

## Permit Fact Sheet

### General Information

Permit Number:	WI-0060003-11-0	
Permittee Name:	VILLAGE OF BIRCHWOOD	
Address:	PO Box 6 101 N. Main	
City/State/Zip:	BIRCHWOOD WI 54817	
Discharge Location:	414 Edenharter Road, Birchwood (SE ¼ SE ¼ of Section 26; T37N-R10W) Washburn County	
Receiving Water:	The Groundwater within the Red Cedar Lake Watershed in the Lower Chippewa River Drainage Basin in Washburn County	
Discharge Type:	Existing continuous discharger	
Design Flow(s)	Annual Average	0.085 MGD
Significant Industrial Loading?	No	
Operator at Proper Grade?	Yes, - Birchwood Wastewater Treatment Facility is a basic plant in subclasses A2, A4, N, and SS. Subclass N is a new requirement upon this reissuance and the OIC has 1 year to gain the certification per s. NR 114.53(4), Wis. Adm. Code.	
Approved Pretreatment Program?	N/A	

### Facility Description

The Village of Birchwood wastewater treatment facility serves a population of approximately 450 with no significant industrial contributors. The annual average design flow is 85,000 gallons per day with actual flows averaging 29,000 gallons per day over the past five years (June 2019 – June 2023). Treatment consists of a head works building (fine screen, influent flow meter and sampler) followed by an aerated lagoon. In the lagoon naturally occurring bacteria and enzymes already in the wastewater metabolize organic matter in the waste stream. The lagoon has floating vertical baffle curtains (used to increase the retention time and direct the wastewater flow), floating aerator units (add oxygen to the wastewater), and an insulated cover (helps retain heat in the system during cold periods). After aeration wastewater flows to a moving bed biofilm reactor unit (MBBR). Wastewater is treated in three tanks, in series, containing thousands of biofilm carriers. The biofilm carriers are small polyethylene disks that are kept in motion with aerators or mixing fans. Microorganisms including bacteria and enzymes found in the wastewater attach and grow on the surface of the discs, where they metabolize additional organic material in the water. Wastewater from the final tank can be sent back to the first tank to help repopulate microorganism numbers if needed. The solids and organic matter that slough off the disks are further treated and allowed to settle in the aerated lagoon. A second lagoon, used for settling, also contains a baffle curtain and insulated surface cover. Effluent is discharged to three seepage cells. Biofilm living on the sandy soil in the bottom of the seepage cells continue to metabolize organic matter and nutrients as the effluent percolates through the soil eventually reaching groundwater. There are seven monitoring wells located around the seepage cells to assess any groundwater impacts of the discharge.

### Substantial Compliance Determination

**Enforcement During Last Permit:** There have been no formal enforcement actions taken during the current permit term. There have been no sanitary sewer overflows.

- The facility has exceeded nitrate in Point of Standard GW monitoring wells on multiple occasions but appears to have taken the required steps to correct the situation. *(An effluent total nitrogen limit has been added to the permit in response to the exceedances.)*
- The facility needs to submit monitoring forms in a more timely manner. *(Recent improvement noted.)*
- The facility also needs to complete required sludge sampling. *(The permittee did submit the results for sludge sampling as requested.)*

After a desk top review of all discharge monitoring reports, groundwater monitoring forms, CMARs, land application reports, and a site visit on May 16, 2023, by Arthur Ryzak, WDNR, the Village of Birchwood has been found to be in substantial compliance with their current permit.

**Compliance determination entered by Arthur Ryzak, WDNR on June 19m 2023.**

<b>Sample Point Designation</b>		
<b>Sample Point Number</b>	<b>Discharge Flow, Units, and Averaging Period</b>	<b>Sample Point Location, Waste Type/sample Contents and Treatment Description (as applicable)</b>
701	<b>INFLUENT</b> An average of 0.029 MGD (2019-2023 data)	Representative samples of the influent shall be taken after the mechanical fine screen in the headworks building.
001	<b>EFFLUENT</b> An average of 0.028 MGD (2019-2023 data)	Representative samples of the effluent shall be taken from Outfall #001 at the manhole (control box) between Lagoon 2 and the seepage cells.
004	<b>SLUDGE</b> 10 dry U.S. tons (Information provided in the application)	Multiple representative grab samples shall be composited from Aerated Lagoons #1 and #2.

