

Permit Fact Sheet

General Information

Permit Number:	WI-0031275-10-0	
Permittee Name:	Hewitt Sanitary District	
Address:	10710 Stadt Rd	
City/State/Zip:	Marshfield WI 54449	
Discharge Location:	Same as address above	
Receiving Water:	Mill Creek in the Mill Creek Watershed of the Upper Wisconsin River Central Sub-Basin located in Wood County	
StreamFlow (Q _{7,10}):	0 cfs	
Stream Classification:	Limited aquatic life community, non-public water supply	
Design Flow(s)	Weekly Maximum	0.267 MGD
	Annual Average	0.148 MGD
Significant Industrial Loading?	None	
Operator at Proper Grade?	Yes	
Approved Pretreatment Program?	N/A	
Publishing News Paper	Marshfield News Herald, PO Box 70, Marshfield, WI 54449-0070	

Facility Description

The Hewitt wastewater treatment facility consists of a headworks room above the pump room that houses a fine screen and grit channel. Outside, there is a 2-channel oxidation ditch, four aerators, one covered final clarifier, and a covered sludge storage tank. Treated wastewater effluent is discharged to Mill Creek. Sludge is land applied on department approved sites or hauled to the Marshfield Wastewater Treatment Plant for storage.

The annual average design flow of the plant is 0.148 million gallons per day (MGD). The actual annual average flow for 2022 was 0.0605 MGD. Disinfection of the effluent is not required based on the conditions of s. NR 210.06(3), Wis. Adm. Code. It should be noted that recreational use surveys may be re-evaluated in the future to ensure the conditions are being met. This re-evaluation could result in requiring disinfection of the effluent at that time.

No major operational changes are proposed for this issuance.

Substantial Compliance Determination

Enforcement During Last Permit: There have been no formal compliance enforcement actions for this facility during the current permit term.

After a desk top review of monitoring reports, CMARs, land application reports, compliance schedule items, and an inspection on 1/10/22, the Hewitt Wastewater Treatment Facility has been found to be in substantial compliance with their current permit.

Compliance Determination made by: Peter Pfefferkorn

Date: 1/28/2022

Concurrence made by: Logan Rubeck

Date: 10/2/2023

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
701	0.066 MGD (Jan 2018 – Dec 2022)	INFLUENT- Flow rate shall be monitored via the continuous magmeter installed on the incoming force main in the pump room. Representative 24-hr flow proportional composite influent samples shall be collected from the influent channel downstream of the fine screen.
001	No flow meter at sample point. Data not available.	EFFLUENT: Representative effluent samples shall be collected from the effluent sampling manhole prior to discharge to Mill Creek.
002	10 dry U.S. tons/year estimated in permit application	SLUDGE: Representative liquid sludge composite samples shall be collected from the sludge storage tank.

1 Influent – Proposed Monitoring

1.1 Sample Point Number: 701- INFLUENT CHANNEL AT HEADWORKS

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

1.1.1 Changes from Previous Permit:

No changes proposed from previous permit.

1.1.2 Explanation of Limits and Monitoring Requirements

Flow, BOD₅ and Total Suspended Solids – Monitoring of influent flow, BOD₅ and total suspended solids (TSS) is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirement for BOD₅ and TSS in s. NR 210.05(1)(a) and (b), Wis. Adm. Code, and in the Standard Requirements section of the permit.

2 Surface Water – Proposed Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT MANHOLE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
BOD ₅ , Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD ₅ , Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	5/week	Grab	
Phosphorus, Total	Monthly Avg	4.7 mg/L	3/Week	24-Hr Flow Prop Comp	Interim limit effective throughout permit term.
Phosphorus, Total	6-Month Avg	0.27 lbs/day	3/Week	Calculated	Monitoring only upon permit effective date. Final TMDL-based mass limits go into effect per the phosphorus compliance schedule. See TMDL section in permit.
Phosphorus, Total	Monthly Avg	0.8 lbs/day	3/Week	Calculated	Monitoring only upon permit effective date. Final TMDL-based mass limits go into effect per the phosphorus compliance schedule. See TMDL section in permit.
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on

Monitoring Requirements and Limitations

Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					the DMR. See TMDL section below.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See TMDL section below.
Chloride	Weekly Avg	493 mg/L	4/month	24-Hr Flow Prop Comp	This is an interim limit. Sampling shall be done on four consecutive days one week per month. See Chloride Variance section and schedule in the permit for applicable chloride target value.
Chloride		lb/day	4/Month	Calculated	Calculate the mass discharge of chloride in lbs/day on the same days chloride sampling occurs. Daily mass (lbs/day) = daily concentration (mg/L) x daily flow (MGD) x 8.34.
Nitrogen, Ammonia (NH ₃ -N) Total		mg/L	Monthly	24-Hr Flow 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 in permit.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section in permit.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section in permit. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and

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

2.1.1 Changes from Previous Permit

Composite Samples- Composite sample type updated from 24-hr composite to 24-hr flow proportional composite to align with sampler type currently used at the facility.

DO- Sampling has been increased to 5 times per week to provide better operational data.

Phosphorus TMDL Limits- An interim limit of 4.7 mg/L goes into effect upon reissuance and will remain in effect unless a more stringent limit is required at a future permit issuance by ss. NR 217.13 and NR 217.16(2), Wis. Adm. Code, or the limit is relaxed following procedures outlined in ch. NR 207, Wis. Adm. Code. Discharge effluent concentration (mg/L) shall be reported three times per week upon permit reissuance and will be used to calculate amounts reported for mass-based parameters. An additional reporting requirement for lbs/month will be used to calculate the facility's 12-month rolling sum of total monthly discharge, which can be compared directly to the facility's designated WLA. Final TMDL WLA-based effluent limits of 0.27 lbs/day as a six-month average and 0.80 lbs/day as a monthly average will go into effect in accordance with compliance schedule 4.1.

Chloride- A Weekly average chloride limit of 493 mg/L has been added to the permit. Monitoring has been increased from quarterly to 4 times per month.

Total Nitrogen Monitoring (NO₂+NO₃, TKN and Total N)- Annual monitoring in rotating quarters has been added to the permit.

2.1.2 Explanation of Limits and Monitoring Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated April 29, 2022, used for this reissuance.

BOD, TSS, pH, Dissolved Oxygen- Categorical limits are included in the permit as outlined in s. NR 210.04, Wis. Adm. Code.

