Permit Fact Sheet

General Information

Permit Number	WI-0022675-11-0
Permittee Name and Address	City of Washburn PO Box 638, 119 Washington Avenue, Washburn, WI 54891
Permitted Facility Name and Address	City of Washburn 10th Avenue West, Washburn, Wisconsin
Permit Term	October 01, 2025 to September 30, 2030
Discharge Location	From the Washburn Wastewater Treatment Facility located at South 10th Avenue West, the discharge line runs due south of the disinfection building approximately 400 feet into Lake Superior.
Receiving Water	Lake Superior within the Bayfield Peninsula Southeast Watershed of Lake Superior Drainage Basin in Bayfield County
Stream Flow ($Q_{7,10}$)	10:1 Lake to effluent dilution ratio used
Stream Classification	Cold water sport fishery, Great Lakes system and public drinking water supply.
Discharge Type	Existing continuous discharge
Annual Average Design Flow (MGD)	0.38 MGD
Industrial or Commercial Contributors	Two industries, Washburn Iron Works and Western Engraving, are non-significant contributors to the treatment facility.
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; P - Total Phosphorus; D - Disinfection; L - Laboratory; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The City of Washburn owns and operates a domestic wastewater treatment system. The plant designed to treat 380,000 gallons per day currently treats an average of 229,000 gallons per day (2020-2024 data).

Primary treatment consists of a bar gate, two fine screens and a grit chamber for solids removal. Secondary treatment is achieved in the extended aeration basin by activated sludge, where naturally occurring metabolizing microorganisms present in the wastewater break down organic matter. Alum is added to the aeration basin to provide phosphorus removal. Water then flows into a final clarifier where solids are settled out. Some of the solids (return activated sludge or RAS) are returned to the aeration basin to reseed the activated sludge process and the remaining solids (waste activated sludge or WAS) is pumped to the aerobic digester for further treatment. Effluent from the final clarifier is disinfected with UV disinfection before being discharged to Lake Superior approximately 400 feet offshore. The inflow/infiltration (I&I) temporary storage (equalization) basin is used during high flow conditions when influent flows exceed peak flow treatment capacity, to prevent flood damage and process upsets. The wastewater is routed post-primary treatment to the I&I basin and is routed back to the aeration basin after influent flow subsides.

WAS generated from the final clarifier is pumped to an aerobic digester for pathogen reduction. Periodically, aeration is shut off to allow solids to settle and decanted supernatant to be routed back to the headworks for treatment. Settled solids are pumped to reed beds for storage and further dewatering by native phragmites australis americana. The sludge is ultimately landfilled once reed beds reach capacity after approximately 15 years. There are two other outfalls for

sludge/solids tracking that are used very infrequently: solids generated from aeration basin maintenance are landfilled, and liquid sludge from the aerobic digester is land applied during reed bed maintenance/sludge removal events if necessary.

Substantial Compliance Determination

There have been a few minor violations of effluent limits, late reporting and CMOM implementation. There were also issues of non-compliance relating to the 2024 effluent pipe project and failure to provide emergency power to lift stations. However, the facility is taking or has taken the necessary steps to correct their actions as coordinated by the Wastewater and Waterways programs.

The City is working with the department to respond to noncompliance issues through the stepped enforcement process. After a desk top review of all discharge monitoring reports, CMARs, land app reports, and compliance schedule items, a site visit by Eric de Venecia, WDNR, on 4/23/2025, and a follow-up phone interview with Gerry Schuette on 4/29/25, the City of Washburn has been found to be in substantial compliance with their current permit.

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	INFLUENT An average of 0.229 MGD (2020-2024 data)	Representative influent samples shall be collected immediately after the fine screen in the pretreatment building.
001	EFFLUENT An average of 0.224 MGD (2020-2024 data)	Representative samples shall be collected after the ultraviolet disinfection unit. The permittee is authorized to discharge to Lake Superior.
002	SLUDGE – REED BEDS Over 1,700 tons was removed in 2018 when the reed beds were replanted.	Representative samples of the sludge shall be collected from the reed beds at various locations and depths that are composited for analysis. Sludge handling and disposal is performed in accordance with a department approved Sludge Management Plan (SMP).
003	SLUDGE – AFTER DIGESTORS This outfall was last used in 2020 when 26,000 was removed.	Representative liquid sludge samples shall be collected from the aerobic digestors prior to land application. Sludge handling and disposal is performed in accordance with a department approved Sludge Management Plan (SMP) but is not anticipated this permit term.
004	AERATION BASIN SOLIDS This outfall was last used during 2023 maintenance project.	Solids are pumped from aeration basin to filtering storage bags, where dewatering and composting takes place for no more than 2 years before being landfilled. Sludge handling and disposal during basin maintenance is performed in accordance with department approved SMP but is not anticipated this permit term.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT TO PLANT

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

Changes from Previous Permit:

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

Explanation of Limits and Monitoring Requirements

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

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Total Daily	
BOD5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	3/Week	Grab	
pH Field	Daily Min	6.0 su	3/Week	Grab	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total	Monthly Avg	1.0 mg/L	Weekly	24-Hr Flow Prop Comp	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	
E. coli	% Exceedance	10 Percent	Monthly	Calculated	
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	24-Hr Flow Prop Comp	Sampling is required during the 2028 calendar year.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Sampling is required during the 2028 calendar year.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Nitrogen Series Monitoring permit section for testing schedule.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	See the Nitrogen Series Monitoring permit section for testing schedule.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Total Nitrogen = Total Nitrogen Kjeldahl (mg/L) + Nitrite + Nitrate Nitrogen (mg/L). See the Nitrogen Series Monitoring permit section for testing schedule.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need permit schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need permit schedule.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	Two tests are required during the permit term. See the Whole Effluent Toxicity Testing permit section for the monitoring schedule.
Chronic WET		TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	Two tests are required during the permit term. See the Whole Effluent Toxicity Testing permit section for the monitoring

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					schedule.

