

# Wilson Permit Fact Sheet

## General Information

Permit Number	WI-0032140-10-0
Permittee	Wilson Wastewater Treatment Facility, 440 Main St PO Box 37, Wilson, WI 54027
Permitted Facility	Wilson Wastewater Treatment Facility, 200 60th Avenue, Wilson, WI 54027
Permit Term	July 01, 2025 to June 30, 2030
Discharge Location	44 deg, 56 min, 59 sec Lat., 92 deg, 10 min, 21 sec Long. Southeast bank of Wilson Creek in south ditch to HWY 12
Receiving Water	Wilson Creek in Wilson Creek of Lower Chippewa River Basin in St. Croix County
Stream Flow (Q <sub>7,10</sub> )	0 cfs
Stream Classification	Limited Aquatic Life (LAL), non-public water supply. Wilson Creek at the outfall location can be classified hydraulically as a diffused surface water as defined in NR 104.02(1)(b) and carries a default classification of LAL.
Discharge Type	Existing, seasonal fill and draw
Annual Average Design Flow (MGD)	0.024 MGD
Industrial or Commercial Contributors	None
Plant Classification	A4 - Ponds, Lagoons and Natural Systems; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

## Facility Description

The Village of Wilson operates a three-cell aerated pond treatment system with a holding pond to handle wastewater. The average annual design flow is 0.024 million gallons per day (MGD) and the facility had an actual annual average influent flow of 0.018 MGD in 2024. Discharge is intermittent, as the facility is operated as a fill and draw. No major operational changes occurred in the last permit term. Wilson Creek is classified as a disappearing stream creating the potential for effluent seepage into the groundwater.

## Substantial Compliance Determination

Enforcement During Last Permit: There were no enforcement actions this permit term,

After a desktop review of all discharge monitoring reports, land app reports, compliance schedule, and a compliance inspection on October 16, 2024, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Adebawale Adesanwo on 01/09/2025.

## 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	0.018 (2024)	Representative influent samples shall be collected at the final lift station.
101	No flow monitored	Representative samples shall be collected at the manhole between the clarification cell and holding cell.
001	0.15 (2024)	Representative effluent samples shall be collected from the effluent v-notch weir after the holding cell.
002	Sludge has never been removed from lagoons and is not planned in this permit term.	Representative composite sludge samples shall be collected in 2026 and monitored for the parameters as listed in the table below. If the permittee plans to remove sludge, they shall monitor sludge for Lists 1, 2, 3 & 4 prior to land application. The Department shall be notified at least 30 days in advance of sludge removal so that appropriate monitoring forms can be provided. Approval of landspreading sites must be completed prior to sludge removal.

## Permit Requirements

### 1 Influent – Monitoring Requirements

#### 1.1 Sample Point Number: 701- INFLUENT FINAL LIFT STATION

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	2/Month	Grab	
Suspended Solids, Total		mg/L	2/Month	Grab	

##### 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 Inplant - Monitoring and Limitations

### 2.1 Sample Point Number: 101- DISCHARGE TO HOLDING CELL

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
BOD5, Total		mg/L	2/Month	Grab	
Suspended Solids, Total		mg/L	2/Month	Grab	

#### 2.1.1 Changes from Previous Permit:

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

#### 2.1.2 Explanation of Limits and Monitoring Requirements

The in-plant sample is included to ensure adequate treatment has taken place before discharging to the 365-day holding cell.

## 3 Surface Water - Monitoring and Limitations

### 3.1 Sample Point Number: 001- EFFLUENT @ V-NOTCH WEIR

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate	Daily Max	0.15 MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	30 mg/L	2/Week	Grab	
BOD5, Total	Monthly Avg	20 mg/L	2/Week	Grab	
Suspended Solids, Total	Weekly Avg	30 mg/L	2/Week	Grab	
Suspended Solids, Total	Monthly Avg	20 mg/L	2/Week	Grab	
pH Field	Daily Min	6.0 su	2/Week	Grab	
pH Field	Daily Max	9.0 su	2/Week	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	2/Week	Grab	
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	See Table	Daily max variable limit applies year-round. Look up the variable ammonia limit from the 'Variable Daily Max Ammonia

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					Limitation' table below and report the variable limit in the Ammonia Variable Limit column on the eDMR.
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Daily Max - Variable	mg/L	2/Week	Grab	Report the daily maximum Ammonia result in the Nitrogen, Ammonia (NH <sub>3</sub> -N) Total column of the eDMR. See Ammonia Limitation Section in permit.
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Weekly Avg	see table below for limits	2/Week	Grab	Weekly & monthly average limits vary seasonally. See the Ammonia Limitation Section below for details on when limits apply.
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Monthly Avg	see table below for limits	2/Week	Grab	
Chloride		mg/L	Annual	Grab	Rotate monitoring seasons when possible.
Nitrogen, Total Kjeldahl		mg/L	Annual	Grab	Rotate monitoring seasons when possible.
Nitrogen, Nitrite + Nitrate Total		mg/L	Annual	Grab	Rotate monitoring seasons when possible.
Nitrogen, Total		mg/L	Annual	Calculated	Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen. Rotate monitoring seasons when possible.

