Permit Fact Sheet

General Information

Permit Number	WI-0035718-07-0
Permittee Name and Address	CHELSEA SANITARY DISTRICT N7068 2nd St, Medford, WI 54451-8609
Permitted Facility Name and Address	Chelsea Sanitary District SWQ, NWQ, SECTION1, T32N-R1E, TOWN OF CHELSEA
Permit Term	July 01, 2026 to June 30, 2031
Discharge Location	West bank of the Black River, one quarter mile south of Elm Street
Receiving Water	Black River, in the Black and Little Black River Watershed, of the Black River Basin in Taylor County
Stream Flow ($Q_{7,10}$)	0.09 cfs
Stream Classification	Cold Water (CW) community, Class II Trout stream, non-public water supply
Discharge Type	Existing; Continuous
Annual Average Design Flow	0.011 MGD
Industrial or Commercial Contributors	None
Plant Classification	A3 - Recirculating Media Filters; D - Disinfection; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Chelsea Sanitary District is designed to treat 0.011 MGD of influent, treats on average 0.0052 MGD, and was constructed in 1994. Wastewater influent generated from each home flows into two 5,000-gallon septic tanks where solids are settled out. The wastewater then travels to a recirculation tank where it is mixed with treated effluent. The mixed flow is evenly distributed over one of three granular media filter beds that further remove particulates and facilitate the breakdown of organic matter. A portion of the filtrate is sent back to the recirculation tank and filtered again. The other portion of the filtrate becomes effluent, which is disinfected seasonally (May – September) using an ultraviolet system. The effluent is discharged year-round to the west bank of the Black River, approximately 0.50 miles downstream of Elm Street. The solids from the septic tanks are pumped regularly to prevent the discharge of accumulated solids to the sand filters. These solids are hauled to another wastewater treatment plant for disposal.

Substantial Compliance Determination

Enforcement During Last Permit: There were no formal enforcement actions taken during the previous permit term.

After a desk top review of all discharge monitoring reports, CMARs, compliance schedule items, and a site visit on 9/29/2022, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Arthur Ryzak, Wastewater Engineer on January 29, 2026.

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	N/A	Representative samples shall be collected from the main lift station at the head of the treatment plant.
001	0.0052 MGD (Avg. 1/1/2021-11/30/2025)	Representative samples shall be collected at the end of the chlorine contact tank except for dissolved oxygen samples which shall be collected at the end of the final effluent cascade aerator.
990	N/A	The septic tank solids are presently being hauled to another permitted wastewater treatment facility.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT

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

1.1.1 Changes from Previous Permit

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

1.1.2 Explanation of Limits and Monitoring Requirements

Monitoring of influent BOD_5 and total suspended solids is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirements in s. NR 210.05, Wis. Adm. Code, and in the Standard Requirements section of the permit.

2 Surface Water - Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Monthly Avg	27 mg/L	2/Month	Grab	Limit effective November-April.
BOD5, Total	Monthly Avg	14 mg/L	2/Month	Grab	Limit effective May-October.
BOD5, Total	Weekly Avg	27 mg/L	2/Month	Grab	Limit effective November-April.
BOD5, Total	Weekly Avg	14 mg/L	2/Month	Grab	Limit effective May-October.
BOD5, Total	Weekly Avg	2.5 lbs/day	2/Month	Calculated	Limit effective November-April.
BOD5, Total	Weekly Avg	1.3 lbs/day	2/Month	Calculated	Limit effective May-October.
Suspended Solids, Total	Monthly Avg	27 mg/L	2/Month	Grab	Limit effective November-April.
Suspended Solids, Total	Monthly Avg	14 mg/L	2/Month	Grab	Limit effective May-October.
Suspended Solids, Total	Weekly Avg	27 mg/L	2/Month	Grab	Limit effective November-April.
Suspended Solids, Total	Weekly Avg	14 mg/L	2/Month	Grab	Limit effective May-October.
Suspended Solids, Total	Weekly Avg	2.5 lbs/day	2/Month	Calculated	Limit effective November-April.
Suspended Solids, Total	Weekly Avg	1.3 lbs/day	2/Month	Calculated	Limit effective May-October.
pH Field	Daily Max	9.0 su	2/Month	Grab	
pH Field	Daily Min	6.0 su	2/Month	Grab	
Dissolved Oxygen	Daily Min	7.0 mg/L	2/Month	Grab	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	21 mg/L	Monthly	Grab	Limit effective November-April.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	24 mg/L	Monthly	Grab	Limit effective May-October.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	35 mg/L	Monthly	Grab	
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	Monthly	Grab	See the Daily Maximum Ammonia Nitrogen Limits

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					table in the permit.
Nitrogen, Ammonia Variable Limit		mg/L	Monthly	Grab	See the Daily Maximum Ammonia Nitrogen (NH3-N) Limits permit section.
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit effective May-September.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit effective May-September. See the E. coli Percent Limit permit section. Enter the result in the DMR on the last day of the month.
Phosphorus, Total	Monthly Avg	6.4 mg/L	2/Month	Grab	Interim limit. See the Phosphorus Variance - Implement Pollutant Minimization Plan permit section and the Phosphorus PMP Schedule.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	Grab	Annual in rotating quarters. See the Nitrogen Series Monitoring permit section.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	Grab	Annual in rotating quarters. See the Nitrogen Series Monitoring permit section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Temperature Maximum		deg F	3/Week	Grab	Monitoring only in September each year beginning September 1, 2026. See the Effluent Temperature Monitoring permit section.
Temperature Maximum	Weekly Avg	66 deg F	3/Week	Grab	Limit effective beginning September 1, 2030. See the Effluent Temperature Limitations and Dissipative Cooling Demonstration-

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					POTW Weekly Average Limits permit sections and the Temperature Limits Compliance and Dissipative Cooling Evaluation Schedule.

2.1.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit.

- The sample frequency for flow has been changed from "Continuous" to "Daily" for eDMR reporting purposes.
- Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.
- The permittee has applied for an individual phosphorus variance (IPV) for this permit term. An IPV interim limit of 6.4 mg/L as a monthly average is included throughout the permit term.
- Annual total nitrogen monitoring is required in specific quarters as outlined in the permit; the rotating quarters in which monitoring is required have changed. Additionally, the total nitrogen sample type has been changed to "Calculated" to accurately reflect that this monitoring parameter is a calculated value.
- Temperature monitoring has been added in the month of September, as well as, a schedule to achieve compliance with the applicable temperature limit in September (to become effective September 1, 2030, per the schedule).

2.1.2 Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo, by Zainah Masri, Water Resources Engineer, dated March 3, 2025.

Monitoring Frequencies – The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term.

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. Minor changes have been made to the limits for BOD_5, TSS, and ammonia nitrogen.

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. Section NR 102.04(5)(a), Wis. Adm. Code, states that all surface waters shall be suitable for recreational use and meet the E. coli criteria established to protect this use. Section NR 102.04(5)(b), Wis. Adm. Code, states that exceptions to the disinfection requirement can be made if the Department determines, in accordance with the procedures specified in s. NR 210.06(3), Wis. Adm. Code, that disinfection is not required to meet water quality criteria. As part of the reissuance process, the requirements for disinfection were reviewed under s. NR 210.06(3), Wis. Adm. Code.

The permittee is required to disinfect, during the months of May – September each year. Disinfection requirements and E. coli limits of 126 #/100 mL as a monthly geometric mean that may not be exceeded and 410 #/100 mL as a daily maximum that may not be exceeded more than 10 percent of the time in any calendar month apply.

Phosphorus – The permittee has applied for an individual phosphorus variance in accordance with s. 283.15, Wis. Stats. Conditions for this variance include maintaining phosphorus effluent concentrations below the interim limit of 6.4 mg/L as a monthly average, implementing the phosphorus pollutant minimization program (PMP) plan dated December 9, 2024, continued optimization for control of phosphorus, and calculating, reporting and tracking phosphorus mass discharge. If approved by EPA, compliance with state water quality standards would be met through the interim limit along with all additional phosphorus variance provisions.