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" to reflect currently acceptable practices at the facility.
- **E. coli -** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- **Total Nitrogen Monitoring (TKN, N02+N03 and Total N)** - Annual monitoring is required in specific quarters as outlined in the permit.
- **PFOS** and **PFOA -** Monitoring once every two months has been included based per s. NR 106.98(2) Wis. Adm. Code.
- **WET Testing –** Two Acute and twoChronic WET tests are required in specific quarters as outlined in the permit.

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 June 26, 2025.

Phosphorus - During the factcheck period the permittee asked if a 6-month average phosphorus limit was also required. The following response was provided.

For discharges directly to the Great Lakes, the department shall set effluent limits consistent with nearshore or whole lake model results approved by the department. The department may set an interim effluent limit based on the best readily available phosphorus removal technology commonly used in Wisconsin as described in s. NR 217.13(4), Wis. Adm. Code. Because a nearshore or whole lake model is currently unavailable for Lake Superior, the department will set an interim 6-month average limit of 0.6 mg/L applicable during the May – October and November – April timeframes based on best readily available phosphorus removal technology as of the rule promulgation on 12/01/2010. If this limit is not readily achievable by the discharge then the interim limit may be based on a level currently achievable expressed as a monthly average limit but no more stringent than the applicable state technology-based limit as described in s. NR 217.04, Wis. Adm. Code. Based on calculated 6-month average effluent phosphorus concentration data for the May – October and November – April timeframes using October 2019 – June 2025 effluent phosphorus data, the City of Washburn would have exceeded the 0.6 mg/L limit twice during the current permit term or would have been in compliance with the limit approx. 82% of the time during October 2019 – June 2025. Therefore, the 6-month average limit of 0.6 mg/L is not recommended during the reissued permit term.

Nitrogen Series - (nitrate +nitrite, total Kjeldahl nitrogen and total nitrogen) **–** The department developed the "Guidance for Total Nitrogen Monitoring in WPDES Permits" document dated October 2019, where annual effluent monitoring for total nitrogen (total nitrogen = total Kjeldahl + (nitrite+nitrate)) is required for municipal and industrial facilities discharging to surface waters. Section 283.55(1)(e) Wis. Stats. allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and s. NR 200.065 (1)(h) Wis. Adm. Code allows for this monitoring to be collected during the permit term. The schedule for this facility is as follows:

- July – September 2026
- October – December 2027
- January – March 2028
- April – June 2029
- July – September 2030

PFOS and PFOA – NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for municipal dischargers with an average flow rate less than 1 MGD, to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(c), 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 proposed permit was drafted, it was identified that the source water has known levels of PFOS/PFOA.

Therefore, monitoring once every two months is included. A sample frequency of 1/2 months means one sample is taken during any two-month period. Examples of 1/2 month sample would be every other month (Jan, March, May, etc.) or back-to-back months with a break in between (February & March, May & June, Aug & Sept, etc.). DMR Short Forms will be generated for the following time periods: January-February, March-April, May-June, July-August, September-October, and November-December. At a minimum one sample result will be present on each form.

The initial determination of the need for sampling shall be conducted for up to two years in order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

WET Testing - A WET Checklist was prepared to determine the number of WET tests that are needed. As toxicity potential increases, more points accumulate, and more monitoring is required to assure toxicity is not occurring over the short (acute) and long (chronic) term. Based on the total points accumulated and Chapter 1.3 of the WET Guidance Document two Acute and Chronic WET Tests are required this permit term during the following quarters:

- April – June 2029
- July – September 2030

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.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
002	B	Cake	Sludge removal is not anticipated this permit term. If removal is needed see the land application and schedule sections of the permit for more information.			
003		Liquid				
004		Liquid				
Does sludge management demonstrate compliance? Yes						

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)**
Is additional sludge storage required? No						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No, the highest result from the last set of tests (2020) was 1.12 pCi/liter.						
Is a priority pollutant scan required? No						

3.1 Sample Point Number: 002- REED BED CAKE; 003- LIQUID SLUDGE; and 004 AERATION BASIN SOLIDS

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	
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	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonia (NH3-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	See the Sludge Analysis for PCBs permit section.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	See the Sludge Analysis for PCBs permit section.
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.

Changes from Previous Permit:

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

- **List 1** (Metals) and **PCB** monitoring is required during the second year of the permit term (2027).
- Because it's recommended that **List 2** (Nutrients) are monitored with the List 1 monitoring, they have been added to the table.
- Due to changes within the land application forms, the 3400-049 ("Characteristics Report"), 3400-052 ("Other Methods of Disposal") and 3400-055 (Annual Land Application") will need to be submitted each year.
- **PFAS** monitoring is required once pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

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).

Monitoring for Outfall 002 – Follow the monitoring table and land application sections found in the permit.
Monitoring of Outfall 003 – Monitoring is only required if sludge is planned to be removed prior to the reed beds.
Monitoring of Outfall 004 – Monitoring is only required if solids are planned to be removed from the aeration basin during maintenance.

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 (2027). Results will assist in the determination of the acres needed for land application of sludge should it be necessary. The number of acres needed is also required for the Sludge Management Schedule (see schedules for more information).

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.

- Sludge analysis during the second year of the permit term has been included. There are check boxes available on the electronic forms to identify if desludging didn't occur.
- Sludge characteristics report (3400-049) – at the top of the form check "yes" or "no" in the box identifying if any land application occurred that year. Complete the form if required or identify the year samples will be or have been taken in the comments section.
- 3400-052 ("Other Methods of Disposal") and 3400-055 ("Annual Land Application") - The reports are technically 2 separate forms that are now combined in one location but separated onto two different tabs. If you answer "No" to both listed questions the forms are complete. If you need to answer "Yes" to either question the corresponding form tabs will go from gray to blue indicting information can be entered on the report.