<b>Sample Point Designation For Groundwater Monitoring Systems</b>	
<b>Sample Pt Number /Well Name</b>	<b>Comments</b>
MW801	Side gradient non-point of standard well located west of seepage cell #1
MW802	Side gradient non-point of standard well located east of seepage cell #2
MW803	Upgradient background well used to calculate PALs. Located NE of the seepage cells.
MW804	Down gradient non-point of standard well located SW of seepage cell #2
MW 805	Down gradient point of standard well. The identities of wells 805 and 806 are in question. See the schedule "Groundwater Monitoring Well Site Map Submittal" section for more information.
MW 806	Down gradient point of standard well. The identities of wells 805 and 806 are in question. See the schedule "Groundwater Monitoring Well Site Map Submittal" section for more information.
MW 807	Down gradient non-point of standard well located SW of seepage cell #1.

# 1 Influent – Monitoring Requirements

## 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	
BOD5, Total		mg/L	Weekly	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	Weekly	24-Hr Flow Prop Comp	
Nitrogen, Total Kjeldahl		mg/L	Monthly	24-Hr Flow Prop Comp	
Nitrogen, Organic Total		mg/L	Monthly	Calculated	Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia Nitrogen
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	24-Hr Flow Prop Comp	

### Changes from Previous Permit:

Limitations and monitoring requirements were re-evaluated for the proposed permit term and no changes were required in this permit section. Sampling requirements and frequencies are the same as the previous permit.

### Explanation of Limits and Monitoring Requirements

Influent monitoring is needed to assess loading to the facility and treatment performance. The required parameters and sampling frequency are appropriate for a land treatment system (ch NR 206, Wis. Adm. Code).

# 2 Land Treatment – Monitoring and Limitations

## Sample Point Number: 001- EFFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Total Daily	
BOD5, Total	Monthly Avg	50 mg/L	Weekly	Grab	
Suspended Solids, Total		mg/L	Weekly	Grab	
pH Field		su	Weekly	Grab	
Nitrogen, Total		mg/L	Weekly	Grab	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Kjeldahl					
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total		mg/L	Weekly	Grab	
Nitrogen, Organic Total		mg/L	Weekly	Calculated	Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia Nitrogen
Nitrogen, Nitrite + Nitrate Total		mg/L	Weekly	Grab	
Nitrogen, Total	Monthly Avg	15 mg/L	Weekly	Calculated	Total Nitrogen = Total Kjeldahl Nitrogen + (Nitrite + Nitrate) Nitrogen
Solids, Total Dissolved		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	

### Changes from Previous Permit:

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

- Flow sampling frequency changed to reflect the reporting standard.
- Total Nitrogen monthly average limit of 15 mg/L has been added this permit term.

### Explanation of Limits and Monitoring Requirements

All requirements for land treatment of municipal wastewater are determined in accordance with NR 206 Wis. Adm. Code. All categorical limits are based on NR 206.08(1) Wis. Adm. Code. More information on the limitations can be found in the “Birchwood WWTF – Land Disposal System Evaluation Report, WPDES Permit # WI-0060003” memo dated January 17, 2024.

**BOD<sub>5</sub>** - Limitations are consistent with facilities approved or modified post January 1, 1990 (NR 206.05 Wis. Adm. Code). Monitoring for BOD<sub>5</sub> is included to track changes in wastewater characteristics and to assess the organic load discharged to the land treatment system.

**Total Nitrogen** - The department waived the 10 mg/L monthly average for total nitrogen based on ch NR 206.06 Wis. Adm. Code beginning in the 1997 permit modification. Down gradient monitoring wells have had regular exceedances of both the PAL and ES standards for nitrite + nitrate. Two of the wells are point of standard wells and a s. NR 140.26 Wis. Adm. Code response action was required. A 15 mg/L total nitrogen effluent limit has been imposed as the response action.