Total Nitrogen Monitoring (TKN, NO2+NO3, and Total N) – Testing is required during the following quarters: October – December 2026; April – June 2027; July – September 2028; January – March 2029; and October – December 2030.

Temperature Limits and Dissipative Cooling Evaluation – Requirements for Temperature are included in NR 102 Subchapter II Water Quality Standards for Temperature and NR 106 Subchapter V Effluent Limitations for Temperature. Thermal discharges must meet the Public Health criterion of 120º F and the Fish and Aquatic Life criteria that are established to protect aquatic communities from lethal and sub-lethal thermal effects. The current permit did not have temperature limits because there was no reasonable potential for the discharge to exceed calculated limits. Temperature limits calculated for this permit term are more restrictive because the weekly average effluent flow rate increased (from 0.0063 MGD to 0.0170 MGD). Effluent temperature monitoring is required 3/Week in September only. The permit includes a schedule for temperature limits compliance and dissipative cooling evaluation. If a dissipative cooling (DC) study is conducted, that study should be conducted in September.

3 Septage Management - Monitoring and Limitations

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

3.1 Sample Point Number: 990- SEPTIC TANK SOLIDS

3.1.1 Changes from Previous Permit

Septage limitations and monitoring requirements were evaluated for this permit term and no changes were required.

3.1.2 Explanation of Limits and Monitoring Requirements

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

4 Schedules

4.1 Phosphorus Pollutant Minimization Program

As a condition of the variance to the water quality-based effluent limitation (WQBEL) for phosphorus granted in accordance with s. 283.15, Wis. Stats., the permittee shall implement the Phosphorus PMP including any subsequent updates.

Required Action	Due Date
Annual Phosphorus Progress Report: Submit an annual progress report that shall discuss which phosphorus pollutant minimization measures have been implemented during the prior calendar year. The report shall include an analysis of trends in weekly average, monthly average and annual total influent and effluent phosphorus concentrations and mass discharge of phosphorus based on phosphorus sampling and flow data. The report shall provide an update on the permittee's: (1) progress in implementing pollutant minimization measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, (2) status of evaluating feasible alternatives for meeting phosphorus WQBELs. Note that the monthly average interim limitation listed in the permit's Surface Water section remains enforceable until new enforceable limits are established in the next permit reissuance. The first annual phosphorus progress report is to be submitted by the Date Due.	03/31/2027
Annual Phosphorus Progress Report #2: Submit a phosphorus progress report as defined above for the previous calendar year.	03/31/2028
Annual Phosphorus Progress Report #3: Submit a phosphorus progress report as defined above for the previous calendar year.	03/31/2029
Annual Phosphorus Progress Report #4: Submit a phosphorus progress report as defined above for the previous calendar year.	03/31/2030
Final Phosphorus Report: Submit a final report documenting the success in reducing phosphorus concentrations in the effluent, as well as the anticipated future reduction in phosphorus sources and phosphorus effluent concentrations. The report shall summarize phosphorus pollutant minimization activities that have been implemented during the current permit term and state which, if any, pollutant minimization activities from the approved pollutant minimization program plan were not pursued and why. The report shall include an analysis of trends in monthly and annual total influent and effluent phosphorus concentrations based on phosphorus sampling during the current permit term. The permittee shall also re-evaluate all available compliance options for meeting the final phosphorus WQBELs. If the report concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an adaptive management plan. If the report concludes water quality trading will be used, the submittal shall include a Water Quality Trading Plan. Additionally, if the permittee intends to seek to re-apply for a phosphorus variance per s. 283.15, Wis. Stats for the reissued permit, a detailed pollutant minimization program plan outlining the pollutant minimization activities proposed for the upcoming permit term should be submitted along with the final report.	12/31/2030
Annual Phosphorus Progress Reports After Permit Expiration: In the event that this permit is not reissued by the date the permit expires, the permittee shall continue to submit reports for the previous calendar year following the due date of annual phosphorus progress reports listed above. Annual phosphorus progress reports shall include information as defined above.	

4.1.1 Explanation of Schedule

Phosphorus Pollutant Minimization Program – This schedule is to be implemented as a condition of the permittee's variance to the water quality standards for phosphorus. Annual phosphorus progress reports update the Department on the

progress made in implementing the Pollutant Minimization Program Plan as well as quantifying reductions achieved through plant optimization and from contributing sources within the collection system.

4.2 Temperature Limits Compliance and Dissipative Cooling Evaluation

This compliance schedule requires the permittee to achieve compliance by the specified date.

Required Action	Due Date
Preliminary Compliance Report: Submit a preliminary compliance report indicating alternatives to achieve the final temperature limits. A Dissipative Cooling Study may be conducted in September 2026. Informational Note: Refer to the Surface Water subsection titled 'Dissipative Cooling Demonstration - POTW Weekly Average Limits' regarding requests for Department consideration of dissipative cooling per NR 106.59, Wis. Adm. Code, as well as re-evaluation of the limits pursuant to NR 106 Subchapters V & VI or NR 102.26, Wis. Adm. Code.	06/30/2027
Action Plan: Submit an action plan for complying with all applicable effluent temperature limits.	06/30/2028
Construction Plans: Submit construction plans (if construction is required for complying with effluent temperature limits) and include plans and specifications with the submittal.	12/31/2028
Initiate Actions: Initiate actions identified in the plan.	06/30/2029
Complete Actions: Complete actions necessary to achieve compliance with effluent temperature limits.	06/30/2030
Limit Effective: The final temperature limits become effective in September annually.	09/01/2030

4.2.1 Explanation of Schedule

Temperature Limits Compliance and Dissipative Cooling Evaluation – This schedule requires the permittee to achieve compliance with temperature limits as soon as possible but no later than September 1, 2030. The permittee must identify alternatives for achieving final temperature limits, including whether construction would be required. The permittee may submit information to the Department that demonstrates through a dissipative cooling study (conducted in September) that temperature limitations are not necessary because in-stream temperature criteria are not exceeded outside of a small area of mixing and cooling. If the permittee successfully demonstrates that temperature limits are unnecessary due to dissipative cooling of the effluent, the Department will modify the permit to remove the temperature limits and remaining schedule items. This schedule is authorized by s. NR 106.62, Wis. Adm. Code.

Attachments

WQBEL Memo: Water Quality-Based Effluent Limitations for the Chelsea Sanitary District WPDES Permit No. WI-00357185-07-0, by Zainah Masri, Water Resources Engineer, dated March 3, 2025

Phosphorus Variance EPA Data Sheet

Phosphorus PMP (Pollutant Minimization Program) Plan, dated December 31, 2025

Justification Of Any Waivers From Permit Application Requirements

The permittee received instructions in the application notification letter that exempt them from certain standard monitoring requirements.

Prepared By: Sarah Donoughe, Wastewater Specialist-Adv **Date:** February 12, 2026

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: March 3, 2025

TO: Sheri Snowbank – Spooner/NOR

FROM: Zainah Masri – WY/3

SUBJECT: Water Quality-Based Effluent Limitations for the Chelsea Sanitary District
WPDES Permit No. WI-00357185-07-00

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 Chelsea Sanitary District in Taylor County. This municipal wastewater treatment facility (WWTF) discharges to the Black River, located in the Black and Little Black River Watersheds in the Black River Basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5 November – April May – October			 27 mg/L 2.5 lbs/day 14 mg/L 1.3 lbs/day	 **27 mg/L** **14 mg/L**		1,3
TSS November – April May – October			 27 mg/L 2.5 lbs/day 14 mg/L 1.3 lbs/day	 **27 mg/L** **14 mg/L**		1,3
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		7.0 mg/L				1
Ammonia Nitrogen May – October November – April	 Variable Variable		 **35 mg/L** **35 mg/L**	 **24 mg/L** **21 mg/L**		1,3,7
Bacteria						
E. coli				126 #/100 mL geometric mean		1,4
Phosphorus				0.225 mg/L	0.075 mg/L	5,6
Temperature September			 66 F°			 8
TKN, Nitrate+Nitrite, and Total Nitrogen						9

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
4. Bacteria limits apply during the disinfection season of May through September. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
5. The facility did not apply for an individual variance under s. 283.15, Wis. Stats. in the current permit application and eligibility for the variance is not included as part of this review. If the permittee applies for a variance and the variance is granted and approved by US Environmental Protection Agency, the current interim limit of 6.4 mg/L may be extended beyond the end of the compliance schedule.
6. If the facility uses water quality trading as an alternative compliance option to offset any total phosphorus discharged from Outfall 001 that exceed the phosphorus WQBELs. The phosphorus WQBELs may be expressed as computed compliance limits, but a MCL must be set as a limit not to be exceeded at the outfall location. Therefore, the phosphorus AEL 6.4 mg/L as a monthly average is recommended during the reissued permit term to serve as the MCL.
7. Monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values should be continued in the issued permit. These limits apply year-round.

