Permit Fact Sheet

General Information

Permit Number	WI-0028941-10-0
Permittee Name and Address	Town of Knight P.O. Box 40, Iron Belt, WI 54536
Permitted Facility Name and Address	Town of Knight Lagoon Road, Iron Belt, Wisconsin
Permit Term	April 01, 2026 to March 31, 2031
Discharge Location	South bank of Alder Creek, ¾ mile north of the lagoons (SW¼ - SW¼ of Section 35; T46N-R1E), Iron Belt in Iron County
Receiving Water	Alder Creek in Potato River Watershed of Lake Superior River Basin in Iron County
Stream Flow ($Q_{7,10}$)	Jan: 0.97; Feb: 0.92; Mar: 1.27; Apr: 9.05; May: 3.39; Jun: 1.35; Jul: 0.74; Aug: 0.65; Sep: 0.76; Oct: 1.16; Nov: 1.84; Dec: 1.42
Stream Classification	Cold Water (CW) community, class I trout stream, exceptional resource water (ERW), non-public water supply, recreational use and within the ceded territory
Wild Rice Impacts *(no specific wild rice standards exist at this time)*	No impacts identified at this location. The conclusion of no impact is based on no rice beds inventoried near the outfall. (Database evaluation completed December 2025)
Discharge Type	Existing intermittent discharger
Annual Average Design Flow (MGD)	0.024 MGD
Industrial or Commercial Contributors	No
Plant Classification	A4 - Ponds, Lagoons and Natural Systems; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Town of Knight owns and operates a domestic wastewater treatment system. The plant designed to treat 24,000 gallons per day currently treats an average of 15,000 gallons per day (2020 - 2024 data). The treatment system consists of three stabilization ponds operated in series. Influent (untreated wastewater) enters the primary stabilization lagoon #1 then to the primary/secondary stabilization/holding lagoon #2, and finally the secondary stabilization/holding lagoon #3. Within these ponds naturally occurring bacteria and organisms already present in the wastewater metabolize organic matter in the wastewater. The treated wastewater (effluent) is authorized to be discharged to an 8-inch diameter HDPE effluent pipe (approximately 2,550 feet long) emptying into a 60-foot PVC lined rip-rapped ditch which conveys the effluent further to Alder Creek.

Substantial Compliance Determination

There have been several minor violations such as late reporting and erroneous mass calculations. However, the facility has taken the necessary steps to correct their actions, and nothing further is required at this time. More significant violations such as CMOM implementation and operator certification are being resolved through stepped enforcement/compliance assistance process and/or have been added as schedule to this permit.

After a desk top review of all discharge monitoring reports, CMARs, and a site visit on January 22, 2026 by Eric de Venecia, WDNR, the Town of Knight has been found to be in substantial compliance with their current permit.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	INFLUENT An average of 0.015 MGD (July 1, 2020 – June 30, 2025 data)	Representative influent samples shall be collected from the influent manhole.
002	SLUDGE Sludge was last removed in 2004. (Information provided in the application)	Representative samples shall be collected from accumulated sludge in the lagoons at various locations and depths that are composited for analysis.
003	EFFLUENT An average of 0.093 MGD over 66 days per year during the months of April, May, June, September, October and November. (July 1, 2020 – June 30, 2024 data)	Representative samples shall be collected at the effluent manhole at the end of Secondary Stabilization/Holding Lagoon 3.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT TO PLANT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	Measurements by an Endress and Hauser Ultrasonic Transducer
BOD5, Total		mg/L	2/Month	Grab	
Suspended Solids, Total		mg/L	2/Month	Grab	

Changes from Previous Permit:

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

The **flow rate** sample frequency was changed from "Continuous" to "Daily" to reflect currently acceptable practices at the facility.

Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, 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: 003- EFFLUENT TO ALDER CREEK

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	Measurements by an Endress and Hauser Ultrasonic Transducer
BOD5, Total	Weekly Avg	45 mg/L	Weekly	Grab	Limit is effective year-round except for the months of June and September.
BOD5, Total	Weekly Avg	43 mg/L	Weekly	Grab	Limit is effective for the month of June.
BOD5, Total	Weekly Avg	39 mg/L	Weekly	Grab	Limit is effective for the month of September.
BOD5, Total	Monthly Avg	30 mg/L	Weekly	Grab	
BOD5, Total	Weekly Avg	20 lbs/day	Weekly	Calculated	Limit is effective for the month of June.
BOD5, Total	Weekly Avg	18 lbs/day	Weekly	Calculated	Limit is effective for the month of September.
BOD5, Total	Weekly Avg	27 lbs/day	Weekly	Calculated	Limit is effective for the month of October.
Suspended Solids, Total	Weekly Avg	45 mg/L	Weekly	Grab	
Suspended Solids, Total	Monthly Avg	30 mg/L	Weekly	Grab	
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
Nitrogen, Ammonia (NH3-N) Total	Daily Max - Variable	mg/L	Weekly	Grab	Enter the daily ammonia result on the eDMR and compare it to the Nitrogen, Ammonia Variable Limit column to determine compliance.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonia Variable Limit		mg/L	Weekly	See Table	Using the daily pH result look up the applicable ammonia limit using the table in the Ammonia Limitation permit section and report the variable limit on the eDMR.
Phosphorus, Total	Monthly Avg	4.2 mg/L	Weekly	Grab	Interim limit in place until final limits effective per Water Quality Based Effluent Limits for Total Phosphorus schedule. See the Phosphorus Water Quality-Based Effluent Limitation(s) permit section for more information.
Chronic WET		TUc	See Listed Qtr(s)	Grab	Two tests are required during the permit term. See the Whole Effluent Toxicity (WET) testing permit section for monitoring schedule.
Nitrogen, Total Kjeldahl		mg/L	Per Cycle	Grab	See the Nitrogen Series Monitoring permit section for testing schedule.
Nitrogen, Nitrite + Nitrate Total		mg/L	Per Cycle	Grab	See the Nitrogen Series Monitoring permit section for testing schedule.
Nitrogen, Total		mg/L	Per Cycle	Calculated	Total Nitrogen = Total Nitrogen Kjeldahl (mg/L) + Nitrite + Nitrate Nitrogen (mg/L). See the Nitrogen Series Monitoring permit section for testing schedule.

Changes from Previous Permit

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

- The **flow rate** sample frequency was changed from "Continuous" to "Daily" to reflect currently acceptable practices at the facility.
- The **flow rate** daily maximum variable limit has been removed.

- **BOD_5** weekly average concentration limits for June and September have been included.
- The monitoring frequency for **field pH** monitoring has been increased from weekly to 5 times a week. The frequency change was implemented to meet standard monitoring frequencies post upgrade which is based on the size and type of the facility.
- A **phosphorus** interim monthly average limit of 4.2 mg/L and schedule to meet final WQBEL limits has been included.
- Two **Chronic WET** Tests are required during the permit term in specific quarters as outlined in the permit.
- Annual **total nitrogen monitoring (TKN, N02+N03 and Total N)** monitoring is required in rotating discharge seasons (Cycles) as outlined in the permit. For the duration of this permit "Per Cycle" refers to each of the two discharge periods: Spring (April, May, June) and Fall (September, October, and November).

Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated December 5, 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. The monitoring frequency for field pH has been changed from weekly to 5 times a week to meet the minimum standards outlined in the guidance.

Flow Rate and **Phosphorus** - The previous permit term had streamflow-based effluent flow limits to prevent the need for a phosphorus WQBEL. Several challenges for the town were identified that caused difficulties in maintaining an accurate and reliable method of measuring the daily streamflow of Alder Creek including, multiple beaver dams, changing stream morphology, and the cost/methodology of a stream gauge. For these reasons monitoring sample point 601 Alder Creek is no longer needed and the variable flow limit has been replaced with monthly phosphorus WQBELs.

3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
002	B	Liquid	Sludge was last removed in 2004, and removal is not anticipated this permit term. If removal is needed see the land application and schedule sections of the permit for more information.			
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? The community water supply is provided by private wells. The Radium-226 levels are unknown since private water wells are not required to be tested for radium, but Radium-226 has not been found to be an issue in Iron County.						

Municipal Sludge Description						
Sample Point	**Sludge Class (A or B)**	**Sludge Type (Liquid or Cake)**	**Pathogen Reduction Method**	**Vector Attraction Method**	**Reuse Option**	**Amount Reused/Disposed (Dry Tons/Year)**
Is a priority pollutant scan required? No						

3.1 Sample Point Number: 002- LAGOON SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Once	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Once	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Once	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Once	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Once	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Once	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Once	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Once	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Once	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Once	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Once	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Once	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Once	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Once	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Once	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Once	Composite	
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	
Nitrogen, Ammonium (NH_4-N) Total		Percent	Per Application	Composite	
Phosphorus, Total		Percent	Per Application	Composite	
Phosphorus, Water		% of Tot P	Per	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Extractable			Application		
Potassium, Total Recoverable		Percent	Per Application	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	See the Sludge Analysis for PCBs permit section.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	See the Sludge Analysis for PCBs permit section.
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS permit sections for more information.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

Changes from Previous Permit:

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

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

Explanation of Limits and Monitoring Requirements

Requirements for disposal, including land application of municipal sludge, are determined in accordance with ch. NR 204, Wis. Adm. Code. Ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k).

List 2 Nutrient monitoring – Monitoring for list 2 (nutrients) is highly recommended at the same time as the monitoring of List 1 (metals) in year 2 of the permit (2027). Results will assist in the determination of the acres needed for land application of sludge should it be necessary. The number of acres needed is also required for the Sludge Management Schedule (see schedules for more information).

Change in form submittal – In prior permit reissuances when it has been noted in the application that sludge would not be removed during the permit term, the department required sampling during the second year of the permit term and the sludge characteristic report (3400-049) would be generated only during that year. Due to moving to electronic submittal

of forms via Switchboard, forms 3400-049 ("Characteristics Report"), 3400-052 ("Other Methods of Disposal") and 3400-055 ("Annual Land Application") will now be generated by the department and the permittee will be required to submit all three reports each year of the permit term. This change was adopted to provide the permittee flexibility because many lagoon desludging projects can be unexpected, are delayed or staggered over multiple years. Additionally, it is used to officially report that no land application of sludge has occurred, and annual submittal of the forms is required per the standard requirements section.

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

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

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

4 Schedules

4.1 CMOM (Capacity, Management, Operation & Maintenance)

Required Action	Due Date
Updated CMOM documentation: Submit a revised plan which includes all changes to the CMOM program.	03/31/2027

Explanation of Schedule

NR 210.23 Wis. Adm. Code requires all communities with collection systems to develop a CMOM. It is important for the permittee to maintain updated documentation.

4.2 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
Operational Evaluation Report: The permittee shall prepare and submit to the Department for	03/31/2027

approval an operational evaluation report. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant during the period prior to complying with final phosphorus WQBELs and, where possible, enable compliance with final phosphorus WQBELs by March 31, 2029. The report shall provide a plan and schedule for implementation of the measures, improvements, and modifications as soon as possible, but not later than March 31, 2029 and state whether the measures, improvements, and modifications will enable compliance with final phosphorus WQBELs. Regardless of whether they are expected to result in compliance, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the operational evaluation report. If the operational evaluation report concludes that the facility can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the permittee shall comply with the final phosphorus WQBEL by March 31, 2029 and is not required to comply with the milestones identified below for years 3 through 9 of this compliance schedule ('Preliminary Compliance Alternatives Plan', 'Final Compliance Alternatives Plan', 'Final Plans and Specifications', 'Treatment Plant Upgrade to Meet WQBELs', 'Complete Construction', 'Achieve Compliance'). STUDY OF FEASIBLE ALTERNATIVES - If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs sooner than March 31, 2035.	
Compliance Alternatives, Source Reduction, Improvements and Modifications Status: The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.	03/31/2028
Preliminary Compliance Alternatives Plan: The permittee shall submit a preliminary compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee’s wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design report. If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan. If water quality trading will be undertaken, the plan must state that trading will be pursued.	03/31/2029
Final Compliance Alternatives Plan: The permittee shall submit a final compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee’s wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code.	03/31/2030

If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	
Progress Report on Plans & Specifications: Submit progress report regarding the progress of preparing final plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2031
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, 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 phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.) Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2032
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. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	06/30/2032
Construction Upgrade Progress Report #1: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	06/30/2033
Construction Upgrade Progress Report #2: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2034
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	02/28/2035
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	03/31/2035

Explanation of Schedule

Phosphorus - A compliance schedule is included in the permit to provide time for the permittee to investigate options for meeting effluent Phosphorus water quality-based effluent limits for the months of May, September, October and November while coming into compliance with the limits as soon as reasonably possible. Final effluent limits are

Month	Concentration (mg/L)	Mass (lbs/day)
May	1.4	2.3
September	1.3	0.52
October	1.3	0.79
November	1.4	1.2

4.3 Sludge Mapping

Required Action	Due Date
Map Sludge Depth: Sludge depth measurements shall be taken across the ponds at the same time samples are taken. A map showing the sludge profile shall be prepared and submitted.	01/31/2028

Explanation of Schedule

Sludge Mapping - The depth and distribution of the sludge in the ponds is not currently known. This information is important to determine the effectiveness of the ponds and estimate when sludge removal is needed.