Phosphorus- Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. Details may be found at: <https://dnr.wisconsin.gov/topic/Wastewater/Phosphorus>.

The permitted facility is included within the Wisconsin River Basin Total Maximum Daily Load (TMDL), which was approved by EPA April 26, 2019. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from Site-Specific Criteria (SSC) for Lakes Petenwell, Castle Rock, and Wisconsin originally included in Appendix K of the TMDL report and approved by the U.S. Environmental Protection Agency on July 9, 2020. The permittee's approved SSC-based limits are consistent with the assumptions and requirements of the EPA-approved WLA in the TMDL, which is 83 lbs/yr for the permitted facility.

The approved TMDL expresses WLAs as lbs/year and lbs/day (maximum annual load divided by 365 days). As outlined in Section 4.6 of the department's *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Program*, mass limits must be given in the permit that are consistent with the TMDL WLA and the phosphorus impracticability agreement that was approved by USEPA in 2012 (see NPDES MOA Addendum dated July 12, 2012 at <https://prodoasint.dnr.wi.gov/swims/downloadDocument.do?id=167886175>). Continuously discharging facilities covered by the WRB TMDL are given monthly average mass limits. If the equivalent effluent concentration is

less than or equal to 0.3 mg/L, six-month average mass limits (averaging period of May through October and November through April) are also included. The equivalent effluent concentration of 0.184 mg/L was calculated for the facility, thus, TMDL based mass limits are 0.27 lbs/day expressed as a six-month average and 0.80 lbs/day expressed as a monthly average.

Facilities with WRB TMDL based effluent limits for phosphorus must report the 12-month rolling sum of total monthly discharge (lbs/yr). If reported 12-month rolling sums exceed the facility's max annual WLA, the facility's mass limits (monthly average and six-month average) may be recalculated using more appropriate CVs or monitoring frequencies when the permit is reissued to bring discharge levels into compliance with the facility's given WLA.

Chloride- Chlorides had previously been monitored periodically at this facility for over a decade, with little change in chloride levels observed over that time period. Under low-flow conditions, the flow in Mill Creek at the point of discharge is dominated by effluent from the City of Marshfield WWTP. At the time of the previous WQBEL review (January 6, 2015), it appeared that a chloride limit was necessary for both Hewitt and Marshfield. After this initial review was conducted, additional chloride results were collected and limits were recalculated for both facilities. At that point, it was determined there was no reasonable potential for the instream criterion to be exceeded and a limit was not included in issuance -09, however, monitoring was to continue on a quarterly basis as part of the permit monitoring requirements.

The WQBEL memo for issuance -10 reviewed data submitted during issuance -09 and recommends a concentration limit of 400 mg/L as a weekly average and monthly average, weekly average mass limit of 494 lbs/day and an alternative wet weather mass limit of 892 lbs/day. The facility, however, is unable to attain these limits at this time.

Since chloride is not substantially reduced by standard wastewater treatment processes, and the installation and operation of alternative chloride removal processes may cause substantial and widespread adverse social and economic impacts in the area where the discharger is located, ch. NR 106, Subchapter VII, provides for a variance from chloride limitations if a permittee submits an application requesting such a variance and the US EPA grants the variance, which is considered a variance from state water quality standards.

Hewitt Sanitary District has submitted an application requesting a chloride variance and as a condition of this variance the permittee has committed to maintaining effluent chloride concentrations at or below the interim limit of 493 mg/L, set equal to the facility's 4-day P₉₉ concentration for chloride, and implementing Hewitt Sanitary District's "Chloride Reduction Management Plan – dated June 2022" (attached to this fact sheet). The Chloride Target Value Compliance Schedule includes additional requirements.

Ammonia- Monthly monitoring is included in the permit to ensure the plant maintains adequate performance with ammonia control. No limits are required at this time.

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. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the "Guidance for Total Nitrogen Monitoring in Wastewater Permits" dated October 1, 2019.

Annual effluent monitoring for Total Nitrogen is required on the following quarters: October 1- December 31, 2024; April 1- June 30, 2025; January 1- March 31, 2026; July 1- September 30, 2027; and October 1- December 31, 2028.

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 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 - Proposed 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	Aerobic Bench	Land Applied	10
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.						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility						
Is a priority pollutant scan required? No.						
Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.						

3.1 Sample Point Number: 002- Sludge Outfall

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

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH ₄ -N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2025.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2025.
PFOA + PFOS		µg/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

3.1.1 Changes from Previous Permit:

PFAS – Annual monitoring is included in the permit pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

3.1.2 Explanation of Limits and Monitoring Requirements

Requirements for 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. Radium requirements are addressed in s. NR 204.07(3)(n), Wis. Adm. Code.

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.

4 Schedules

4.1 TMDL Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

The permittee shall comply with the WQBELs for Phosphorus as specified. No later than 14 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance. If a submittal is required, a timely submittal fulfills the notification requirement.

Required Action	Due Date
Plans and Specifications: The facility shall begin drafting plans and specifications.	07/01/2024
Final Plans and Specifications: The permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final TMDL-based phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below.	04/30/2025
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41, Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications.	09/30/2025
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades.	06/30/2026
Achieve Compliance: The permittee shall achieve compliance with final phosphorus TMDL-based WQBELs.	07/01/2026

4.1.1 Explanation of Schedule

Final phosphorus WQBELs included in issuance -09 have been replaced with a TMDL-based final effluent limit. In their Final Compliance Alternatives Plan, dated November 12, 2021, the facility indicated they will be able to comply with the final TMDL-based effluent limits through the use of ferric chloride. This schedule is given to allow the facility time to install a permanent chemical feed system and calibrate the system to meet phosphorus removal needs.