Daily Maximum Ammonia Nitrogen Limits – CW Cat. 5

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

8. A weekly average temperature maximum limit is necessary for the month of September. A compliance schedule may be included in the permit and a dissipative cooling (DC) study conducted in September should be considered.
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 (NO_3), nitrite (NO_2), 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 Zainah Masri at Zainah.Masri@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

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

PREPARED BY: Zainah Masri, Water Resources Engineer Zainah Masri

APPROVED BY: Diane Figiel Date: 03/03/2025
Diane Figiel, PE,
Water Resources Engineer

E-cc: Arthur Ryzak, Wastewater Engineer – Ladysmith/NOR
Michelle BalkLudwig, Regional Wastewater Supervisor – Spooner/NOR
Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, NR Program Manager – WY/3
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Chelsea Sanitary District

WPDES Permit No. WI-00357185-07-00

Prepared by: Zainah Masri – WY/3

PART 1 – BACKGROUND INFORMATION

Facility Description

The Chelsea Sanitary District is designed to treat 0.011 MGD of influent, treats on average 0.0053 MGD and was constructed in 1994. Wastewater influent generated from each home flows into two 5,000 gallon septic tanks where solids are settled out. The wastewater then travels to a recirculation tank where it is mixed with treated effluent. The mixed flow is evenly distributed over one of three granular media filter beds that further remove particulates and facilitate the breakdown of organic matter. A portion of the filtrate is sent back to the recirculation tank and filtered again. The other portion of the filtrate becomes effluent, which is disinfected seasonally (May – September) using an ultraviolet system. The effluent is discharged year-round to the west bank of the Black River, approximately 0.50 miles downstream of 4th Street. The solids from the septic tanks are pumped regularly to prevent the discharge of accumulated solids to the sand filters. These solids are hauled to another wastewater treatment plant for disposal.

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

Existing Permit Limitations

The current permit, expiring on December 31, 2025, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5						1,8
November – April			27 mg/L 2.5 lbs/day	**27 mg/L**		
May – October			14 mg/L 1.3 lbs/day	**14 mg/L**		
TSS						1,8
November – April			27 mg/L 2.5 lbs/day	**27 mg/L**		
May – October			14 mg/L 1.3 lbs/day	**14 mg/L**		
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		7.0 mg/L				1
Ammonia Nitrogen						6,8
November – April	Variable		**35 mg/L**	**21 mg/L**		
May – October	Variable		**35 mg/L**	**24 mg/L**		

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Bacteria						
Interim Limit Fecal Coliform				400 #/100 mL geometric mean		4,5
Final Limit *E. coli*				126 #/100 mL geometric mean		
Phosphorus Interim Limit Final Limits				6.4 mg/L 0.225 mg/L	0.075 mg/L	4
TKN, Nitrate+Nitrite, and Total Nitrogen						7

Footnotes:

1. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
2. Monitoring only
3. A variance to the water quality-based effluent limit (WQBEL) for phosphorus was granted in accordance with s. 283.15, Wis. Stats. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitations specified in the table above, (b) implement the phosphorus pollutant minimization measures specified in the Pollutant Minimization Plan (PMP) dated March 2020 and (c) perform the actions listed in the schedule of compliance section of the permit.
4. A compliance schedule is in the current permit to meet the final WQBEL by April 30, 2025.
5. Bacteria limits apply during the disinfection season of May through September. The fecal coliform interim limit will apply until the end of the compliance schedule when *E. coli* limits take effect. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
6. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values are included in the permit in place of the single limit. These limits apply year-round.

Effluent pH s.u.	**Limit mg/L**	**Effluent pH s.u.**	**Limit mg/L**	**Effluent pH s.u.**	**Limit mg/L**
$6.0 < pH \leq 6.1$	108	$7.0 < pH \leq 7.1$	66	$8.0 < pH \leq 8.1$	14
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$6.6 < pH \leq 6.7$	89	$7.6 < pH \leq 7.7$	29	$8.6 < pH \leq 8.7$	4.4
$6.7 < pH \leq 6.8$	84	$7.7 < pH \leq 7.8$	24	$8.7 < pH \leq 8.8$	3.7
$6.8 < pH \leq 6.9$	78	$7.8 < pH \leq 7.9$	20	$8.8 < pH \leq 8.9$	3.1
$6.9 < pH \leq 7.0$	72	$7.9 < pH \leq 8.0$	17	$8.9 < pH \leq 9.0$	2.6

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. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.

Receiving Water Information

- Name: Black River
- Waterbody Identification Code (WBIC): 1676700
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Cold Water (CW) community, Class II Trout stream non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q_{10} and 7-Q_2 values are from USGS for Station for Chelsea WI, where Outfall 001 is located.
  7-Q_{10} = 0.09 cfs (cubic feet per second)
  7-Q_2 = 0.21 cfs
  Harmonic Mean Flow = 0.65 cfs using a drainage area of 4.72 mi^2.
- Hardness = 100 mg/L as $CaCO_3$. This value represents the geometric mean of data from site-specific hardness data of the Black River in Taylor County.
- % 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 Black River is 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: There are several other dischargers to the Black River downstream of Outfall 001, 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: Over 16 miles downstream, the Black River below Medford is listed as impaired for total phosphorus and mercury.

Effluent Information

- Design flow rate(s):
  Annual average = 0.011 MGD (Million Gallons per Day)
  For reference, the actual average flow from January 2019 to November 2024 was 0.010 MGD.
- Hardness = 111 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 4) from the previous permit application (March 2019).
- 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 (wastewater): Domestic wastewater with no industrial contributors.
- Additives: None
- Effluent characterization: This facility is categorized as a minor municipality and received instructions in the application notification letter that exempt it from standard monitoring requirements. The permit required ammonia nitrogen and phosphorus monitoring during the current

permit term.

The following table presents the average concentrations and loadings at Outfall 001 from January 2019 to November 2024 for all parameters with limits in the current permit, in order to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameters with Effluent Limits

	Average Measurement	Average Mass Discharged
BOD_5	10 mg/L*	0.40 lbs/day*
TSS	8.0 mg/L*	0.44 lbs/day
pH field	7.0 s.u.	-
Phosphorus	4.3 mg/L	-
Ammonia Nitrogen	4.6 mg/L	-
Fecal Coliform	710 #/ 100 mL*	-
E.Coli	821 #/100 mL*	-

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

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

Mercury –The permit application did not require monitoring for mercury because Chelsea Sanitary District is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3., Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, "there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5)." However, sludge sampling is not available because Chelsea Sanitary District is a recirculating sand filter and generates solids which are hauled away as septage. It is not expected that there are exceedances of the high-quality mercury concentration based on similar municipal treatment plants and the lack of industries. **No monitoring is recommended.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. The type of discharge, the effluent flow rate and the types of indirect dischargers contributing to the collection system PFOS and PFOA **monitoring is not recommended at this time.**

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.
- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.

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:

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

Where:

A = 0.411 and B = 58.4 for a Cold-Water Category 5 fishery, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 200 sample results were reported from January 2019 to November 2024. The maximum reported value was 7.60 s.u. (Standard pH Units). The effluent pH was 7.60 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 7.72 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 7.70 s.u. Therefore, a value of 7.60 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 7.60 s.u. into the equation above yields an ATC = 17.0 mg/L.

Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method

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.

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	34.1
1-Q_{10}	183.1

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

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

Daily Maximum Ammonia Nitrogen Limits – CW Cat. 5

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 and receiving water flow rates. The calculations from the previous WQBEL memo are shown in attachment #2.

Effluent Data
Samples for ammonia nitrogen were taken from January 2019 to November 2024 and their results were as follows:

Ammonia Nitrogen Effluent Data

	Ammonia Nitrogen

Attachment #1

	mg/L
1-day P_{99}	15.3
4-day P_{99}	9.1
30-day P_{99}	5.96
Mean*	4.55
Std	2.99
Sample size	82
Range	0.13 - 16

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

Ammonia Nitrogen Effluent Data

Ammonia Nitrogen mg/L	November - April	May - October
1-day P_{99}	13.4	17.0
4-day P_{99}	8.4	9.7
30-day P_{99}	5.86	6.05
Mean	4.68	4.43
Std	2.54	3.37
Sample size	39	43
Range	0.13 - 12	0.233 - 16

The permit currently has daily maximum limits, as well as weekly and monthly average limits year-round. Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

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

Conclusions and Recommendations

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

Final Ammonia Nitrogen Limits

	Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
November - April	Variable	35 mg/L	21 mg/L
May – October	Variable	35 mg/L	24 mg/L

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

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

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

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because Chelsea Sanitary District 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. The E.Coli limit will become effective on April 30, 2025, and limits are recommended to continue throughout the next permit term.

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 Chelsea Sanitary District does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than 150 lbs/month, which is the threshold for municipalities in accordance with s. NR 217.04(1)(a)1, Wis. Adm. Code, and therefore no technology-based limit is required.

Annual Average Mass Total Phosphorus Loading

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
January 2023	0.075	6.1	3.8
February 2023	0.091	5.0	3.8
March 2023	0.142	5.0	5.9
April 2023	0.552	1.1	5.2
May 2023	0.127	1.7	1.8

Attachment #1

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
June 2023	0.052	2.5	1.1
July 2023	0.064	5.7	3.0
August 2023	0.084	5.0	3.5
September 2023	0.077	5.0	3.2
October 2023	0.114	5.5	5.2
November 2023	0.077	5.2	3.3
December 2023	0.079	6.0	3.9
Average			**3.7**

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual (not design) flow (in MGD) for that month

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

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

Section NR 102.06(3)(a), Wis. Adm. Code, specifically names river segments for which a phosphorus criterion of 0.100 mg/L applies. For other stream segments that are not specified in s. NR 102.06(3)(a), Wis. Adm. Code, s. NR 102.06(3)(b), Wis. Adm. Code, specifies a phosphorus criterion of 0.075 mg/L. The phosphorus criterion of 0.075 mg/L applies for the Black River.

The conservation of mass equation is described in s. NR 217.13(2)(a), Wis. Adm. Code, for phosphorus WQBELs and includes variables of water quality criterion (WQC), receiving water flow rate (Qs), effluent flow rate (Qe), and upstream phosphorus concentrations (Cs) provided below.

$$\text{Limitation} = [(WQC)(Qs+(1-f)\ Qe) - (Qs-f\ Qe)\ (Cs)]/Qe$$

Where:

WQC = 0.075 mg/L for the Black River.
Qs = 100% of the 7-Q_2 of 0.21 cfs
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
Qe = effluent flow rate = 0.011 MGD = 0.017 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

Section NR 217.13(2)(d), Wis. Adm. Code, specifies that the background phosphorus concentration used in the limit calculation formula shall be calculated as a median using the procedures specified in s. NR 102.07(1)(b) to (c), Wis. Code. All representative data from the most recent 5 years shall be used, but data from the most recent 10 years may be used if representative of current conditions.

A previous evaluation resulted in a WQBEL of 0.075 mg/L using a background concentration of 0.084 mg/L. Section NR 217.13(2)(d), Wis. Adm. Code, states that the determination of upstream concentrations shall be evaluated at each permit reissuance. Additional data were considered in estimating the background phosphorus concentration.

A review of all available in stream total phosphorus data from May 2014 – October 2022 stored in the Surface Water Integrated Monitoring System database indicates the median background total phosphorus concentration in Black River at Elm St. (SWIMS station ID #10042249) is 0.087 mg/L, approximately 0.20 mi upstream from the point of discharge to the Black River.

SWIMS ID	10042249
Station Name	Black River Monitoring station at Elm Street
Waterbody	Black River
Sample Count	42 samples
First Sample	May 2014
Last Sample	October 2022
Mean	0.092 mg/L
Median	0.087 mg/L

Substituting a background concentration above criteria into the limit calculation equation above would result in a calculated limit that is less than the applicable criterion of 0.075 mg/L. However, s. NR 217.13(7), Wis. Adm. Code, specifies that "if the WQBEL calculated pursuant to the procedures in this section is less than the phosphorus criterion specified in s. NR 102.06, Wis. Adm. Code, for the water body, the effluent limit shall be set equal to the criterion."

Effluent Data

A compliance schedule is included in the current permit to meet the phosphorus limits by June 30, 2025. The following table summarizes effluent total phosphorus monitoring data from January 2019 to November 2024.

Total Phosphorus Effluent Data

	Phosphorus mg/L
1-day P_{99}	9.2
4-day P_{99}	6.4
30-day P_{99}	4.98
Mean	4.26
Std	1.58
Sample size	197
Range	0.44 - 9.34

Reasonable Potential Determination

The effluent discharge has reasonable potential to cause or contribute to an exceedance of the water quality criterion because the 30-day P_{99} of reported effluent total phosphorus data is greater than the calculated WQBEL**.** Therefore, **a WQBEL is required.**

Limit Expression

According to s. NR 217.14(2), Wis. Adm. Code, because the calculated WQBEL is less than or equal to 0.3 mg/L, the effluent limit of 0.075 mg/L may be expressed as a six-month average. If a concentration limitation expressed as a six-month average is included in the permit, a monthly average concentration limitation of 0.225 mg/L equal to three times the WQBEL calculated under s. NR 217.13, Wis. Adm. Code shall also be included in the permit. The six-month average should be averaged during the months of May – October and November – April.

Variance Request

A variance to the water quality-based effluent limit (WQBEL) for phosphorus was granted for the current permit in accordance with s. 283.15, Wis. Stats. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitations specified in the table above, (b) implement the phosphorus pollutant minimization measures specified in the Pollutant Minimization Plan (PMP) dated March 2020 and (c) perform the actions listed in the schedule of compliance section of the permit. An interim limit of 6.4 mg/L is applicable.

The facility did not apply for an individual variance under s. 283.15, Wis. Stats. in the current permit application and eligibility for the variance is not included as part of this review. If the permittee applies for a variance and the variance is granted and approved by US Environmental Protection Agency**, the current interim limit of 6.4 mg/L may be extended beyond the end of the compliance schedule.**

Water Quality Trading Minimum Control Level

If the facility uses water quality trading as an alternative compliance option to offset any total phosphorus discharged from Outfall 001 that exceed the phosphorus WQBELs. The phosphorus WQBELs may be expressed as computed compliance limits, but a MCL must be set as a limit not to be exceeded at the outfall location. **Therefore, the phosphorus AEL 6.4 mg/L as a monthly average would be recommended during the reissued permit term to serve as the MCL.**

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

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

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

flow reported from January 2019 to June 2024. Two data points from September 19, 2020 and September 20, 2020 were excluded from the data set as they were believed to not be representative of the discharge.

