Points	Same as Acute. 5 Points
Wastewater Treatment	Secondary or better. 0 Points	Same as Acute. 0 Points
Downstream Impacts	No impacts known. 0 Points	Same as Acute. 0 Points
Total Checklist Points:	14 Points	24 Points
Recommended Monitoring Frequency (from Checklist):	No tests required.	2 tests during permit term.
Limit Required?	No	Limit = 1.6 TU _c
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2022) and other information described above, **no acute and annual chronic WET tests are recommended in the reissued permit**. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge. Testing should continue after the permit expiration date (until the permit is reissued).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, **a chronic WET limit is required. The chronic WET limit shall be expressed as 1.6 TU_c as a monthly average in the effluent limits table of the permit. A minimum of annual chronic monitoring is required because a chronic WET limit is required.** Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.

Attachment #2 Site Map



Ammonia Nitrogen Limit Calculations from the Facility Planning Memo Dated September 12, 2022

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Warm Water Sport Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

$$CTC = E \times \{ [0.0676 \div (1 + 10^{(7.688 - pH)})] + [2.912 \div (1 + 10^{(pH - 7.688)})] \} \times C$$

Where:

pH = the pH (s.u.) of the receiving water,

E = 0.854,

C = the minimum of 2.85 or $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Present), or

C = $1.45 \times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Absent), and

T = the temperature (°C) of the receiving water – (Early Life Stages Present), or

T = the maximum of the actual temperature (°C) and 7 – (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q₁₀ (4-Q₃, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q₅ (estimated as 85% of the 7-Q₂ if the 30-Q₅ is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the Maunasha River based on conversations with local fisheries biologists. So “ELS Absent” criteria apply from October through March, and “ELS Present” criteria will apply from April through September for a warmwater sport fishery classification.

Since minimal ambient data is available, the “default” basin assumed values are used for Temperature, pH and background ammonia concentrations, shown in the table below, with the resulting criteria and effluent limitations.

		Spring	Summer	Winter
		April	May – Sept.	Oct. - March
Effluent Flow	Q _e (MGD)	0.617	0.617	0.617
Background Information	7-Q ₁₀ (cfs)	2.4	2.4	2.4
	7-Q ₂ (cfs)	5.9	5.9	5.9
	Ammonia (mg/L)	0.135	0.09	0.07
	Temperature (°C)	9	23	3
	pH (s.u.)	7.97	8.2	7.97
	% of Flow used	25	100	25
	Reference Weekly Flow (cfs)	0.6	2.4	0.6
	Reference Monthly Flow (cfs)	1.25375	5.015	1.25375
Criteria (mg/L)	4-day Chronic			
	Early Life Stages Present	6.35	2.59	6.35
	Early Life Stages Absent	9.06	2.59	10.31

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		Spring	Summer	Winter
		April	May – Sept.	Oct. - March
	30-day Chronic			
	Early Life Stages Present	2.54	1.04	2.54
	Early Life Stages Absent	3.63	1.04	4.12
Effluent Limitations (mg/L)	Weekly Average			
	Early Life Stages Present	10	8.9	
	Early Life Stages Absent			17
	Monthly Average			
	Early Life Stages Present	5.7	6.0	
	Early Life Stages Absent			9.4

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Waterloo WWTF			7-Q₁₀:	2.4 cfs	Temp Dates	Flow Dates
Outfall(s):	001			Dilution:	25%	Start:	01/01/24
Date Prepared:	4/21/2026			f:	0	End:	12/31/24
Design Flow (Q_e):	0.617	MGD		Stream type:	Small warm water sport or forage fish		
Storm Sewer Dist.	0	ft		Qs:Q_e ratio:	0.6 :1		
				Calculation Needed?	YES		

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs) (cfs)	Representative Highest Effluent Flow Rate (Q _e)			f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	T _a (default) (°F)	Sub-Lethal WQC (°F)	Acute WQC (°F)		7-day Rolling Average (Q _{esl}) (MGD)	Daily Maximum Flow Rate (Q _{ed}) (Qea) (MGD)			Weekly Average (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	33	49	76	4.4	0.445	0.571		0	53	54	75	120
FEB	34	50	76	5.0	0.440	0.639		0	52	53	79	120
MAR	38	52	77	8.5	0.500	0.599		0	53	54	90	120
APR	48	55	79	15	0.566	0.699		0	55	59	85	120
MAY	58	65	82	8.2	0.591	0.739		0	63	66	81	120
JUN	66	76	84	5.2	0.622	0.785		0	67	69	90	103
JUL	69	81	85	3.8	0.613	0.768		0	71	73	93	98
AUG	67	81	84	3.1	0.708	0.809		0	79	80	91	95
SEP	60	73	82	2.7	0.539	0.747		0	76	79	84	95
OCT	50	61	80	3.4	0.529	0.589		0	72	73	72	108
NOV	40	49	77	4.4	0.430	0.522		0	67	69	64	120
DEC	35	49	76	4.3	0.392	0.465		0	58	61	74	120