### 3.1.1 Changes from Previous Permit

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

- The fecal coliform limits and monitoring have been removed. In the past this requirement was for protection of groundwater in the event that the effluent left the streambed via sinkholes and made it to the aquifer. The location of the receiving stream is on the boundary between Karst bedrock and non-Karst bedrock. Karst geology is prone to sink holes that can create direct conduits to the groundwater aquifer. Given the Karst in this area is not very thick (being on the boundary), any potential sink holes are unlikely to reach the aquifer. Therefore, based on this

evaluation and data gathered from other facilities statewide, the department has determined fecal coliform monitoring and limits are not needed as a measure to protect to groundwater.

### 3.1.2 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 5, 2025 and referenced towards the end of this fact sheet.

**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 and it was determined no monitoring frequency changes are needed.

**MUNICIPAL EFFLUENT LIMITS** – Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the discharge.

**Ammonia:** Weekly and monthly average ammonia limits that vary by the month and daily maximum ammonia limits that vary with effluent pH apply year-round are presented in the tables below.

**Variable Daily Maximum Ammonia Limitations**

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq \text{pH} \leq 6.1$	83	$7.0 < \text{pH} \leq 7.1$	51	$8.0 < \text{pH} \leq 8.1$	11
$6.1 < \text{pH} \leq 6.2$	82	$7.1 < \text{pH} \leq 7.2$	46	$8.1 < \text{pH} \leq 8.2$	8.8
$6.2 < \text{pH} \leq 6.3$	80	$7.2 < \text{pH} \leq 7.3$	40	$8.2 < \text{pH} \leq 8.3$	7.3
$6.3 < \text{pH} \leq 6.4$	78	$7.3 < \text{pH} \leq 7.4$	35	$8.3 < \text{pH} \leq 8.4$	6.0
$6.4 < \text{pH} \leq 6.5$	75	$7.4 < \text{pH} \leq 7.5$	31	$8.4 < \text{pH} \leq 8.5$	4.9
$6.5 < \text{pH} \leq 6.6$	72	$7.5 < \text{pH} \leq 7.6$	26	$8.5 < \text{pH} \leq 8.6$	4.1
$6.6 < \text{pH} \leq 6.7$	69	$7.6 < \text{pH} \leq 7.7$	22	$8.6 < \text{pH} \leq 8.7$	3.4
$6.7 < \text{pH} \leq 6.8$	65	$7.7 < \text{pH} \leq 7.8$	19	$8.7 < \text{pH} \leq 8.8$	2.8
$6.8 < \text{pH} \leq 6.9$	60	$7.8 < \text{pH} \leq 7.9$	16	$8.8 < \text{pH} \leq 8.9$	2.4
$6.9 < \text{pH} \leq 7.0$	56	$7.9 < \text{pH} \leq 8.0$	13	$8.9 < \text{pH} \leq 9.0$	2.0

**Seasonal Weekly Average & Monthly Average Ammonia Limitations**

Month	Weekly Average Limit	Monthly Average Limit
Nov-April	33 mg/L	13 mg/L
May	None	8.5 mg/L
June	16 mg/L	6.6 mg/L
July	14 mg/L	5.8 mg/L
August	15 mg/L	6.1 mg/L
September	None	9 mg/L
October	None	13 mg/L

**PFOS and PFOA:** NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Pursuant to s. NR 106.98(3)(b), Wis. Adm. Code, the department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites and other potential sources of PFOS or PFOA. Based on information available at the time the permit was drafted, the

department has determined the permittee does not need to sample for PFOS or PFOA as part of this permit reissuance. 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.

## 4 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	Sludge has never been removed from the ponds and sludge removal is not anticipated this permit term.			
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						
Is a priority pollutant scan required? No						
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.						

### 4.1 Sample Point Number: 002- PRIMARY CELL SLUDGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Once	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Once	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Once	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Once	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Once	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Once	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Once	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Once	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Once	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Once	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Once	Composite	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nickel Dry Wt	High Quality	420 mg/kg	Once	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Once	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Once	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Once	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Once	Composite	
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total		Percent	Per Application	Composite	
Phosphorus, Total		Percent	Per Application	Composite	
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	
Potassium, Total Recoverable		Percent	Per Application	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

#### 4.1.1 Changes from Previous Permit:

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

Sludge limitations and monitoring requirements were evaluated for this permit term and the following changes described below were made from the previous permit:

**List 2 Nutrient monitoring** – Monitoring for list 2 (nutrients) is highly recommended at the same time as the monitoring of List 1 (metals) in year 2 of the permit. Results will assist in the determination of the acres needed for land application of sludge should it be necessary.