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

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

4 Schedules

4.1 Phosphorus

Required Action	Due Date
Progress Report: Submit an update on the progress of any phosphorus optimization, including any implementation schedules identified in the previous progress reports.	09/30/2026
Progress Report: Submit an update on the progress of any phosphorus optimization, including any implementation schedules identified in the previous progress reports.	09/30/2027
Progress Report: Submit an update on the progress of any phosphorus optimization, including any	09/30/2028

implementation schedules identified in the previous progress reports.	
Progress Report: Submit an update on the progress of any phosphorus optimization, including any implementation schedules identified in the previous progress reports.	09/30/2029
Updated Draft Report: Submit an update to the draft Comprehensive Facility Plan, include any new findings and conclusions from the progress reports. The updated draft plan shall be used to provide an outline of all the items necessary for completion of a Final Comprehensive Facility Plan. It shall address the identified technology-based level for phosphorus removal of the existing plant and potential use of Adaptive Management Plan options/alternatives, including Water Quality Trading for achieving compliance with a final WQBEL for phosphorus. It is recognized submittal of a final comprehensive facility plan will not be required until such time the WQBEL limit for phosphorus has been determined by the Department for subsequent permit re-issuance or modification.	09/30/2030

Explanation of Schedule

Phosphorus - It is unknown if the existing treatment plant is or will be capable of achieving the calculated or future limits based on nearshore or whole lake model water quality based effluent limits. If the calculated loading allocations are lower than the current discharges the facility may need to consider other control methods. This compliance schedule addresses continued optimization of phosphorus discharge reduction with the existing facilities and requires an update to the comprehensive facility plan and Operational Needs Report and Optimization Plan. Upon completion of any nearshore or whole lake model, the Department has the authority to modify the WPDES permit to include established WQBELs.

4.2 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.	09/30/2026
Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued. If, however, the Department determines there is no reasonable potential for the facility to discharge	09/30/2027

PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.	

Explanation of Schedule

PFOS/PFOA Minimization Plan Determination of Need - As stated above, ch. NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Section NR 106.98, Wis. Adm. Code, specifies steps to generate data in order to determine the need for reducing PFOS and PFOA in the discharge. Data generated per the effluent monitoring requirements will be used to determine the need for developing a PFOS/PFOA minimization plan. As part of the schedule, the permittee is required to submit two annual Reports on Effluent Discharge.

If the Department determines that a minimization plan is needed, the permit will be modified or revoked/reissued to include additional requirements.

4.3 Reed Bed Phragmites Survey

Surveys of adjacent lands for phragmites is required during years one and three of the permit term. If new areas are identified annual surveys are required. After three years of no new areas, the schedule reverts to twice a permit term.

Required Action	Due Date
Phragmites Survey - Year 1: The permittee shall conduct a survey of adjacent lands for new Phragmites growth. The survey shall follow the conditions for contents and assessment area found in the "Requirements for Reed Bed Systems" section of the permit.	10/31/2026
Phragmites Survey - Year 2: The permittee shall submit a Phragmites Survey if new areas of Phragmites were found outside of the reed beds as part of the previous survey.	10/31/2027
Phragmites Survey - Year 3 : The permittee shall conduct a survey of adjacent lands for new Phragmites growth. The survey shall follow the conditions for contents and assessment area found in the "Requirements for Reed Bed Systems" section of the permit.	10/31/2028
Phragmites Survey - Year 4: The permittee shall submit a Phragmites Survey if new areas of Phragmites were found outside of the reed beds as part of a previous survey.	10/31/2029
Phragmites Surveys After Permit Expiration: In the event that this permit is not reissued on time, the permittee shall continue to conduct surveys as necessary per permit requirements, submitting reports no later than October 31.	

Explanation of Schedule

Reed Bed Phragmites Survey - Surveys of adjacent lands for phragmites is required during years one and three of the permit term. If new areas of *Phragmites australis australis* and/or *Phragmites australis americanus* are identified annual surveys are required. After three years of no new areas, the schedule reverts to twice a permit term.

4.4 Reed Bed Sludge Management Plan (SMP)

Required Action	Due Date
Submit a Sludge Management Plan: The permittee shall submit a revised sludge 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: • Describe how and where is sludge is sampled providing details if samples are commingled or are	

discrete. Collect samples from each bed to better characterize potential issues with the sludge in each bed.

- Provide information relating to sludge storage. State if beds will be taken offline to allow reed sludge to dry and condense. State if the beds will be reactivated. State if the sludge from individual cells will be commingled into other beds for drying purposes.
- Describe how will the sludge be removed providing details on volume, characterization and how will the treatment plant continue to function during the drawdown;
- Describe how will the sludge be prepared to eliminate opportunities for uncontrolled dissemination of Phragmites outside of the facility prior to landfilling, land application and/or other approved disposal method. Examples include but are not limited to screening methods to remove rhizomes, and onsite storage including transferring sludge into other offline beds, temporary storage on lined areas at the facility (collecting any liquid) and potential composting protocols.
- Describe the type of transportation and spreading vehicles and loading and unloading practices. Include methods to protect the loss of sludge, seeds and rhizomes during transport. Also include information relating to washdown of vehicles leaving the site;
- Identify disposal locations. If the proposal is for applying the sludge to lands for beneficial use, then apply to the department by submitting completed land application site requests and show acreage approved subtracting areas with site limitations, demonstrate total acres needed and provide details associated with developing vegetative cover management practices. Nitrogen calculations should be included as well as potential pollutant (metals) loadings. If landfilling, provide approval from licensed landfill for acceptance at the landfill. Also communicate that the sludge may be susceptible for phragmite infestations if not handled properly by placing sludge into the cell of the landfill;
- Include Wetland Invasive BMPs (https://dnr.wisconsin.gov/sites/default/files/topic/Invasives/bmp_WetlandInvasive.pdf) into the SMP
- Specify record keeping procedures including site loading decontamination of vehicles, equipment, tools and other personal protective equipment;
- Address contingency plans for adverse weather and odor/nuisance abatement;
- Identify the preparations which will be implemented to stop the "chimney effect" during burning of reeds, protecting facility infrastructure and general burning practices such as obtaining a burning permit or public notification. The chimney effect is the rapid upward flow of air that can cause a fire to burn hotter and faster. Practices may include but are not limited to:
    - Reduce pile height: A smaller, flatter brush pile will minimize the chimney effect by reducing the vertical space for air to rise through.
    - Distribute fuel evenly: Avoid stacking large branches in a single direction, instead, mix smaller twigs and branches throughout the pile to create a more even fuel distribution.
    - Use barriers within the pile: Place larger logs or rocks strategically within the pile to disrupt the airflow and prevent hot air from rising too quickly in one spot.
    - Consider moisture content: Slightly damp brush will burn slower and produce less intense heat, helping to control the chimney effect.
    - Burn in small batches: If you have a large amount of brush to burn, divide it into smaller

piles and burn them one at a time to better manage the fire. o Weather: Brush piles should be burned when wind speeds are less than 15 mph and not gusty. Also, wind direction should be considered to keep embers and smoke from becoming a problem downwind. Burning brush piles when relative humidity remains greater than 40 percent can slow down the burning process. • Include any other pertinent information such as other disposal options that may be used or specifications of any pretreatment processes.	

Explanation of Schedule

Reed Bed Sludge Management Plan (SMP) - If there plans to de-sludge the reed beds during this permit term a management plan is needed to show compliance with ch. NR 204, Wis. Adm. Code.

Attachments

Water Flow Schematic updated July 2025

Water Quality Based Effluent Limits memo dated June 26, 2025

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance

Prepared By: Sheri A. Snowbank Wastewater Specialist **Date:** July 2, 2025

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: June 26, 2025

TO: Sheri Snowbank– NOR/Spooner

FROM: Zainah Masri – WY/3

SUBJECT: Water Quality-Based Effluent Limitations for the City of Washburn
WPDES Permit No. WI-0022675-11-0

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 City of Washburn in Bayfield County. This municipal wastewater treatment facility (WWTF) discharges to Lake Superior located in the Bayfield Peninsula Southeast Watershed in the Lake Superior 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					1,2
BOD_5			45 mg/L	30 mg/L	1
TSS			45 mg/L	30 mg/L	1
pH	9.0 s.u.	6.0 s.u.			1
Ammonia Nitrogen					2
Bacteria					3
Final Limit *E. coli*				126 #/100 mL geometric mean	
Chloride					4
PFOS and PFOA					5
Phosphorus					6
Interim				1.0 mg/L	
TKN, Nitrate+Nitrite, and Total Nitrogen					7
Acute WET					8
Chronic WET					9,10

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Bacteria limits apply during the disinfection season year-round. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
4. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
5. PFOS and PFOA monitoring is recommended at a once every two months frequency in accordance with s. NR 106.98(2), Wis. Adm. Code.

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6. Section NR 102.06(5)(a), Wis. Adm. Code, specifies a total phosphorus criterion of 5 µg/L (0.005 mg/L) for the open and nearshore waters of Lake Superior. For discharges directly to the Great Lakes, s. NR 217.13(4), Wis. Adm. Code, says that the Department shall set effluent limits consistent with nearshore or whole lake models approved by the Department. At this time, there is no model available. According to phosphorus implementation guidance, an interim limit should be set at a level that is achievable and that makes progress toward phosphorus reductions without the investment of temporary treatment or a compliance schedule to meet the interim limit.
7. 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. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total Kjeldahl nitrogen (TKN) (all expressed as N).
8. After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above 2 acute WET tests throughout the permit term are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
9. After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above 2 chronic WET tests throughout the permit term are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).
10. The Instream Waste Concentration (IWC) to assess chronic test results is 9%. 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% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from Lake Superior.

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

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

Attachments (3) – Narrative, Map and Thermal Table

PREPARED BY: Zainah Masri, Water Resources Engineer

APPROVED BY: _____ Date: _____
Diane Figiel, PE,
Water Resources Engineer

E-cc: Eric De Venecia, Wastewater Engineer – NOR/Superior
Michelle BalkLudwig, Regional Wastewater Supervisor – NOR/Spooner
Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, Natural Resources Program Manager – WY/3
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
The City of Washburn

WPDES Permit No. WI-0022675-11-0

Prepared by: Zainah Masri – WY/3

PART 1 – BACKGROUND INFORMATION

Facility Description

The Wastewater Treatment Facility of the City of Washburn is designed to treat 0.380 MGD. Primary treatment consists of a bar gate, two fine screens and a grit chamber for solids removal. Secondary treatment is achieved in the extended aeration basin by activated sludge, where naturally occurring metabolizing microorganisms present in the wastewater break down organic matter. Alum is added to the aeration basin to provide phosphorus removal. Water then flows into a final clarifier where solids are settled out. Some of the solids (return activated sludge or RAS) are returned to the aeration basin to reseed the activated sludge process and the remaining solids (waste activated sludge or WAS) is pumped to the aerobic digester for further treatment. Effluent from the final clarifier is disinfected with UV disinfection before being discharged to Lake Superior approximately 400 feet offshore. The inflow/infiltration (I&I) temporary storage (equalization) basin is used during high flow conditions when influent flows exceed peak flow treatment capacity, to prevent flood damage and process upsets. The wastewater is routed post-primary treatment to the I&I basin and is routed back to the aeration basin after influent flow subsides.

WAS generated from the final clarifier is pumped to an aerobic digester for pathogen reduction. Periodically, aeration is shut off to allow solids to settle and decanted supernatant to be routed back to the headworks for treatment. Settled solids are pumped to reed beds for storage and further dewatering by native phragmites. The sludge is ultimately landfilled once reed beds reach capacity after approximately 15 years. There are two other outfalls for sludge/solids tracking that are used very infrequently: solids generated from aeration basin maintenance are landfilled, and liquid sludge from the aerobic digester is land applied during reed bed maintenance/sludge removal events if necessary.

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

Existing Permit Limitations

The current permit, expired on September 30, 2024 and includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD_5			45 mg/L	30 mg/L		1
TSS			45 mg/L	30 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Ammonia Nitrogen						2
Fecal Coliform May – September			**656#/100 mL geometric mean**	400#/100 mL geometric mean		3
E. Coli						4
Chloride						2
Phosphorus Interim				1.0 mg/L		5
Acute WET						6
Chronic WET						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 during 2021 calendar year.
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. Monitoring only.
5. Section NR 102.06(5)(a), Wis. Adm. Code, specifies a total phosphorus criterion of 5 µg/L (0.005 mg/L) for the open and nearshore waters of Lake Superior. For discharges directly to the Great Lakes, s. NR 217.13(4), Wis. Adm. Code, says that the Department shall set effluent limits consistent with nearshore or whole lake models approved by the Department. At this time, there is no model available. According to phosphorus implementation guidance, an interim limit should be set at a level that is achievable and that makes progress toward phosphorus reductions without the investment of temporary treatment or a compliance schedule to meet the interim limit.
6. Acute and Chronic tests shall be conducted once during the 2022 calendar year. It is recommended that tests take place during the summer (July 1 – September 30 (Third Quarter)) tourist season. WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified in 2022. For example, the next test would be required during the 2025 calendar year.

Receiving Water Information

- Name: Lake Superior
- Waterbody Identification Code (WBIC): 2751220
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Cold water full fish and aquatic life, public water supply, and outstanding resource water (ORW).
- Flow: A ten-to-one dilution ratio will be used for calculating effluent limitations based on chronic or long-term impacts, in accordance with s. NR 106.06(4)(b)2, Wis. Adm. Code, because the receiving water does not exhibit a unidirectional flow at the point of discharge. A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.
- Hardness = 52 mg/L as $CaCO_3$. This value represents the geometric mean of data from WET testing from February 2010 to August 2022.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%

- Source of background concentration data: Metals data for Lake Superior is very limited. Because no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple Dischargers: There are several other dischargers to Lake Superior however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: Lake Superior is an impaired water due to fish tissue being contaminated with mercury and polychlorinated biphenols (PCBs). These pollutants do not impact WQBELs due to the concerned concentrations being limited to the fish tissue.

Effluent Information

- Design flow rate(s):
  Annual average = 0.38 MGD (Million Gallons per Day)
  For reference, the actual average flow from March 2019 to April 2025 was 0.23 MGD.

- Hardness = 214 mg/L as $CaCO_3$. This value represents the geometric mean of data from February 2024 taken from 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 two non-significant industrial contributors, Western Engraving, a small metal engraving business, which was determined not to be a pretreatment industry and Washburn Iron Works a metal casting company that does not discharge process water to the City of Washburn.
- Water supply: Municipality waterworks and private wells.
- Additives: Alum is utilized for chemical phosphorus removal.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus hardness and phosphorus. The current permit required monitoring for ammonia nitrogen and chloride.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, 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 Copper Data

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
02/07/2024	19	02/22/2024	22	03/07/2024	26
02/12/2024	18	02/26/2024	26	03/11/2024	18
02/15/2024	28	02/29/2024	17	03/14/2024	17
02/19/2024	23	03/04/2024	20		
1-day P_{99} = 32 µg/L					
4-day P_{99} = 26 µg/L					

Attachment #1

Effluent Chloride Data

Sample Date	Chloride mg/L	Sample Date	Chloride mg/L	Sample Date	Chloride mg/L
01/21/2021	171	05/03/2021	120	09/07/2021	118
02/01/2021	134	06/01/2021	119	10/04/2021	118
03/01/2021	171	07/12/2021	109	11/01/2021	122
04/05/2021	142	08/02/2021	118	12/06/2021	165
1-day P_{99} = 196 mg/L					
4-day P_{99} = 163 mg/L					

The following table presents the average concentrations and loadings at Outfall 001 from March 2019 to April 2025 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement
BOD_5	12 mg/L*
TSS	7.4 mg/L
pH field	6.8 s.u.
Phosphorus	0.40 mg/L
Ammonia Nitrogen	0.11 mg/L*
E.coli	7.1 #/100 mL
Fecal Coliform	19 #/100 mL

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

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 P_{99}) 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_{10}

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_{10} 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.

$$\text{Limitation} = \frac{(WQC)\,(Qs + (1-f)\,Qe) - (Qs - f\,Qe)\,(Cs)}{Qe}$$

Where:

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

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

Qe = 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

Cs = 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_{10} 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 the City of Washburn 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).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 10:1 dilution

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	<1.2		
Cadmium	214	10	21	4.2	<1		
Chromium	214	3,362	6,725	1,345	<2		
Copper	214	32	64			32	28
Lead	214	223	446	89	<1		
Nickel	214	893	1,786	357	<9		
Zinc	214	234	468	94	23		
Chloride (mg/L)		757	1,514			196	171

* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q_{10} 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 = 10:1 dilution

SUBSTANCE	REF. HARD. mg/L	CTC	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Arsenic		148	1,628	326	<1.2	

Attachment #1

SUBSTANCE	REF. HARD. mg/L	CTC	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Cadmium	52	1.5	16	3.2	<1	
Chromium	52	50	555	111	<2	
Copper	52	5.9	65			26
Lead	52	15	164	33	<1	
Nickel	52	30	330	66	<9	
Zinc	52	68	747	150	23	
Chloride (mg/L)		395	4,345			163

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 = 10:1 dilution

SUBSTANCE	HTC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	4,070	814	<1
Chromium (+3)	3,818,000	419,980,000	8,399,600	<2
Lead	140	1,540	308	<1
Nickel	43,000	473,000	94,600	<9

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 10:1 dilution

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	146	29	<1.2

Conclusions and Recommendations
Based on a comparison of the effluent data and calculated effluent limitations, **effluent limitations are not required, but PFOA/PFOS monitoring and continued chloride monitoring is recommended.**

Chloride – Considering available effluent data from January 2021 to December 2021 the 1-day P_{99} chloride concentration is 196 mg/L, and the 4-day P_{99} of effluent data is 163 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 the City of Washburn 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 within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from July 27, 2020 was 0.50 mg/kg. Therefore, **no mercury monitoring is recommended at Outfall 001.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Because Lake Superior has a PFOS fish consumption advisory, **PFOS and PFOA monitoring is recommended at a once every two months frequency**.

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. Given the fact that the City of Washburn does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

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 = 0.275 and B = 39.0 for a Cold-Water Category 1 fishery

pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 1,546 sample results were reported from March 2019 to April 2025. The maximum reported value was 7.3 s.u. (Standard pH Units). The effluent pH was 7.2 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.3 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 7.3 s.u. Therefore, a value of 7.3 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 7.3 s.u. into the equation above yields an ATC = 17.5 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-Q_{10} 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_{10} (estimated as 80 % of 7-Q_{10}) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	35
1-Q_{10}	192

The 2×ATC method yields the most stringent limits for City of Washburn.

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 – Cold water

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	72	7.0 < pH ≤ 7.1	44	8.0 < pH ≤ 8.1	9.3
6.1 < pH ≤ 6.2	71	7.1 < pH ≤ 7.2	39	8.1 < pH ≤ 8.2	7.6
6.2 < pH ≤ 6.3	69	7.2 < pH ≤ 7.3	35	8.2 < pH ≤ 8.3	6.3
6.3 < pH ≤ 6.4	67	7.3 < pH ≤ 7.4	31	8.3 < pH ≤ 8.4	5.2
6.4 < pH ≤ 6.5	65	7.4 < pH ≤ 7.5	27	8.4 < pH ≤ 8.5	4.3
6.5 < pH ≤ 6.6	63	7.5 < pH ≤ 7.6	23	8.5 < pH ≤ 8.6	3.5
6.6 < pH ≤ 6.7	60	7.6 < pH ≤ 7.7	19	8.6 < pH ≤ 8.7	3.0
6.7 < pH ≤ 6.8	56	7.7 < pH ≤ 7.8	16	8.7 < pH ≤ 8.8	2.5
6.8 < pH ≤ 6.9	52	7.8 < pH ≤ 7.9	14	8.8 < pH ≤ 8.9	2.1
6.9 < pH ≤ 7.0	48	7.9 < pH ≤ 8.0	11	8.9 < pH ≤ 9.0	1.8

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.

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 for a Cold-Water Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

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

Where:

pH = the pH (s.u.) of the receiving water,
E = 0.854,
C = the minimum of 2.85 or $1.45 \times 10^{(0.028 \times (25 - T))}$,
T = the temperature (ºC) of the receiving water

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used to derive weekly average limitations, and the 30-day criteria are used to derive monthly average limitations, both by a mass-balance using a ten-to-one dilution ratio.

Weekly and Monthly Ammonia Nitrogen Limits – CW

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Effluent Flow	Qe (MGD)	0.38	0.38	0.38
Background Information	7-Q_{10} (cfs)	0	0	0
	7-Q_2 (cfs)	0	0	0
	Ammonia (mg/L)	0.03	0.03	0.025
	Average Temperature (°C)	11	16	4
	Maximum Temperature (°C)	13	18	9
	pH (s.u.)	7.7	7.8	7.5
	% of Flow used	25	100	25
	Reference Weekly Flow (cfs)	0	0	0
	Reference Monthly Flow (cfs)	0	0	0
	Dilution factor (for lakes)	10	10	10
Criteria mg/L	4-day Chronic	8.95	6.45	10.91
	30-day Chronic	3.58	2.58	4.36
Effluent Limits mg/L	Weekly Average	98	71	120
	Monthly Average	39	28	48

Effluent Data

Ammonia nitrogen samples were taken from January 2021 to December 2021 and their results were as follows:

Ammonia Nitrogen Effluent Data

	Ammonia Nitrogen mg/L
1-day P_{99}	0.7
4-day P_{99}	0.4
30-day P_{99}	0.19
Mean*	0.11
Std	0.15
Sample size	18
Range	<0.1 - 0.6

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

Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits.

No limits are needed however monitoring is recommended.

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

The current permit requires the City of Washburn to disinfect year-round for protection of the public water supply, The outfall is located within 5 miles of a public drinking water supply, therefore year-round disinfection is required according to s. NR 210.06(3)(b), Wis. Adm Code. Because the *E. coli* limits listed in NR 210.06(2)(a)1, Wis. Adm. Code, are set for protection of recreational uses and not drinking water supply, these *E. coli* limits do not necessarily need to be applied year-round. However, either *E. coli* or fecal coliform bacteria limits are needed year-round in order to ensure that there is no reduction from the current level of disinfection needed to protect the public drinking water source.

In accordance with s. NR 210.06(2)(a)2, Wis. Adm. Code, outside of the recreational season, bacteria limits may either be set equal to the previous fecal coliform limits or the listed *E. coli* limits. Therefore, the facility can select one of the two possible sets of permit limits:

- *E. coli* limits as listed above during the recreation period of May through September and a fecal coliform limit of 400 counts/100 mL as a monthly geometric mean in November through April. Any fecal coliform weekly geometric mean limit which was included in the previous permit for expression of limits purposes does not need to be included in the reissued permit.
- *E. coli* limits as listed above apply year-round.

Effluent Data
The City of Washburn has monitored effluent *E. coli* from October 2019 to April 2025 and a total of 99 results are available. A geometric mean of 126 counts/100 mL was exceeded once, with a maximum monthly geometric mean of 140 counts/100 mL on December 3, 2019. The maximum reported value was 140 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.

Because the City of Washburn currently has an existing technology-based limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent water quality-based concentration limit is given. In addition, the need for a WQBEL for phosphorus must be considered.

Water Quality-Based Effluent 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 102.06(5)(b) specifies that a total phosphorus criterion of 5 µg/L (0.005 mg/L) applies for the open and nearshore water of Lake Superior. For discharges directly to the Great Lakes, s. NR 217.13(4), Wis. Adm. Code, says that the Department shall set effluent limits consistent with nearshore or whole lake models approved by the Department. At this time, there is no model available. According to phosphorus implementation guidance, an interim limit should be set at a level that is achievable and that makes progress toward phosphorus reductions without the investment of temporary treatment or a compliance schedule to meet the interim limit.

Effluent Data
The following table summarizes effluent total phosphorus monitoring data from March 2019 to April 2025.

Total Phosphorus Effluent Data

	Phosphorus mg/L
1-day P_{99}	2.4
4-day P_{99}	1.3
30-day P_{99}	0.67
Mean	0.40
Std	0.51
Sample size	382
Range	0.06 - 6.27

Interim Limit
It is recommended that the interim limit continue to be set equal to the current technology based limit of 1.0 mg/L for permit reissuance along with requirements for optimization of phosphorus removal.

The Guidance for Implementation of Wisconsin's Phosphorus Water Quality Standards states that facilities discharging to the Great Lakes will be required to optimize facility operations upon permit reissuance. During the permit term, the facility has carried out optimization efforts as part of the phosphorus compliance schedule. The facility should continue the measures in their optimization plan until a near-shore or whole lake model allows for the calculation of a WQBEL.

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.

The lowest calculated limitation is 120° F (s. NR 106.55(7)) for a Lake Superior off – shore discharge as included in the Thermal Table in Attachment #3.

At temperatures above approximately 103° F, conventional biological treatment systems do not function properly and experience upsets. There is no indication that this has ever occurred in this treatment system. Therefore, there is no reasonable potential for the discharge to exceed this limit. **No monitoring or effluent limits are recommended for temperature.**

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_{50} (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 IC_{25} (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 is 9% based on dilution of 10 parts lake water to 1-part effluent, as specified in s. NR 106.06(4)(b)2, Wis. Adm. Code, or a factor of 1 in 11 to calculate the IWC.

- 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.

- 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. Data which is not believed to be representative of the discharge is not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. There have been 8 total WET tests that have been conducted at this facility from September 1998 – June 2013. WWTF improvements during the current permit term include a UV system replacement, SCADA/flow monitoring control upgrades, I&I basin bypass line installation, and a reed bed reconstruction to native phragmites in place of the previously used non-native variety. These improvements have occurred in 2013, 2016, 2017, and 2018 respectively. In addition, blending has not been requested for the reissued permit term. These upgrades support better process control which is believed to be the primary factor related to past process upsets. Therefore, historic WET tests are no longer considered representative of the current discharge and will not be considered in WET determination.

Attachment #1

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %					Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Algae (IC_{50})	Pass or Fail?	Use in RP?	
09/16/1998	>100	>100	Pass	No	-	-	-	-	-	1
10/13/1999	>100	>100	Pass	No	-	-	-	-	-	1
02/16/2010	>100	74	Fail	No	-	-	-	-	-	-
10/02/2012	>100	>100	Pass	No	49	52	-	Pass	No	-
11/07/2012	>100	>100	Pass	No	-	-	-	-	-	-
06/11/2013	>100	>100	Pass	No	>100	>100	-	Pass	No	-
08/20/2019	>100	>100	Pass	Yes	>100	>100	>100	Pass	Yes	-
08/22/2022	>100	>100	Pass	Yes	>100	>100	-	Pass	Yes	-

Footnotes:

1. *Data Not Representative.* Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. It may be appropriate to exclude data collected before July 1, 2005, unless 1) it shows repeated toxicity that was never resolved or 2) older data is all that is available, and no significant changes have occurred which obviously make it unrepresentative. Ammonia limits were added to the permit in 2005 based on updated water quality criteria.

- 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.**

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

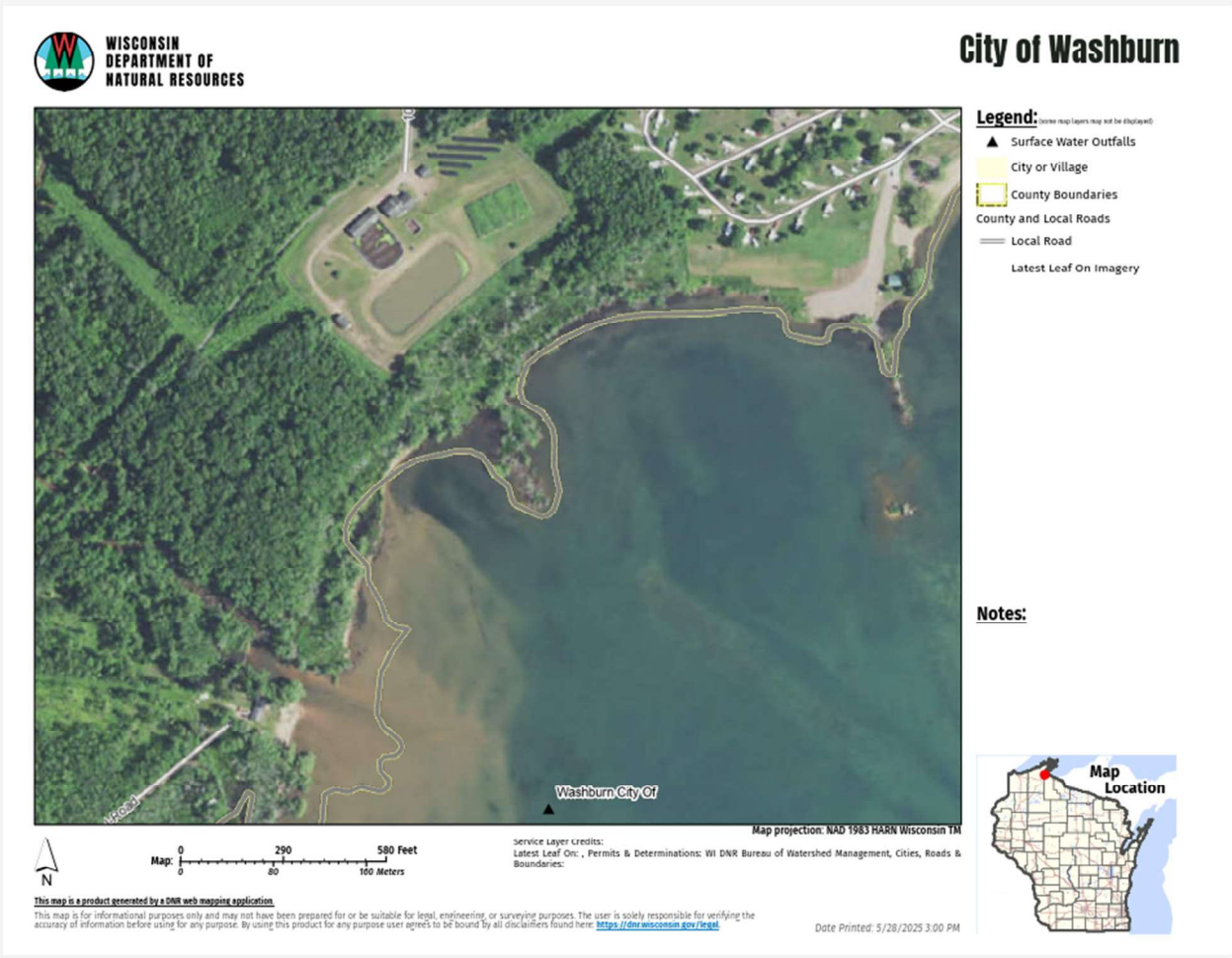
	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 9%. **0 Points**
Historical Data	2 tests used to calculate RP. No tests failed. **0 Points**	2 tests used to calculate RP. No tests failed. **0 Points**

Attachment #1

	Acute	Chronic
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	L. Superior **15 Points**	Same as Acute. **15 Points**
Chemical-Specific Data	No Reasonable potential for limits for any substances based on ATC; Ammonia nitrogen, zinc, chloride, copper detected. **3 Points**	Reasonable potential for limits for limits for any substances based on CTC; Ammonia nitrogen, zinc, chloride, copper detected. **3 Points**
Additives	0 Biocides and 1 Water Quality Conditioner added. Permittee has proper P chemical SOP in place. **1 Point**	All additives used more than once per 4 days. **1 Point**
Discharge Category	0 Industrial Contributors. **0 Points**	Same as Acute. **0 Points**
Wastewater Treatment	Secondary or Better **0 Points**	Same as Acute. **0 Points**
Downstream Impacts	No impacts known. **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**19 Points**	**19 Points**
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term	2 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 **2 acute WET tests and 2 chronic WET tests throughout the permit term are recommended in the reissued permit**. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

Site Map:


WISCONSIN
DEPARTMENT OF
NATURAL RESOURCES
City of Washburn
Legend:
Surface Water Outfalls
City or Village
County Boundaries
County and Local Roads
Local Road
Latest Leaf On Imagery
Notes:
Washburn City Of
Map projection: NAD 1983 HARN Wisconsin TM
Map:
0
290
580 Feet
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80
160 Meters
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Service Layer Credits:
Latest Leaf On: , Permits & Determinations: WI DNR Bureau of Watershed Management, Cities, Roads & Boundaries:
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Date Printed: 5/28/2025 3:00 PM
Map Location

Thermal Table:

Temperature limits for receiving waters without unidirectional flow
(calculation using default ambient temperature data)

Facility:	City of Washburn	**Lake Type:**	Lake Superior		**Temp Dates** **Flow Dates**
Outfall(s):	001	**Discharge Type:**	Great Lakes off-shore discharge	**Start:**	01/00/00 03/01/19
Date Prepared:				**End:**	01/00/00 08/22/24
Design Flow (Qe):	0.38 MGD	**Maximum area of mixing zone allowed (coefficient "A"):**	3,141,593 ft^2		

Month	Water Quality Criteria			Representative Highest Effluent Flow Rate (Qe)		B	e^{-a} (for SL-WQBEL)	e^{-a} (for A-WQBEL)	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC	7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)				Weekly Average	Daily Maximum	**Weekly Average Effluent Limitation**	**Daily Maximum Effluent Limitation**
	(°F)	(°F)	(°F)	(MGD)	(MGD)				(°F)	(°F)	(°F)	(°F)
JAN	35	41	69	0.34	0.46	0.405	0.000	0.000	0	0	NA	120
FEB	34	46	69	0.34	0.74	0.405	0.000	0.000	0	0	NA	120
MAR	34	51	69	0.68	1.31	0.405	0.000	0.000	0	0	NA	120
APR	35	57	69	1.09	1.31	0.405	0.000	0.000	0	0	NA	120
MAY	41	63	70	0.60	1.14	0.405	0.000	0.000	0	0	NA	120
JUN	49	69	72	0.51	0.88	0.405	0.000	0.000	0	0	NA	120
JUL	55	72	73	0.39	0.52	0.405	0.000	0.000	0	0	NA	120
AUG	57	71	73	0.31	0.43	0.405	0.000	0.000	0	0	NA	120
SEP	57	64	73	0.30	0.50	0.405	0.000	0.000	0	0	NA	120
OCT	50	55	72	0.30	0.48	0.405	0.000	0.000	0	0	NA	120
NOV	43	45	70	0.35	0.97	0.405	0.000	0.000	0	0	NA	120
DEC	38	42	69	0.53	1.24	0.405	0.000	0.000	0	0	NA	120

City of Washburn
Wastewater Treatment Plant

The Washburn wastewater treatment facility is an activated sludge plant with extended aeration and chemical phosphorus removal. Effluent is discharged to Lake Superior. Sludge is treated in an aerobic digester and stored in a reed bed. The diagram below shows the treatment units and sampling locations.