The table below summarizes the maximum temperatures reported during monitoring from July 2015 to October 2016, as this is the most current data available.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	45	45	118	120
FEB	44	44	58	98
MAR	43	43	65	80
APR	46	46	69	83
MAY	51	55	78	84
JUN	57	60	80	81
JUL	65	65	75	83
AUG	67	67	72	88
SEP	66	66	**66**	74
OCT	61	61	64	94
NOV	53	53	81	120
DEC	49	49	91	120

Reasonable Potential

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

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

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are shown in bold. Based on this analysis, **a weekly average limit is necessary for the month of September.** The calculated limit is more restrictive than the previously calculated limits because the weekly average effluent flow rate increased from 0.0063 MGD to 0.0170 MGD.

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

- Effluent monitoring data: Verification or additional effluent monitoring (flow and/or temperature) may be appropriate if there were questions on the representativeness of the current effluent data.
- Monthly low receiving water flows: Contract with USGS to generate monthly low flow estimates for the receiving water to be used in place of the annual low flow.
- Mixing zone studies: A demonstration of rapid and complete mixing may allow for the use of a mixing zone other than the default 25%.
- Dissipative cooling demonstration: Effluent limitations based on sub-lethal criteria may be adjusted based on the potential for heat dissipation from municipal treatment plants as described in s. NR 106.59(4), Wis. Adm. Code.
- Collection of site-specific ambient temperature: default background temperatures for streams in Wisconsin, so actual data from the direct receiving water may provide for relaxed thermal limits but only if the site-specific temperatures are lower than the small stream defaults used in the above tables.
- A variance to the water quality standard: This is typically considered to be the least preferable and most complex option as it requires the evaluation of the other alternatives.

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

PART 6 – 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).*

Guidance in Chapter 1.11 of the WET Guidance Document (WET Testing of Minor Municipal Discharges) was consulted. This is a minor municipal discharge (< 1.0 MGD) comprised solely of domestic wastewater, with no history of WET failures and no toxic compounds detected at levels of concern. No WET testing is recommended at this time because of the low risk in effluent toxicity.

Thermal Table:

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

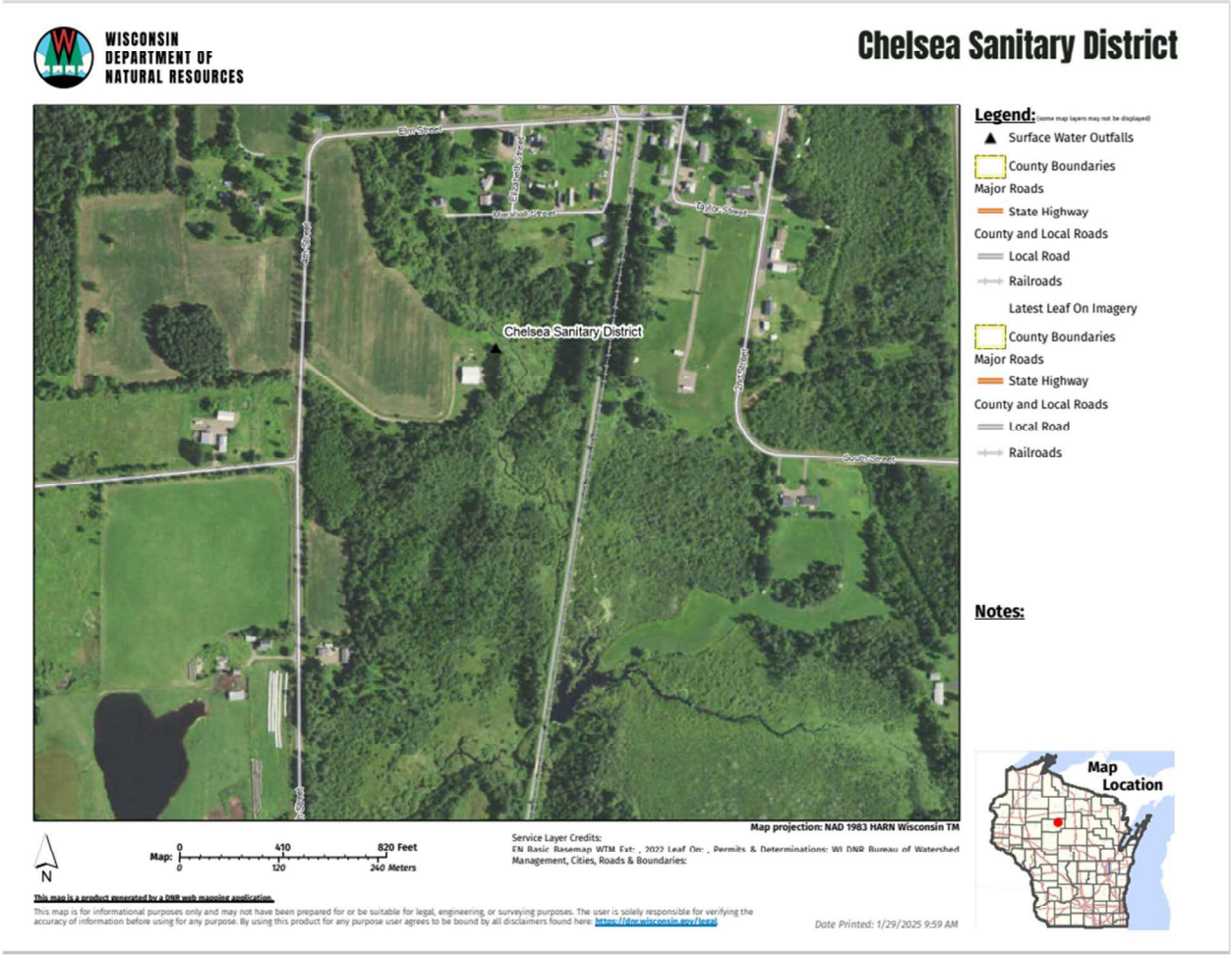
Facility:	Chelsea Sanitary District		**7-Q_{10}:**	0.21 cfs	**Temp Dates**	**Flow Dates**
Outfall(s):	001		**Dilution:**	25%	**Start:** 07/01/15	01/01/19
Date Prepared:			**f:**	0	**End:** 10/31/16	06/25/24
Design Flow (Qe):	0.01	MGD	**Stream type:**	Cold water community		
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	3.1 :1		
			Calculation Needed?	YES		

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit		**Adjusted Thermal Limits**	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qes)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation	**Weekly Average**	**Daily Maximum**
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
JAN	35	47	68	0.21	0.006	0.007	0	45	45	118	120	118.3	120.0
FEB	36	47	68	0.21	0.033	0.036	0	44	44	58	98	58.2	98.2
MAR	39	51	69	0.21	0.030	0.090	0	43	43	65	80	64.6	80.3
APR	47	57	70	0.21	0.029	0.058	0	46	46	69	83	68.6	83.5
MAY	56	63	72	0.21	0.015	0.044	0	51	55	78	84	78.4	84.3
JUN	62	67	72	0.21	0.013	0.037	0	57	60	80	81	80.5	81.2
JUL	64	67	73	0.21	0.013	0.031	0	65	65	75	83	74.7	82.9
AUG	63	65	73	0.21	0.010	0.022	0	67	67	72	88	72.1	88.4
SEP	57	60	72	0.21	0.017	0.028	0	66	66	66	90	66.0	90.2
OCT	49	53	70	0.21	0.013	0.030	0	61	61	64	94	63.8	93.8
NOV	41	48	69	0.21	0.007	0.016	0	53	53	81	120	81.3	120.0
DEC	37	47	69	0.21	0.008	0.016	0	49	49	91	120	91.0	120.0

Ammonia Nitrogen Calculations from WQBEL dated January 10, 2020

Black River (CW Cat. 5)		Summer	Winter
		May – Oct.	Nov. – April
Effluent Flow	Qe (MGD)	0.011	0.011
Background Information	7-Q_{10} (cfs)	0.09	0.09
	7-Q_2 (cfs)	0.21	0.21
	Ammonia (mg/L)	0.03	0.17
	Average Temperature (°C)	15	4
	Maximum Temperature (°C)	18	8
	pH (s.u.)	7.41	6.94
	% of Flow used	50	25
	Reference Weekly Flow (cfs)	0.045	0.023
	Reference Monthly Flow (cfs)	0.089	0.045
Criteria mg/L	4-day Chronic	9.52	15.10
	30-day Chronic	3.81	6.04
Effluent Limits mg/L	Weekly Average	35	35
	Monthly Average	24	21

Map:


WISCONSIN
DEPARTMENT OF
NATURAL RESOURCES
Chelsea Sanitary District
Elm Street
Marshall Street
Taylor Street
Chelsea Sanitary District
Legend:
Surface Water Outfalls
County Boundaries
Major Roads
State Highway
County and Local Roads
Local Road
Railroads
Latest Leaf On Imagery
County Boundaries
Major Roads
State Highway
County and Local Roads
Local Road
Railroads
Notes:
Map Location
Map projection: NAD 1983 HARN Wisconsin TM
N
Map:
0
410
820 Feet
0
120
240 Meters
Service Layer Credits:
Management, Cities, Roads & Boundaries:
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Date Printed: 1/29/2025 9:59 AM

needed.