**Change in form submittal** – In prior permit reissuances when it has been noted in the application that sludge would not be removed during the permit term, the department required sampling during the second year of the permit term and the sludge characteristic report (3400-049) would be generated only during that year. Due to moving to electronic submittal of forms via Switchboard, forms 3400-049 (“Characteristics Report”), 3400-052 (“Other Methods of Disposal”) and 3400-055 (“Annual Land Application”) will now be generated by the department and the permittee will be required to submit all three reports each year of the permit term. This change was adopted to provide the permittee flexibility because many lagoon desludging projects can be unexpected, are delayed or staggered over multiple years. Additionally, it is used to officially report that no land application of sludge has occurred, and annual submittal of the forms is required per the standard requirements section.

**PCBs** – PCB monitoring was not required during the last permit term, so it has been added once during this permit term.

**PFAS** – Monitoring for PFAS has been added once during the permit term pursuant s. NR 204.06(2)(b)9., Wis. Adm. Code.

## 4.1.2 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). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k).

**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 potential risks associated with land applying residuals which contain PFOA and/or PFOS. The DNR is evaluating this information and may alter the current approach based on this review. In the interim, the department has developed the “Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS.”

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.

## 5 Schedules

### 5.1 Sludge Management Plan

Required Action	Due Date
Submit Sludge Management Plan: The permittee shall submit a management plan for approval if removal of sludge will occur during this permit term. The plan shall demonstrate compliance with ch. NR 204, Wis. Adm. Code and at minimum address 1) How and where is sludge sampled; 2) Available sludge storage details and location(s); 3) How will the sludge be removed with details on volume, characterization and how will the treatment plant continue to function during the drawdown; 4) Describe the type of transportation and spreading vehicles and loading and unloading practices; 5) Identify approved land application sites, apply for needed sites, site limitations, total acres needed and vegetative cover management; 6) Specify record keeping procedures including site loading; 7) Address contingency plans for adverse weather and odor/nuisance abatement; and 8) Include any other pertinent information such as other disposal options that may be used or specifications of any pretreatment processes	



Once approved, all sludge management 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. No desludging may occur unless approval from the Department is obtained. Daily logs shall be kept that record where the sludge has been disposed.	
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The plan is due at least 60 days prior to desludging.

**Explanation of Sludge Management Plan Schedule:** If the lagoons are to be de-sludged during this permit term, a management plan is needed to show compliance with ch NR 204, Wis. Adm. Code that clearly explains how the sludge will be safely removed, what contingencies are in place, the type of equipment that will be used and how the sludge will be land applied to ensure the proper precautions are in place to prevent any negative impacts to surface water or groundwater.

## Other Comments

Tribune Press Reporter, 105 Misty Court PO Box 38, Glenwood City, WI 54013

## Attachments

Water Quality Based Effluent Limits: May 5, 2025 memo from Ben Hartenbower to Holly Heldstab titled "Water Quality-Based Effluent Limitations for the Wilson Wastewater Treatment Facility WPDES Permit No. WI-0032140"

## Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

**Prepared By:** Holly Heldstab, Wastewater Specialist

**Date:** May 15, 2025

**CORRESPONDENCE/MEMORANDUM****State of Wisconsin**

DATE: May 5, 2025

TO: Holly Heldstab – WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for the Wilson Wastewater Treatment Facility  
WPDES Permit No. WI-0032140

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 Wilson Wastewater Treatment Facility in St. Croix County. This municipal wastewater treatment facility (WWTF) discharges to Wilson Creek, located in the Wilson Creek Watershed in the Lower Chippewa River Basin.

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	0.15 MGD				1
BOD <sub>5</sub>			30 mg/L	20 mg/L	1,2
TSS			30 mg/L	20 mg/L	1,2
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		4.0 mg/L			1,2
Ammonia Nitrogen	Variable			8.5 mg/L	1,3
May					
June				16 mg/L	
July				14 mg/L	
August				15 mg/L	
September				9 mg/L	
October				13 mg/L	
November - April				33 mg/L	
Chloride					1
TKN, Nitrate+Nitrite, and Total Nitrogen					1,4

## Footnotes:

1. No changes from the current permit.
2. These limits are based on the Limited Aquatic Life (LAL) community of the immediate receiving water as described in s. NR 104.02(3)(b), Wis. Adm. Code.

3. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit. These limits apply year-round.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	4.9
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

4. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. 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 (NO<sub>3</sub>), nitrite (NO<sub>2</sub>), and total Kjeldahl nitrogen (TKN) (all expressed as N).

Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the discharge.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Benjamin Hartenbower at (715) 225-4705 or benjamin.hartenbower@gmail.com or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (2) – Narrative & Map

PREPARED BY:



Benjamin Hartenbower, PE,  
Water Resources Engineer

Date: 05/05/2025

E-cc: Adebawale Adesanwo, Wastewater Engineer – WCR/Eau Claire  
Geisa Bittencourt, Regional Wastewater Supervisor – WCR/Eau Claire  
Diane Figiel, Water Resources Engineer – WY/3  
Nate Willis, Wastewater Engineer – WY/3  
Chris Willger, Water Quality Biologist – WCR/Eau Claire

## Water Quality-Based Effluent Limitations for The Wilson Wastewater Treatment Facility

**WPDES Permit No. WI-0032140**

Prepared by: Benjamin P. Hartenbower

### PART 1 – BACKGROUND INFORMATION

#### Facility Description

The Village of Wilson operates a three-cell aerated pond treatment system with a holding pond to handle wastewater. The average annual design flow is 0.024 million gallons per day (MGD). Discharge is intermittent, as the facility is operated as a fill and draw.

