

Permit Fact Sheet

General Information

Permit Number	WI-0024023-11-0
Permittee Name and Address	VILLAGE OF FOOTVILLE P O Box 445 156 Depot Street, Footville, WI 53537
Permitted Facility Name and Address	Footville Wastewater Treatment Facility 500 SOUTH GILBERT STREET, FOOTVILLE, WISCONSIN
Permit Term	January 01, 2026 to December 31, 2030
Discharge Location	Bass Creek (Bass Creek Watershed, LR03 – Lower Rock River Basin) in Rock County
Receiving Water	Bass Creek in Bass Creek of Rock River (lower) in Rock County
Stream Flow ($Q_{7,10}$)	3.4 cfs
Stream Classification	Warm water sport fish community, non-public water supply
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	0.114 MGD
Industrial or Commercial Contributors	None
Plant Classification	A3 - Recirculating Media Filters; D - Disinfection; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Village of Footville serves a population of approximately 770 people with no significant industrial contributions and no significant anticipated growth. The Village operates a wastewater treatment plant (WWTP) that consists of a recirculating sand filter (RSF) system comprised of a collection system, a septic tank, a dosing chamber, and a recirculating sand filter which provides biological treatment of the wastewater. The dosing chamber allows for different rates of recirculation depending on flow and environmental conditions. Disinfection is required seasonally and is accomplished through ultraviolet (UV). Solids in the septic tank are handled as septage and requirements for septage management are determined in accordance with ch. NR 113, Wis. Adm. Code. Effluent is discharged to Bass Creek. The Department has found the facility to be in substantial compliance with their current WPDES permit. Shaded cells indicate changes from previous permit.

Substantial Compliance Determination

Enforcement During Last Permit:

Three Notices of Noncompliance (NON) were issued over the last permit term. Two of the NON's were for average monthly phosphorus exceedances and one of the NON's was for under reporting due to lack of certified operator. The

Village has addressed these violations through obtaining a certified operator and starting a chemical phosphorus removal pilot study. After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on 4/9/2025.

Compliance determination made by Ashley Brechlin on 5/5/2025.

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	0.11 MGD (2024)	Influent: 24-Hr flow proportional sampler intake and flow meter located on the inlet side of the septic tank.
001	0.10 MGD (2024)	Effluent: 24-Hr flow proportional composite sampler intake and flow meter located prior to the UV channel. Grab samples taken after the UV channel prior to discharge to Bass Creek.
901		Solids from the septic tank of the Recirculating Sand Filter WWTF.

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	
BOD ₅ , Total		mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	2/Week	24-Hr Flow Prop Comp	

Changes from Previous Permit:

Flow sample frequency changed to daily from continuous for eDMR reporting purposes.

Explanation of Limits and Monitoring Requirements

BOD₅ and Total Suspended Solids: Tracking of BOD₅, and Suspended Solids are required for percent removal requirements found in s. NR 210.05, Wis. Adm. Code and in Standard Requirements 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	45 mg/L	2/Week	24-Hr Flow Prop Comp	November - April
BOD5, Total	Weekly Avg	31 mg/L	2/Week	24-Hr Flow Prop Comp	May - October
BOD5, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	30 lbs/day	2/Week	Calculated	Report year-round. Limit effective May - October.
Suspended Solids, Total	Weekly Avg	45 mg/L	2/Week	24-Hr Flow Prop Comp	November - April
Suspended Solids, Total	Weekly Avg	31 mg/L	2/Week	24-Hr Flow Prop Comp	May - October
Suspended Solids, Total	Monthly Avg	30 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	40.1 lbs/day	2/Week	Calculated	January, March, May, July, August, October, and December
Suspended Solids, Total	Weekly Avg	48.6 lbs/day	2/Week	Calculated	February
Suspended Solids, Total	Weekly Avg	40.5 lbs/day	2/Week	Calculated	April, June, September, and November
Suspended Solids, Total	Monthly Avg	27.1 lbs/day	2/Week	Calculated	January, March, May, July, August, October, and December
Suspended Solids, Total	Monthly Avg	32.86 lbs/day	2/Week	Calculated	February
Suspended Solids, Total	Monthly Avg	27.33 lbs/day	2/Week	Calculated	April, June, September, and November
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	See Table	Look up the variable ammonia limit from the 'Variable Ammonia Limitation' table and report the variable limit in the Ammonia Variable Limit column on the eDMR.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	2/Week	24-Hr Flow Prop Comp	Report the daily maximum Ammonia result in the Nitrogen, Ammonia (NH3-N) Total column of the eDMR. See Ammonia Limitation Section.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	29 mg/L	2/Week	24-Hr Flow Prop Comp	November - April
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	25 mg/L	2/Week	24-Hr Flow Prop Comp	November - March
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	16 mg/L	2/Week	24-Hr Flow Prop Comp	April
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
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	Monthly	24-Hr Flow Prop Comp	Monitoring in 2029 only.
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	Monitoring in 2029 only.
Phosphorus, Total	Monthly Avg	4.0 mg/L	2/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	6.71 lbs/day	2/Week	Calculated	January
Phosphorus, Total	Monthly Avg	6.68 lbs/day	2/Week	Calculated	February
Phosphorus, Total	Monthly Avg	4.25 lbs/day	2/Week	Calculated	March
Phosphorus, Total	Monthly Avg	2.87 lbs/day	2/Week	Calculated	April
Phosphorus, Total	Monthly Avg	2.38 lbs/day	2/Week	Calculated	May
Phosphorus, Total	Monthly Avg	2.67 lbs/day	2/Week	Calculated	June
Phosphorus, Total	Monthly Avg	2.62 lbs/day	2/Week	Calculated	July
Phosphorus, Total	Monthly Avg	2.06 lbs/day	2/Week	Calculated	August