Section I: General Information

A. Name of Permittee: Chelsea Sanitary District

B. Facility Name: Chelsea Sanitary District Wastewater Treatment Facility

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Phosphorus **Date completed:** February 9, 2026

E. Permit #: WI-0035718-07-0 **WQSTS#:** (EPA USE ONLY)

F. Duration of Variance **Start Date:** October 1, 2026 **End Date:** September 30, 2031

G. Date of Variance Application: December 9, 2024

H. Is this permit a:
☐ **First time submittal for variance**
☒ **Renewal of a previous submittal for variance** *(Complete Section X)*

I. Description of proposed variance:

The previous permit also contained a phosphorus variance. Chelsea Sanitary District was issued a WPDES permit containing a stringent phosphorus WQBEL (ch. NR 217, Wis. Adm. Code) on January 1, 2015. As part of the permit requirements, the District evaluated their options to meet the WQBEL. It was determined that a facility upgrade was needed but not economically feasible.

The effluent limits are based on the downstream impacts to the Black River. Using the phosphorus WQBEL calculation formula cited in s. NR 217.13 (2)(a), Wis. Adm. Code, effluent limits are 0.225 mg/L (monthly average) and 0.075 mg/L (6-month average). The effluent phosphorus concentration is currently 6.4 mg/L (4-day P99); therefore, based on NR 102.06, Wis. Adm. Code, the interim effluent limit is 6.4 mg/L as a monthly average. The proposed permit contains a requirement to implement a phosphorus pollutant minimization program (PMP) with the main focus of achieving future compliance through water quality trading (WQT).

J. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Sarah Donoughe	Sarah.Donoughe@Wisconsin.gov	920-366-6076	Permit Drafter/Variance Coordinator
Arthur Ryzak	Arthur.Ryzak@Wisconsin.gov	715-403-2924	Compliance Engineer
Zainah Masri	Zainah.Masri@Wisconsin.gov	608-422-9940	Limits Calculator
Matt Claucherty	Matthew.Claucherty@Wisconsin.gov	608-400-5596	Phosphorus/Economics

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: 0.075 mg/L Phosphorus WQC

B. List other criteria likely to be affected by variance: None.

C. Source of Substance: Chelsea Sanitary District discharges to the Black River within the Black and Little Black River Watershed and Headwaters Black River sub watershed (HUC 12). According to the Pollutant Load Ratio Estimation Tool (PRESTO) model, 86% of the phosphorus entering the river within the Headwaters Black River sub watershed is coming from nonpoint sources and natural background conditions. The District contributes the remaining 14% originating from point sources. The District is the only wastewater discharge to the Headwaters Black River sub watershed. The Black River is a large river system and there are multiple dischargers downstream; however, they are not in the immediate vicinity and the mixing zones do not overlap.

Citation: PRESTO is a statewide GIS-based tool that compares the average annual phosphorus loads originating from point and nonpoint sources within a watershed. More information about this model is available at http://dnr.wi.gov/topic/surfacewater/presto.html.

D. Ambient Substance Concentration: 0.087 mg/L ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

E. If measured or estimated, what was the basis? Include citation.
SWIMS station ID #10042249 approximately 0.20 mi upstream from the point of discharge to the Black River. 42 samples.

F. Average effluent discharge rate: 0.011 MGD **Maximum effluent discharge rate:** 0.30 MGD

G. Effluent Substance Concentration:
1-day P99 = 9.2 mg/L
4-day P99 = 6.4 mg/L
30-day P99 = 4.98 mg/L
Mean = 4.26 mg/L

☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

H. If measured or estimated, what was the basis? Include Citation. Effluent data reported during the current permit term (January 2019 to November 2024).

I. Type of HAC:
☐ **Type 1: HAC reflects waterbody/receiving water conditions**
☐ **Type 2: HAC reflects achievable effluent conditions**
☒ **Type 3: HAC reflects current effluent conditions**

J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Phosphorus PMP and pursue WQT. Thus, the HAC at commencement of this variance is 6.4 mg/L, which reflects the greatest phosphorus reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's Phosphorus PMP. This HAC determination is based on the economic feasibility of available compliance options for Chelsea Sanitary District at this time (see Economic Section below). The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.

K. Variance Limit: 6.4 mg/L as a monthly average

L. Level currently achievable (LCA): 6.4 mg/L as a monthly average

M. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)*
Based upon 197 effluent data points from January 2019 – November 2024. The interim monthly average phosphorus limit of 6.4 mg/L is consistent with the 4-day P99 value.

N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.
The variance limit is set at the interim limit of 6.4 mg/L which is consistent with the 4-day P99. This value allows the permittee a limit they can meet without investing in additional treatment while allowing greater operational flexibility. This is consistent with the limits expressed in s. NR 217.17, Wis. Adm. Code, and the averaging period is consistent with the limit expression in accordance with s. NR 217.14(2), Wis. Adm. Code.

O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below: ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☒ **6**

Chelsea Sanitary District was not designed for chemical removal of phosphorus through chemical feed; the recirculating sand filters minimally treat effluent total phosphorus. During the previous permit term, the District evaluated their compliance options and determined that all available options were not economically feasible. The District evaluated options and there is no feasible treatment action to be taken. Chemical addition creates concerns regarding sand filter longevity, UV system effectiveness/failure, and excessive chemical usage/sludge buildup. These technologies are also not cost-effective for the District, as major upgrades would increase the user rates to 3.09% of the median household income (MHI). Pursuing WQT during the upcoming permit term is expected to lead to reduced phosphorus levels over the course of the variance. The District has already begun the process of securing trades. Given the long-term effects of phosphorus pollution, an interim monthly average limit of 6.4 mg/L is recommended along with implementation of the Phosphorus PMP and continued exploration of potential economically feasible phosphorus compliance options.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Taylor, Clark, Jackson, Monroe, Trempealeau and La Crosse

B. Receiving waterbody at discharge point: Black River

C. Flows into which stream/river? Mississippi River **How many miles downstream?** ~200 mi

D. Coordinates of discharge point (UTM or Lat/Long): Lat: 45.2879682; Long: -90.3097946

E. What are the designated uses associated with this waterbody?
Cold Water (CW) community, Class II Trout stream, non-public water supply

F. Describe downstream waters: The Mississippi River is designated as Full Fish Aquatic Life (FAL) and Warm Water Sport Fish (WWSF) at the confluence with the Black River.

G. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the applicable criterion of the substance?
In the 2022 impaired water assessment this portion of the Black River was listed as impaired from the headwaters upstream the point of discharge, and then feeds directly into the Mississippi River which is also listed as impaired for total phosphorus.

H. Provide the equation used to calculate that distance.
N/A

I. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody: None.

Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet.
See "Chelsea SD – Current Variance Outfall(s)" map.