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

#### Existing Permit Limitations

The current permit, expiring on 06/30/2025, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate	0.15 MGD				
BOD <sub>5</sub>			30 mg/L	20 mg/L	1,2
TSS			30 mg/L	20 mg/L	1,2
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		4.0 mg/L			2
Ammonia Nitrogen	Variable				3
May				8.5 mg/L	
June			16 mg/L	6.6 mg/L	
July			14 mg/L	5.8 mg/L	
August			15 mg/L	6.1 mg/L	
September				9 mg/L	
October				13 mg/L	
November - April			33 mg/L	13 mg/L	
Fecal Coliform				400#/100 mL Geometric Mean	
Chloride					4
TKN, Nitrate+Nitrite, and Total Nitrogen					4

Footnotes:

Attachment #1

1. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
2. These limits are based on the Limited Aquatic Life (LAL) community of the immediate receiving water as described in s. NR 104.02(3)(b), Wis. Adm. Code.
3. The variable daily maximum ammonia nitrogen limit table corresponding to effluent pH values. These limits apply year-round.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq \text{pH} \leq 6.1$	83	$7.0 < \text{pH} \leq 7.1$	51	$8.0 < \text{pH} \leq 8.1$	11
$6.1 < \text{pH} \leq 6.2$	82	$7.1 < \text{pH} \leq 7.2$	46	$8.1 < \text{pH} \leq 8.2$	8.8
$6.2 < \text{pH} \leq 6.3$	80	$7.2 < \text{pH} \leq 7.3$	40	$8.2 < \text{pH} \leq 8.3$	7.3
$6.3 < \text{pH} \leq 6.4$	78	$7.3 < \text{pH} \leq 7.4$	35	$8.3 < \text{pH} \leq 8.4$	6.0
$6.4 < \text{pH} \leq 6.5$	75	$7.4 < \text{pH} \leq 7.5$	31	$8.4 < \text{pH} \leq 8.5$	4.9
$6.5 < \text{pH} \leq 6.6$	72	$7.5 < \text{pH} \leq 7.6$	26	$8.5 < \text{pH} \leq 8.6$	4.1
$6.6 < \text{pH} \leq 6.7$	69	$7.6 < \text{pH} \leq 7.7$	22	$8.6 < \text{pH} \leq 8.7$	3.4
$6.7 < \text{pH} \leq 6.8$	65	$7.7 < \text{pH} \leq 7.8$	19	$8.7 < \text{pH} \leq 8.8$	2.8
$6.8 < \text{pH} \leq 6.9$	60	$7.8 < \text{pH} \leq 7.9$	16	$8.8 < \text{pH} \leq 8.9$	2.4
$6.9 < \text{pH} \leq 7.0$	56	$7.9 < \text{pH} \leq 8.0$	13	$8.9 < \text{pH} \leq 9.0$	2.0

4. Monitoring only.

#### Receiving Water Information

- Name: Wilson Creek
- Waterbody Identification Code (WBIC): 2066000
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Limited Aquatic Life (LAL), non-public water supply. Wilson Creek at the outfall location can be classified hydraulically as a diffused surface water as defined in NR 104.02(1)(b) and carries a default classification of limited aquatic life. The volume of effluent discharged also seeps into groundwater prior to reaching the permanent flowing portion of Wilson Creek.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code:
  - 7-Q<sub>10</sub> = 0 cubic feet per second (cfs)
  - 7-Q<sub>2</sub> = 0 (cfs)
  - Harmonic Mean Flow = 0 (cfs) using a drainage area of 0 mi<sup>2</sup>
  - The Harmonic Mean has been estimated based on average flow and the 7-Q<sub>10</sub> 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).
- Hardness = 175 mg/L as CaCO<sub>3</sub>. Effluent hardness is used in place of receiving water because there is no receiving water flow upstream of the discharge.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable where the receiving water low flows are zero.
- Source of background concentration data: Background concentrations are not included because they don't impact the calculated WQBEL when the receiving water low flows are equal to zero.
- Impaired water status: The Knapp Wastewater Treatment Facility discharges to the Wilson Creek, however it is several miles downstream and the mixing zones do not overlap. Therefore, other dischargers do not impact this evaluation.