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Phosphorus, Total	Monthly Avg	2.32 lbs/day	2/Week	Calculated	September
Phosphorus, Total	Monthly Avg	2.39 lbs/day	2/Week	Calculated	October
Phosphorus, Total	Monthly Avg	3.66 lbs/day	2/Week	Calculated	November
Phosphorus, Total	Monthly Avg	4.9 lbs/day	2/Week	Calculated	December
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. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrate + Nitrate Nitrogen.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET section.

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-** The sample frequency for flow has been changed from “continuous” to “daily” for eDMR reporting purposes.
- **Ammonia-** Additional weekly average limits November – April added. Daily limit changed to variable limit.
- **pH-** Sample frequency decreased to 5/week.
- **E. coli-** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- **Copper-** Monitoring added in 2029 only.
- **Total Phosphorus-** Final TMDL mass limits effective.
- **Total Nitrogen Monitoring (TKN, N02+N03 and Total N)-** Annual monitoring is required in specific quarters as outlined in the permit.
- **Acute WET-** Sampling added.

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 7/31/2025.

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 frequency remained at the current frequencies.

Expression of Limits- In accordance with the federal regulation 40 CFR 122.45(d) and s. NR 205.065, Wis. Adm. Code, limits in this permit are to be expressed as weekly average and monthly average limits.

Copper- The permittee submitted additional copper data that there is no reasonable potential to exceed copper limits. The calculated P99 with the additional data is 69.7 ug/L with a maximum effluent concentration of 61 ug/L to the acute max effluent limit of 89 ug/L. One year of copper sampling is included in the permit to ensure 11 samples for the next permit reissuance.

3 Septage Management - Monitoring and Limitations

Septage management is required in accordance ch. NR 113, Wisconsin Administrative Code. Records must be kept and made available to the Department on request. Required record keeping includes volumes of septage pumped, dates when the septage was removed, land application site DNR number and method used to satisfy pathogen and vector control, and/or the treatment plant where septage is disposed. Annual reporting is required when the permittee land applies the septage. Annual reporting is also required when the permittee disposes of septage at a designated treatment facility.

3.1 Sample Point Number: 901- SEPTIC TANK

3.1.1 Changes from Previous Permit:

No changes.

Explanation of Limits and Monitoring Requirements

Requirements for septage management are determined in accordance with ch. NR 113, Wis. Adm. Code.

Other Comments

None

Attachments

Water Quality Based Effluent Limits 7/31/2025

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: 8/14/2025

Revision date after Fact Sheet: 10/29/2025; Copper limits and hardness monitoring removed based on additional data submitted by the permittee.

Revision date after Public Notice:

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: July 31, 2025

TO: Jennifer Jerich– SCR/Horicon

FROM: Zainah Masri – WY/3

SUBJECT: Water Quality-Based Effluent Limitations for the Village of Footville
WPDES Permit No. WI-0024023-11-0

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 Footville Wastewater Treatment Facility in Rock County. This municipal wastewater treatment facility (WWTF) discharges to the Bass Creek located in the Bass Creek Watershed in the Lower Rock River (LR03) Basin. This discharge is included in the Rock River Total Maximum Daily Load (TMDL) as approved by EPA on 09/28/2011. 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	Six-Month Average	Footnotes
Flow Rate						1,2
BOD ₅ Year round May – October November – April			31 mg/L 30 lbs/day 45 mg/L	30 mg/L		1
TSS Year round May – October November – April			31 mg/L 45 mg/L	30 mg/L		1,9
pH	9.0 s.u.	6.0 s.u.				
Ammonia Nitrogen April May – October November – March	Variable Variable Variable		29 mg/L - 29 mg/L	16 mg/L - 25 mg/L		3,4
Bacteria						
Final Limit <i>E. coli</i>				126 #/100 mL geometric mean		5
Copper Concentration Limit Mass Limit	45 µg/L 0.09 lbs/day		45 mg/L	45 mg/L		3
Chloride						6
Hardness						7
Phosphorus				4.0 mg/L		
TMDL						8,9,10