4.2 Chloride Source Reduction Measures (Target Value)

As a condition of the variance to the water quality based effluent limitation(s) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
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<p>Annual Chloride Progress Report: Submit an annual chloride progress report related to the source reduction activities for the previous year. The annual chloride progress report shall:</p> <p>Indicate which chloride source reduction measures or activities in the Source Reduction Plan have been implemented and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why. Include an assessment of whether each implemented source reduction measure appears to be effective or ineffective at reducing pollutant discharge concentrations and identify actions planned for the upcoming year;</p> <p>Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data; and</p> <p>Include an analysis of how effluent chloride varies with time and with significant loadings of chloride. Note that the interim limitation listed in the Surface Water section of this permit remains enforceable until new enforceable limits are established in the next permit issuance.</p> <p>The first annual chloride progress report is to be submitted by the Date Due.</p>	01/31/2025
<p>Annual Chloride Progress Report #2: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.</p>	01/31/2026
<p>Annual Chloride Progress Report #3: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.</p>	01/31/2027
<p>Annual Chloride Progress Report #4: Submit the chloride progress report, related to the source reduction activities for the previous year, as defined above.</p>	01/31/2028
<p>Final Chloride Report: Submit the final chloride report documenting the success in meeting the chloride target value of 444 mg/L, as well as the anticipated future reduction in chloride sources and chloride effluent concentrations.</p> <p>The report shall:</p> <p>Summarize chloride source reduction measures that have been implemented during the current permit term and state which, if any, source reduction measures from the Source Reduction Plan were not pursued and why;</p> <p>Include an assessment of which source reduction measures appear to have been effective or ineffective. Evaluate any needed changes to the pollutant reduction strategy accordingly;</p> <p>Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data during the current permit term; and</p> <p>Include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride as identified in the source reduction plan.</p> <p>If the permittee intends to reapply for a chloride variance, for the reissued permit, proposed target limits and a detailed source reduction measures plan, outlining the source reduction activities proposed for the upcoming permit term, shall also be included per ss. NR 106.90 (5) and NR 106.83 (4), Wis. Adm. Code. An updated source reduction measures plan shall:</p> <p>Include an explanation of why or how each source reduction measure will result in reduced discharge of the target pollutant; and</p> <p>Evaluate any available information on pollutant sources, timing, and concentration to update the mass balance assumptions and expected sources of the pollutant, and</p>	12/31/2028

<p>Identify any information needs that would help to better determine pollutant sources and make plans to collect that information.</p> <p>Note that the target value is the benchmark for evaluating the effectiveness of the chloride source reduction measures but is not an enforceable limitation under the terms of this permit.</p>	
<p>Annual Chloride 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 annual chloride reports for the previous year following the due date of Annual Chloride Progress Reports listed above. Annual Chloride Progress Reports shall include the information as defined above.</p>	

4.2.1 Explanation of Schedule

This schedule is a condition of receiving a variance from the chronic water quality-based chloride limit of 400 mg/L. Since a schedule is being granted, an interim limit of 493 mg/L weekly average is required. The schedule requires that annual reports shall indicate which source reduction measures the permittee has implemented during each calendar year, and an analysis of chloride concentration and mass discharge data based on chloride sampling and flow data. The annual reports shall document progress made towards meeting the chloride target value of 444 mg/L by the end of the permit term.

Attachments:

Water Quality Based Effluent Limits for Hewitt Sanitary District, April 29, 2022, Benjamin Hartenbower, Water Resources Engineer

Chloride Reduction Management Plan, June 2022, Village of Hewitt

Amendment to Chloride Reduction Management Plan, January 2024, Village of Hewitt

Proposed Expiration Date:

June 30, 2029

Justification Of Any Waivers From Permit Application Requirements

No waivers were given for permit application requirements.

Prepared By: Amanda Perdsock, Wastewater Specialist

Date: September 22, 2023

CORRESPONDENCE/MEMORANDUM

DATE: April 29, 2022

TO: Angela Parkhurst – WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for the Hewitt Sanitary District
WPDES Permit No. WI-0031275

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 Hewitt Sanitary District in Wood County. This municipal wastewater treatment facility (WWTF) discharges to Mill Creek, located in the Mill Creek Watershed in the Central Wisconsin River Basin. This discharge is included in the Wisconsin River TMDL as approved by EPA on April 26, 2019 with site-specific criteria approved by EPA on July 9, 2020. 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
BOD ₅			30 mg/L	20 mg/L		1
TSS			30 mg/L	20 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				1
Ammonia Nitrogen						2
Chloride			400 mg/L 494 lbs/day	400 mg/L		3,4
Phosphorus						5
Interim				4.7 mg/L		
Final				0.80 lbs/day	0.27 lbs/day	
TKN, Nitrate+Nitrite, and Total Nitrogen						2,6

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. These are the WQBELs for chloride. An alternative effluent limitation of 529 mg/L (105% of the highest weekly average) as a weekly average may be included in the permit in place of these limits if a chloride variance application is submitted and approved by EPA. If the variance is not approved, a wet weather mass limit of 892 lbs/day would also be required.
4. 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.
5. The phosphorus mass limit is based on the Total Maximum Daily Load (TMDL) for the Wisconsin River Basin to address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA on April 26, 2019 with site-specific criteria approved by EPA on July 9, 2020.

6. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (TKN) (all expressed as N).

Chapter 1.11 *WET Testing of Minor Municipal Discharges* in the WET Guidance Document (2019) was consulted because this facility is a minor municipal discharge. No WET testing is recommended because this discharge is comprised solely of domestic wastewater, with no history of WET failures and no toxic compounds detected at levels of concern.

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

Attachments (3) – Narrative, Ammonia Calculations (2015), & Map

PREPARED BY: _____ Date: _____
Benjamin Hartenbower, PE,
Water Resources Engineer

E-cc: Pete Pfefferkorn, Wastewater Engineer – Wisconsin Rapids
Geisa Thielen, Regional Wastewater Supervisor – Eau Claire
Diane Figiel, Water Resources Engineer – WY/3
Scott Provost, Water Quality Biologist – Wisconsin Rapids
Laura Dietrich, Variance Coordinator – Waukesha

**Water Quality-Based Effluent Limitations for
Hewitt Sanitary District**

WPDES Permit No. WI-0031275

Prepared by: Benjamin P. Hartenbower

PART 1 – BACKGROUND INFORMATION

Facility Description

The Hewitt wastewater treatment facility consists of a headworks room above the pump room that houses a fine screen and grit channel. Outside, there is a 2-channel oxidation ditch, four aerators, one covered final clarifier, and a covered sludge storage tank. Treated wastewater effluent is discharged to Mill Creek.

Disinfection of the effluent is not required based on the conditions of s. NR 210.06(3), Wis. Adm. Code. It should be noted that recreational use surveys may be re-evaluated in the future to ensure the conditions are being met. This re-evaluation could result in requiring disinfection of the effluent at that time.