4.4 Sludge Management Plan

Required Action	Due Date
Submit a Sludge Management Plan: The permittee shall submit an update to the management plan for approval if removal of sludge will occur during this permit term. The plan shall demonstrate compliance with ch. NR 204 Wis. Adm. Code and at minimum address 1) How and where is sludge sampled; 2) Available sludge storage details and location(s); 3)How will the sludge be removed with details on volume, characterization and how will the treatment plant continue to function during the draw-down; 4) Describe the type of transportation and spreading vehicles and loading and unloading practices; 5) Identify approved land application sites, apply for needed sites, site limitations, total acres needed and vegetative cover management; 6) Specify record keeping procedures including site loading; 7) Address contingency plans for adverse weather and odor/nuisance abatement; and 8) Include any other pertinent information such as other disposal options that may be used or specifications of any pretreatment processes Once approved, all sludge management activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the Department prior to implementing the changes. No desludging may occur unless approval from the Department is obtained. Daily logs shall be kept that record where the sludge has been disposed. The plan is due at least 60 days prior to desludging.	

Explanation of Schedule

Sludge Management Plan (municipal facility with a lagoon)- If the lagoons are to be de-sludged during this permit term a management plan is needed to show compliance with ch. NR 204, Wis. Adm. Code. There are outlines available to assist in plan development.

Attachments

Water Flow Schematic updated January 2026
Water Quality Based Effluent Limits December 5, 2025

Justification Of Any Waivers From Permit Application Requirements

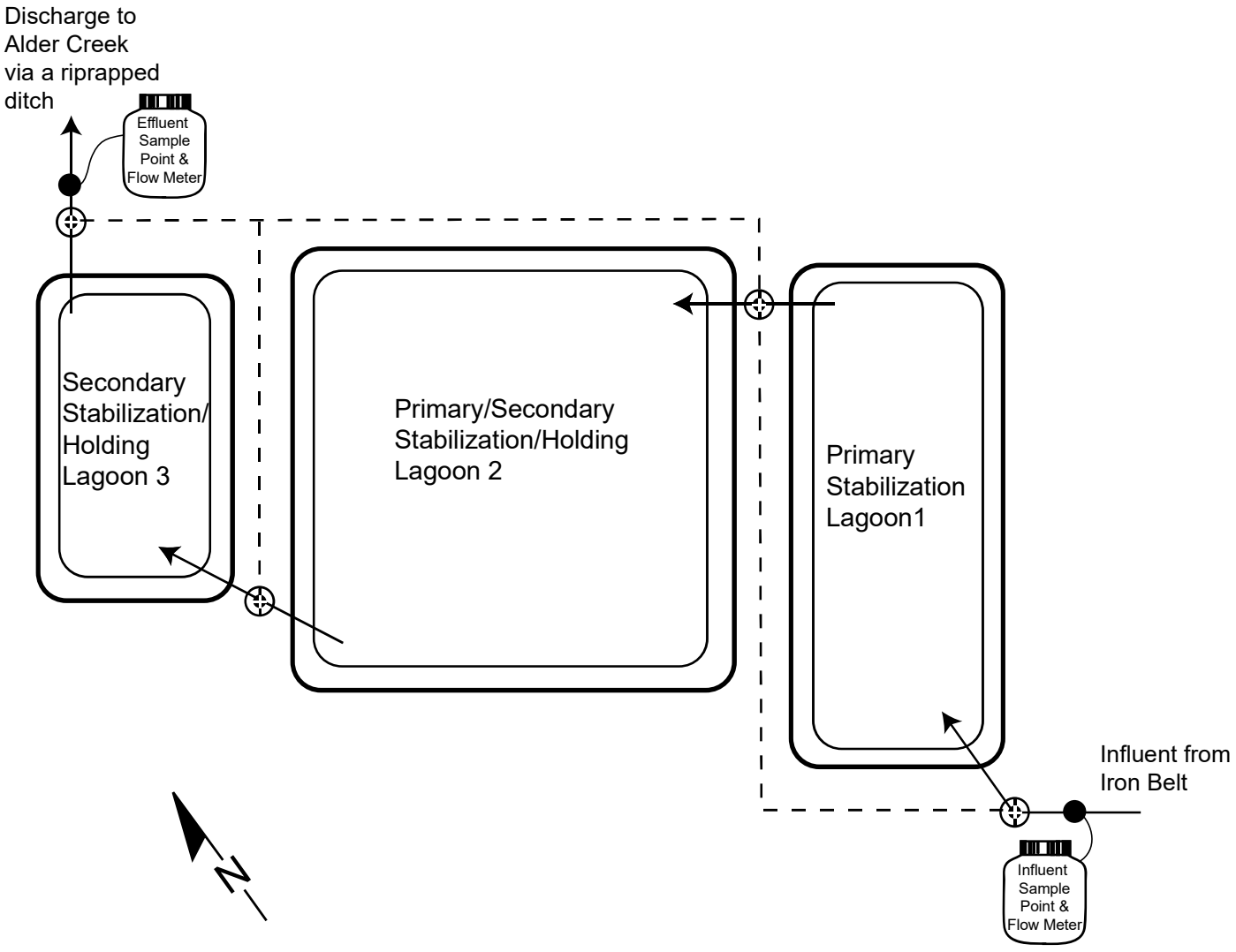
A decision has been made not to require effluent monitoring for metals in the application because:

1. The very low design flow (0.024 MGD) and low actual flows (an average of 0.015 MGD);
2. The metals in the sludge are well below high quality limits which correlates to low metal concentrations in the effluent;
3. The wastewater is all domestic with no industrial contributors to the collection system; and
4. The town does not have a public water supply system and does not have any control over corrosivity in the influent wastewater.

Prepared By: Sheri A. Snowbank Wastewater Specialist **Date:** December 19, 2025

Town of Knight
Wastewater Treatment Plant

The Town of Knight wastewater treatment facility consists of three stablization ponds operated in series. Effluent is authorized to be discharged to Alder Creek in Iron County. The diagram below shows the treatment units and sampling locations.



Design Data:
Annual Avg Flow: 0.024 MGD
Daily Max Flow: 0.059 MGD
BOD: 54 lbs/day
Construction Yr: 2004

- Sampling location
- Flow control manholes
- Wastewater flow
- Bypass paths

NOT TO SCALE

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: December 5, 2025

TO: Sheri Snowbank – NOR/Spooner Service Center

FROM: Michael Polkinghorn – NOR/Rhinelander Service Center Michael Polkinghorn

SUBJECT: Water Quality-Based Effluent Limitations for the Town of Knight
WPDES Permit No. WI-0028941-10-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable) for the discharge from the Town of Knight in Iron County. This municipal wastewater treatment facility (WWTF) discharges to Alder Creek, located in the Potato River Watershed in the Lake Superior Basin.

The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at Outfall 003:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
BOD_5 Year round June September October			 45 mg/L 43 mg/L 20 lbs/day 39 mg/L 18 lbs/day 27 lbs/day	 30 mg/L	 2
TSS			45 mg/L	30 mg/L	2, 3
pH	9.0 s.u.	6.0 s.u.			2, 3
Ammonia Nitrogen	Variable				3, 4
Phosphorus					
Interim				4.2 mg/L	
Final May September October November				 1.4 mg/L 2.3 lbs/day 1.3 mg/L 0.52 lbs/day 1.3 mg/L 0.79 lbs/day 1.4 mg/L 1.2 lbs/day	5
TKN, Nitrate+Nitrite, and Total Nitrogen					6
Chronic WET					7

Footnotes:

1. Monitoring whenever the discharge occurs.

2. These limits are based on the Cold Water (CW) community of the downstream receiving water as described in s. NR 210.05(1), Wis. Adm. Code. The mass BOD_5 WQBELs are based on the dissolved oxygen water quality standard of the CW community of the downstream receiving water.
3. No changes from the current permit.
4. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit.