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
TKN, Nitrate+Nitrite, and Total Nitrogen						11
Acute WET						12,14,15
Chronic WET						13,14,15

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
4. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit. Footville Wastewater Treatment Facility shall notify the Department if the single limit or the variable limits based on effluent pH are preferred. The limits would then revert to 9.4 mg/L year round as a daily maximum, weekly average and monthly average. 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	108	7.0 < pH ≤ 7.1	66	8.0 < pH ≤ 8.1	14
6.1 < pH ≤ 6.2	106	7.1 < pH ≤ 7.2	59	8.1 < pH ≤ 8.2	11
6.2 < pH ≤ 6.3	104	7.2 < pH ≤ 7.3	52	8.2 < pH ≤ 8.3	9.4
6.3 < pH ≤ 6.4	101	7.3 < pH ≤ 7.4	46	8.3 < pH ≤ 8.4	7.8
6.4 < pH ≤ 6.5	98	7.4 < pH ≤ 7.5	40	8.4 < pH ≤ 8.5	6.4
6.5 < pH ≤ 6.6	94	7.5 < pH ≤ 7.6	34	8.5 < pH ≤ 8.6	5.3
6.6 < pH ≤ 6.7	89	7.6 < pH ≤ 7.7	29	8.6 < pH ≤ 8.7	4.4
6.7 < pH ≤ 6.8	84	7.7 < pH ≤ 7.8	24	8.7 < pH ≤ 8.8	3.7
6.8 < pH ≤ 6.9	78	7.8 < pH ≤ 7.9	20	8.8 < pH ≤ 8.9	3.1
6.9 < pH ≤ 7.0	72	7.9 < pH ≤ 8.0	17	8.9 < pH ≤ 9.0	2.6

5. Bacteria limits apply during the disinfection season of May through September. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
6. Monitoring in the fourth year of the permit term at a frequency to ensure that 11 samples are available at the next permit issuance.
7. Hardness monitoring is recommended because of the relationship between hardness and daily maximum copper limits based on acute toxicity criteria.
8. The phosphorus mass limit is based on the Total Maximum Daily Load (TMDL) for the Rock River to address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA in July 2011.
9. Additional phosphorus and TSS mass limitations are required in accordance with the waste load allocations specified in the Rock River TMDL

Month	Monthly Ave TSS Effluent Limit lbs/day	Weekly Ave TSS Effluent Limit lbs/day	Monthly Ave Total P Effluent Limit lbs/day
Jan	27.10	40.1	6.71
Feb	32.86	48.6	6.68
March	27.10	40.1	4.25

April	27.33	40.5	2.87
May	27.10	40.1	2.38
June	27.33	40.5	2.67
July	27.10	40.1	2.62
Aug	27.10	40.1	2.06
Sept	27.33	40.5	2.32
Oct	27.10	40.1	2.39
Nov	27.33	40.5	3.66
Dec	27.10	40.1	4.90

10. The current concentration limit of 4.0 mg/L should be retained the reissued permit to prevent anti-degradation and anti-backsliding.
11. 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 (NO₃), nitrite (NO₂), and total Kjeldahl nitrogen (TKN) (all expressed as N).
12. After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2022) and other information described above, three acute tests during the permit term are recommended in the reissued permit. 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.
13. After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2022) and other information described above, three chronic WET tests during the permit term are recommended in the reissued permit. The Instream Waste Concentration (IWC) to assess chronic test results is 17%. 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%, 30%, 10%, 3% & 1%. The primary control water used in chronic WET tests conducted on Outfall 001 shall be a grab sample collected from Bass Creek.
14. 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.
15. If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then acute WET testing can be reduced to two tests during the permit term and no chronic WET testing in the reissued permit.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Zainah Masri at Zainah.Masri@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

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

PREPARED BY: Zainah Masri, WY/3 *Zainah Masri*

APPROVED BY: *Diane Figiel* Date: *07/31/2025*
Diane Figiel, PE,
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, Environmental Engineering Manager– WY/3
Kari Fleming, Natural Resources Program Manager– WY/3

Water Quality-Based Effluent Limitations for Footville Wastewater Treatment Facility

WPDES Permit No. WI-0024023-11-0

Prepared by: Zainah Masri – WY/3

PART 1 – BACKGROUND INFORMATION

Facility Description

The Village of Footville serves a population of approximately 800 people with no significant industrial contributions and no significant anticipated growth. The Village operates a wastewater treatment facility that consists of a recirculating sand filter (RSF) system comprised of a collection system, septic tanks, a dosing chamber, and four recirculating sand filter cells which provides biological treatment of the wastewater. The dosing chamber allows for different rates of recirculation depending on flow and environmental conditions. Disinfection is required seasonally and is accomplished through ultraviolet (UV) radiation. Solids in the septic tank are handled as septage and requirements for septage management are determined in accordance with ch. NR 113, Wis. Adm. Code. Effluent is discharged to Bass Creek.