J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☒ **Yes** ☐ **No** ☐ **Unknown**

River Mile	Pollutant	Impairment
73.36 – 180.98 (below Medford to Black River Falls)	Total Phosphorus, Mercury	Impairment Unknown; Mercury Contaminated Fish Tissue
0 – 73.36 (confluence with the Mississippi to Black River Falls)	PCBs, Total Phosphorus, Mercury	Impairment Unknown; PCBs Contaminated Fish Tissue

Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

A. Are there any industrial users contributing phosphorus to the POTW? If so, please list.
N/A

B. Are all industrial users in compliance with local pretreatment limits for phosphorus? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc)
N/A

C. When were local pretreatment limits for phosphorus last calculated?
N/A

D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW
N/A

Section V: Public Notice

A. Has a public notice been given for this proposed variance? ☒ **Yes** ☐ **No**

B. If yes, was a public hearing held as well? ☒ **Yes** ☐ **No** ☐ **N/A**

C. What type of notice was given?
☒ **Notice of variance included in notice for permit** ☐ **Separate notice of variance**

D. Date of public notice: February 26, 2026 **Date of hearing:** April 13, 2026

E. Were comments received from the public in regards to this notice or hearing? ☐ Yes ☐ No
(If yes, please attach on a separate sheet)

Section VI: Human Health

A. Is the receiving water designated as a Public Water Supply? ☐ Yes ☒ No

B. Applicable criteria affected by variance: N/A

C. Identify any expected impacts that the variance may have upon human health, and include any citations: None.

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water: Cold Water (CW) community, non-public water supply

B. Applicable criteria affected by variance: 75 ug/L (0.075 mg/L), Fish and Aquatic Life Criteria

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:
Chelsea Sanitary District lies within the Headwaters Black River sub-watershed (HUC 12). It is approximately 5 miles downstream from the source of the Black River. Within the sub-watershed, the Black River is a class II trout stream and classified as Fish and Aquatic Life (FAL). Background sources (forests and wetlands), agricultural, residential and urban nonpoint source pollution have impacted the habitat in the Headwaters Black River sub-watershed. PRESTO has corroborated these nonpoint source inputs estimating that approximately 86% of the phosphorus loading is coming from nonpoint sources.

The District's Phosphorus PMP long-term plan to pursue Water Quality Trading (WQT) will help ensure that further degradation of the environment will not occur with this variance and will ultimately improve downstream water quality.

Citation: PRESTO http://dnr.wi.gov/topic/surfacewater/presto.html

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations:
The following list contains the Federally Endangered, Threatened, Proposed, and Candidate Species in Taylor County, Wisconsin From U.S. Fish and Wildlife Service, Region 3, January 2026.

BIRDS
Piping Plover (E)
CLAMS
Higgins Eye (E)
Sheepnose Mussel (E)
Snuffbox Mussel (E)
Spectaclecase (mussel) (E)
Winged Mapleleaf (E)
MAMMALS
Indiana bat (E)
Norther Long-Eared Bat (E)
REPTILES
Eastern Massasauga (rattlesnake) (T)
SNAILS
Iowa Pleistocene snail (E)
INSECTS
Hine's emerald dragonfly (E)
Karner Blue Butterfly (E)
Poweshiek skipperling (E)
Rusty Patched Bumble Bee (E)
FLOWERING PLANTS
Dwarf lake iris (T)
Eastern prairie fringed orchid (T)
Fassett's locoweed (T)
Mead's Milkweed (T)
Northern wild monkshood (T)
Pitcher's thistle (T)

Prairie Bush-clover (T)

Citation: U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technologies (treatment processes):
The Chelsea Sanitary District Wastewater Treatment Facility is designed to treat 0.011 MGD of influent and treats on average 0.0052 MGD. Wastewater (influent) generated from each home flows into two 5,000-gallon septic tanks where solids are settled out. The wastewater then travels to a recirculation tank where it is mixed with treated effluent. The mixed flow is evenly distributed over one of three granular media filter beds that further remove particulates and facilitate the breakdown of organic matter. A portion of the filtrate is sent back to the recirculation tank and filtered again. The other portion of the filtrate becomes effluent, which is disinfected seasonally (May – September) using an ultraviolet system. The effluent is discharged year-round to the west bank of the Black River. The solids from the septic tanks are pumped regularly to prevent the discharge of accumulated solids to the sand filters. These solids are hauled to another wastewater treatment plant for disposal.

B. What modifications would be necessary to comply with the current limits? List additional treatment processes and/or technologies available. Include any citations.
The Chelsea Sanitary District WWTF does not treat for phosphorus removal. The District considered multiple upgrade options including Ovivo Ultrafiltration Technology and Ballasted Clarification (CoMag). Variance documentation for other facilities with recirculating sand filters, were also reviewed for technologies and conclusions. Options include:

1. Upgrade the WWTF with the installation of chemical phosphorus removal (alum) and Ultrafiltration Phosphorus Removal (Ovivo Tertiary Filtration System (TFS)).
   a. A chemical phosphorus removal system would also be required ahead of the system components. A full-scale pilot test to determine the optimized chemical dosage and long-term testing would be needed to determine the sludge accumulation rate.
   b. Chemical phosphorus removal would require chemical storage/spill containment, chemical feed including pumps and control, new piping and electrical wiring.
   c. Ultrafiltration phosphorus removal would need a great deal of new infrastructure, a new building, specific technologies such as membrane cassettes, pumps, blowers, valves, controls, mixing tank(s) and a permeate tank, instrumentations and controls, electrical wiring and plumbing/piping.

2. Upgrade the WWTF with the installation of chemical phosphorus removal (e.g. ferric chloride or alum) and CoMag.
   a. Chemical phosphorus removal would also be required ahead of the system components. A full-scale pilot test to determine optimized chemical dosage and long-term testing would be needed to determine the sludge accumulation rate.
   b. Chemical phosphorus removal would require chemical storage/spill containment, chemical feed including pumps and control, new piping and electrical wiring.
   c. CoMag would need new infrastructure, including coagulation reaction tank, ballast reaction tank, polymer reaction tank, & conventional circular clarifier, instrumentations and controls, electrical wiring and plumbing/piping.

Ovivo Ultrafiltration and CoMag are both options that can meet phosphorus limitations, but are not considered to be economically feasible.

Citation: Appendix E – Final Compliance Alternatives Report Phosphorus WQBELs dated January 2019

C. Identify any expected environmental impacts that would result from further treatment, and include any citations:
None.

D. Is it technically and economically feasible for this permittee to modify the treatment process to comply with the water quality-based limits? ☐ **Yes** ☒ **No**

E. If treatment is possible, is it possible to comply with the limits on the substance? ☒ **Yes** ☐ **No**

F. If yes, what prevents this from being done? Include any citations.

Chelsea Sanitary District was not designed for chemical removal of phosphorus through chemical feed; the recirculating sand filters minimally treat effluent total phosphorus. Upgrades to treat for phosphorus and all evaluated compliance options are economically infeasible, as major upgrades would increase the user rates to 3.09% of the MHI.

G. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

The District investigated several alternatives including, regionalization (economically infeasible), WWTF upgrades (economically infeasible; see section VIII B.), the Multi-Discharger Variance (economically infeasible; also, the facility can't currently meet a phosphorus limit of 1 mg/L), Adaptive Management (infeasible because the District lacks agricultural partners in the county), and Water Quality Trading (WQT).

WQT was determined to be the most cost-effective option to reduce phosphorus in the watershed. The Chelsea Sanitary District intends to use the proposed permit term to pursue WQT as the long-term phosphorus compliance option.

Citation: Final Compliance Alternatives Report Phosphorus WQBELs dated January 2019

H. Describe the economic impacts of compliance: ***{applies only to municipalities; include other cost estimates for industries}***

Economic Factor		Source
MHI	$40,313	http://data.census.gov
Calculated preliminary screener	3.09%	Economic Evaluation Worksheet
Secondary score value	6	Guidance for Implementing WI's Multi-Discharger Variance for Phos., Appendix A – Secondary Screeners for Municipal POTWs

Section IX: Multi-Discharger Variance Feasibility *(this assumes MDV approval)*

A. Does the facility meet the economic indicators to qualify for the MDV? ☒ **Yes** ☐ **No** ☐ **Unknown**

MDV secondary indicator score: 6

B. Is it technically and economically feasible for this permittee to comply with a phosphorus WQBEL of 1 mg/L or lower? ☐ **Yes** ☒ **No** ☐ **Unknown**

C. Justification for considering an individual variance in lieu of the MDV: All evaluated compliance options are economically infeasible, as major upgrades would increase the user rates to 3.09% of the MHI.