**Effluent Information**

- Design flow rate:  
Annual average = 0.024 million gallons per day (MGD)  
For reference, the actual average flow from 07/01/2020 to 10/31/2024 during discharge periods was 0.15 MGD. Due to the fill and draw operation of this facility, the permitted maximum flow rate of 0.15 MGD is used in the limit calculations.
- Hardness = 175 mg/L as CaCO<sub>3</sub> This value represents the geometric mean of four samples collected in October 2024 which were reported on the permit application.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Wastewater source: Domestic wastewater.
- Water supply: Municipal water supply from the Village of Wilson.
- Additives: None.
- 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 Phosphorus and Hardness. The permit-required monitoring for Ammonia Nitrogen and Chloride from 10/06/2020 to 10/31/2024 is used in this evaluation.
- 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.

**Effluent Data**

Sample Date	Copper (µg/L)	Sample Date	Chloride (mg/L)
10/07/2024	9	10/06/2020	68
10/08/2024	<6	10/12/2022	90
10/10/2024	<6	10/29/2024	79
10/12/2024	6		
10/15/2024	<6		
10/17/2024	<6		
10/19/2024	<6		
10/22/2024	11		
10/24/2024	6		
10/26/2024	<6		
10/29/2024	<6		
Mean	3 µg/L	Mean	79 mg/L

“<” means that the pollutant was not detected at the indicated limit of detection. The mean concentration was calculated using zero in place of the non-detected results.

The following table presents the average concentrations and loadings at Outfall 001 from July 2020 to October 2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

<b>Parameters with Effluent Limits</b>	
	Average Measurement
BOD <sub>5</sub> *	5.7 mg/L
TSS*	6.5 mg/L
pH	8.08 su
Dissolved Oxygen	10.25 mg/L
Ammonia Nitrogen*	1.18 mg/L
Fecal Coliform**	2 #/100 ml

\*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 99<sup>th</sup> percentile (or P<sub>99</sub>) 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-Q<sub>10</sub>**

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. 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-Q<sub>10</sub> 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<sub>s</sub> = average minimum 1-day flow which occurs once in 10 years (1-day Q<sub>10</sub>)  
if the 1-day Q<sub>10</sub> flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q<sub>10</sub>).

Q<sub>e</sub> = 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<sub>s</sub> = 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-Q<sub>10</sub> method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for the Wilson Wastewater Treatment Facility, and the limits are set based on the 1-Q<sub>10</sub> method.

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 and chloride (mg/L).

#### Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0.00 cfs, (1-Q<sub>10</sub> (estimated as 80% of 7-Q<sub>10</sub>)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MEAN BACK- GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P <sub>99</sub>	1-day MAX. CONC.
Arsenic		340		340	68	3.9		
Cadmium	175	55.00		55.11	11.02	<1		
Chromium (+3)	175	2857		2863	573	<2		
Copper	175	26.37		26.42	5.28	3		11
Lead	175	184.06		184.42	36.88	<1		
Nickel	175	754.87		756.33	151.27	<9		
Zinc	175	196.80		197.19	39.44	12		
Chloride (mg/L)		757		758	152	79		90

\* \* Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q<sub>10</sub> flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.



**Weekly Average Limits based on Chronic Toxicity Criteria (CTC)**RECEIVING WATER FLOW = 0.00 cfs (1/4 of the 7-Q<sub>10</sub>), as specified in s. NR 106.06(4), 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 <sub>99</sub>
Arsenic		152		152	30	3.9	
Cadmium	175	3.82		3.82	0.76	<1	
Chromium (+3)	175	209		209	42	<2	
Copper	175	16.74		16.74	3.35	3	
Lead	175	48.21		48.21	9.64	<1	
Nickel	175	118.15		118.15	23.63	<9	
Zinc	175	196.80		196.80	39.36	12	
Chloride (mg/L)		395		395	79	79	

\* 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.

**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 Threshold Criteria (HTC)**

RECEIVING WATER FLOW = 0.00 cfs (1/4 of the 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.	30-day P <sub>99</sub>
Cadmium	880.00		880.00	176.00	<1	
Chromium (+3)	8400000		8400000	1680000	<2	
Lead	2240.0		2240.0	448.0	<1	
Nickel	110000		110000	22000	<9	

**Monthly Average Limits based on Human Cancer Criteria (HCC)**

RECEIVING WATER FLOW = 0.00 cfs (1/4 of the Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK- GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P <sub>99</sub>
Arsenic	40.00		40.00	8.00	3.9	

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, effluent limits are not required for toxic substances.

Mercury - The permit application did not require monitoring for mercury because the Wilson 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 data reveals that all the sample results are not below the 17 mg/kg level. The average concentration in the sludge from 2021 was 0.70 mg/kg. **Therefore, no monitoring is recommended for 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.

PFOS and PFOA were not detected in the water supply. Based on the annual design flow and lack of nondomestic contributions, it is unlikely that the effluent will contain PFOS or PFOA. **Therefore, 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 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 variable daily maximum, weekly, and monthly limits. These limits are re-evaluated at this time due to the following changes:

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- The maximum expected effluent pH has changed.