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

Existing Permit Limitations

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD ₅						1
Year round						
May – October			31 mg/L 30 lbs/day	30 mg/L		
November – April			45 mg/L			
TSS						1,3
Year round						
May – October			31 mg/L	30 mg/L		
November – April			45 mg/L			
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen						
April	29 mg/L		29 mg/L	16 mg/L		
May – October	-		-	-		
November – March	29 mg/L		29 mg/L	25 mg/L		
Bacteria						
Interim Limit				400 #/100 mL		5
Fecal Coliform				geometric mean		

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Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Final Limit <i>E. coli</i>				126 #/100 mL geometric mean		
Chloride						4
Phosphorus TMDL Interim limit				4.0 mg/L		3
TKN, Nitrate+Nitrite, and Total Nitrogen						6

Footnotes:

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. Monitoring only
3. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL. A compliance schedule is included in the permit to meet the final Phosphorus TMDL limits by 05/01/2023. The phosphorus limits can be met in all the months except for May and August.

Month	Monthly Ave TSS Effluent Limit lbs/day	Weekly Ave TSS Effluent Limit lbs/day	Monthly Ave Total P Effluent Limit lbs/day
Jan	27.10	40.1	6.71
Feb	32.86	48.6	6.68
March	27.10	40.1	4.25
April	27.33	40.5	2.87
May	27.10	40.1	2.38
June	27.33	40.5	2.67
July	27.10	40.1	2.62
Aug	27.10	40.1	2.06
Sept	27.33	40.5	2.32
Oct	27.10	40.1	2.39
Nov	27.33	40.5	3.66
Dec	27.10	40.1	4.90

4. Monitoring only in 2024 at a frequency to ensure that 11 samples are available at the next permit issuance.
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. 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 (NO₃), nitrite (NO₂), and total Kjeldahl nitrogen (TKN) (all expressed as N).

Receiving Water Information

- Name: Bass Creek

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- Waterbody Identification Code (WBIC): 795800
- 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 7-Q₁₀ and 7-Q₂ values are based on flow information at the bridge on Highway 11, 0.7 mile south of Footville.
7-Q₁₀ = 3.4 cubic feet per second (cfs)
7-Q₂ = 4.4 cfs
Harmonic Mean Flow = 6.9 cfs using a drainage area of 14 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).
- Hardness = 325 mg/L as CaCO₃. This value represents the geometric mean of receiving water data as reported on WET tests from 2009-2013.
- % 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: The background metals and chloride concentrations given in the tables below are based on data collected by the Department at the Rock River at Afton, WI because there is no data available for Bass Creek. The Rock River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: The Town of Plymouth Sanitary District #1 also discharges to Bass Creek downstream of Footville's outfall. However, they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, other dischargers do not impact this evaluation.
- Impaired water status: Bass Creek is listed as impaired for total phosphorus at the point of discharge (listed 04/01/2014) and is also an Exceptional Resource Water (listed in s. NR 102.11(d), Wis. Adm. Code). The Rock River is also listed as impaired for total phosphorus and total suspended solids and has an EPA-approved TMDL in place.

Effluent Information

- Design flow rate(s):
Annual average = 0.114 million gallons per day (MGD)
Peak daily = 0.236 MGD
The peak daily design flow was estimated from the annual average design flow on data from April 2019 to March 2025 and a peaking daily design flow from the approved facility plan.
For reference, the actual average flow from April 2019 to May 2025 was 0.08 MGD.
- Hardness = 307 mg/L as CaCO₃. This value represents the geometric mean of four samples collected in August 2023 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 with no industrial contributors.
- Water supply: Municipality waterworks and private wells.
- Additives: Footville has included one additive in the permit application that have the potential to be present in Outfall 001. These additives are listed below:
 - Alum – For Phosphorus Removal
 - 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 additives and the facility is not

Attachment #1

requesting increased dosages or use frequencies. Therefore, an additive review is not needed at this time.