Daily Maximum Ammonia Nitrogen Limits

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

5. The monthly average limit of 4.2 mg/L, based on the maximum monthly average of effluent phosphorus data, will serve as the interim limit for the phosphorus compliance schedule.
6. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Sections 283.37(5) and 283.55(1)(e), Wis. Stats, and ss. NR 200.065(1)(g) and NR 200.065(1)(h), Wis. Adm. Codes, provide the authority to request this monitoring during the permit term. Total nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total Kjeldahl nitrogen (TKN) (all expressed as N).
7. Two chronic whole effluent toxicity (WET) tests are recommended during the reissued permit term. The Instream Waste Concentration (IWC) to assess chronic test results is 48%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5%. The primary control water used in chronic WET tests conducted on Outfall 003 shall be a grab sample collected from Alder Creek upstream of the confluence of the effluent ditch. Sampling WET concurrently with any chemical-specific toxic substances is recommended. The permit should be written to ensure that the monitoring recommended below is representative of both spring and fall discharge conditions.

Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the discharge.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Michael Polkinghorn at (715) 360-3379 or Michael.Polkinghorn@wisconsin.gov and Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, discharge area map, & thermal table.

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Attachment #1

Water Quality-Based Effluent Limitations for
Town of Knight

WPDES Permit No. WI-0028941-10-0

Prepared by: Michael A. Polkinghorn

PART 1 – BACKGROUND INFORMATION

Facility Description

The treatment system consists of three stabilization ponds operated in series. Influent enters the primary stabilization lagoon #1 then to the primary/secondary stabilization/holding lagoon #2, and finally the secondary stabilization/holding lagoon #3. Within these ponds naturally occurring bacteria and organisms already present in the wastewater break down the organic matter until the wastewater is able to meet discharge standards. Effluent is discharged on a noncontinuous basis via Outfall 003 to an 8-inch diameter HDPE effluent pipe (approx. 2,550 ft long) emptying into a 60-foot PVC lined rip-rapped effluent ditch to the south bank of Alder Creek. Discharges typically occur during April – June and September – November.

Attachment #2 is a discharge area map of Outfall 003.

Existing Permit Limitations

The current permit, which expired on 09/30/2024, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate	Variable				1
BOD_5 Year round June September October			 45 mg/L 20 lbs/day 18 lbs/day 27 lbs/day	 30 mg/L	 2
TSS			45 mg/L	30 mg/L	2, 3
pH	9.0 s.u.	6.0 s.u.			2, 3
Ammonia Nitrogen	Variable				4
Phosphorus					5
Chloride					5
Temperature					5
Acute WET					6

Footnotes:

1. Based on Qs:Qe ratio of 53:1 of phosphorus concentration loading to ensure that a phosphorus WQBEL is not required as described in ch. NR 217, Wis. Adm. Code. The variable daily

maximum flowrate limits table is provided with respect to the 4-day P_{99} of 2.60 mg/L of effluent phosphorus data and the phosphorus WQC of 0.075 mg/L. These limits would apply during all months when the discharge occurs.

Daily Maximum Effluent Flowrate Limits

Using a phosphorus effluent concentration of 2.60 mg/L

Stream Flow (cfs)	Effluent Flow (MGD)	Stream Flow (cfs)	Effluent Flow (MGD)
0.8	0.01	6.5	0.08
1.6	0.02	7.3	0.09
2.4	0.03	8.1	0.10
3.3	0.04	9.0	0.11
4.1	0.05	9.8	0.12
4.9	0.06	10.6	0.13
5.7	0.07	11.4	0.14

2. These limits are based on the Cold Water (CW) community of the downstream receiving water as described in s. NR 210.05(1), Wis. Adm. Code. The mass BOD_5 WQBELs are based on the dissolved oxygen water quality standard of the CW community of the downstream receiving water.
3. **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.
4. The variable daily maximum table corresponding to various effluent pH values should be included in the permit in place of a single limit. These limits would apply during all months when the discharge occurs.

Daily Maximum Ammonia Nitrogen Limits

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 < pH \leq 6.1$	72	$7.0 < pH \leq 7.1$	44	$8.0 < pH \leq 8.1$	9.3
$6.1 < pH \leq 6.2$	71	$7.1 < pH \leq 7.2$	39	$8.1 < pH \leq 8.2$	7.6
$6.2 < pH \leq 6.3$	69	$7.2 < pH \leq 7.3$	35	$8.2 < pH \leq 8.3$	6.3
$6.3 < pH \leq 6.4$	67	$7.3 < pH \leq 7.4$	31	$8.3 < pH \leq 8.4$	5.2
$6.4 < pH \leq 6.5$	65	$7.4 < pH \leq 7.5$	27	$8.4 < pH \leq 8.5$	4.3
$6.5 < pH \leq 6.6$	63	$7.5 < pH \leq 7.6$	23	$8.5 < pH \leq 8.6$	3.5
$6.6 < pH \leq 6.7$	60	$7.6 < pH \leq 7.7$	19	$8.6 < pH \leq 8.7$	3.0
$6.7 < pH \leq 6.8$	56	$7.7 < pH \leq 7.8$	16	$8.7 < pH \leq 8.8$	2.5
$6.8 < pH \leq 6.9$	52	$7.8 < pH \leq 7.9$	14	$8.8 < pH \leq 8.9$	2.1
$6.9 < pH \leq 7.0$	48	$7.9 < pH \leq 8.0$	11	$8.9 < pH \leq 9.0$	1.8

5. Monitoring only.
6. Two acute whole effluent toxicity (WET) tests were required during the reissued permit term.

Receiving Water Information

- Name: Alder Creek
- Waterbody Identification Code (WBIC): 2908700
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Cold Water (CW) community, class I trout stream, exceptional resource water (ERW), non-public water supply, and recreational use. Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.
  - Outfall 003 technically discharges to an effluent ditch, which has a Limited Aquatic Life community classification, before reaching Alder Creek as described in s. NR 104.02(3)(b)1, Wis. Adm. Code. Because the length of the effluent ditch approx. 60 ft, historic limit evaluations have assumed there is little to no assimilation of substances in the discharge over this relatively short distance. In addition, most calculated WQBELs for a CW community will be more stringent than those for an LAL community. Therefore, this evaluation will continue treating Outfall 003 as if it were a direct discharge to Alder Creek.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q_{10} values are from USGS for Station SW¼, SW¼ of Section 35; T46N-R1E, where Outfall 003 is located. There were no 7-Q_2 values calculated at the time when the 7-Q_{10} values were determined. The annual 7-Q_{10} and 7-Q_2 values are 0.38 and 0.96 cfs respectively using *Surface Water Data Viewer*. This yields a 7-Q_2/7-Q_{10} ratio of 2.5 that is utilized to estimate monthly 7-Q_2 flows to the corresponding 7-Q_2 values.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q_{10} (cfs)	0.97	0.92	1.27	9.05	3.39	1.35	0.74	0.65	0.76	1.16	1.84	1.42
7-Q_2 (cfs)	2.45	2.32	3.21	22.86	8.56	3.41	1.87	1.64	1.92	2.93	4.65	3.59

- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%. A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.
- Multiple dischargers: Whitecap Mountain Sanitary District is an overland discharge nearby Alder Creek approx. 4 miles downstream of Outfall 003, and the mixing zones do not overlap. Therefore, other dischargers do not impact this evaluation.
- Impaired water status: There are no known impairments to Alder Creek or any surface waterbodies within a reasonable distance downstream of Outfall 003.