#### 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 = 0.633 and B = 90.0 for Limited Aquatic Life, and  
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 31 sample results were reported from 10/06/2020 to 10/31/2024. The maximum reported value was 8.50 s.u. (Standard pH Units). The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.55 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 8.54 s.u. Therefore, a value of 8.50 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 8.50 s.u. into the equation above yields an ATC = 4.94 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-Q<sub>10</sub> 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-Q<sub>10</sub> (estimated as 80 % of 7-Q<sub>10</sub>) and the 2×ATC approach are shown below.

#### Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	9.87
1-Q <sub>10</sub>	4.94

The 1-Q<sub>10</sub> method yields the most stringent limits for the Wilson Wastewater Treatment Facility.

Attachment #1

The current permit has variable daily maximum effluent limits based on effluent pH. Presented below is a table of daily maximum limitations corresponding to various effluent pH values.

**Daily Maximum Ammonia Nitrogen Limits – LAL**

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	4.9
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

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

The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria for ammonia, because those limits relate to the assimilative capacity of the receiving water.

Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code.

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as Limited Aquatic Life 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 = 1.0,

C =  $8.09 \times 10^{(0.028 \times (25 - T))}$ ,

T = the temperature of the receiving (°C)

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-Q<sub>10</sub> (4-Q<sub>3</sub>, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q<sub>5</sub> (estimated as 85% of the 7-Q<sub>2</sub> if the 30-Q<sub>5</sub> 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.

Attachment #1

The “default” basin assumed values are used for Temperature, because minimum ambient data is available. Values for pH are from Wilson Creek. These values are shown in the table below, with the resulting criteria and effluent limitations.

**Weekly and Monthly Ammonia Nitrogen Limits – LAL**

		May	June	July	August
<b>Effluent Flow</b>	Qe (MGD)	0.150	0.150	0.150	0.150
<b>Background Information</b>	7-Q <sub>10</sub> (cfs)	0.00	0.00	0.00	0.00
	7-Q <sub>2</sub> (cfs)	0.00	0.00	0.00	0.00
	Ammonia (mg/L)	N/A	N/A	N/A	N/A
	Average Temperature (°C)	15.0	17.8	20.6	20.0
	Maximum Temperature (°C)	15.0	17.8	20.6	20.0
	pH (s.u.)	8.36	8.12	8.10	8.14
	% of Flow used	50	100	100	100
	Reference Weekly Flow (cfs)	0.00	0.00	0.00	0.00
	Reference Monthly Flow (cfs)	0.00	0.00	0.00	0.00
<b>Criteria mg/L</b>	4-day Chronic	21.84	26.92	23.21	22.61
	30-day Chronic	8.74	10.77	9.28	9.05
<b>Effluent Limits mg/L</b>	Weekly Average	22	27	23	23
	Monthly Average	8.7	10.8	9.3	

**Weekly and Monthly Ammonia Nitrogen Limits – LAL**

		September	October	November - April
<b>Effluent Flow</b>	Qe (MGD)	0.150	0.150	0.150
<b>Background Information</b>	7-Q <sub>10</sub> (cfs)	0.00	0.00	0.00
	7-Q <sub>2</sub> (cfs)	0.00	0.00	0.00
	Ammonia (mg/L)	N/A	N/A	N/A
	Average Temperature (°C)	17.2	12.8	5.8
	Maximum Temperature (°C)	17.2	12.8	10.0
	pH (s.u.)	8.00	8.13	7.98
	% of Flow used	100	50	25
	Reference Weekly Flow (cfs)	0.00	0.00	0.00
	Reference Monthly Flow (cfs)	0.00	0.00	0.00
<b>Criteria mg/L</b>	4-day Chronic	33.39	36.59	54.74
	30-day Chronic	13.36	14.64	21.89
<b>Effluent Limits mg/L</b>	Weekly Average	33	37	55
	Monthly Average	13.4	14.6	

**Effluent Data**

Samples for ammonia nitrogen were taken from October 2020 to October 2024, and their results were as follows:

**Ammonia Nitrogen Effluent Data**

	Ammonia Nitrogen mg/L
1-day P <sub>99</sub>	5.1
4-day P <sub>99</sub>	3.1
30-day P <sub>99</sub>	1.8
Mean*	1.2
Std	1.1
Sample size	31
Range	<0.1 - 3.6

\*Values lower than the limit of detection were substituted with a zero.

**Reasonable Potential**

The need to include ammonia limits in the Wilson Wastewater Treatment Facility permit is determined by calculating 99th upper percentile (or P<sub>99</sub>) values for ammonia and comparing those to the calculated limits. Based on this comparison, daily limits are required.

The permit currently has variable daily maximum, weekly, and monthly limits. Where there are existing ammonia nitrogen limits in the permit, 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
May	Variable		8.5
June	Variable	16	6.6
July	Variable	14	5.8
August	Variable	15	6.1
September	Variable		9.0
October	Variable		13
November - April	Variable	33	13

#### **PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA**

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Codes, 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.