- 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 ammonia, chloride, hardness and phosphorus.
- 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)
01/13/2025	88	01/30/2025	88	02/13/2025	62
01/16/2025	91	02/03/2025	75	02/17/2025	62
01/20/2025	88	02/06/2025	70	02/21/2025	61
01/27/2025	79	02/10/2025	63		
1-day P ₉₉ = 108 µg/L					
4-day P ₉₉ = 90 µg/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.

Chloride Effluent Data

	Chloride (mg/L)
1-day P ₉₉	509
4-day P ₉₉	290
30-day P ₉₉	178
Mean	129
Std	101
Sample size	101
Range	41 - 1041

The following table presents the average concentrations and loadings at Outfall 001 from April 2019 to May 2025 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	5.1 mg/L*	3.0 lbs/day*
TSS	3.8 mg/L*	6.7 lbs/day*
pH field	7.5 s.u.	-
Ammonia Nitrogen	3.3 mg/L*	-
Fecal Coliform	5.1 #/100 mL**	-
<i>E. coli</i>	3.2 #/100 mL**	-
Phosphorus	3.1 mg/L	1.9 lbs/day

Attachment #1

*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. 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 Footville Wastewater Treatment Facility and the limits are set based on two times the acute toxicity criteria.

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

Attachment #1

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 2.72 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	680	136	<1.1		
Cadmium	307	37	75	15	<0.17		
Chromium	301	4446	8892	1778	<1.1		
Copper	307	45	89			108	91
Lead	307	316	632	126	<5.4		
Nickel	268	1080	2161	432	<4.7		
Zinc	307	321	642	128	39		
Chloride (mg/L)		757	1514			509	1041

* 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.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0.85 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
Arsenic		152	1.3	879	176	<1.1	
Cadmium	175	3.8	0.02	22	4.4	<0.17	
Chromium	301	326	0.80	1892	378	<1.1	
Copper	325	28	2.1	155			90
Lead	325	87	0.83	505	101	<5.4	
Nickel	268	120	1.3	693	139	<4.7	
Zinc	325	337	5.2	1938	388	39	
Chloride (mg/L)		395	62	2001			290

* 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 Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 1.725 cfs (¼ 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.
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Attachment #1

Cadmium	370	0.02	3988	798	<0.17
Chromium (+3)	3,818,000	0.79	41,156,274	8,231,255	<1.1
Lead	7,636	0.83	82,313	16,463	<5.4
Nickel	43,000	1.30	463,507	92,701	<4.7

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 1.725 cfs (¼ of 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.
Arsenic	13.3	1.3	131	26	<1.1

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are **required for copper and monitoring for chloride and quarterly monitoring for hardness is recommended.** Limits and/or monitoring recommendations are made in the paragraphs below:

Copper – Considering available effluent data from January 2025 to February 2025 the 1-day P₉₉ concentration is 108 µg/L, with a maximum concentration of 91 µg/L. The maximum effluent concentration and the 1-day P₉₉ of the effluent data exceed the calculated daily maximum limit, therefore **concentration and mass limits, as well as monthly monitoring, are required.**

The acute mass limitation of 0.09 lbs/day is based on the concentration limit and the peak daily design flow rate of 0.236 MGD (45 µg/L * 0.236 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

Quarterly hardness monitoring is also recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.

Chloride – Considering available effluent data from January 2024 to December 2024 the 1-day P₉₉ chloride concentration is 509 mg/L, and the 4-day P₉₉ of effluent data is 290 mg/L.

These effluent concentrations are below the calculated WQBELs for chloride, therefore no effluent limits are needed. **Chloride monitoring is recommended to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.**

Mercury – The permit application did not require monitoring for mercury because Footville 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).” However, sludge sampling is not available because Footville Wastewater Treatment Facility is a recirculating sand filter and generates solids which are hauled away as septage. It is not expected that there are exceedances of the high-quality mercury concentration based on similar municipal treatment plants and the lack of industries. **No monitoring is recommended.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge, the effluent flow rate, and unknown levels 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 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 limits and weekly average and monthly average 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 = 0.411 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 2230 sample results were reported from April 2019 to May 2025. The maximum reported value was 8.8 s.u. (Standard pH Units). The effluent pH was 8.1 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 8.3 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 8.3 s.u. Therefore, a value of 8.3 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 8.3 s.u. into the equation above yields an ATC = 4.7 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 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.