Effluent Information

- Design flow rate(s):
  Annual average = 0.024 million gallons per day (MGD)
  365-day maximum annual average = 0.11 MGD
  Maximum monthly average (April) = 0.250 MGD
  Maximum monthly average (May) = 0.192 MGD
  Maximum monthly average (June) = 0.053 MGD
  Maximum monthly average (September) = 0.048 MGD
  Maximum monthly average (October) = 0.072 MGD
  Maximum monthly average (November) = 0.109 MGD

  For reference, the actual average flow from October 2019 – September 2025 was 0.087 MGD excluding days discharge did not occur. The maximum monthly design flowrates from the facility

planning limit addendum (November 2003) are used to account for the noncontinuous nature of the discharge.

- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Wastewater source: Domestic wastewater with no industrial contributors.
- Water supply: Municipality waterworks.
- 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. Monitoring for phosphorus, chloride, and temperature was required during the current permit term.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Chloride Effluent Data

Sample Date	Conc. (mg/L)	Sample Date	Conc. (mg/L)	Sample Date	Conc. (mg/L)
04/26/2022	53	06/01/2022	50	11/02/2022	48
05/04/2022	58	06/08/2022	43	11/09/2022	49
05/10/2022	55	10/11/2022	51	11/16/2022	41
05/18/2022	50	10/19/2022	43		
05/25/2022	42	10/26/2022	48		
1-day P_{99} = 62 mg/L					
4-day P_{99} = 55 mg/L					

The following table presents the average concentrations and loadings at Outfall 003 from October 2019 – September 2025 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameters with Effluent Limits

	Average Measurement*	Average Mass Discharged
Flow Rate	0.087 MGD	
BOD_5	4.5 mg/L	20 lbs/day
TSS	5.7 mg/L	
pH field	8.2 s.u.	
Ammonia Nitrogen	0.70 mg/L	

*Any results below the limit of detection (LOD) were included as zeroes in calculation of average.

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

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)

2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P_{99}) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q_{10}

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q_{10} receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

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

Where:

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

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

Qe = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

Cs = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Town of Knight, and the limits are set based on two times the acute toxicity criteria.

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

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0.61 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06(3)(bm), Wis. Adm. Code.

SUBSTANCE	ATC	MAX. EFFL. LIMIT*	1-day P_{99}	1-day MAX. CONC.
Chloride (mg/L)	757	1,514	62	58

* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q_{10} flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)
RECEIVING WATER FLOW = 0.19 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

SUBSTANCE	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	4-day P_{99}
Chloride (mg/L)	395		589	55

Monthly Average Limits based on Wildlife Criteria (WC)
The effluent characterization did not include any effluent sampling results for substances for which WC exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)
The effluent characterization did not include any effluent sampling results for substances for which HTC exist.

Monthly Average Limits based on Human Cancer Criteria (HCC)
The effluent characterization did not include any effluent sampling results for substances for which HCC exist.

Conclusions and Recommendations
Based on a comparison of the effluent data and calculated effluent limitations, **effluent limitations are not recommended for any toxic substances.** Limits and/or monitoring recommendations are made in the paragraphs below:

Mercury – The permit application did not require monitoring for mercury because the Town of Knight 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 sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The concentration in the sludge from 10/25/2021 was 0.33 mg/kg. **Therefore, mercury monitoring is not recommended during the reissued permit term.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge, the effluent flow rate, the lack of indirect dischargers contributing to the collection system and known levels of PFOS/PFOA in the source water, **PFOS and PFOA monitoring is not recommended during the reissued permit term.** 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 BOD_5

The BOD_5 limits in the current permit are based on the CW community of Alder Creek as described in s. NR 210.05(1), Wis. Adm. Code. They are also based on the protection of the dissolved oxygen water quality standards of Alder Creek and the maximum monthly average design flows of the facility. Upon

initial review of the current limits, additional limits should have been implemented during June, September, and October. Therefore, those limits will be reevaluated at this time.

BOD_5
In establishing BOD_5 limitations, the primary intent is to prevent a lowering of dissolved oxygen levels in the receiving water below water quality standards as specified in ss. NR 102.04(4)(a) and (b), Wis. Adm. Codes. The 26-lb method (13-lb method for cold water community streams) is the most frequently used approach for calculating BOD_5 limits when resources are not available to develop a detailed water quality model. This simplified model was developed in the 1970's by the Wisconsin Committee on Water Pollution on the Fox, Wisconsin, Oconto, and Flambeau Rivers. Further studies throughout the 1970's proved this model to be relatively accurate. The model has since then been used by the Department on many occasions when resources are not available to perform a site-specific model.

The calculation of the BOD_5 limits based on the full assimilative capacity are explained in detail in the previous facility planning limit addendum (November 2003). The final limits April – June and September – November are included below:

Weekly Average BOD_5/TSS Limits (November 2003)

Month	Conc. (mg/L)	Mass (lbs/day)
April	45	190
May	45	72
June	43	20
September	39	18
October	45	27
November	45	41

Whenever the calculated BOD_5 WQBEL is less than 45 mg/L, a concentration and mass BOD_5 limit shall be implemented in the permit to protect the receiving water quality. **June has a weekly average BOD_5 limit of 43 mg/L so it is recommended during the reissued permit term. Similarly, September has a weekly average BOD_5 limit of 39 mg/L so it is also recommended during the reissued permit term.** The calculated mass BOD_5 WQBEL for October was implemented in the permit despite the high concentration limit was due to concerns of the facility exceeding the respective maximum monthly average design flow rate for the month.

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum limits year round. These limits are re-evaluated at this time to determine the need for weekly and monthly average limits in the permit.

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 ATC for ammonia is calculated using the following equation:

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

Where:

A = 0.411 and B = 58.4 for a CW community (category 5), and
pH (s.u.) = that characteristic of the effluent.