**Sampling Frequency** - The “[Monitoring Frequencies for Individual Wastewater Permits](#)” guidance document (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect

during this permit term. The department has determined at this time that the facility meets the guidance and no changes in the monitoring frequency is required this permit term.

### 3 Groundwater – Monitoring and Limitations

#### 3.1 Groundwater Monitoring System for Monitoring Well System

**Location of Monitoring system:** Monitoring wells located around the perimeter of the system.

**Wells to be Monitored:** MW801, MW802, MW803, MW804, MW805, MW806, MW807

**Well Used To Calculate PALs:** MW803

**Point of Standards Application Well(s):** MW805 and MW806

Parameter	Units	Preventative Action Limit	Enforcement Standard	Frequency
Depth To Groundwater	feet	*****	N/A	Quarterly
Groundwater Elevation	feet MSL	*****	N/A	Quarterly
Nitrogen, Nitrite + Nitrate (as N) Dissolved	mg/L	2.0	10	Quarterly
Chloride Dissolved	mg/L	125	250	Quarterly
pH Field	su	7.3	N/A	Quarterly
Nitrogen, Total Kjeldahl Dissolved	mg/L	*****	N/A	Quarterly
Nitrogen, Ammonia Dissolved	mg/L	0.97	9.7	Quarterly
Nitrogen, Organic Dissolved	mg/L	2.3	N/A	Quarterly
Solids, Total Dissolved	mg/L	425	N/A	Quarterly

#### Changes from Previous Permit:

Limitations and monitoring requirements were re-evaluated for the proposed 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 **Nitrite+Nitrate** PAL has changed.
- Monitoring for **Alkalinity** and **Hardness** is not required this permit term.

#### Explanation of Limits and Monitoring Requirements

Groundwater limits and requirements are determined in accordance with ch. NR 140, Wis. Adm. Code. Indicator parameter Preventive Action Limit (PAL) values are established per s. NR 140.20 Wis. Adm. Code. More information can be found in the “Birchwood WWTF – Land Disposal System Evaluation Report, WPDES Permit # WI-0060003” memo dated January 17, 2024.

### Changes to Permit Issuance - 11

Parameter	Permit Issuance - 10		Permit Issuance - 11	
	Preventive Action Limit	Enforcement Standard	Preventive Action Limit	Enforcement Standard
Nitrogen, Nitrite + Nitrate (as N) Dissolved	3.9 mg/L	10.0 mg/L	2.0 mg/L	10.0 mg/L

**Nitrite+Nitrate** – The PAL was calculated using results from upgradient well 803 recorded during permit issuance #10.

**Alkalinity and Hardness** – The parameters don't need to be sampled in the monitoring wells this permit term. The information is no longer needed.

## 4 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)
004	B	Liquid	Fecal Coliform	Injection	Land Application	An estimated 10 dry tons/year
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, during the most recent set of samples (2020) the results were below the limit of detection.						
If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in land applying 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.						

### Sample Point Number: 004- Aerated 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	

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
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, Ammonia (NH3-N) Total		Percent	Per Application	Composite	
Phosphorus, Total		Percent	Per Application	Composite	
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	
Potassium, Total Recoverable		Percent	Per Application	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Monitoring is required once in the 2026 calendar year.

### **Changes from Previous Permit:**

Limitations and monitoring requirements were re-evaluated for the proposed 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.

**PFOA+PFOS** monitoring is required during the 2026 calendar year.

### **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). 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). Radium requirements are addressed in s. NR 204.07(3)(n).

**List 2 Nutrient monitoring** – Monitoring for list 2 (nutrients) is highly recommended at the same time as the monitoring of List 1 (metals) in the second full year of the permit (2026). Results will assist in the determination of the acres needed for land application of sludge should it be necessary. The number of acres needed is also required for the Sludge Management Schedule (see schedules for more information).

**PCB monitoring** – PCB monitoring is not required this permit term but will be included in the next reissuance. The facility stated in their application they don’t have plans to remove sludge during the permit term, there are no potential industrial sources, and a review of historic PCB data was well below high quality and ceiling limitations. s. NR 204.07 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” which is being employed at this time and provides the basis for PFAS monitoring requirements.