Attachment #1

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	9.4
1-Q ₁₀	76

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

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 ≤ pH ≤ 6.1	108	7.0 < pH ≤ 7.1	66	8.0 < pH ≤ 8.1	14
6.1 < pH ≤ 6.2	106	7.1 < pH ≤ 7.2	59	8.1 < pH ≤ 8.2	11
6.2 < pH ≤ 6.3	104	7.2 < pH ≤ 7.3	52	8.2 < pH ≤ 8.3	9.4
6.3 < pH ≤ 6.4	101	7.3 < pH ≤ 7.4	46	8.3 < pH ≤ 8.4	7.8
6.4 < pH ≤ 6.5	98	7.4 < pH ≤ 7.5	40	8.4 < pH ≤ 8.5	6.4
6.5 < pH ≤ 6.6	94	7.5 < pH ≤ 7.6	34	8.5 < pH ≤ 8.6	5.3
6.6 < pH ≤ 6.7	89	7.6 < pH ≤ 7.7	29	8.6 < pH ≤ 8.7	4.4
6.7 < pH ≤ 6.8	84	7.7 < pH ≤ 7.8	24	8.7 < pH ≤ 8.8	3.7
6.8 < pH ≤ 6.9	78	7.8 < pH ≤ 7.9	20	8.8 < pH ≤ 8.9	3.1
6.9 < pH ≤ 7.0	72	7.9 < pH ≤ 8.0	17	8.9 < pH ≤ 9.0	2.6

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

Weekly and monthly average limits are not included in the current permit but are being evaluated here due to changes to ch. NR 106, Wis. Adm. Code. **The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change** because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in attachment #2.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from April 2019 to

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	April	May - October	November - March
1-day P ₉₉	17.8	8.2	27.5
4-day P ₉₉	9.6	4.5	15.1
30-day P ₉₉	5.13	2.07	8.45
Mean*	3.26	1.08	5.66
Std	3.67	1.81	5.61

Attachment #1

Sample size	60	225	260
Range	<0.05 - 18.32	<0.05 - 9.22	<0.05 - 27.9

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

Reasonable Potential

The permit currently has daily maximum limits and weekly and monthly average limits from November – March and in April. 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.

In addition, the calculated daily maximum limits are more stringent than the daily maximum limits in the current permit, and therefore, the newly calculated daily maximum limits will be used in place of the current ones.

Expression of Limits

Revisions to ch. NR 106, Wis. Adm. Code, in September 2016 aligned Wisconsin's WQBELs with 40 CFR § 122.45(d), which specifies that effluent limits for continuous dischargers must be expressed as weekly and monthly averages for publicly owned treatment works and as daily maximums and monthly averages for all other dischargers, unless shown to be impracticable. Because a daily maximum ammonia limit is necessary for Footville Wastewater Treatment Facility weekly and monthly average limits are also required under this code revision.

The methods for calculating limitations for municipal treatment facilities to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.

In this case, the recommended daily maximum limits vary with effluent pH, so additional limits should be set equal to the highest recommended limit. Therefore, **monthly and weekly average limits of 9.4 mg/L** are recommended in the permit if a single limit of 9.4 is included for the daily maximum limit.

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	Variable	29	16
May – October	Variable	-	-
November – March	Variable	29	25

Or if a single daily maximum limit is the preferred option:

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
April	9.4	9.4	9.4
May – October		-	-
November – March	9.4	9.4	9.4

**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.

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because Footville Wastewater Treatment Facility 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 during May through September. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data

Footville Wastewater Treatment Facility has monitored effluent *E. coli* from May 2021 to May 2025 and a total of 122 results are available. A geometric mean of 126 counts/100 mL was exceeded once on August 22, 2022 with a maximum geometric mean of 131 counts/100 mL. Effluent data has not exceeded 410 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.

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.

Attachment #1

Because Footville 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 150 lbs/month, which is the threshold for municipalities in accordance with s. NR 217.04(1)(a)1, Wis. Adm. Code, and therefore no technology-based limit is required.

Annual Average Mass Total Phosphorus Loading

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
Jan 2023	2.3	2.7	52
Feb 2023	2.2	2.6	48
Mar 2023	3.2	1.8	47
April 2023	3.1	2.1	54
May 2023	2.6	3.4	74
June 2023	1.8	4.3	66
July 2023	1.7	4.6	66
Aug 2023	1.7	4.5	65
Sept 2023	1.7	4.6	66
Oct 2023	1.9	3.7	62
Nov 2023	1.5	3.6	46
Dec 2023	1.6	3.5	48
Average			59

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 flow (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.

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived WQBEL for phosphorus in addition to, or in lieu of, a s. NR 217.13 WQBEL in a WPDES permit. Because the discharge is to the Rock River, which is an impaired segment covered under an approved TMDL, the TMDL-based limit is protective of the immediate receiving water as well as downstream waters and can be included in the WPDES permit absent the s. NR 217.13 WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL.