Section X: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

During this permit term, the Chelsea Sanitary District focused on actions related to their Watershed Reduction Program. The District administration and staff worked on education regarding WQT, including meeting with WDNR staff and surrounding counties. The District worked to identify possible projects or properties. For projects determined to be feasible, the District began developing trading plan and implement options. The District also worked on adding a line item budget for WQT activities.

Citation: Phosphorus PMP Annual Reports

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

As conditions of the variance, the permittee is required to (a) maintain effluent quality at or below the interim effluent limitation specified in the proposed permit, (b) implement the phosphorus pollutant minimization measures specified in

the Pollutant Minimization Program (PMP) Plan dated December 31, 2025, and (c) perform the actions listed in the Phosphorus Pollutant Minimization Program Schedule (see the Schedules section in the proposed permit).

Section XI: Compliance with Previous Permit *(Variance Reissuances Only)*

A. Date of previous submittal: October 14, 2020 **Date of EPA Approval:** November 3, 2020

B. Previous Permit #: WI-0035718-06-0 **Previous WQSTS #:** (EPA USE ONLY)

C. Effluent substance concentration: 6.4 mg/L (4-day P99) **Variance Limit:** 6.4 mg/L as a monthly average

D. Target Value(s): N/A **Achieved?** ☒ **Yes** ☐ **No** ☐ **Partial**

compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
Watershed Reduction Program: a. Village administration and staff: information and education for WQT. Meet with WDNR staff, surrounding counties and identify partners as appropriate.	☒ **Yes** ☐ **No**
b. Identify possible projects or properties.	☒ **Yes** ☐ **No**
c. If determined feasible, develop trading plan and implement options.	☒ **Yes** ☐ **No**
d. Addition of a line item budget for WQT activities.	☒ **Yes** ☐ **No**

Chelsea Sanitary District
Phosphorus Pollutant Minimization Plan (P- PMP)
December 31, 2025

The Chelsea Sanitary District applied for a renewal of the Phosphorus Variance.

There are three categories of Total Phosphorus (TP) sources that can be targeted in a phosphorus PMP:

1. Reducing influent TP loadings to the plant.
2. Reducing effluent TP concentrations.
3. Watershed reductions.

This document describes actions that the Chelsea Sanitary District has taken during the previous permit term of 2021-2025.

Waste Water Treatment Plant (WWTP) Description – Re-circulating Sand Filter (RSF)

The Chelsea Sanitary District wastewater treatment plant serves a population of approximately 92 with no industrial or commercial contributors. The annual average design flow is 11,000 gallons per day with actual flows averaging 5,000 gallons per day over the past five years (2021 – 2025). The system consists of:

- Two 5,000-gallon Septic Tanks
- Recirculation Tank where sand filter filtrate is either discharged or recirculated to the filter beds
- Sand Filters - three filter beds constructed of layers of fine and coarse sand
- Ultraviolet disinfection system

Economics and Background

The current average residential sewer use charge for the 43 homes is $744.36/year, which is equivalent to 1.86% of the median household income (MHI) of $40,000 (Source – RCAP 11/2018 income survey). An increased user fee charge was assessed as of January 1, 2026 for the October-December 2025 quarterly payment. Due to the small number of homes (43), the cost of construction of a facility upgrade to reduce phosphorous concentrations in our effluent is not economically feasible and would raise our already high rates well above the hardship threshold of 2% of the MHI. Therefore, the Sanitary District must pursue an Individual Phosphorous Variance to remain compliant with the WPDES permit. Routine maintenance and repair projects which are critical to the long-term viability of the existing wastewater collection and treatment system need take precedence with the current utility budget (net-income). The granting of an individual variance will allow the Sanitary District to continue to maintain short term permit limit compliance as well as plan for and execute an affordable alternative for long term compliance with the final phosphorus limit.

1. Reducing Influent TP Loading to the WWTP

The Chelsea Sanitary District WWTP receives flow from a population of 92. The only source of phosphorus in the influent wastewater is domestic strength sewage from residents in the Sanitary District. The collection system is considered in good condition and is just over 25 years old. There has been some infiltration and inflow (I/I) issues which are being looked at through the plant review with SEH. Hauled waste is not accepted at the WWTP. Through a facility plan that is being worked on, there are some plans for improvement like extending the building over the plant filter bed and also adding risers to some manholes.

2. Reducing Effluent TP Concentrations and Loadings

Per the Final Compliance Alternatives Report from January, 2019 concluded, construction of tertiary treatment for phosphorus was prohibitively expensive as either a short-term or long-term option. Chemical addition was also evaluated but rejected because of the inability to add chemical within the

existing physical layout of the recirculating sand filter system, in addition to potential adverse effects to the treatment process which includes impairing the sand filters and staining/clouding the UV bulbs (which has been experienced in the past). There are no areas of improvement to be made in this category of reducing effluent TP.

3. Watershed Reduction Program

The Chelsea Sanitary District is pursuing Water Quality Trading (WQT) as our long-term phosphorus compliance option. A Water Quality Trading Plan has been completed and is currently in review with the DNR for approval. We currently have 21 acres of land that was purchased and is being followed per the WQT Plan to help reduce phosphorus, however, it is not generating enough credits at this time. With help from the DNR and WRWA, we will be searching for additional land to offset the remaining phosphorus credits. Also, attached is our Phosphorus Pollution Minimization Measures report for 12-31-25 with breakdown of meetings held throughout 2025 for upgrades to the plant, etc.

The Chelsea Sanitary District will continue to work with the WDNR staff, GLCAP/RCAP, SEH, WaterTA, Taylor County Land Conservation Department, USDA, and others. Grants/Loans are being looked at through the Clean Water Fund, USDA and WaterTA. With the above-mentioned groups, we have been looking for funding sources where some items could be done at no costs to the Chelsea Sanitary District as to not burden the Chelsea Sanitary District homeowners with an exponential user rate.

Chelsea Sanitary District
Phosphorus Pollutant Minimization Plan
December, 2025

PMP Activities	Year 1	Year 2	Year 3	Year 4	Year 5
Watershed Reduction Program					
a. Continue working with the DNR, GLCAP, SEH, WRWA, Water TA, etc. to find the best resources available to help our small district find grants/loans, etc. to help fund projects needed per the facility plan.	X	X	X	X	X
b. A Water Quality Trading Plan was completed in 2025 and is awaiting approval.	X				
c. The Chelsea Sanitary District had purchased a 21-acre parcel along the Black River which is actively farmed with row crop agriculture. The Sanitary District will apply practices per the WQT Plan to reduce phosphorus loading from the parcel to generate phosphorous credits.	X	X	X	X	X
d. With the help of the DNR and Wisconsin Rural Water Association, we will wok towards finding additional phosphorous trading opportunities to comply with the phosphorus limit.	X	X	X	X	X
e. EPA/ERG/SEH is working on a facility plan to be submitted in 2026 as to work that needs to be done at the treatment plant and throughout the collection system. Part of the facility plan would be to extend the building over the third plant filter bed and adding risers to some manholes to eliminate excessive rain water and runoff in streets, etc. into the plant. Possible upgrade to lower phosphorus, however, depends on costs.	X	**	**	**	**
f. With the help of our WaterTA group, we will plan on a meeting with all Chelsea Sanitary District users to review the facility plan and what steps we need to take to upgrade our treatment plant and collection system along with reducing phosphorus levels.	X	**	**	**	**
g. Educate users of the sanitary district on what they can do to help reduce phosphorus coming into the treatment plan.	X	**	**	**	**

X Indicates action taken/started this year

** Indicates follow-up action that may be taken depending on previous results – see detailed descriptions.

Submitted by Chelsea Sanitary District: Date: 2-8-26

Dennis Jensen

Dennis Jensen, President