## 5 Schedules

### 5.1 Land Treatment Management Plan

A management plan is required for the land treatment system.

Required Action	Due Date
<b>Land Treatment Management Plan Submittal:</b> Submit an update to the management plan to optimize the land treatment system performance and demonstrate compliance with ch. NR 206, Wis. Adm. Code. The land treatment system shall be operated in accordance with the approved management plan.	09/30/2024

### 5.2 Groundwater Monitoring Well Site Map Submittal

Required Action	Due Date
<b>Conduct Well Survey:</b> The permittee shall survey the groundwater monitoring well network. The survey shall include the elevation of the top of casing (TOC) for the wells and a calculated ground surface elevation.	12/31/2024
<b>Submit Survey Results and Map:</b> Per ch. NR141.065 Wis. Admin Code the permittee shall submit a map of the land treatment system. All monitoring well locations and well names shall be reported to the department on a plan map drawn to a specific scale. The map shall indicate structural boundaries, property boundaries, any nearby surface waters and a north arrow. The plan shall show the wells in relation to each other, to property and structural boundaries and to a common reference point on a horizontal grid system. The origin of the grid system shall be located according to latitude and longitude or according to the state plane coordinate system. The exact vertical location of the top of the well casing shall be referenced to the nearest benchmark for the national geodetic survey datum. This plan map shall show the exact location of the installed wells on a horizontal grid system which is accurate to within 1 foot.	03/31/2025



### 5.3 Sludge Management Plan

Required Action	Due Date
<p><b>Submit a Sludge Management Plan:</b> 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 drawdown; 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</p> <p>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.</p> <p>The plan is due at least 60 days prior to desludging.</p>	

### Explanation of Schedules

**Land Treatment Management Plan** - Per ss. NR 206.07(2)(h) Wis. Adm. Code, a management plan for optimizing system performance and demonstrating compliance with the requirements of ch NR 206, Wis. Adm. Code. Once approved, operations shall be conducted in accordance with the department approved management plan.

**Groundwater Monitoring Well Site Map Submittal** - Accurate well information is needed to ensure the requirements of NR 140 Wis. Adm. Code are met. There were a number of inconsistencies that are expected to be investigated and resolved by the end of this schedule. Two maps submitted by the facility, one in 2011 and another in 2015, have conflicting locations for monitoring wells 805 and 806. The correct locations of the wells are needed as well as confirmation that the correct monitoring results were submitted for the correct location. The elevations for the newest well, 807, appears to be anomalies. The top of casing (TOC) elevations for all wells need to be taken and corrections noted.

**Sludge Management Plan** - 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 February 2024

“Birchwood WWTF – Land Disposal System Evaluation Report, WPDES Permit # WI-0060003” memo dated January 17, 2024