TMDL Limits – Phosphorus

The monthly average total phosphorus (Total P) effluent limits in lbs/day are calculated based on the monthly phosphorus wasteload allocation (WLA) given in pounds per month as suggested in the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin*, dated July 2011. The WLA for this facility is found in the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin* report dated July 2011. These limits are equivalent to concentrations ranging from 2.2 mg/L to 7.1 mg/L at the facility design flow of 0.114 MGD. **Monthly**

average mass effluent limits with accordance to the following table are recommended for this discharge.

Point of Discharge Limits – Phosphorus

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 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. Allocations for Footville were based upon 0.075 mg/L water quality criteria within Bass Creek. Therefore, the TMDL wasteload allocations are considered protective of the receiving water and do not require additional s. NR 217.13, Wis. Adm. Code, limits. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13 WQBEL unless these reductions are likely to occur.

Total Phosphorus Effluent Limitations

Month	Monthly Total P WLA¹ (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit² (lbs/day)
Jan	208.04	31	6.71
Feb	186.98	28	6.68
March	131.74	31	4.25
April	86.16	30	2.87
May	73.93	31	2.38
June	79.99	30	2.67
July	81.22	31	2.62
Aug	63.97	31	2.06
Sept	69.66	30	2.32
Oct	74.04	31	2.39
Nov	109.91	30	3.66
Dec	151.87	31	4.90

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

The following table summarizes effluent total phosphorus monitoring data from April 2019 to May 2025.

Total Phosphorus Effluent Data

	Phosphorus mg/L
1-day P ₉₉	6.5
4-day P ₉₉	4.6
30-day P ₉₉	3.6
Mean	3.1
Std	1.1
Sample size	641

Attachment #1

	Phosphorus mg/L
Range	0.61 - 6.5

TMDL Limits

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (April 2020)* and are based on the annual phosphorus wasteload allocation (WLA) given in lbs/yr. This WLA is found in Appendix P (pg. 147) of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin (July 2011)* and is expressed as a maximum annual load (lbs/yr). For Footville Wastewater Treatment Facility this WLA is 1,317.51 lbs/yr and 3.6 lbs/day.

The current concentration limit of 4.0 mg/L should be retained the reissued permit to prevent anti-degradation and anti-backsliding.

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 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 2019 September 2024.

The table below summarizes the maximum temperatures reported during monitoring from January 2018 through December 2018.

Monthly Temperature Effluent Data & Limits

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	37	38	NA	120
FEB	45	47	NA	120
MAR	45	45	101	120

Attachment #1

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)
APR	53	54	70	120
MAY	63	71	92	120
JUN	76	76	92	108
JUL	77	77	95	97
AUG	71	72	NA	120
SEP	71	71	113	120
OCT	64	68	105	120
NOV	55	56	91	120
DEC	45	46	NA	120

* NA denotes “not applicable” when the calculated weekly average limit is greater than or equal to 120 °F.

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 QBEL. 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 QBEL. 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

Based on the available effluent data **no effluent limits are recommended for temperature**. The complete thermal table used for the limit calculation is attached.

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).

Attachment #1

- 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 17%**, 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 = 0.114 MGD = 0.176 cfs

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

Q_s = $\frac{1}{4}$ of the 7- Q_{10} = 3.4 cfs $\div$ 4 = 0.85 cfs

- 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 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.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %				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?	
07/09/2009	>100	>100	Pass	No	>100	>100	Pass	No	1
12/09/2010	>100	>100	Pass	No	>100	91.53	Pass	No	1
07/23/2013	>100	>100	Pass	Yes	>100	>100	Pass	Yes	-

Footnotes:

- 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 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.**

$$\text{Acute Reasonable Potential} = [(TUa \text{ effluent}) (B)(AMZ)]$$

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$$\text{Chronic Reasonable Potential} = [(TUC \text{ effluent}) (B)(IWC)]$$

According to s. NR 106.08(6)(d), Wis. Adm. Code, TUA and TUC effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC_{50} , IC_{25} or $IC_{50} \geq 100\%$).

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 = 17 %. 0 Points
Historical Data	0 tests used to calculate RP. No tests failed. No data available from the past five years. 5 Points	0 tests used to calculate RP. No tests failed. No data available from the past five years. 5 Points
Effluent Variability	Little variability, some phosphorus violations, no upsets, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	WWSF 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	Reasonable potential for limit for copper and ammonia nitrogen based on ATC; Chloride and Zinc detected. 8 Points	Reasonable potential for limits for Ammonia Nitrogen based on CTC; Chloride, Copper and Zinc detected. 8 Points
Additives	No Biocides and 1 Water Quality Conditioner added. Permittee does not have a proper P chemical SOPs in place 16 Points	All additives used more than once per 4 days. 16 Points
Discharge Category	No Industrial Contributors. 0 Points	Same as Acute. 0 Points
Wastewater Treatment	Secondary or Better 0 Points	Same as Acute. 0 Points

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	Acute	Chronic
Downstream Impacts	No impacts known 0 Points	Same as Acute. 0 Points
Total Checklist Points:	34 Points	34 Points
Recommended Monitoring Frequency (from Checklist):	3 tests during permit term	3 tests during permit term
Limit Required?	No	No
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, three acute tests during the permit term and three chronic WET tests during the permit term 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.
- If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then acute WET testing can be reduced to two tests during the permit term and no chronic WET testing in the reissued permit.