Attachment #3 is a map of the area showing the approximate location of Outfall 001.

Existing Permit Limitations

The current permit, expiring on September 30, 2022, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
BOD ₅			30 mg/L	20 mg/L		1
TSS			30 mg/L	20 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				1
Ammonia Nitrogen						2
Chloride						2
Phosphorus Interim Final				6.3 mg/L 0.225 mg/L	0.075 mg/L	3

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 compliance schedule is in the current permit to meet the final WQBEL by September 30, 2026.

Receiving Water Information

- Name: Mill Creek
- Waterbody Identification Code (WBIC): 1398600
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Limited Aquatic Life (LAL) community, non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: Due to the nature of the receiving water, the 7-Q₁₀, 7-Q₂, and Harmonic Mean are estimated to be zero.
 - 7-Q₁₀ = 0 cfs (cubic feet per second)
 - 7-Q₂ = 0 cfs
 - Harmonic Mean Flow = 0 cfs
- Hardness = 330 mg/L as CaCO₃. Effluent hardness is used in place of receiving water because there is no receiving water flow upstream of the discharge.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable where the receiving water low flows are zero.
- Source of background concentration data: Background concentrations are not included because they don't impact the calculated WQBEL when the receiving water low flows are equal to zero
- Multiple dischargers: The Blenker Sherry and Marshfield Wastewater Treatment Facilities also discharge to Mill Creek. The Marshfield WWTF outfall is <1 mile upstream. However, the other dischargers do not impact this evaluation.
- Impaired water status: Mill Creek is impaired for Low Dissolved Oxygen and Total Phosphorus and is part of the Wisconsin River TMDL

Effluent Information

- Design flow rate(s)
 - Annual average = 0.148 MGD (Million Gallons per Day)
 - Peak weekly = 0.267 MGD
 - The peak weekly design flow was estimated from the annual average design flow and a peaking factor based on data from October 2017 to February 2022.
 - For reference, the actual average flow from October 2017 to February 2022 was 0.065 MGD.
- Hardness = 330 mg/L as CaCO₃. This value represents the geometric mean of effluent data from 09/26/2021 to 11/02/2021 (n=8)
- 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 private wells
- Additives: Ferric chloride is being piloted to meet expected TMDL phosphorus limits
- Effluent characterization: This facility is categorized as a minor municipality so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus hardness. The permit required chloride, ammonia nitrogen and phosphorus monitoring during the current permit term is used in this evaluation.
- Total Phosphorus Wasteload Allocation: 83 lbs/year (see Appendix K of the TMDL document)
- 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.

Attachment #1

	Chloride mg/L
1-day P ₉₉	574
4-day P ₉₉	493
30-day P ₉₉	447
Mean	422
Std	58
Sample size	18
Range	322 - 504

Sample Date	Copper µg/L
09/26/2021	4.60
09/30/2021	5.20
10/05/2021	6.50
10/10/2021	3.88
10/14/2021	4.71
10/19/2021	4.99
10/24/2021	4.48
11/02/2021	8.00
11/07/2021	5.47
11/11/2021	3.77
11/16/2021	3.34
1-day P ₉₉	8.86
4-day P ₉₉	6.73

The following table presents the average concentrations and loadings at Outfall 001 from October 2017 to February 2022 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Averages of Parameters with Limits

	Average Measurement
BOD ₅	2.5 mg/L*
TSS	2.4 mg/L*
pH field	7.03 s.u.
Dissolved Oxygen	6.23 mg/L
Phosphorus	3.05 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)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Daily Maximum Limit 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. In accordance with s. NR 106.06(3)(b), limitations based on acute toxicity are either set equal to two times the acute criteria (the final acute value) or calculated using the mass balance equation below, whichever is more restrictive.

$$\text{Limitation} = \frac{(\text{WQC}) (\text{Q}_s + (1-f) \text{Q}_e) - (\text{Q}_s - f \text{Q}_e) (\text{C}_s)}{\text{Q}_e}$$

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.

In this case, limits calculated based on the mass balance equation are more restrictive and this method is used to calculate the daily maximum limits shown in the table below.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0 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	340	68.0	<0.989		
Cadmium	330	114	114	22.7	<0.025		
Chromium	301	4446	4446	889	<0.99		

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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.
Copper	330	47.9	47.9			8.86	8.00
Lead	330	339	339	67.9	<4.3		
Nickel	268	1080	1080	216	<0.037		
Zinc	330	342	342	68.5	<0.020		
Chloride (mg/L)		757	757			574	504

* 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.

** Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q₁₀ flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0 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		152	30.4	<0.989	
Cadmium	175	3.8		3.8	0.8	<0.025	
Chromium	301	326		326	65.2	<0.99	
Copper	330	28.8		28.8			6.73
Lead	330	89		89	17.8	<4.3	
Nickel	268	169		169	33.8	<0.037	
Zinc	330	342		342	68.5	<0.020	
Chloride (mg/L)		395		395			493

* 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 = 0 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MOLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	880		880	176	<0.025
Chromium (+3)	8400000		8400000	1680000	<0.99
Lead	2240		2240	448	<4.3
Nickel	110000		110000	22000	<0.037

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 0 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	40		40	8.0	<0.989

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

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for Chloride.

Chloride – Considering available effluent data from the current permit term (October 2017 to January 2022), the 4-day P₉₉ of effluent data is 493 mg/L.

Because the 4-day P₉₉ exceeds the calculated weekly average WQBEL, an effluent limit is needed in accordance with s. NR 106.05(4)(b), Wis. Adm. Code.

However, Subchapter VII of ch. NR 106, Wis. Adm. Code, provides for a variance from water quality standards for this substance, and the Hewitt Sanitary District would need to request such a variance. That variance may be granted subject to the following conditions:

- 1) The permit shall include an “Interim” limitation intended to prevent an increase in the discharge of Chloride;
- 2) The permit shall specify “Source Reduction Measures” to be implemented during the permit term, with periodic progress reports; and
- 3) The permit shall include a “Target Limit” or “Target Value” to gage the effectiveness of the Source Reduction Measures, and progress toward the WQBELs.

Interim Limit for Chloride

Section NR 106.82(9), Wis. Adm. Code, defines a “Weekly average interim limitation” as either the 4-day P₉₉ concentration or 105% of the highest weekly average. A concentration of 529 mg/L is based on 105% of the highest weekly average of the representative data and is recommended as the interim limitation.