The Wilson Wastewater Treatment Facility had previously been exempted from disinfection based on the limited aquatic life classification of the receiving water. Section NR 210.06(3)(g), Wis. Adm. Code, states that disinfection decisions may be made based on the hydrologic classifications listed in s. NR 104.02(1), Wis. Adm. Code (not on the water quality classifications - i.e., limited forage fish, limited aquatic life - that are defined in s. NR 104.02(3), Wis. Adm. Code). The hydrologic classification for Wilson Creek at the outfall location is a diffused surface water. Discharges to diffuse surface waters that have very little to no flow most often result in effluent-dominated situations. As noted above, the risk of illness is related to the concentration of *E. coli* and therefore dilution is an important consideration when considering risk to human health. Since little to no dilution is present in these situations, disinfection should not be exempted based solely on this hydrological classification.

The last permit term's flow data shows that, as a rolling average, > 180-d detention time was provided at all times during the permit term. The greatest 180 day rolling average at Outfall 701 was 0.0265 MGD (March to August 2024). Using a total pond volume of 895,185 cubic ft, the minimum detention time was 253 days. Since data shows that the facility provides > 180-d detention time, disinfection is not required and **effluent limits and monitoring are not needed in the permit.**

$$\text{Detention Time [days]} = \frac{\text{Total Pond Volume [MG]}}{180\text{-d average flow rate[mgd]}}$$

## PART 5 – PHOSPHORUS

### Technology-Based Effluent Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, 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.

Because the Wilson Wastewater Treatment Facility does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than/greater than 150 lbs/month, which is the threshold for municipalities in accordance to s. NR 217.04 (1) (a) 1, Wis. Adm. Code, and therefore a technology-based limit is not required.

**Annual Average Mass Total Phosphorus Loading**

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
October 2024	1.36	3.750	42.38

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)

Where total flow is the sum of the actual (not design) flow (in MGD) for that month

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

### Water Quality-Based Effluent Limits (WQBEL)

Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to s. NR 102.06, Wis. Adm. Code, which establish phosphorus standards for surface waters. Subchapter III of NR 217, Wis. Adm. Code, establishes procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

Phosphorus criteria in s. NR 102.06, Wis. Adm. Code, do not apply to limited aquatic life waters [s. NR 102.06 (6) (d)]. These waters were not included in the USGS/WDNR stream and river studies and, therefore, the Department lacked the technical basis to determine and propose applicable criteria. At some time in the future, the Department may adopt phosphorus criteria based on new studies focusing on limited aquatic life waters. The Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges (2020) suggests that during the interim, WQBELs should be based on the criteria and flow conditions for the next stream segment downstream (or downstream lake or reservoir, if appropriate), since ss. 217.12 and 217.13, Wis. Adm. Code, state that the Department must set WQBELs to protect downstream waters. The discharge location of the wastewater from the Wilson Wastewater Treatment Facility is classified as diffused surface water per s. NR 104.01(3)(b), Wis. Adm. Code, which carries a default designated use of limited aquatic life. The receiving water at this location is characterized as a disappearing stream and the effluent completely seeps into groundwater before reaching the continuously flowing portion of Wilson Creek which is classified as a Cold Water Class II Trout Stream. Therefore, the seasonal effluent discharged from the Wilson Wastewater Treatment Facility does not impact downstream surface waters. **No limits or additional monitoring for phosphorus are recommended.**



## **PART 6 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL**

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in Chapters NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. The daily maximum effluent temperature limitation shall be 86 °F for discharges to surface waters classified as Limited Aquatic Life according to s. NR 104.02(3)(b)1, Wis. Adm. Code, except for those classified as wastewater effluent channels and wetlands regulated under ch. NR 103 and described in s. NR 106.55(2), Wis. Adm. Code, which has a daily maximum effluent temperature limitation of 120 °F.

Since this facility provides hydraulic detention times of at least 253 days, elevated effluent temperatures are unlikely and discharge temperatures are expected to be similar to ambient conditions. The facility uses a fill and draw method of operation with effluent discharges occurring only during the cool weather periods in when ambient temperatures are less than 55 deg. F

## **PART 7 – 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 LC<sub>50</sub> (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.
- Chronic testing is usually not recommended where the distance between the outfall and the point where the receiving water becomes a non-variance waterbody (i.e., one that supports a cold water, warm water sport fish, or warm water forage fish community) is greater than four miles. For the Wilson Wastewater Treatment Facility, the effluent seeps into groundwater before the receiving water becomes a non-variance waterbody. There is believed to be little potential for chronic toxicity effects in the Coldwater portion of Wilson Creek associated with the discharge from the Wilson Wastewater Treatment Facility so the need for chronic WET testing was not considered further.
- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

Attachment #1

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>.