Attachment #2

Site Map:

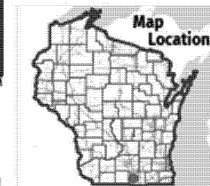


Footville Wastewater Treatment Facility



Legend: Current map layers may not be displayed
 ▲ Surface Water Outfalls
 Latest Leaf On Imagery

Notes:



Map projection: NAD 1983 HARN Wisconsin TM
 Service Layer Credits:
 Latest Leaf On, Permits & Determinations: WI DNR Bureau of Watershed Management

This map is a product generated by a DNR web mapping application.

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Thermal Table:

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Footville WWTF		7-Q₁₀:	3.40	cfs	Temp Dates	Flow Dates	
Outfall(s):	001		Dilution:	25%		Start:	01/01/18	04/01/19
Date Prepared:			f:	0		End:	12/31/18	09/21/24
Design Flow (Q_e):	0.11	MGD	Stream type:	Small warm water sport or forage f				
Storm Sewer Dist.	0	ft	Qs:Q_e ratio:	4.8	: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	Daily Maximum Effluent Limitation (°F)
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Q _{esl})	Daily Maximum Flow Rate (Q _{ea})		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	
	(°F)	(°F)	(°F)		(MGD)	(MGD)		(°F)	(°F)	(°F)	
JAN	33	49	76	3.40	0.092	0.097	0	37	38	NA	120
FEB	34	50	76	3.40	0.090	0.105	0	45	47	NA	120
MAR	38	52	77	3.40	0.157	0.161	0	45	45	101	120
APR	48	55	79	3.40	0.257	0.341	0	53	54	70	120
MAY	58	65	82	3.40	0.141	0.150	0	63	71	92	120
JUN	66	76	84	3.40	0.349	0.415	0	76	76	92	108
JUL	69	81	85	3.40	0.461	0.729	0	77	77	95	97
AUG	67	81	84	3.40	0.140	0.167	0	71	72	NA	120
SEP	60	73	82	3.40	0.177	0.310	0	71	71	113	120
OCT	50	61	80	3.40	0.138	0.144	0	64	68	105	120
NOV	40	49	77	3.40	0.117	0.124	0	55	56	91	120
DEC	35	49	76	3.40	0.105	0.109	0	45	46	NA	120

Ammonia Nitrogen calculations from the WQBEL memo dated April 29, 2008

The following sections summarize the effluent quality and associated monthly limitations calculated in accordance with chs. NR 105, and 106 (Wis. Adm. Code).

AMMONIA (as N) LIMITS			
CLASSIFICATION	WARMWATER SPORTFISH		
EFFLUENT FLOW (MGD)	0.114		
EFFLUENT FLOW (cfs)	0.176		
MAX. EFFLUENT pH (s.u.)	7.70		
BACKGROUND INFO	<i>May – Oct.</i>	<i>Nov. – March</i>	<i>April</i>
7-Q ₁₀ (cfs)	3.4	3.4	3.4
7-Q ₂ (cfs)	4.4	4.4	4.4
Ammonia (mg/L)	0.07	0.17	0.09
Temperature (deg C)	23	3	9
pH (std. units)	8.21	7.97	7.97
% of river flow used	100	25	25
Reference weekly flow	3.4	0.85	0.85
Reference monthly flow	3.74	0.935	0.935
CRITERIA (in mg/L)			
Acute (@ effl. pH)	14.44	14.44	14.44
4-day Chronic (@ backgrd. pH)			
early life stages present	2.55	6.35	6.35
early life stages absent	2.55	10.31	9.06
30-day Chronic (@ backgrd. pH)			
early life stages present	1.02	2.54	2.54
early life stages absent	1.02	4.12	3.63
EFFLUENT LIMITS (in mg/L)			
Daily maximum	28.88	28.88	28.88
Weekly average			
early life stages present	50.42	36.13	36.52
early life stages absent		59.18	52.31
Monthly average			
early life stages present	21.19	15.10	15.53
early life stages absent		25.09	22.37

Note: Early life stages present limits apply during the months of April through September and the early life stages absent limits apply to October through March for warm water sport fish community streams where burbot are not expected to be present.