Permit language for Source Reduction Measures are not recommended as part of this evaluation. These should follow contact with the Hewitt Sanitary District. Though if the Department and the Hewitt Sanitary District are unable to reach agreement on all the terms of a Chloride Variance, the calculated limits described earlier should be included in the permit, in accordance with s. NR 106.83(3), Wis. Adm. Code.

Chloride Monitoring Recommendations

Four samples per month (on consecutive days) are recommended. This allows for averaging of the results to compare with the interim limit and allows the use of the average in determining future interim limits, and degree of success with chloride reduction measures.

In the absence of a variance, Hewitt Sanitary District would be subject to the WQBEL of **400 mg/L as a weekly average**; the weekly average **mass limit of 494 lbs/day** ($400 \text{ mg/L} \times 0.148 \text{ MGD} \times 8.34$); and an **alternative wet weather mass limit of 892 lbs/day** ($400 \text{ mg/L} \times 0.267 \text{ MGD} \times 8.34$).

Sections NR 106.07(3) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain weekly average and monthly average limitations for municipal dischargers whenever practicable and necessary to protect water quality. **Therefore a monthly average limit of 400 mg/L is would also be required** to meet expression of limits requirements in addition to the weekly average limit.

Mercury – The permit application did not require monitoring for mercury because the Hewitt 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), Wis. Adm. Code.” A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from 2018 to 2021 was 2.06 mg/kg, with a maximum reported concentration of 3.50 mg/kg. Therefore, mercury monitoring is not recommended at Outfall 001.

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that the Hewitt Sanitary District does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation:

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

Where:

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

The effluent pH data was examined as part of this evaluation. A total of 1612 sample results were reported from October 2017 to February 2022. The maximum reported value was 7.70 s.u. (Standard pH Units). The effluent pH was 7.60 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 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 7.72 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 7.72 s.u. into the equation above yields an ATC = 21.48 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 either set equal to two times the acute criteria (the final acute value) or calculated using the mass balance equation in s. NR 106.32(2)(e), Wis. Adm. Code.

In this case, limits calculated based on the mass balance equation are more restrictive. This method is used to calculate the daily maximum limit of **21 mg/L**.

Presented below is a table of daily maximum limitations corresponding to various effluent pH values updated using the 1-Q₁₀. Use of this table is not necessarily recommended in the permit, but it is presented herein for informational purposes.

Daily Maximum Ammonia Nitrogen Limits – LAL

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	83	7.0 < pH ≤ 7.1	51	8.0 < pH ≤ 8.1	11
6.1 < pH ≤ 6.2	82	7.1 < pH ≤ 7.2	46	8.1 < pH ≤ 8.2	8.8
6.2 < pH ≤ 6.3	80	7.2 < pH ≤ 7.3	40	8.2 < pH ≤ 8.3	7.3
6.3 < pH ≤ 6.4	78	7.3 < pH ≤ 7.4	35	8.3 < pH ≤ 8.4	6.0
6.4 < pH ≤ 6.5	75	7.4 < pH ≤ 7.5	31	8.4 < pH ≤ 8.5	5.0
6.5 < pH ≤ 6.6	72	7.5 < pH ≤ 7.6	26	8.5 < pH ≤ 8.6	4.1
6.6 < pH ≤ 6.7	69	7.6 < pH ≤ 7.7	22	8.6 < pH ≤ 8.7	3.4
6.7 < pH ≤ 6.8	65	7.7 < pH ≤ 7.8	19	8.7 < pH ≤ 8.8	2.8
6.8 < pH ≤ 6.9	60	7.8 < pH ≤ 7.9	16	8.8 < pH ≤ 8.9	2.4
6.9 < pH ≤ 7.0	56	7.9 < pH ≤ 8.0	13	8.9 < pH ≤ 9.0	2.0

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

The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do **not change** because there have been no changes in the effluent and receiving water flow rates. The calculations from the previous WQBEL memo are shown in attachment #2.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from November 2017 to July 2021, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Hewitt Sanitary District permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

	Ammonia Nitrogen mg/L
1-day P ₉₉	N/A*
Mean**	0.15
Std	1.01
Sample size	53
Range	<0.13 - 2.60

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

*Less than 11 detected values

Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. No limits are needed, however continued monitoring is recommended.

PART 4 – PHOSPHORUS

Technology-Based Effluent Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of Total Phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because the Hewitt 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 to s. NR 217.04(1)(a)1, Wis. Adm. Code, and therefore a technology-based limit is not required.

Annual Average Mass Total Phosphorus Loading

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
March 2021	3.72	1.96	60.92
April 2021	2.63	2.37	51.89
May 2021	3.34	2.29	63.90
June 2021	3.80	1.99	62.84
July 2021	3.91	2.19	71.53
August 2021	3.27	2.31	62.90
September 2021	3.68	1.74	53.46
October 2021	4.74	1.47	58.26
November 2021	4.60	1.45	55.69
December 2021	3.83	1.56	49.82
January 2022	3.35	1.50	41.79
February 2022	3.19	1.24	32.91
Average	3.67	1.84	55.49

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.

TMDL Limits – Phosphorus

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* (May 2020). The wasteload allocations (WLA) that implement site-specific criteria for Lakes Petenwell, Castle Rock, and Wisconsin are found in Appendix K of the *Total Maximum Daily Loads for Total Phosphorus in the Wisconsin River Basin (WRB TMDL)* report dated April 26, 2019 and are expressed as maximum annual loads (lbs/year) and maximum daily loads (lbs/day). The WLA that implement statewide criteria found in Appendix J of the TMDL report are no longer applicable following approval of these site-specific criteria. The daily WLAs in the WRB TMDL equals the annual WLA divided by the number of days in the year. Therefore, the daily WLA is an annual average. Since the derivation of daily

Attachment #1

WLAs from annual WLAs does not take effluent variability or monitoring frequency into consideration, maximum daily WLAs from the WRB TMDL should not be used directly as permit effluent limits.

Total Phosphorus Wasteload Allocation: 83 lbs/year (see Appendix K of the TMDL document)

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL.

Therefore, limits given to continuously discharging facilities covered by the WRB TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

$$\begin{aligned}\text{TP Equivalent Effluent Concentration} &= \text{Daily WLA} \div (\text{Flow Rate} * \text{Conversion Factor}) \\ &= 0.23 \text{ lbs/day} \div (0.148 \text{ MGD} * 8.34) \\ &= 0.184 \text{ mg/L}\end{aligned}$$

Since this value is less than 0.3 mg/L, both a six-month average mass limit and a monthly average mass limit are applicable for total phosphorus. The monthly average limit is set equal to three times the six-month average limit.

$$\begin{aligned}\text{TP Six-Month Average Permit Limit} &= \text{Daily WLA} * \text{Six-Month Average Multiplier} \\ &= 0.23 \text{ lbs/day} * 1.17 \\ &= 0.27 \text{ lbs/day}\end{aligned}$$

$$\begin{aligned}\text{TP Monthly Average Permit Limit} &= \text{TP Six-Month Average Permit Limit} * 3 \\ &= 0.27 \text{ lbs/day} * 3 \\ &= 0.80 \text{ lbs/day}\end{aligned}$$

The multiplier used in the six-month average calculation was used as recommended in TMDL implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 0.38. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived phosphorus permit limits will affect effluent variability. Thus, the maximum anticipated coefficient of variation expected by any facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as thrice weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

The WRB TMDL establishes TP wasteload allocations to reduce the loading in the entire watershed including WLAs to meet water quality standards, for tributaries to the Wisconsin River. Therefore, WLA-based WQBELs are protective of immediate receiving waters and TP WQBELs derived according to s. NR 217.13, Wis. Adm. Code are not required.

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TP. Rolling 12-month sums can be compared directly to the annual wasteload allocation. Six-month average limits apply in the periods May – October and November – April.

Interim Limit – Phosphorus

An interim limit is needed when a compliance schedule is included in the permit to meet the TMDL limits. This limit should reflect a value which the facility is able to currently meet; however, it should also consider the receiving water quality, keeping the water from further impairment. It is recommended that the interim limit be set equal to 4.7 mg/L, expressed as a monthly average. This value reflects the 4-day P₉₉ concentration of 4.72 mg/L from the past five years. This value is recommended instead of the 30-day P₉₉ concentration of 3.60 mg/L to allow operational flexibility when the facility begins to initiate phosphorus treatment optimization activities, which often consist of trial and error. The following table lists the statistics for effluent phosphorus levels from October 2017 to February 2022 for informational purposes. In the cases where reporting the mass discharge is not required in the current permit, the mass is calculated using the reported phosphorus concentration and the effluent flow rate for that day.

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from August 2018 to November 2021.

	Phosphorus mg/L	Phosphorus lbs/day
1-day P ₉₉	6.88	3.48
4-day P ₉₉	4.72	2.42
30-day P ₉₉	3.60	1.87
Mean	3.05	1.59
Std	1.20	0.60
Sample size	684	684
Range	0.04 - 7.29	0.02 - 5.46

Conclusions:

In summary, the following limits are recommended by this evaluation:

- Monthly average Total Phosphorus mass limit of 0.80 lbs/day
- Six-month average Total Phosphorus mass limit of 0.27 lbs/day
- Monthly average Total Phosphorus concentration limit of 4.7 mg/L

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 Chapters NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. The daily maximum effluent temperature limitation shall be 86 °F for discharges to surface waters classified as Limited Aquatic Life according to s. NR 104.02(3)(b)1, Wis. Adm. Code, except for those classified as wastewater effluent channels and wetlands regulated under ch. NR 103 and described in s. NR 106.55(2), Wis. Adm. Code, which has a daily maximum effluent temperature limitation of 120 °F. The 86 °F limit applies because the hydrologic classification is not listed as a wetland in ch. NR 104, Wis. Adm. Code.

Reasonable Potential

Section NR 106.59(2)(b), Wis. Adm. Code, allows the use of temperature effluent data, on a case-by-case basis, from at least two other POTWs within a 100-mile radius that utilize similar wastewater treatment technology and have a similar ratio of domestic to industrial waste stream composition, or representative data of the POTW. Based on data from other municipal facilities, **no limits or monitoring are recommended.**

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 (October 29, 2019)*.

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.

Ammonia Nitrogen Calculations from the January 6, 2015 WQBEL Memo

AMMONIA (as N) LIMITS

Effluent Flow (mgd):	0.148
Effluent Flow (cfs):	0.229

Effluent pH data:

Begin Date	01-Mar-10
End Date	31-Jul-14
# of Samples	1614
Maximum	7.8
Average	7.28
Standard Deviation	0.225
Estimated 99th Percentile	7.8
Max. Effluent pH (s.u.):	7.80

BACKGROUND INFORMATION:

	<i>summer</i>	<i>winter</i>	<i>spring</i>	<i>fall</i>
4Q3 (cfs)				
7Q10 (cfs)	0	0		
30Q5 (cfs)				
7Q2 (cfs)	0	0		
Ammonia (mg/L) (1)	0	0		
Temperature (deg C) (2)	23	3		
pH (std. units) (3)	8.21	7.97		
% of river flow used:	100	25		
Reference weekly flow:	0	0		
Reference monthly flow:	0	0		

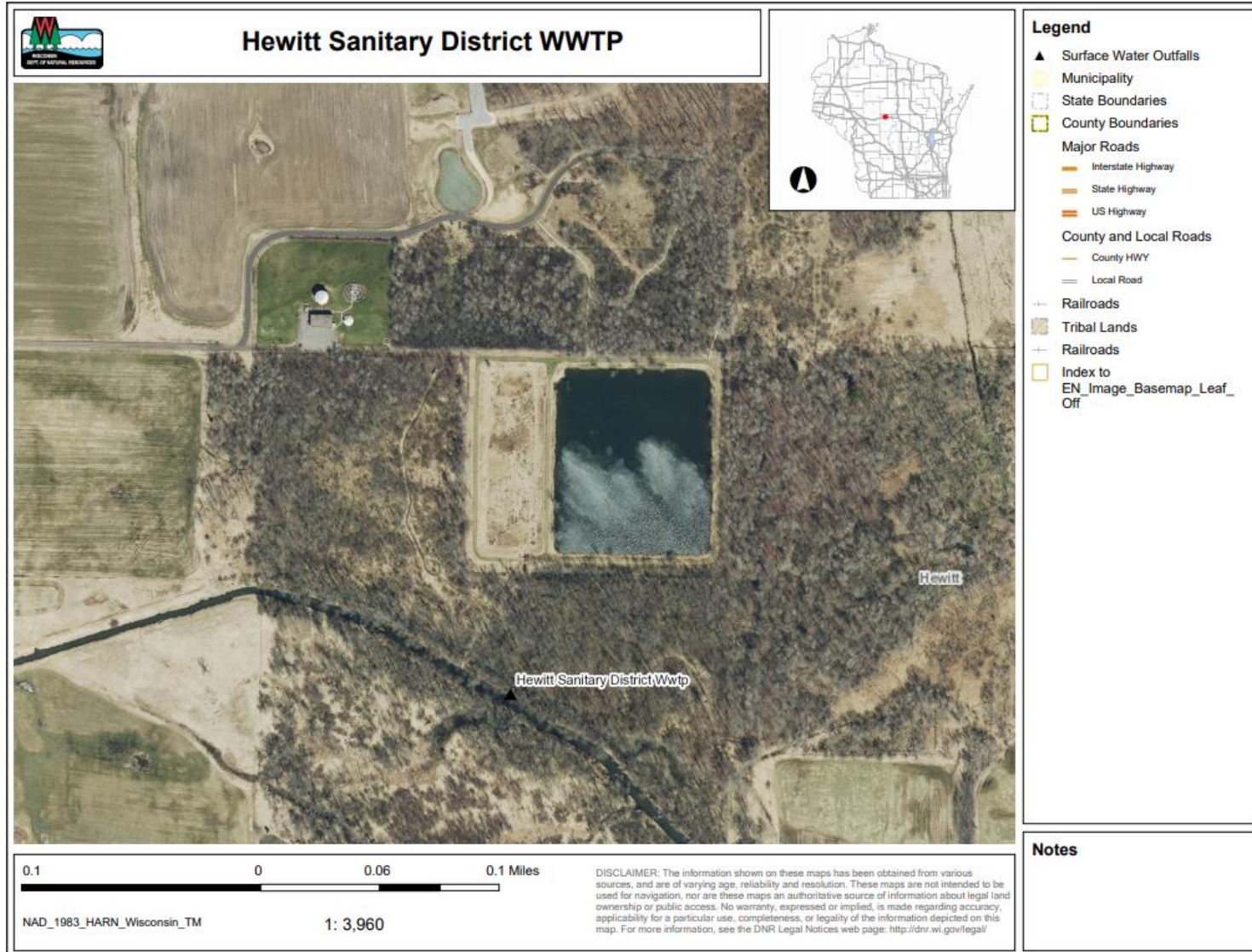
CRITERIA (in mg/L):

Acute (@ effl. pH):	18.71	18.71
4-day Chronic (@ backgrd. pH):	16.68	87.18
30-day Chronic (@ backgrd. pH)	6.67	34.87

EFFLUENT LIMITS (in mg/L):

Daily maximum	37.4	37.4
Weekly average	16.7	87.2
Monthly average	6.67	34.87

-
- (1) Default Data
 - (2) Default Data
 - (3) Default Data



Chloride Reduction Management Plan

**Village of Hewitt
Wood County, Wisconsin**

Project No. 00582028

June 2022

Chloride Reduction Management Plan

**Village of Hewitt
Wood County, Wisconsin**

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Prepared by:

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INTRODUCTION

The Village of Hewitt submitted a chloride variance to the WDNR in June 2022 in response to the Chloride Notification within the Village’s WPDES, which states that “the permittee shall notify the Department in writing of any proposed changes with may affect the characteristics of the wastewater, which results in an increase in the concentration of chloride”. This chloride reduction management plan will characterize known and suspected sources of chloride and identify control strategies for those chloride sources to satisfy the requirements of the variance conditions.

IDENTIFICATION OF CHLORIDE SOURCES

The Village of Hewitt does not have any commercial or industrial contributors to the Hewitt Sanitary District’s wastewater treatment facility. Hewitt has already contacted the existing gas station (Draxler’s) within the Village and confirmed that chloride is not being contributed in any excessive quantity from this source.

Hewitt also does not maintain salt piles within the Village; when roads need salting, Wood County salts Highway T and the Village hires someone to salt near the stop sign locations when needed. Therefore, chloride reduction by way of commercial/industrial contributors’ minimization or salt pile relocation to eliminate chloride in runoff water is not an option for Hewitt.

Possible sources of chloride include road salt entering the sanitary sewer system through manholes along roadways and salt entering the sanitary sewer system from home water softeners. It is likely that the majority of salt being introduced to the sanitary sewer system is from the home water softeners; reduction of this source will be addressed in the following section regarding best management practices for reduction.

BEST MANAGEMENT PRACTICES FOR REDUCTION

Chloride may culminate at the wastewater treatment plant due to road salt entering the sanitary sewer through manholes along roadways. This can happen when Wood County salts Highway T to combat icy road conditions. The Village hires someone to salt additional areas near stop signs if needed, although this is usually minimal; Village streets otherwise remain unsalted. It is not recommended that the quantity of road salt used be reduced within the Sanitary District, as this would jeopardize public safety. However, it is recommended that manholes along roadways be sealed to prevent road salt from entering into the sanitary sewer system if chloride concentrations do not decrease by the next permit term following other BMP practices which will be discussed.

Yellowstone Drive was reconstructed in 2021 and the sanitary manhole covers were replaced with sealed covers to decrease the entrance of salt and stormwater into the collection system.

It is estimated that about 15,600 pounds of road salt is distributed each year by Wood County along this stretch of Highway T within the Sanitary District (assuming approximately 26 storms/snow events per year at 600 lbs of salt/event). However, keeping this quantity of salt out of the sanitary sewer by way of sealing manholes would likely result in only a marginal decrease in chloride concentrations entering the wastewater treatment facility. Average effluent concentrations, discussed in the next section, illustrate that there is no real trend or consistent increase in effluent chloride concentrations during the winter months.

Additionally, it is likely that chloride is being introduced into the sanitary sewer system via home water softeners. Excessive use of salt in home water softeners is believed to be the primary culprit for chloride contributions into the system. An inventory of all water softeners in the Village, including make, model, age, and type will be completed during the current WPDES permit term. This inventory will include identification of whether optional water that has not been softened on-site is provided for outside faucets.

Circulating educational pamphlets informing customers of the impact of chloride from residential softeners and the benefits of updating their water softeners to newer, more efficient models has been proposed to minimize salt usage. More efficient water softeners calibrate the time needed between regeneration cycles based on hardness input (tested elsewhere) and flow measurements to optimize salt usage. Voluntary softener tune-ups will also be recommended. Additionally, the educational pamphlets may also provide information for a designated Village official that may be contacted when replacing or installing new water softeners and for information on optimizing water softener usage.

With regards to using water that has not been softened for outside faucets, any licensed plumber should know this is standard. Information for self-installers of softeners on providing water that has not been softened for outside faucets will be provided in the educational pamphlet. Appropriate information will also be provided when building permits are issued and when plumbing inspections are conducted.

RECOMMENDATIONS

Plant effluent chloride concentration values ranged from 270 to 504 mg/L with an average value of 412 mg/L from January 2014 to April 2022. Yearly averages, as listed in **Table 1** below, indicate that effluent chloride concentrations have been rising over the past four years.

In five of the last nine years, average chloride concentrations during March through September have been higher than the chloride concentrations measured from October through February. This suggests that winter use of road salt does not contribute any significant amount to higher chloride concentrations during the winter months.

Table 1: Yearly Average Effluent Chloride Concentrations

Year	Effluent Chloride Conc. (mg/L)	March through September Avg Conc. (mg/L)	October – February Avg Conc. (mg/L)
2014	370.25	352.5	403.0
2015	422.00	455.5	383.5
2016	420.50	432.5	385.5
2017	381.33	399.0	425.0
2018	426.67	469.5	324.0
2019	392.50	399.0	375.5
2020	428.75	477.0	342.0
2021	433.25	404.0	445.0
2022	455.50	393.0	486.0

The Village is limited with what they can do to minimize chloride, as there are no significant commercial or industrial contributors and salt piles are not stockpiled within the Village.

Based on the findings of this chloride reduction management plan, it is in the best interest of the Village of Hewitt to consider sealing any manholes along roadways that may not be watertight to minimize road salt being introduced into the sanitary sewer and ultimately culminating at the wastewater treatment facility. It is also recommended that the Village of Hewitt distribute educational pamphlets to Village residents in the summer/fall of 2022 about the impact of chloride from softeners, options for increasing softener salt efficiency, and voluntary tune-ups or replacement of existing with more efficient water softeners. Additionally, having appropriate information for dispersal when building permits are issued and when plumbing inspections are conducted is also recommended.

Overall, the reduction measures discussed in this management plan are marginal and are unlikely to help the WWTF to consistently meet the proposed weekly average effluent chloride limit of 400 mg/L.

Appendix A

Effluent Chloride Concentrations (January 2014 to April 2022)

Date	Chloride Concentration (mg/L)		
4/7/2022	393		
1/4/2022	498	2022 Avg	445.50 mg/L
10/12/2021	474		
7/20/2021	411	2021 Avg	433.25 mg/L
4/6/2021	397		
1/11/2021	451		
10/12/2020	439		
4/7/2020	450	2020 Avg	428.75 mg/L
7/7/2020	504		
1/2/2020	322		
10/1/2019	362		
7/3/2019	396	2019 Avg	392.50 mg/L
4/1/2019	402		
1/7/2019	410		
11/6/2018	341		
7/24/2018	491	2018 Avg	426.67 mg/L
4/3/2018	448		
10/18/2017	324		
8/8/2017	399		
4/12/2017	<0.1	2017 Avg	381.33 mg/L
1/17/2017	421		
11/2/2016	429		
7/26/2016	435	2016 Avg	420.50 mg/L
5/2/2016	430		
1/18/2016	388		
10/6/2015	383		
7/20/2015	469	2015 Avg	422.00 mg/L
4/8/2015	442		
1/12/2015	394		
10/14/2014	373		
7/21/2014	435	2014 Avg	370.25 mg/L
4/2/2014	270		
1/7/2014	403		
Min	270 mg/L		
Max	504 mg/L		
Average *	412 mg/L		

*4/12/2017 excluded in average calculation

Appendix B
Reduction Plan Table

Village of Hewitt – WPDES Permit No. WI-0031275-09-0

Variance Request for Chloride Source Reduction Plan.

SRM Activities - Year	1	2	3	4	5
1. Pollutant Source Identification Efforts					
a. Develop an inventory of all commercial and industrial users	X	Update as necessary	Update as necessary	Update as necessary	Update as necessary
2. Chloride related sewer use ordinances.					
a. Continue Implementing and enforcement of current sewer use ordinances.	X	X	X	X	X
b. Village Board to adopt resolution that requires new homes and businesses install modern high efficiency water softeners. Provide Village Board meeting minutes.	X	X			
c. Village board to adopt resolution that all existing homes shall install high efficiency water softeners when existing softeners are to be replaced. Provide Village Board meeting minutes.	X	X			
d. Update ordinances as needed.	X	X	X	X	X
3. Residential softener tune-up and replacement program.					
a. Village Board to discuss chlorides and possible softener tune-ups based on water testing. Provide Village Board meeting minutes.	X	X	X	X	X
b. Encourage sewer users to test water produced by their private wells for hardness and update softener settings accordingly.	X	X	X	X	X
c. Village to recommend softener settings based on water hardness on Village website and Facebook page.	X	X	X	X	X
d. Continue to provide educational material on Village website and Facebook page.	X	X	X	X	X
e. Village Board to discuss if it's economically feasible to provide rebates for water softener replacement on an annual basis. Provide Village Board meeting minutes.	X	X	X	X	X

4. Collection System and Road Salt Reduction					
a. Continue to implement CMOM practices specific to finding and correcting I/I issues.	X	X	X	X	X
b. Inspect manholes during routine street and sanitary maintenance activities. Maintain manhole seals.	X	X	X	X	X
c. Investigate streets and other areas that require high salt use in winter whereby salt has the potential to enter the collection system and/or stormwater system and conduct appropriate maintenance or reduction measures if applicable.	X	X	X	X	X
d. Educate businesses with parking lots to properly salt using Wisconsin Salt Wise or other educational sites. Provide this information on Village website and Facebook page.	X	X	X	X	X
5. Staff Education					
a. Participate in educational opportunities for proactive environmental education.	X	X	X	X	X
b. Investigate lab protocols for chloride analysis and investigate chloride sampling protocols. Increase chloride water sampling and analysis frequency.	X	X	X	X	X

Amended 1/25/2024