The daily maximum limits in the current permit are based on a CW community (category 4) and are more stringent than the applicable daily maximum limits based on a CW community (category 5). If the Town of Knight would like to request an increase to the existing permit limits an assessment of their effluent data consistent with the requirements of ss. NR 207.04(1)(a) and (c), Wis. Adm. Code, must be provided. This evaluation is on a parameter by parameter basis and includes consideration of operations, maintenance and temporary upsets. **Without a demonstration of need for a higher limit in accordance with s. NR 207.04, Wis. Adm. Code, the current limits based on a CW community (category 4) must be continued in the reissued permit.**

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 Community (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

Daily Maximum Ammonia Nitrogen Limits – CW Community (Cat. 4)

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq pH \leq 6.1$	72	$7.0 < pH \leq 7.1$	44	$8.0 < pH \leq 8.1$	9.3
$6.1 < pH \leq 6.2$	71	$7.1 < pH \leq 7.2$	39	$8.1 < pH \leq 8.2$	7.6
$6.2 < pH \leq 6.3$	69	$7.2 < pH \leq 7.3$	35	$8.2 < pH \leq 8.3$	6.3
$6.3 < pH \leq 6.4$	67	$7.3 < pH \leq 7.4$	31	$8.3 < pH \leq 8.4$	5.2
$6.4 < pH \leq 6.5$	65	$7.4 < pH \leq 7.5$	27	$8.4 < pH \leq 8.5$	4.3
$6.5 < pH \leq 6.6$	63	$7.5 < pH \leq 7.6$	23	$8.5 < pH \leq 8.6$	3.5
$6.6 < pH \leq 6.7$	60	$7.6 < pH \leq 7.7$	19	$8.6 < pH \leq 8.7$	3.0
$6.7 < pH \leq 6.8$	56	$7.7 < pH \leq 7.8$	16	$8.7 < pH \leq 8.8$	2.5
$6.8 < pH \leq 6.9$	52	$7.8 < pH \leq 7.9$	14	$8.8 < pH \leq 8.9$	2.1
$6.9 < pH \leq 7.0$	48	$7.9 < pH \leq 8.0$	11	$8.9 < pH \leq 9.0$	1.8

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria (CTC) for ammonia, because those limits relate to the assimilative capacity of the receiving water. Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code. The 30-day CTC for ammonia in waters classified for a CW community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

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

Where:

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

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q_{10} (4-Q_3, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q_5 (estimated as 85% of the 7-Q_2 if the 30-Q_5 is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 ºC, 25% of the flow is used if the Temperature < 11 ºC, and 50% of the flow is used if the Temperature ≥ 11 ºC but < 16 ºC.

The "default" basin assumed values are used for Temperature, pH and background ammonia concentrations, because minimum ambient data is available. These values are shown in the table below, with the resulting criteria and effluent limitations.

Weekly & Monthly Ammonia Nitrogen Limits – CW Community

		April	May	June	Sept.	Oct.	Nov.
Effluent Flow	Qe (MGD)	0.250	0.192	0.053	0.048	0.072	0.109
Background Information	7-Q_{10} (cfs)	9.05	3.39	1.35	0.76	1.16	1.84
	7-Q_2 (cfs)	22.86	8.56	3.41	1.92	2.93	4.65
	Ammonia (mg/L)	0.03	0.03	0.03	0.02	0.02	0.02
	Temperature (°C)	8	13	17	14	9	5
	pH (s.u.)	7.26	7.26	7.26	7.18	7.18	7.18
	% of Flow used	25	50	100	50	25	25
	Reference Weekly Flow (cfs)	2.3	1.7	1.4	0.38	0.29	0.46
	Reference Monthly Flow (cfs)	4.9	3.6	2.9	0.82	0.62	1.0
Criteria mg/L	4-day Chronic	13.01	13.01	11.33	13.62	13.62	13.62
	30-day Chronic	5.21	5.21	4.53	5.45	5.45	5.45
Effluent Limits mg/L	Weekly Average	89	87	197	83	49	51
	Monthly Average	70	68	163	65	36	37

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from November 2019 – June 2025.

Ammonia Nitrogen Effluent Data

Statistics (mg/L)	April	May	June
1-day P_{99}		8.7	
4-day P_{99}		4.7	
30-day P_{99}		2.2	
Mean*	1.9	1.1	0.6
Std	3.7	2.2	1.1
Sample size	10	21	10
Range	<0.1 - 10.4	<0.1 - 7.8	<0.1 - 2.8
Statistics (mg/L)	Sept.	Oct.	Nov.
1-day P99			1.9
4-day P99			1.1
30-day P99			0.6
Mean*	<0.1	0.1	0.4
Std		0.1	0.4
Sample size	4	19	19
Range	<0.1	<0.1 - 0.4	<0.1 - 1.7

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

Reasonable Potential

The need to include ammonia limits in the Town of Knight permit is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during April – June and September – November and comparing those to the calculated limits. Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. However, since the permit currently has daily maximum limits year-round, **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.

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

Section NR 102.04(5), Wis. Adm. Code, states that all surface waters shall be suitable for supporting recreational use and shall meet *E. coli* criteria during the recreation season. Section NR 102.04(5)(b), Wis. Adm. Code, allows the Department to make exceptions when it determines, in accordance with s. NR 210.06(3), Wis. Adm. Code, that wastewater disinfection is not required to meet E. coli limits and protect the recreational use. Section NR 210.06(3), Wis. Adm. Code, tasks the Department with determining the need for disinfection using a site-specific analysis based on potential risk to human or animal health. It sets out the factors that must be considered in determining the necessity to disinfect municipal wastewater or to change the length of the disinfection season.

The Town of Knight had previously been exempted from disinfection based on the LAL or LFF community classification of the receiving water. Section NR 210.06(3)(g), Wis. Adm. Code, states that disinfection decisions may be made based on the hydrologic classifications listed in s. NR 104.02(1), Wis. Adm. Code (**not** on the water quality classifications - i.e., limited forage fish, limited aquatic life - that are defined in s. NR 104.02(3), Wis. Adm. Code). Effluent channels are considered to be part of the wastewater treatment system (i.e., essentially an extension of the outfall pipe), therefore *E. coli* WQC and the recreational use (and disinfection requirements) would apply at the end of the effluent channel. In order to be considered an effluent channel, the permittee must be able to provide information that shows that the discharge conveyance was constructed primarily for the purpose of transporting wastewater from the facility. Modifications made to previously existing natural watercourses cannot be considered effluent channels. Outfall 003 discharges into a 60-foot PVC lined rip-rapped effluent channel to the south bank of Alder Creek. Therefore, the implementation of *E. coli* WQC and protection of the recreational use will be evaluated at Alder Creek.

It is recognized the Town of Knight potentially has a detention time of at least 180 days, in which the resulting discharged effluent is thought to not pose a risk to human and animal heath, as described in s. NR 210.06(3)(h), Wis. Adm. Code. The maximum 180-day rolling average flowrate for the facility is 0.030 MGD (October 2019 – April 2025) including days discharge did not occur. The volumetric capacity of the lagoons is approx. 9.638 MG, calculated based on dimensions provided by the facility. Therefore, the estimated shortest detention time for the facility is approximately 9.638 MG / 0.030 MGD = 317 days and is significantly greater than the 180-day minimum. This detention time is essentially providing disinfection where additional disinfection treatment is not expected to be needed. **Therefore, bacteria limits or monitoring are not recommended during the reissued permit term.**

PART 6 – 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 Town of Knight 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. **Therefore, a technology-based limit is not recommended during the reissued permit term.** In addition, the need for a WQBEL for phosphorus must be considered.

Annual Average Mass Total Phosphorus Loading

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
Oct. 2024	2.8	0.62	14
Nov. 2024	2.1	2.6	46
May 2025	1.4	2.7	32
June 2025	1.2	1.4	14

Average =	27

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual flow (MGD) for that month

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 Alder Creek.

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 Alder Creek.
Qs = 100% of the 7-Q_2 low flow = multiple based on the discharge month.
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
Qe = effluent flow rate = multiple based on the discharge month.
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 review of all available in stream total phosphorus data from stored in the Surface Water Integrated Monitoring System database shows there is no samples available for Alder Creek upstream of Outfall 003 nor have there been any updated samples for nearby surface waterbodies since the previous limit evaluation. Therefore, the background phosphorus concentration of 0.028 mg/L determined in the previous limit evaluation (April 2019) will be used in this evaluation. The background concentration is based on phosphorus samples (n = 7, May 2013 – October 2018) taken at the Potato River 200 m upstream of the Highway 77 bridge.

The current permit has streamflow-based effluent flow limits to prevent the need for a phosphorus WQBEL applicable to noncontinuous discharges as described in s. NR 217.13(2)(c)3, Wis. Adm. Code. The flow limits were based on a Qs:Qe ratio of 53:1, the 4-day P_{99} of 2.60 mg/L of effluent phosphorus data, and the phosphorus WQC of 0.075 mg/L. Because the Town of Knight does not have an accurate and reliable method of measuring the daily streamflow of Alder Creek, this limit methodology will not be continued during the reissued permit term.

Because the discharge is noncontinuous, scheduled to discharge April – June and September – November, and monthly 7-Q_2 low flows are available for the receiving water, the use of monthly average phosphorus WQBELs are applicable for the Town of Knight. The monthly average phosphorus WQBELs in the table below are calculated for every month the discharge occurs using the respective maximum monthly average design flow and the monthly 7-Q_2 low flow for Alder Creek, along with previously determined parameters.

Monthly Phosphorus WQBELs

Month	Maximum Monthly Average Design Flow (MGD)	Monthly 7-Q_2 Low Flow (cfs)	P WQBEL (mg/L)
April	0.250	22.86	2.8
May	0.192	8.56	1.4
June	0.053	3.41	2.0
September	0.048	1.92	1.3
October	0.072	2.93	1.3
November	0.109	4.65	1.4

The facility may opt to sample Alder Creek upstream of Outfall 003 since there are currently no background phosphorus samples available and the WQBELs are based on a background concentration of a different surface waterbody. The monthly average WQBELs may be amended if background phosphorus stream data, collected using the procedures as described in s. NR 217.13(2)(d) and 102.07(1)(b) to (c), Wis. Adm. Codes, are submitted to the Department that shows the upstream concentration of total phosphorus are less than the applicable criterion.

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from October 2019 – June 2025.

Total Phosphorus Effluent Data

Statistics	Conc. (mg/L)
1-day P_{99}	4.5
4-day P_{99}	2.8
30-day P_{99}	2.0
Mean	1.6
Std	0.86
Sample size	83
Range	0.24 - 4.16

Reasonable Potential Determination

The 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 majority of the calculated monthly average WQBELs**. Therefore, phosphorus WQBELs are recommended during May and September – November.**

Mass Limits
Mass limits are also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code, because Alder Creek is an ERW. These mass limits are determined as follows:

- **May: 1.4 mg/L × 0.192 MGD × 8.34 = 2.3 lbs/day as a monthly average**
- **September: 1.3 mg/L × 0.048 MGD × 8.34 = 0.52 lbs/day as a monthly average**
- **October: 1.3 mg/L × 0.072 MGD × 8.34 = 0.79 lbs/day as a monthly average**
- **November: 1.4 mg/L × 0.109 MGD × 8.34 = 1.2 lbs/day as a monthly average**

Interim Limit
An interim limit is required per s. NR 217.17, Wis. Adm. Code, when a compliance schedule is needed in the permit to meet the WQBEL. The interim limit should reflect a concentration that the facility is able to meet without investing in additional "temporary" treatment but also should prevent backsliding from current conditions. **Therefore, it is recommended that the interim limit be set equal to 4.2 mg/L as a monthly average for permit reissuance along with requirements for optimization of phosphorus removal.** This value reflects the maximum monthly average phosphorus concentration during October 2019 – June 2025 and is recommended over the statistical values to allow operational flexibility when the facility begins to initiate phosphorus treatment optimization activities, which often consist of trial and error.

PART 7 – 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 October 2019 – June 2025.

The heat loss equation as described by s. NR 106.55(5), Wis. Adm. Code, is used for discharges to storm sewer/storm water conveyance channels where the default cooling rate is estimated as 1 ^{o}F per 400 ft and is used to estimate the given cooling over the 2,610 ft between Outfall 003 and Alder Creek. This is considered conservative for open-channel flow especially during the winter months where the heat loss is expected to be more significant than estimated.

The table below summarizes the maximum temperatures reported during monitoring from May 2022 – November 2022 and the cooling adjusted temperature limits. The complete thermal limit calculations are included as attachment #3.

Attachment #1

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)
APR			NA	120
MAY	61	63	99	120
JUN	67	68	86	103
SEP			71	99
OCT	53	54	67	111
NOV	49	53	72	120

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

Reasonable Potential

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

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute 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

Based on the available effluent data in comparison with the calculated limits, there is no reasonable potential with exceeding any temperature limits. In addition, this facility provides hydraulic detention times of approx. 317 days as a worst case scenario so elevated effluent temperatures are unlikely and discharge temperatures are expected to be similar to ambient conditions. The facility uses a fill and draw method of operation with effluent discharges occurring only during the cool weather periods in spring and fall when ambient temperatures are less than 67 deg. F. **Therefore, temperature limits or monitoring are not recommended during the reissued permit term.**

PART 8 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency

and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document* (2022).

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.

- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 48%, shown in the WET Checklist summary below, was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q_e = 0.11 MGD = 0.176 cfs.
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = ¼ of the minimum monthly 7-Q_{10} low flow applicable to discharge (Sept.) = 0.76 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 003 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.

- Shown below is a tabulation of all available WET data for Outfall 003. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	
10/20/2021	>100	>100	Pass	Yes	
05/01/2024	>100	>100	Pass	Yes	

- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.

  Acute Reasonable Potential = [(TUa effluent) (B)(AMZ)]

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

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

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

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not applicable. **0 Points**	IWC = 48%. **10 Points**
Historical Data	Two tests used to calculate RP. No tests failed. **0 Points**	No historic chronic tests available. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as acute. **0 Points**
Receiving Water Classification	ERW. **12 Points**	Same as acute. **12 Points**
Chemical-Specific Data	No reasonable potential for limits based on ATC; Ammonia nitrogen limit carried over from the current permit. Chloride detected. No additional compounds of concern. **2 Points**	No reasonable potential for limits based on CTC; Ammonia nitrogen limit carried over from the current permit. Chloride detected. No additional compounds of concern. **2 Points**
Additives	None. **0 Points**	None. **0 Points**
Discharge	No industrial contributors.	Same as acute.

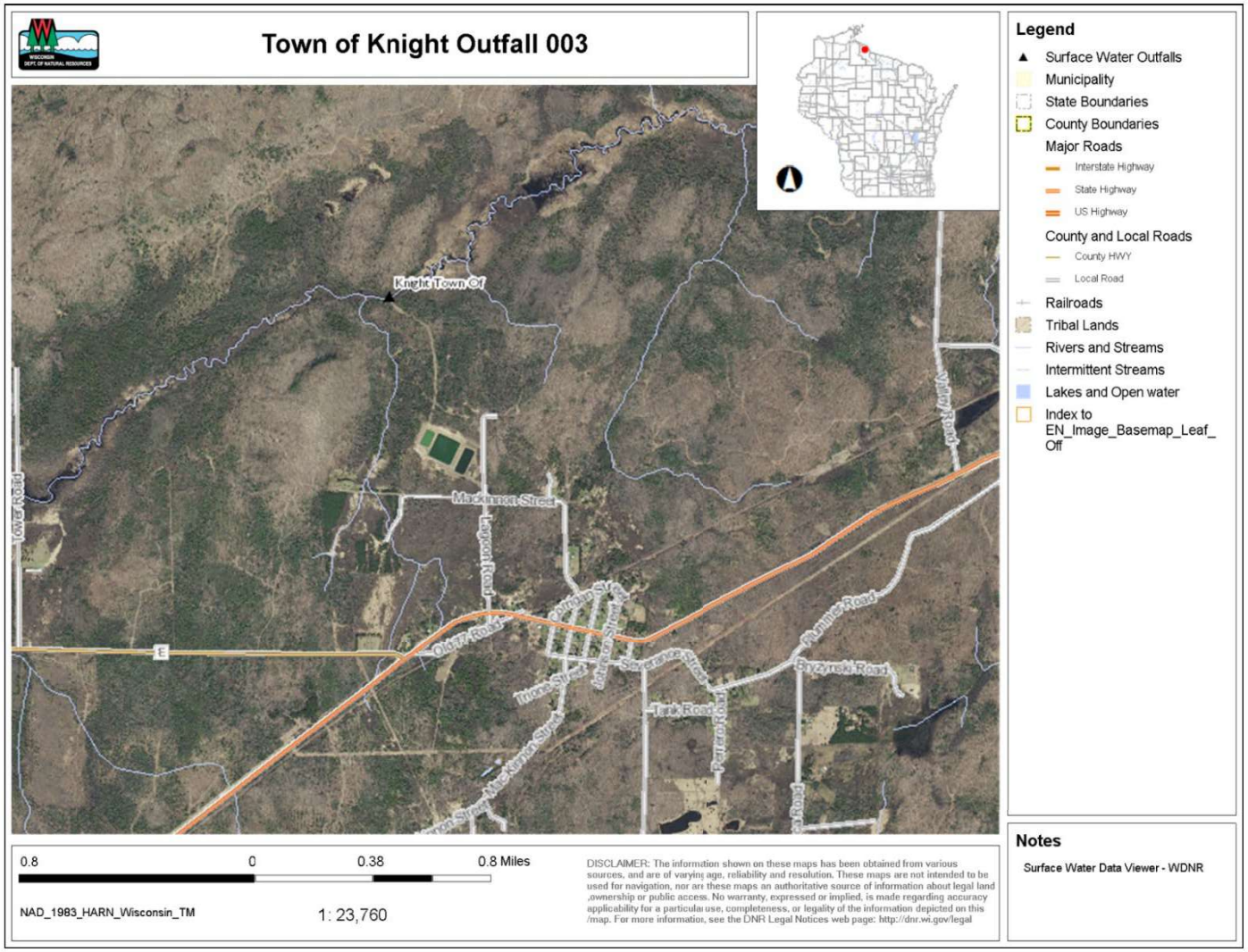
Attachment #1

	Acute	Chronic
Category	**0 Points**	**0 Points**
Wastewater Treatment	Secondary or better. **0 Points**	Same as acute. **0 Points**
Downstream Impacts	No impacts known. **0 Points**	Same as acute. **0 Points**
Total Checklist Points:	**14 Points**	**29 Points**
Recommended Monitoring Frequency (from Checklist):	No acute tests recommended.	Three chronic tests recommended.
Limit Required?	No.	No.
TRE Recommended? (from Checklist)	No.	No.

- The WET Checklist completed in SWAMP (and summarized above) recommends 3x chronic tests during the reissued permit term. Those recommendations are driven primarily by the IWC and the ERW classification of the receiving water. The number of WET tests recommended during the reissued permit term have been adjusted accordingly based on the following reason(s):
  - WET Checklist recommendations assume a year-round discharge is occurring. Since this discharge is seasonal, fewer WET tests are necessary to assess the toxicity potential. The discharge typically occurs during the spring and fall timeframe during April – June and September – November of each year. The permit should be written to ensure that the monitoring recommended below is representative of both spring and fall discharge conditions.

- After consideration of the guidance provided in the Department's *WET Program Guidance Document* (2022) and other information described above, **2x chronic WET tests are recommended in the reissued permit.** Sampling WET concurrently with any chemical-specific toxic substances is recommended.

Attachment #2



Attachment #3

Temperature Limits for Receiving Waters with Unidirectional Flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	Town of Knight		**7-Q_{10}:**	0.76	cfs		
Outfall(s):	003		**Dilution:**	25%		**Start:**	05/10/22	10/23/19
Date Prepared:	11/4/2025		**f:**	0		**End:**	11/18/22	06/24/25
Design Flow (Qe):	0.114	MGD	**Stream type:**	Cold water community			
Storm Sewer Dist.	2610	ft	**Qs:Qe ratio:**	1.1	: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 (Qea)		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)
APR	47	57	70	9.05	0.112	0.113	0			NA	120	NA	120
MAY	56	63	72	3.39	0.131	0.131	0	61	63	92	120	99	120
JUN	62	67	72	1.35	0.089	0.089	0	67	68	79	97	86	103
SEP	57	60	72	0.76	0.090	0.090	0			64	92	71	99
OCT	49	53	70	1.16	0.103	0.113	0	53	54	60	105	67	111
NOV	41	48	69	1.84	0.118	0.134	0	49	53	66	120	72	120