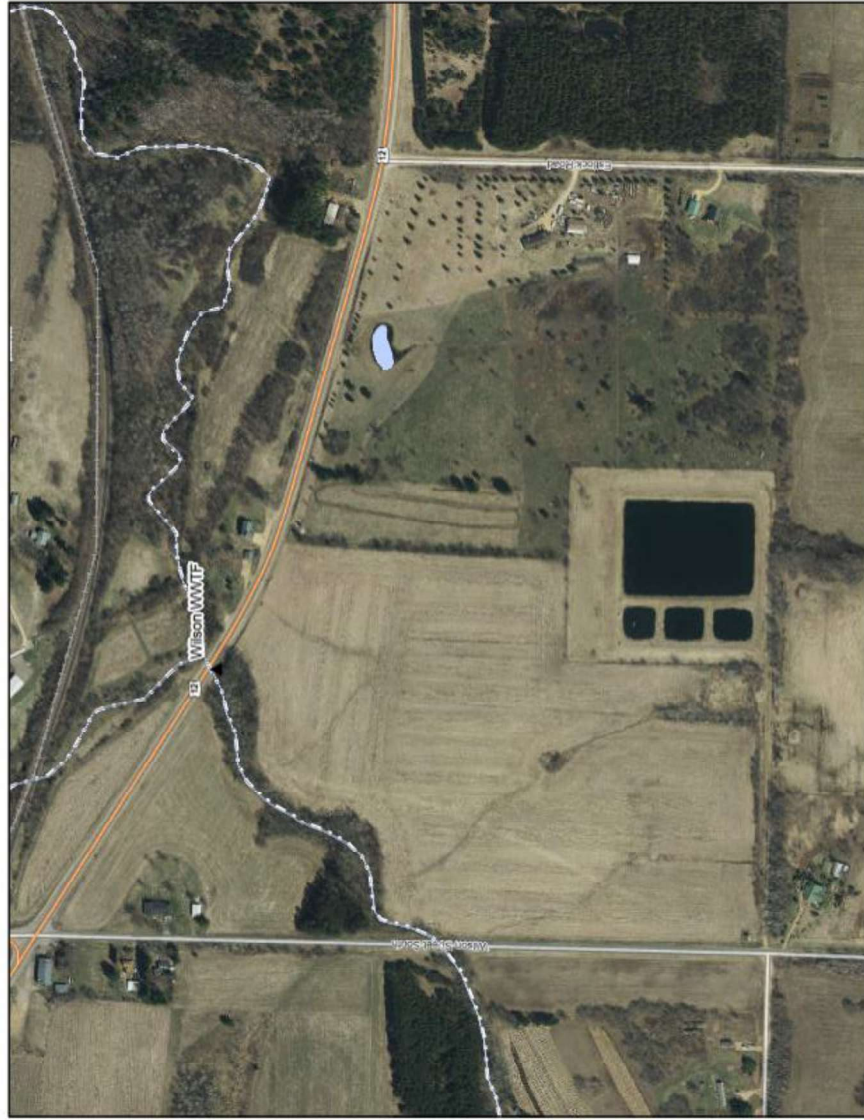
**WET Checklist Summary**

	<b>Acute</b>	<b>Chronic</b>
<b>AMZ/IWC</b>	Not Applicable. <b>0 Points</b>	
<b>Historical Data</b>	No data available. <b>5 Points</b>	
<b>Effluent Variability</b>	Little variability, no violations or upsets, consistent WWTF operations. <b>0 Points</b>	
<b>Receiving Water Classification</b>	Variance water > 4 mi to non-variance <b>0 Points</b>	
<b>Chemical-Specific Data</b>	Reasonable potential for Ammonia limits based on ATC; (5 pts) Arsenic, Copper, Zinc and Chloride detected.(3 pts) Additional Compounds of Concern: None <b>8 Points</b>	
<b>Additives</b>	No Additives. <b>0 Points</b>	
<b>Discharge Category</b>	No Industrial Contributors. <b>0 Points</b>	
<b>Wastewater Treatment</b>	Secondary or Better <b>0 Points</b>	
<b>Downstream Impacts</b>	No impacts known <b>0 Points</b>	
<b>Total Checklist Points:</b>	<b>13 Points</b>	
<b>Recommended Monitoring Frequency (from Checklist):</b>	No acute monitoring required.	
<b>Limit Required?</b>	No	
<b>TRE Recommended? (from Checklist)</b>	No	

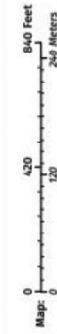
- No WET testing is required because information related to the discharge indicates the potential for effluent toxicity is believed to be low.



# Wilson WWTF



Map projection: NAD 1983 HARN Wisconsin TM  
Service Layer Credits:  
Latest Leaf Off, Permits & Determinations: WI DNR Bureau of Watershed Management, Cities, Roads & Boundaries, Surface Water (Cached): WIDNR, USGS, and other data



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- Legend:** (Some map layers may not be displayed)
- ▲ Surface Water Outfalls
  - Rivers and Streams
  - Intermittent Streams
  - Open Water
  - 24K Intermittent Streams
  - 24K Lakes and Open Water
  - 24K Streams and Rivers
  - City or Village
  - County Boundaries
  - Major Roads
  - US Highway
  - County and Local Roads
  - Local Road
  - Railroads
  - Latest Leaf Off Imagery

## Notes:

