

Permit Fact Sheet

General Information

Permit Number:	WI-0021059-10-0	
Permittee Name and Address:	CONSOLIDATED KOSHKONONG SANITARY DISTRICT 328 East Ellendale Road, Edgerton, WI 53534	
Permitted Facility Name and Address:	CONSOLIDATED KOSHKONONG SANITARY DISTRICT WWTF KIDDER ROAD, FULTON TWP, SEC 14, EDGERTON, WISCONSIN	
Permit Term:	Effective: January 01, 2025 Expiration: December 31, 2029	
Discharge Location:	East bank of the Rock River, approx. ¼ mile west of plant. NE ¼ of SW ¼, Section 14, T4N, R12E. Lat: 42.81090° N / Lon: 89.04422° W	
Receiving Water:	Rock River (Rock River/Milton Watershed, LR04 – Lower Rock River Basin) in Rock County	
StreamFlow (Q _{7,10}):	140 cfs	
Stream Classification:	Warm water sport fish (WWSF), non-public water supply	
Discharge Type:	Existing, Continuous	
Design Flow(s)	Daily Maximum	2.911 MGD
	Monthly Maximum	0.901 MGD
	Annual Average	0.769 MGD
Industrial or Commercial Contributors:	None	
Plant Classification:	Facility is Basic with subclasses A4 – Ponds, Lagoons & Natural Systems, D – Disinfection, L – Laboratory, SS – Sanitary Sewage Collection System	
Approved Pretreatment Program?	N/A	

Facility Description

The Consolidated Koshkonong Sanitary District serves four different townships with no significant industries or anticipated growth. This facility is a 3-cell aerated lagoon system originally built in 1972. The lagoons are operated in series and all three are aerated with a diffuse air system. Each lagoon contains 6.05 million gallons.

The facility completed an upgrade in 2022 that included new PVC liners and covers on each treatment lagoon, replacement of the chlorine disinfection system with ultraviolet light, installation of chemical phosphorus removal facilities and polishing reactor for nitrogen treatment. The Consolidated Koshkonong Sanitary District discharges in a shared outfall with the City of Milton Wastewater Treatment Facility.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on January 19, 2023, this facility has been found to be in substantial compliance with their current permit.

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	0.523 MGD (Average 2023)	Influent: 24-hr flow proportional composite samples shall be taken from pump station A at the v-notch weir prior to the wet well. Flow is monitored by a magnetic flow meter located in piping at the headworks.
001	0.575 MGD (Average October 2018 – May 2024)	Effluent: 24-hr flow proportional composite samples shall be taken prior UV disinfection. Grab samples shall be taken after UV disinfection from effluent manhole #1 prior to the City of Milton’s effluent flow and discharge to the Rock River. Flow is monitored in the discharge pipe Parshall Flume with an ultrasonic flow meter.
002	Sludge Removed 2019 – 9,103 metric tons 2020 – 3,694 metric tons	Liquid, Class B. Representative composite grab lagoon sludge samples shall be taken from each lagoon and then combined for one sample. If a lagoon is scheduled for desludging, a composite grab sample of just that lagoon sludge may be needed prior to land application.

1 Influent – Monitoring Requirements

Sample Point Number: 701- INFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	Weekly	24-Hr Flow Prop Comp	January - March
BOD5, Total		mg/L	Monthly	24-Hr Flow Prop Com	April - December
CBOD5		mg/L	Weekly	24-Hr Flow Prop Comp	April - December
Suspended Solids, Total		mg/L	Weekly	24-Hr Flow Prop Comp	

Changes from Previous Permit:

Influent 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: Sample frequency has changed to ‘Daily’ for eDMR reporting purposes.

BOD5: Monthly monitoring in April – December has been added to the permit.

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. In accordance with s. NR 210.07, Wis. Adm. Code, influent monitoring must include CBOD5 and BOD5 when CBOD5 limits are required.

2 Surface Water - Monitoring and Limitations

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	Weekly	24-Hr Flow Prop Comp	January - March
BOD5, Total	Monthly Avg	30 mg/L	Weekly	24-Hr Flow Prop Comp	January - March
CBOD5	Weekly Avg	40 mg/L	Weekly	24-Hr Flow Prop Comp	April - December
CBOD5	Monthly Avg	25 mg/L	Weekly	24-Hr Flow Prop Comp	April - December
Suspended Solids, Total	Weekly Avg	45 mg/L	Weekly	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	Weekly	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	360 lbs/day	Weekly	Calculated	January, March, May, July, August, October, December
Suspended Solids, Total	Weekly Avg	400 lbs/day	Weekly	Calculated	February
Suspended Solids, Total	Weekly Avg	380 lbs/day	Weekly	Calculated	April, June, September, November
Suspended Solids, Total	Monthly Avg	294 lbs/day	Weekly	Calculated	January, March, May, July, August, October, December
Suspended Solids, Total	Monthly Avg	326 lbs/day	Weekly	Calculated	February
Suspended Solids, Total	Monthly Avg	302 lbs/day	Weekly	Calculated	April, June, September, November
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Ammonia Variable Limit		mg/L	Weekly	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.
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	Weekly	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	60 mg/L	Weekly	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	60 mg/L	Weekly	24-Hr Flow Prop Comp	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	May - September
E. coli	% Exceedance	10 Percent	Monthly	Calculated	May - September
Phosphorus, Total	Monthly Avg	1.0 mg/L	Weekly	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	55.1 lbs/day	Weekly	Calculated	January
Phosphorus, Total	Monthly Avg	79.06 lbs/day	Weekly	Calculated	February
Phosphorus, Total	Monthly Avg	54.17 lbs/day	Weekly	Calculated	March
Phosphorus, Total	Monthly Avg	33.93 lbs/day	Weekly	Calculated	April
Phosphorus, Total	Monthly Avg	50.78 lbs/day	Weekly	Calculated	May
Phosphorus, Total	Monthly Avg	11.82 lbs/day	Weekly	Calculated	June
Phosphorus, Total	Monthly Avg	8.84 lbs/day	Weekly	Calculated	July
Phosphorus, Total	Monthly Avg	2.11 lbs/day	Weekly	Calculated	August
Phosphorus, Total	Monthly Avg	17.07 lbs/day	Weekly	Calculated	September
Phosphorus, Total	Monthly Avg	14.16 lbs/day	Weekly	Calculated	October
Phosphorus, Total	Monthly Avg	17.14 lbs/day	Weekly	Calculated	November
Phosphorus, Total	Monthly Avg	32.34 lbs/day	Weekly	Calculated	December
Chloride		mg/L	Monthly	24-Hr Flow	Monitoring in 2027.

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
				Prop Comp	
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 Nitrite + Nitrate Nitrogen.

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: Sample frequency has changed to ‘Daily’ for eDMR reporting purposes.

Total Suspended Solids (TSS): The permit includes a 45 mg/l weekly average limit and 30 mg/l monthly average limit.

pH: The sample frequency has changed to 5/week.

E. coli: Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.

Chloride: The monitoring year has been updated to 2027.

Total Nitrogen Monitoring (TKN, N02+N03 and Total N): Annual monitoring in rotating quarters throughout the permit term was added to the proposed permit.

Temperature and Acute WET: Monitoring for these parameters have been removed.

Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached Water Quality-Based Effluent Limitations (WQBEL) for the Consolidated Koshkonong Sanitary District WWTF memo, prepared by Sarah Luck, dated July 23, 2024.

BOD₅, CBOD₅, and pH: Categorical limits and WQBELs are included in the permit as outlined in ch. NR 210, Wis. Adm. Code. The effluent limitations for BOD₅, COB₅, and pH are carried over from the previous permit and are not subject to change at this time because the receiving water characteristics have not changed.

TSS: The TSS variance limit is no longer applicable. Categorical limits are set equal to BOD₅ concentration limits which are from NR210.07(5), Wis. Adm. Code.

TMDL: A total maximum daily load (TMDL) was developed for the Rock River Basin to determine the maximum amounts of phosphorus and sediment that can be discharged to protect and improve water quality. The Rock River Basin’s

TMDL was approved by the Environmental Protection Agency (EPA) in September 2011. These final effluent limits were derived from and comply with the applicable water quality criterion and is consistent with the assumptions and requirements of the EPA-approved WLA for the Rock River. The entire report can be found at: http://dnr.wi.gov/topic/TMDLs/RockRiver/Final_Rock_River_TMDL_Report_with_Tables.pdf. The proposed permit includes limitations and requirements necessary to implement the recommendations of the TMDL.

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

Ammonia: Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia.

E. Coli: Revisions to bacteria surface water quality criteria to protect recreational uses and accompanying E. coli WPDES permit implementation procedures became effective May 1, 2020. The new rule requires that WPDES permits for facilities with required disinfection include monitoring for E. coli while facilities are disinfecting during the recreation period, and establish effluent limitations for E. coli established in s. NR 210.06 (2), Wis. Adm Code. The administrative code rule changes included the following actions: revised the bacteria water quality criteria from fecal coliform to E. coli to protect recreation in ch. NR 102, Wis. Adm. Code.; removed fecal coliform criteria for certain individual waters from ch. NR 104, Wis. Adm. Code.; revised permit requirements for publicly and privately owned sewage treatment works in ch. NR 210, Wis. Adm. Code.; and, updated approved analytical methods for bacteria in ch. NR 219, Wis. Adm. Code. An evaluation of effluent data determined the facility can meet the E. coli limits, and no compliance schedule is included.

Chloride: Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter VII of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for chloride.

Total Nitrogen Monitoring (NO₂+NO₃, TKN and Total N): The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which 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 through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term.

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 fairness and 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.

The department has been revisiting the sampling frequencies at every facility to evaluate whether current frequencies are appropriate or if an increase is warranted. The frequency for pH was increased to align Consolidated Koshkonong Sanitary District with other facilities of similar size to ensure fairness and in consideration of department guidance on sampling frequencies. The frequency for BOD₅, CBOD₅, TSS, ammonia, and phosphorus are set at the minimum sample frequency outlined in guidance. In evaluating the monitoring frequency for parameters with limits in the permit, the department considered the potential public health impacts, probable environmental impact, and past operating performance. Since data submitted during the previous permit term shows consistent compliance with permit limitations, the minimum monitoring frequency is continued in the proposed permit. The department may re-evaluate current sampling frequencies and implement more frequent monitoring via a permit modification or at permit reissuance.

Requirements in administrative code (NR 108, 205, 210, and 214 Wis. Adm. Code) and Sections 283.55, Wis. Stats., were considered, where applicable, when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term.

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 whenever practicable.

PFOS and PFOA: NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Pursuant to s. NR 106.98(3)(b), Wis. Adm. Code, the department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, the department has determined the permittee does not need to sample for PFOS or PFOA in the effluent discharge as part of this permit reissuance. The department may re-evaluate the need for sampling at the next permit reissuance if new information becomes available that suggests PFOS or PFOA may be present in the discharge.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
002	B	Liquid	Fecal Coliform	Injection	Land Application	Lagoon System
Does sludge management demonstrate compliance? Yes.						
Is additional sludge storage required? No.						
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No.						
Is a priority pollutant scan required? No, design flow is less than 5 MGD.						
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

Sample Point Number: 002- SLUDGE

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

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
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	Once	Composite	Once when land application occurs.
Nitrogen, Ammonium (NH4-N) Total		Percent	Once	Composite	Once when land application occurs.
Phosphorus, Total		Percent	Once	Composite	Once when land application occurs.
Phosphorus, Water Extractable		% of Tot P	Once	Composite	Once when land application occurs.
Potassium, Total Recoverable		Percent	Once	Composite	Once when land application occurs.
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

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.

PFAS: Monitoring in 2026 is included in the permit pursuant 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), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07(7), Wis. Adm. Code for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k), Wis. Adm. Code.

List 2 Nutrients: 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 term (2026). 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 Land Application Management Plan Schedule (see schedules for more information). List 2 nutrient sampling is required when land application occurs.

PFAS: The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA is currently developing a risk assessment to determine future land application rates and expects to release this risk assessment by the end of 2024. In the interim, the department has developed the “Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS”.

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

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.

4 Schedules

4.1 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
<p>Land Application Management Plan Submittal: If the permittee proposes to land apply sludge, a management plan shall be submitted and approved by the Department. The management plan shall be consistent with the requirements of this permit, and s. NR 204.07, Wis. Adm. Code. At a minimum, the plan shall describe how the application rate has been calculated as well as how the sludge will be land applied and incorporated. Record keeping and tracking of site loadings shall also be described. Requests for land application site approvals shall also be included. The plan is due sixty (60) days prior to land applying.</p>	

Explanation of Schedule

If the permittee wishes to land apply sludge from the lagoons during the permit term, they must submit a plan detailing how the sludge will be handled and where it will be applied for the department to approve. The plan must be submitted at least sixty (60) day prior to sludge being applied.

4.2 Desludging Management Plan

Required Action	Due Date
Desludging Management Plan Submittal: The permittee shall submit a management plan for approval if removal of the sludge will occur during this permit term. At a minimum, the plan shall address how the sludge will be sampled, removed, transported, and disposed of. No desludging may occur unless approval by the Department is obtained. Daily logs shall be kept that record where the sludge has been disposed. The plan is due sixty (60) days prior to desludging.	

Explanation of Schedule

If desludging of the lagoons is proposed, a plan needs to be developed that clearly explains how the sludge will be removed, what contingencies are in place, and the type of equipment will be used. If the lagoons are to be de-sludged during this permit term, a management plan needs to be submitted sixty (60) days prior to desludging. At minimum, this plan should address how the sludge will be sampled, removed, transported, and disposed of. An outline is available to assist in plan development.

Attachments:

Water Quality Based Effluent Limitations for the Consolidated Koshkonong Sanitary District WWTF WPDES Permit No. WI-0021059-10-0, dated July 23, 2024

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance.

Prepared By: BetsyJo Howe, Wastewater Specialist

Date: 9/16/2024; 10/09/2024; 10/30/2024

CORRESPONDENCE/MEMORANDUM

DATE: July 23, 2024

TO: BetsyJo Howe – SCR/Fitchburg

FROM: Sarah Luck – SCR/Fitchburg

SUBJECT: Water Quality-Based Effluent Limitations for the Consolidated Koshkonong Sanitary District WWTF
 WPDES Permit No. WI-0021059-10-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Consolidated Koshkonong Sanitary District WWTF in Rock County. This municipal wastewater treatment facility (WWTF) discharges to the Rock River, located in the Rock River/Milton Watershed in the Lower Rock River Basin. This discharge is included in the Rock River TMDL as approved by EPA. 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
BOD ₅ January – March			45 mg/L	30 mg/L		2
CBOD ₅ April – December			40 mg/L	25 mg/L		2
TSS			45 mg/L	30 mg/L		3,4
pH	9.0 s.u.	6.0 s.u.				2
Ammonia Nitrogen	Variable		60 mg/L	60 mg/L		2,5
Bacteria <i>E. coli</i>				126 #/100 mL geometric mean		6
Phosphorus				1.0 mg/L		4,7
Chloride						8
TKN, Nitrate+Nitrite, and Total Nitrogen						9

Footnotes:

1. Monitoring only.
2. No changes from the current permit.
3. The previous permit had a TSS concentration limit of 60 mg/L as a monthly average which was a variance limit in accordance with s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes. However, since phosphorus is now removed chemically using alum, the TSS variance limit is no longer applicable, and concentration limits are set equal to BOD₅ concentration limits which are from s. NR 210.07(5), Wis. Adm. Code.
4. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL:

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Average Total P Limit (lbs/day)
Jan	294	360	55.10
Feb	326	400	79.06
March	294	360	54.17
April	302	380	33.93
May	294	360	50.78
June	302	380	11.82
July	294	360	8.84
Aug	294	360	2.11
Sept	302	380	17.07
Oct	294	360	14.16
Nov	302	380	17.14
Dec	294	360	32.34

5. 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. These limits apply year-round. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, are included in bold.

Effluent pH s.u.	NH ₃ -N Limit mg/L	Effluent pH s.u.	NH ₃ -N Limit mg/L	Effluent pH s.u.	NH ₃ -N 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

6. Bacteria limits apply during the disinfection season of May through September. Additional limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL. A compliance schedule is not needed.
7. The monthly average phosphorus limit of 1.0 mg/L is a technology-based limit.
8. Monitoring at a frequency to ensure that 11 samples are available at the next permit issuance.
9. 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 (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).

No WET testing is required because information related to the discharge indicates low to no risk for toxicity.

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

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

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**Water Quality-Based Effluent Limitations for
Consolidated Koshkonong Sanitary District WWTF**

WPDES Permit No. WI-0021059-10-0

PART 1 – BACKGROUND INFORMATION

Facility Description

The Consolidated Koshkonong Sanitary District serves a population of approximately 2,286 people from four different townships with no significant industries or anticipated growth. This facility is a 3-cell aerated lagoon system originally built in 1972. The lagoons are operated in series and all three are aerated with a diffused air system. Each lagoon contains 6.05 million gallons.

The facility completed an upgrade in 2022 that included new PVC liners and covers on each treatment lagoon, replacement of the chlorine disinfection system to ultraviolet light, installation of chemical phosphorus removal facilities, and installation of a polishing reactor for nitrogen treatment.

The Milton Wastewater Treatment Facility discharges at an annual average design flow of 0.625 MGD in a shared outfall with Consolidated Koshkonong Sanitary District.

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

Existing Permit Limitations

The current permit, which expired on September 30, 2023, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD ₅ January – March			45 mg/L	30 mg/L	2
CBOD ₅ April – December			40 mg/L	25 mg/L	2
TSS				60 mg/L	3,4
pH	9.0 s.u.	6.0 s.u.			2
Ammonia Nitrogen	Variable		60 mg/L	60 mg/L	5
Fecal Coliform May – September			656#/100 mL geometric mean	400#/100 mL geometric mean	-
Phosphorus Interim Final				3.4 mg/L 1.0 mg/L	6
Temperature					1
Chloride					1
Acute WET					7

Footnotes:

1. Monitoring only. Temperature monitoring was for May only.
2. 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.
3. The TSS limit is a variance limit according to s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes.
4. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL:

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Average Total P Limit (lbs/day)
Jan	294	360	55.10
Feb	326	400	79.06
March	294	360	54.17
April	302	380	33.93
May	294	360	50.78
June	302	380	11.82
July	294	360	8.84
Aug	294	360	2.11
Sept	302	380	17.07
Oct	294	360	14.16
Nov	302	380	17.14
Dec	294	360	32.34

5. 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. These limits apply year-round. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, are included in bold.

Effluent pH s.u.	NH ₃ -N Limit mg/L	Effluent pH s.u.	NH ₃ -N Limit mg/L	Effluent pH s.u.	NH ₃ -N 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

6. A compliance schedule is in the current permit to meet the final WQBEL by October 1, 2022.
7. Two acute WET tests were required.

Receiving Water Information

- Name: Rock River

Attachment #1

- Waterbody Identification Code (WBIC): 788800
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply
- Low Flow: The following 7-Q₁₀ and 7-Q₂ values are from Indianford Dam, upstream of Outfall 001. These flows were provided to the department from USGS in 2003. The Harmonic Mean has been estimated as recommended in *State of Wisconsin Water Quality Rules Implementation Plan* (Publ. WT-511-98)
 - 7-Q₁₀ = 140 cfs (cubic feet per second)
 - 7-Q₂ = 290 cfs
 - 90-Q₁₀ = 246.5 cfs
 - Harmonic Mean Flow = 609 cfs
- Hardness = 270 mg/L as CaCO₃. This value represents the geometric mean of data (n=2) from 06/06/20 and 07/26/22 WET tests conducted by Milton Wastewater Treatment Facility.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Rock River at Afton are used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: The Milton Wastewater Treatment Facility discharges at an annual average design flow of 0.625 MGD in a shared outfall with Consolidated Koshkonong Sanitary District. The combined flow from these two facilities (1.394 MGD) is used to calculate the water quality based effluent limits. Additionally, Edgerton Wastewater Treatment Facility's outfall is located approximately 1.3 miles downstream but does not impact this evaluation.
- Impaired water status: The Rock River is listed as impaired for total phosphorus and total suspended solids at the point of discharge and has an EPA-approved TMDL in effect.

Effluent Information

- Flow rate:
 - Design annual average = 0.769 MGD (Million Gallons per Day)
 - Peak daily = 2.911 MGD
 - Peak monthly = 0.901 MGDThe flow rates above are from the 2017 facility plan approval.
Since Consolidated Koshkonong Sanitary District and Milton Wastewater Treatment Facility share an outfall, **the combined design annual average flow rate of 1.394 MGD (0.769 MGD + 0.625 MGD at Milton) is used in the calculation of limits.**
For reference, the actual average flow from October 2018 through May 2024 was 0.575 MGD.
- Hardness = 397 mg/L as CaCO₃. This value represents the geometric mean of data (n=4) from April 2022 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).
- Water source: Domestic wastewater with water supply from wells (no industries).
- Additives: Aluminum Sulfate (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 ammonia, chloride, hardness, and phosphorus.

Attachment #1

- 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.

Copper Effluent Data

Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)	Sample Date	Copper (µg/L)
04/04/22	8	04/22/22	7	05/06/22	10
04/08/22	7	04/25/22	6	05/09/22	6
04/11/22	7	04/29/22	7	05/16/22	7
04/19/22	7	05/02/22	8		
1-day P ₉₉ = 10 µg/L					
4-day P ₉₉ = 9 µg/L					

Chloride Effluent Data

Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)	Sample Date	Chloride (mg/L)
01/11/22	275	05/11/22	227	09/13/22	240
02/08/22	285	06/14/22	254	10/11/22	233
03/08/22	255	07/11/22	238	11/08/22	253
04/12/22	222	08/09/22	255	12/13/22	248
1-day P ₉₉ = 295 mg/L					
4-day P ₉₉ = 271 mg/L					

The following table presents the average concentrations and loadings at Outfall 001 from October 2018 through May 2024 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	Average Mass Discharged
BOD ₅	9.7 mg/L	
CBOD ₅	13.8 mg/L	
TSS	14.4 mg/L	67.7 lbs/day
pH field	7.7 s.u.	
Fecal Coliform	20.6 #/100 mL	
Phosphorus	1.9 mg/L	8.8 lbs/day
Ammonia Nitrogen	3.51 mg/L	

*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 P₉₉) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)

- 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 Consolidated Koshkonong Sanitary District WWTF, 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. 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 = 112 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Arsenic		340	679.6	135.9	<4		
Cadmium	397	50.1	100.2	20.0	<4		
Chromium	301	4446	8891.7	1778	<6		
Copper	397	57.0	114.0			10	10
Lead	356	365	729.3	145.9	<40		
Nickel	268	1080	2160.6	432	<6		
Zinc	333	345	689.4	137.9	30		

Attachment #1

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.
Chloride (mg/L)		757	1514.0			295	285

* 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 = 35 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		152.2	1.31	2601	520.1	<4	
Cadmium	175	3.82	0.017	65.53	13.1	<4	
Chromium	270	298.00	0.79	5121	1024.2	<6	
Copper	270	24.21	2.1	383.0			8.7
Lead	270	73.12	0.83	1246.2	249.2	<40	
Nickel	268	120.18	1.3	2049	409.9	<6	
Zinc	270	286.92	5.2	4858	971.7	30	
Chloride (mg/L)		395	61.8	5802			271

* 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 = 152 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.
Cadmium	370	0.017	26496	5299.1	<4
Chromium (+3)	3818000	0.79	273417687	54683537	<6
Lead	140	0.83	9967	1993.4	<40
Nickel	43000	1.3	3079259	615852	<6

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 152 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	1.31	859.9	171.99	<4

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

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, **no effluent limitations are required.**

Chloride – Considering available effluent data (January to December 2022), the 1-day P₉₉ chloride concentration is 295 mg/L, and the 4-day P₉₉ of effluent data is 271 mg/L. These effluent concentrations are below the calculated WQBELs for chloride; therefore, **no effluent limits are needed. Chloride monitoring is recommended at a frequency 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 Consolidated Koshkonong Sanitary District WWTF 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 the sample result was within expected analytical ranges and well below the 17 mg/kg level. The single concentration in the sludge on 04/24/19 was a non-detect of less than 1.36 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. Based on the type of discharge, the effluent flow rate, and lack of indirect dischargers, **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, 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 1390 sample results were reported from October 2018 through May 2024. The maximum reported value was 8.3 s.u. (Standard pH Units). The effluent pH was 8.0 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 8.2 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 8.2 s.u. Therefore, a value of 8.2 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 8.2 s.u. into the equation above yields an ATC = 5.73 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.

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	11
1-Q ₁₀	301

The 2×ATC method yields the most stringent limits for Consolidated Koshkonong Sanitary District.

The current permit has variable daily maximum effluent limits based on effluent pH, presented below.

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)

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 or receiving water flow rates. The calculations from the previous WQBEL memo are shown in Attachment #3.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from October 2018 through May 2024, along with data since the upgrade was completed in 2022 since upgrades were made especially to reduce nitrogen. The results are compared to the calculated limits to determine the need to include ammonia limits in the Consolidated Koshkonong Sanitary District WWTF permit. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia and comparing the daily maximum values to the daily maximum limit.

Ammonia Nitrogen Effluent Data

	October 2018 – May 2024 (mg/L)	September 2022 – May 2024 (post-upgrade) (mg/L)
1-day P ₉₉	27.61	1.64
4-day P ₉₉	15.43	1.04
30-day P ₉₉	6.95	0.43
Mean*	3.51	0.15
Std	6.2	0.4
Sample size	290	91
Range	0.005 - 28.66	0.005 - 3.19

Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. **However, since the permit currently has daily maximum, weekly average, and monthly average limits, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:**

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

Conclusions and Recommendations

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

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
Year-round	Variable	60	60

Additional limits to meet the requirements in s. NR 106.07, Wis. Adm Code, are denoted in bold text.

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. Since Consolidated Koshkonong Sanitary District WWTF's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

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

Effluent Data

Consolidated Koshkonong Sanitary District WWTF monitored effluent *E. coli* from June 2022 through September 2022. A geometric mean of 126 counts/100 mL was not exceeded, and the maximum monthly geometric mean (n=16) was 12.8 counts/100 mL. The maximum reported value was 54 counts/100 mL. Based on this effluent data it appears that **the facility can meet new *E. coli* limits, and no compliance schedule is recommended in the reissued permit.**

PART 5 – PHOSPHORUS AND TOTAL SUSPENDED SOLIDS

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.

Since Consolidated Koshkonong Sanitary District WWTF currently has a monthly average limit of 1.0 mg/L, this limit should be retained in the reissued permit.

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

Phosphorus Water Quality Based Effluent Limits (WQBEL)

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

The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA

approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices can be found at: <https://dnr.wisconsin.gov/topic/TMDLs/RockRiver/index.html>.

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality based effluent limit (WQBEL) for phosphorus in addition to, or in lieu of, a s. NR 217.13, Wis. Adm. Code, WQBEL in a WPDES permit. Since the Rock River Basin TMDL was developed to protect and improve the water quality of phosphorus-impaired waters within the basin and the discharge from Consolidated Koshkonong Sanitary District WWTF flows directly into the Rock River, which is classified as phosphorus-impaired, the TMDL-based limit can be included in the WPDES permit absent the s. NR 217.13, Wis. Adm. Code, WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If 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, Wis. Adm. Code, WQBEL unless these reductions are likely to occur.

Phosphorus TMDL Limits

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 *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* dated April 15, 2013. 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. The limits are equivalent to concentrations ranging from 0.33 mg/L to 12.33 mg/L at the design flow of 0.769 MGD. **Monthly average mass effluent limits in accordance with the following table are recommended for this discharge.**

Total Phosphorus Effluent Limitations

Month	Monthly Total P WLA ¹ (lbs./month)	Days Per Month	Monthly Ave Total P Effluent Limit ² (lbs./day)	Equivalent Conc Limit for informational purposes only (mg/L)
Jan	1708.25	31	55.10	8.59
Feb	2213.70	28	79.06	12.33
March	1679.31	31	54.17	8.45
April	1017.93	30	33.93	5.29
May	1574.07	31	50.78	7.92
June	354.58	30	11.82	1.84
July	273.94	31	8.84	1.38
Aug	65.37	31	2.11	0.33
Sept	512.17	30	17.07	2.66
Oct	438.93	31	14.16	2.21
Nov	514.32	30	17.14	2.67
Dec	1002.62	31	32.34	5.04

Footnotes:

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

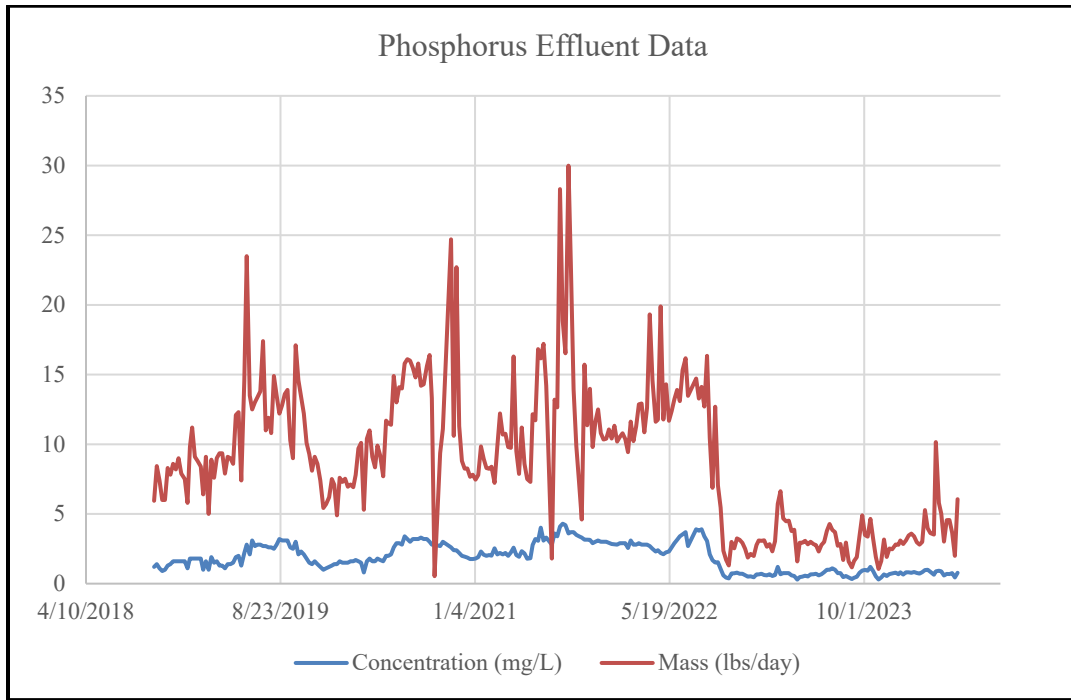
2- Monthly average Total P effluent limit (lbs./day) = monthly Total P WLA (lbs./month) ÷ days per month

For informational purposes, the following table lists the statistics for total phosphorus in the discharge as concentration and mass from October 2018 through May 2024 and after the upgrade was complete (from

September 2022 through May 2024). A graph is also presented to illustrate the impact of the new phosphorus treatment implemented in September 2022.

Total Phosphorus Effluent Data

	October 2018 through May 2024		September 2022 through May 2024	
	mg/L	lbs/day	mg/L	lbs/day
1-day P ₉₉	5.31	26.57	1.49	9.30
4-day P ₉₉	3.32	16.34	1.06	5.94
30-day P ₉₉	2.32	11.19	0.84	4.23
Mean	1.85	8.81	0.73	3.43
Std	1.01	5.09	0.25	1.74
Sample Size	290	290	91	91
Range	0.29 - 4.30	0.536 - 29.99	0.29 - 1.69	1.05 - 12.69



TSS Concentration Limits

The previous permit had a TSS concentration limit of 60 mg/L as a monthly average which was a variance limit in accordance with s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes. However, since phosphorus is now removed chemically using alum, the TSS variance limit is no longer applicable, and concentration limits are set equal to BOD₅ concentration limits which are from s. NR 210.07(5), Wis. Adm. Code.

TSS TMDL Limits

Weekly average and monthly average mass effluent limitations should be included in the permit according to the table below in addition to the weekly average and monthly average concentration limits. For reference, the mass limits shown are equivalent to concentrations ranging from 46 – 51 mg/L

as a monthly average and 56 – 62 mg/L as a weekly average at the design annual average flow of 0.769 MGD.

Total Suspended Solids Effluent Limitations

Month	Monthly TSS WLA ¹ (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit ² (lbs/day)	Weekly Ave TSS Effluent Limit ³ (lbs/day)
Jan	4.56	31	294	360
Feb	4.57	28	326	400
March	4.56	31	294	360
April	4.53	30	302	380
May	4.56	31	294	360
June	4.53	30	302	380
July	4.56	31	294	360
Aug	4.56	31	294	360
Sept	4.53	30	302	380
Oct	4.56	31	294	360
Nov	4.53	30	302	380
Dec	4.56	31	294	360

Footnotes:

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

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

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

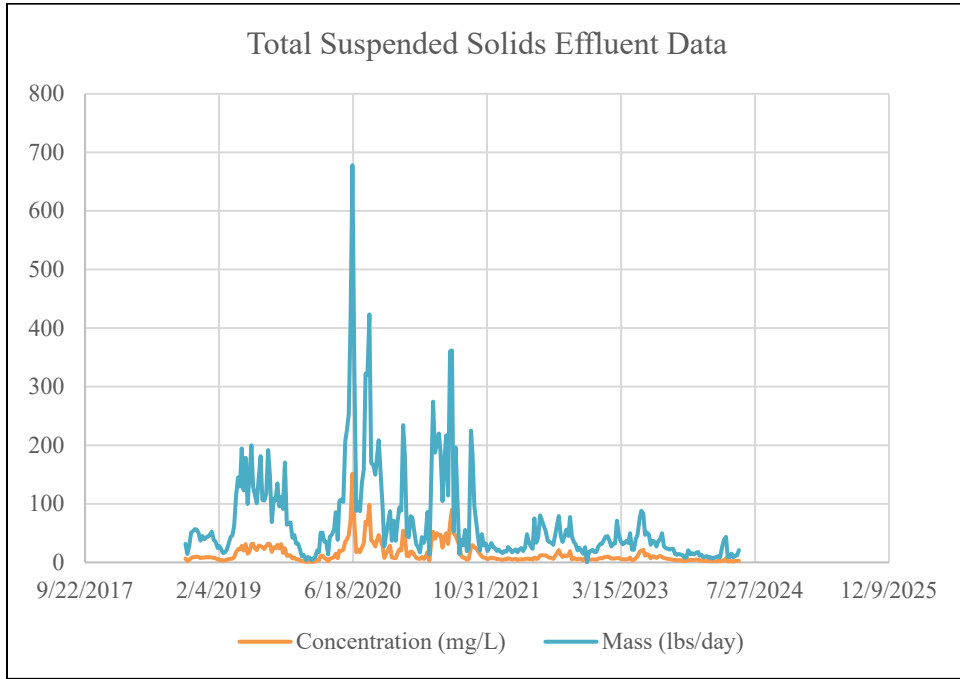
Since Consolidated Koshkonong is meeting the current monthly limits, the limits will not be recalculated at this time.

Effluent Data

Limits based on a WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the following table summarizes effluent TSS monitoring data from October 2018 through May 2024.

Total Suspended Solids Effluent Data

	mg/L	lbs/day
1-day P ₉₉	82.3	388.8
4-day P ₉₉	44.5	210.2
30-day P ₉₉	23.2	109.5
Mean	14.4	9.9
Std	17.1	80.8
Sample size	289	289
Range	0.8 - 151.3	0.492-678



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 the combined actual flow reported from October 2018 through May 2024 from both Consolidated Koshkonong Wastewater Treatment Facility and Milton Wastewater Treatment Facility.

The table below summarizes the maximum temperatures reported from Consolidated Koshkonong Wastewater Treatment Facility in 2012, except for May when temperature data was collected from 2019 through 2024.

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	38	39	-	120
FEB	37	39	-	120
MAR	62	64	-	120
APR	57	59	-	120
MAY	60	68	-	120
JUN	80	82	-	120
JUL	85	90	-	120
AUG	80	84	-	120
SEP	77	79	-	120
OCT	59	61	-	120
NOV	50	52	-	120
DEC	49	50	-	120

Based on the available effluent data **no effluent limits or monitoring are recommended for temperature**. The complete thermal table used for the limit calculation is provided in Attachment #4.

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 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 6% 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:

Attachment #1

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

Where:

- Q_e = annual average flow = 1.394 MGD = 2.157 cfs
- f = fraction of the Q_e withdrawn from the receiving water = 0
- Q_s = 1/4 of the 7-Q₁₀ = 140 cfs ÷ 4 = 35 cfs

The IWC of 6% is higher than the previously calculated IWC of 3.3% since the previous IWC did not consider the combined effluent flow rate at the outfall.

NOTE: Although chronic testing is usually not recommended where the ratio of the 7-Q₁₀ to the effluent flow exceeds 100:1 (for Consolidated Koshkonong Sanitary District WWTF’s portion of the discharge, that ratio is approximately 118:1), the combined flow discharge ratio is approximately 65:1. Therefore, the need for chronic testing is evaluated.

- 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.

Tests conducted prior to 2005 are not presented in the table below due to significant changes that were made to WET test methods in 2004. These changes were assumed to be fully implemented by certified labs by no later than June 2005.

WET Data History

Date Test Initiated	Acute Results LC ₅₀ %			
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?
10/26/2005	>100	>100	Pass	Yes
05/13/2015	>100	>100	Pass	Yes
09/27/2017	>100	>100	Pass	Yes
06/30/2020	>100	>100	Pass	Yes
11/09/2022	>100	>100	Pass	Yes

- 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.**

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

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

Attachment #1

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

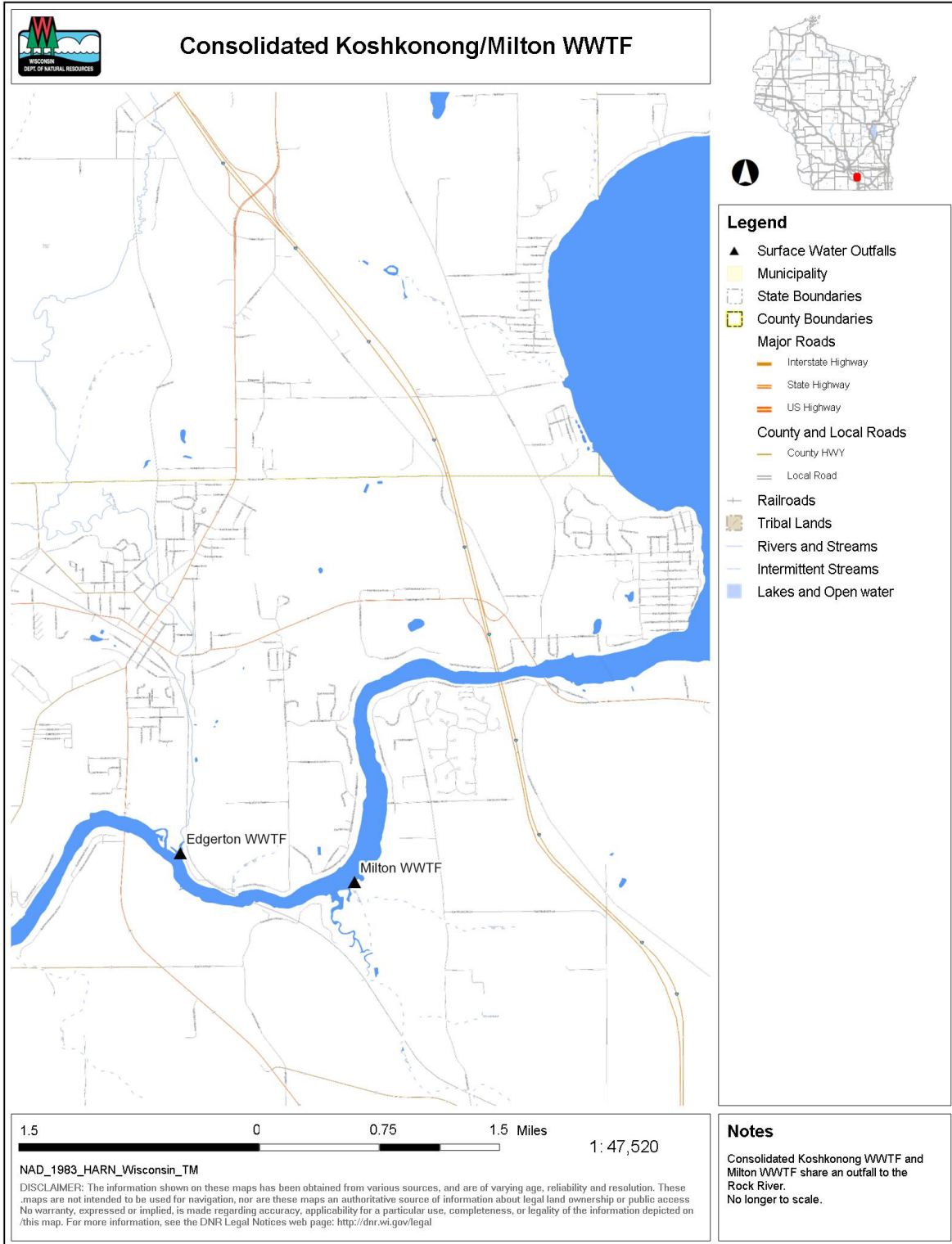
WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 6% 0 Points
Historical Data	5 tests used to calculate RP. No tests failed. 0 Points	No data available. 5 Points
Effluent Variability	Little variability, no upsets or significant violations, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	WWSF 5 Points	Same as Acute. 5 Points
Chemical-Specific Data	No reasonable potential for limits based on ATC. Ammonia nitrogen limit carried over from the current permit. Chloride, copper, and zinc detected. Additional Compounds of Concern: None. 3 Points	No reasonable potential for limits based on CTC. Ammonia nitrogen limit carried over from the current permit. Chloride, copper, and zinc detected. Additional Compounds of Concern: None. 3 Points
Additives	No biocides and one water quality conditioner (alum) added. Permittee has proper P chemical SOP in place. 1 Point	All additives used more than once per 4 days. 1 Point
Discharge Category	No 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:	9 Points	14 Points
Recommended Monitoring Frequency (from Checklist):	None.	None.
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

Attachment #1

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

Attachment #2
Site Map



Ammonia Nitrogen Calculations from the QBEL Memo Dated May 15, 2018

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

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

		Summer	Winter	Spring
		June – Sept.	Oct. - March	April & May
Background Information	7-Q ₁₀ (cfs)	140	140	140
	7-Q ₂ (cfs)	290	290	290
	Ammonia (mg/L)	0.07	0.135	0.09
	Temperature (°C)	19	4	6
	pH (s.u.)	8.08	7.98	8.09
	% of Flow used	100	25	25
	Reference Weekly Flow (cfs)	140	35	35
	Reference Monthly Flow (cfs)	246.5	61.625	61.625
Criteria mg/L	4-day Chronic			
	Early Life Stages Present	4.15	6.26	5.32
	Early Life Stages Absent	3.56	8.38	5.50
	30-day Chronic			
	Early Life Stages Present	1.66	2.50	2.13
Early Life Stages Absent	1.42	3.35	2.20	
Effluent Limitations mg/L – at current 0.6 MGD Design Flow	Weekly Average			
	Early Life Stages Present	305.62	119.38	101.96
	Early Life Stages Absent	261.26	160.60	105.49
	Monthly Average			
	Early Life Stages Present	208.52	79.54	68.44
Early Life Stages Absent	177.45	107.92	70.86	
Effluent Limitations mg/L – at future 0.769 MGD Design Flow	Weekly Average			
	Early Life Stages Present	269.07	105.67	90.25
	Early Life Stages Absent	230.01	142.14	93.37
	Monthly Average			
	Early Life Stages Present	183.44	70.20	60.40
Early Life Stages Absent	156.11	95.25	62.54	

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Consolidated Koshkonong WWTF	7-Q₁₀:	140 cfs	Temp Dates	Flow Dates
Outfall(s):	001	Dilution:	25%	Start:	01/01/12 10/01/18
Date Prepared:	6/19/2024	f:	0	End:	12/31/12 03/23/24
Design Flow (Q_e):	1.39 MGD	Stream type:	Small warm water sport or forage fish		
Storm Sewer Dist.	0 ft	Q_s:Q_e ratio:	16.2 :1		

Month	Water Quality Criteria			Receiving Water Flow Rate (Q _s) (cfs)	Representative Highest Effluent Flow Rate* (Q _e)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	T _a (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Q _{esl}) (MGD)	Daily Maximum Flow Rate (Q _{ea}) (MGD)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)		(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	140	1.003	1.094	0	38	39	NA	120
FEB	34	50	76	140	1.121	1.801	0	37	39	NA	120
MAR	38	52	77	140	1.204	1.423	0	62	64	NA	120
APR	48	55	79	140	1.252	1.425	0	57	59	NA	120
MAY	58	65	82	140	1.329	1.406	0	60**	68**	NA	120
JUN	66	76	84	140	1.019	1.195	0	80	82	NA	120
JUL	69	81	85	140	1.118	1.375	0	85	90	NA	120
AUG	67	81	84	140	1.086	1.507	0	80	84	NA	120
SEP	60	73	82	140	1.211	1.896	0	77	79	NA	120
OCT	50	61	80	140	1.168	1.848	0	59	61	NA	120
NOV	40	49	77	140	1.349	1.686	0	50	52	NA	120
DEC	35	49	76	140	1.038	1.278	0	49	50	NA	120

*These flow rates represent the combined effluent flow rates of Consolidated Koshkonong WWTF and Milton WWTF.

**Temperature data from May 2019 – 2024.