### Expiration Date:

June 30, 2029

### Justification Of Any Waivers From Permit Application Requirements

N/A

**Prepared By: Sheri A. Snowbank      Wastewater Specialist**

**Date:** February 28, 2024

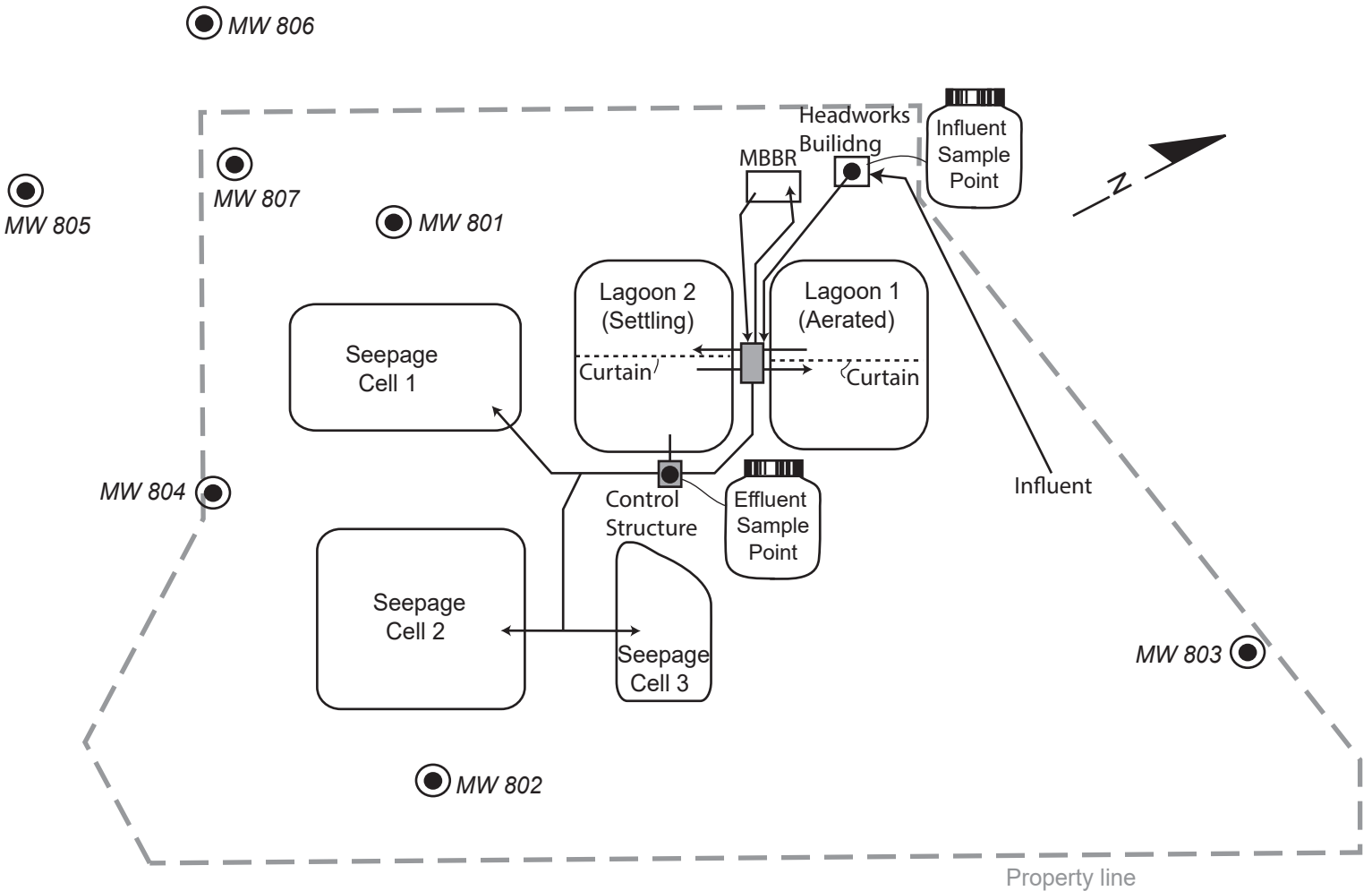
**Date updated based on Factcheck comments:** Corrections were made to the facility diagram (April 3, 2024)

**Date updated based on public notice comments:**

*Notice of reissuance was published in the Rice Lake Chronotype PO Box 30, Rice Lake, WI 54868-0030.*

# Village of Birchwood Wastewater Treatment Plant

The Birchwood wastewater treatment facility consists of aerated lagoon #1 followed by a moving bed biofilm reactor unit (MBBR) and then aerated lagoon #2. The two lagoons are divided by floating vertical baffle curtains and have insulated covers. Effluent is discharged to the groundwater via 3 seepage cells. There are 7 monitoring wells around the perimeter of the system. The diagram below shows the treatment units and sampling locations.



- represents monitoring well locations
- represents sample locations


NOT TO SCALE

Flow: 0.0737 MGD  
Construction Year: 2015 (est)

DATE: January 17, 2024

FILE REF: 6083

TO: File

FROM: Woody Myers - WCR SUBJECT: Birchwood WWTF - Land Disposal System Evaluation Report,  
WPDES Permit # WI-0060003**Site Information**

The Birchwood WWTF, a municipal facility is located at 414 Edenharter Road, Birchwood, Washburn County. Wastewater is currently treated and discharged to groundwater via absorption ponds (seepage cells) located in the SE ¼ of the SE ¼ of Section 26, T37N, R10W, Town of Birchwood.

**Land Disposal Effluent & Groundwater Evaluation Summary**

**Table 1 Land Treatment Effluent Parameters and Limits  
Outfall 001 Absorption Ponds**

Parameter	Current Permit WI-0060003-10		Proposed Permit WI-0060003-11	
	Limits and Units	Limit Type	Limits and Units	Limit Type
Flow Rate	- MGD		- MGD	
BOD <sub>5</sub>	50 mg/l	Monthly Avg	50 mg/l	Monthly Avg
Total Suspended Solids	- mg/l		- mg/l	
pH, Field	- su		- su	
Nitrogen, Total Kjeldahl	- mg/l		- mg/l	
Nitrogen, Ammonia	- mg/l		- mg/l	
Nitrogen, Organic	- mg/l		- mg/l	
Nitrogen, Nitrite + Nitrate	- mg/l		- mg/l	
Nitrogen, Total	- mg/l		<b>*15 mg/l</b>	<b>Monthly Avg</b>
Total Dissolved Solids	- mg/l		- mg/l	
Chloride	- mg/l		- mg/l	

\* Proposed permit changes

**Table 2 Monitoring Wells**

Well	Current Permit WI-0060003-10		Proposed Permit WI-0060003-11	
	Well Location	Well Designation	Well Location	Well Designation
801 (MW801)	Side-gradient	Non-Point of Standard	Side-gradient	Non-Point of Standard
802 (MW802)	Side-gradient	Non-Point of Standard	Side-gradient	Non-Point of Standard
803 (MW803)	Up-gradient	Background	Up-gradient	Background
804 (MW804)	Down-gradient	Non-Point of Standard	Down-gradient	Non-Point of Standard
805 (MW805)	Down-gradient	Point of Standard	Down-gradient	Point of Standard
806 (MW806)	Down-gradient	Point of Standard	Down-gradient	<b>*Not Determined</b>
807 (MW807)	Down-gradient	Non-Point of Standard	Down-gradient	<b>*Not Determined</b>

\* Proposed permit changes

**Table 3 Groundwater Quality Standards**

Parameter	Current Permit WI-0060003-10		Proposed WI-0060003-11	
	PAL	ES	PAL	ES
Depth to Groundwater	N/A	N/A	N/A	N/A
Groundwater Elevation	N/A	N/A	N/A	N/A
Nitrogen, Nitrite + Nitrate	3.9 mg/l (ACL)	10.0 mg/l	<b>*2.0 mg/l</b>	10.0 mg/l
Chloride	125 mg/l	250 mg/l	125 mg/l	250 mg/l
pH, Field	5.3-7.3 su	N/A	5.3-7.3 su	N/A
Nitrogen Total Kjeldahl	N/A	N/A	N/A	N/A
Nitrogen, Ammonia	0.97 mg/l	9.7 mg/l	0.97 mg/l	9.7 mg/l
Nitrogen, Organic	2.3 mg/l	N/A	2.3 mg/l	N/A
Total Dissolved Solids	425 mg/l	N/A	425 mg/l	N/A
Alkalinity, as CaCO <sub>3</sub>	N/A	N/A	<b>*Discontinue</b>	
Hardness, as CaCO <sub>3</sub>	N/A	N/A	<b>*Discontinue</b>	

\* Proposed permit changes

### Geology

This facility is in close proximity to the boundary of the Eau Claire formation and the Mount Simon formation. The Eau Claire is comprised of a subangular poorly sorted fine-grained sandstone. Glauconite deposits are common with flaggy beds separated by green shale and the Mount Simon is comprised of sandstone, conglomerate and shale (*Bedrock Geology of Wisconsin, Regional Map Series Northwest Sheet*, Wisconsin Geological and Natural History Survey (WGNHS), 1987). Bedrock is anticipated to be between 100 and 200 feet below ground surface (bgs) (*Depth to Bedrock in Wisconsin*, WGNHS, 1973). The regolith consists of material ranging from fine gravel to silt. Surface soil primarily consists of the Anigon silt (USDA NRCS Web Soil Survey).

### Hydrogeology

Calculated groundwater elevations range between 1201 and 1209 feet above mean sea level (msl). Depth to groundwater was reported to be between 53 and 81 feet bgs. Groundwater flow direction was calculated to be predominately to the southwest. Regional groundwater is to the Northwest in this area of Washburn County (*Mean Elevation of Water Table, Map*, United States Department of Interior, 1968). The site is approximately 2,800 feet southwest of Birch Lake and approximately 3,000 feet east of Balsam Lake. There are 6 wells (municipal, other than municipal, private and high-capacity) within a 1,500-foot range of this facility's groundwater discharge.

### Land Disposal Effluent Quality and Loading Rates

The following table is the average flow (hydraulic loading), nitrite + nitrate as nitrogen, chloride and BOD<sub>5</sub> loading summations for the Land Disposal System.

**Table 5 Land Treatment Disposal Loading Averages**

Year	Flow (MGD)	Nitrogen (mg/l)	Chloride (mg/l)	BOD5 (mg/l)
2023#	0.027	2.37	109	18.4
2022	0.025	10.69	61	6.7
2021	0.027	16.57	56	6.5
2020	0.029	14.90	72	19.8
2019	0.033	1.80	92	33.5
2018	0.028	3.14	103	31.8

# Indicates partial year

**Groundwater Monitoring System and Sampling Frequency**

All parameters are analyzed for the dissolved phase in groundwater. Established groundwater quality standards are found in Table 1 Public Health Groundwater Quality Standards s. NR 140.10 Wis. Adm. Code, and Table 2 Public Welfare Groundwater Standards s. NR 140.12 Wis. Adm. Code. The thresholds of these standards are the Enforcement Standard (ES) and the Preventative Action Limit (PAL).

**Table 6 Groundwater Monitoring Well Data**

Sample Point	Well Name	Elevation (feet above msl)				Length (feet)		Well Type
		Casing Top	Ground Surface	Screen Top	Screen Bottom	Screen Length	Well Depth	
801	MW801					3.0	80.0	WT
802	MW802					3.0	70.0	WT
803	MW803	1147.05	1143.7	1099.2	1084.2	15.0	60.0	WT
804	MW804	1160.64	1157.8	1095.8	1080.8	15.0	79.7	WT
805	MW805	1170.80	1170.80	1090.8	1080.8	10.0	90.0	WT
806	MW806	1170.23	1167.7	1090.7	1080.7	10.0	87.0	WT
807	MW807	1168.63	1166.3	1095.3	1080.3	15.0	87.0	WT

All measurements in feet  
 WT-Water table Observation P-Piezometer O-Other

Groundwater sampling results from this facility have been analyzed for each well to evaluate trends of the regulated compounds in groundwater and to calculate PALs for s. NR 140.22 Wis. Adm. Code Indicator Parameters and to evaluate potential exemptions under s. NR 140.28 Wis. Adm. Code. The groundwater was evaluated by looking at the groundwater data from March 26, 2018 – September 25, 2023.

**Background Groundwater Quality**

Groundwater sampling results from this facility have been analyzed for each well to evaluate trends of the regulated compounds in groundwater and to calculate PALs and Alternative Concentration Limits (ACL) where appropriate. The groundwater was evaluated by looking at approximately five years of monitoring results. PALs and ACLs are calculated from this time range.

There were no PAL exceedances observed in the background groundwater quality and the trends for the results were stable.

### Down-Gradient Groundwater Quality

The only compound that exceeded its PAL and ES was nitrite + nitrate. These exceedances were observed in groundwater monitoring wells 804, 805, 806 and 807. The exceedances were sporadic in magnitude and without a clear trend. See Figure 1.

### Land Disposal System Impact to Groundwater Quality

Concentrations and trends in the groundwater monitoring data were compared to the loading data for the land disposal system. There is not a clear correlation between the effluent loading levels of nitrite + nitrate and the groundwater monitoring results. A delay is expected between the land disposal loading dates (as seen in the effluent concentrations) and the groundwater sampling results.

### Proposed Groundwater Monitoring Requirements

**Table 7 Groundwater Quality Sampling Frequency and Limits  
Outfall 001 Permit WI-0060003-11**

Sample Point	Well Name	Sample Frequency	Well Designation
801	MW801	Quarterly	Non-Point of Standard
802	MW802	Quarterly	Non-Point of Standard
803	MW803	Quarterly	Background
804	MW804	Quarterly	Non-Point of Standard
805	MW805	Quarterly	Point of Standard
806	MW806	Quarterly	
807	MW807	Quarterly	
Parameter	PAL	ES	Source
Depth to Groundwater	N/A	N/A	Measured
Groundwater Elevation	N/A	N/A	Measured
Nitrogen, Nitrite + Nitrate	<b>*2.0 mg/l</b>	10.0 mg/l	NR 140 Table 1
Chloride	125 mg/l	250 mg/l	NR 140 Table 2
pH, Field	5.3-7.3 su	N/A	Calculated
Nitrogen, Kjeldahl	N/A	N/A	Measured
Nitrogen, Ammonia	0.97 mg/l	9.7 mg/l	NR 140 Table 1
Nitrogen, Organic	2.3 mg/l	N/A	Calculated
Total Dissolved Solids	425 mg/l	N/A	Calculated
Alkalinity, as CaCO <sub>3</sub>			<b>*Discontinue</b>
Hardness, as CaCO <sub>3</sub>			<b>*Discontinue</b>

\* Proposed permit changes

### Indicator Parameter PALs

Indicator Parameter PALs are developed following the procedures described in s. NR 140.20(2), Wis. Adm. Code. Indicator parameters do not have Enforcement Standards. The PAL for an indicator parameter is a benchmark for evaluating site specific trends. When significant increases in the trends are observed, the facility and the department's response action under s. NR 140.24 Wis. Adm. Code should be to investigate the source of the compound. The indicator parameter PALs for use in the upcoming permit WI-0060003-11 were calculated using results from 803 during the current permit term March 26, 2018 – September 28, 2023 using the following equation:

$$\Sigma [\text{Background groundwater quality} + \text{Minimum Increase (NR 140.20 Table 3)}]$$

There were no changes to the indicator parameter PALs based on the background groundwater sampling results.

### **Alternative Concentration Limits**

Alternative concentration Limits (ACLs) can be developed and provided for a groundwater monitoring system utilizing the procedures described in s. NR 140.28, Wis. Adm. Code. For example, if a high percentage of results from samples collected at the background monitoring well(s) exceed the NR 140 PAL, if there are multiple results exceeding the NR 140 ES, or if there is a pattern of PAL exceedances (i.e., seasonal variation), calculation of an ACL may be appropriate. The ACLs for use in the upcoming permit WI-0060003-11 were calculated using results from 803 during the current permit term March 26, 2018 – September 28, 2023 using the following equation:

$$\Sigma[(2 \times \text{Standard Deviation}) + \text{Background sample results Mean}]$$

The calculated ACLs were all below the ss. NR 140.10 and NR 140.12 Wis. Adm. Code PALs, therefore the PALs remained at the administrative code established PALs. The ACL for nitrite + nitrate was removed lowering the PAL to the s. NR 140.10 Wis. Adm. Code PAL.

### **Conclusions**

Groundwater sampling results in the down-gradient groundwater monitoring wells have had regular exceedances of the established limits (both PAL and ES) for nitrite + nitrate. Two of the wells are point of standards wells so a s. NR 140.26 Wis. Adm. Code response action is required. A 15 mg/l total nitrogen effluent limit has been imposed as the response action.

The groundwater monitoring wells 806 and 807 are potentially miss labeled on the MSA 2015 facility map. This miss-labeling is consistent with a depth to groundwater and groundwater elevation anomaly for these two wells. The correct nomenclature for the wells and a time-frame when the error occurred needs to be determined.

### **Compliance Schedule Recommendations**

The s. NR 206.07 (2)(h) 1. Wis. Adm. Code requires a land disposal management plan for facilities with land disposal systems. The facility should review their plan within 90 days of permit reissuance and any revisions should be submitted to the department for approval.



Figure 1  
Nitrite + Nitrate

