

Permit Fact Sheet

General Information

Permit Number:	WI-0061115-10-0	
Permittee Name:	VILLAGE OF SOLON SPRINGS	
Address:	PO Box 273 11523 S Business 53	
City/State/Zip:	SOLON SPRINGS WI 54873	
Discharge Location:	12071 S. Holly Lucius Road, Solon Springs WI (SW&SE¼ - NE¼ of Section 2; T44N-R12W)	
Receiving Water:	Groundwater of the Upper St. Croix and Eau Claire Rivers Watershed in the St. Croix River Drainage Basin in Douglas County	
Discharge Type:	Existing seasonal	
Design Flow(s)	Annual Average	0.107 MGD
Significant Industrial Loading?	No	
Operator at Proper Grade?	Yes	
Approved Pretreatment Program?	N/A	

Facility Description

The Solon Springs wastewater treatment facility serves a population of approximately 1,200 with no significant industrial contributors. The annual average design flow is 107,000 gallons per day with actual flows averaging 104,000 gallons per day over the past five years (June 2019 – June 2024 data) from the Village of Solon Springs, Upper St Croix Lake Sanitary District and Gordon Sanitary District #1. The system consists of three stabilization ponds operated in series. In each pond naturally occurring bacteria already in the wastewater treat the waste stream by metabolizing organic matter. Normal pond operation is flow from pond 1, (the primary pond in which most of the sedimentation of settleable solids and anaerobic sludge digestion) to pond 2 (secondary treatment) then pond 3 (additional storage and final polishing of effluent prior to seepage cell dispersal). From the ponds the treated water (called effluent) is discharged to two seepage cells. The sandy soil in the bottom of the seepage cells continues to treat the water further, as it percolates through the soil eventually reaching groundwater. There are three monitoring wells located around the seepage cells to assess any groundwater impacts of the discharge. The facility’s fill and draw system is designed for 300 days of storage capacity to help ensure adequate residence time for nitrogen reduction prior to discharge.

Substantial Compliance Determination

Enforcement During Last Permit: There are some items identified that need updating, such as an emergency/spill/overflow response in the CMOM plan, lagoon O&M procedures, and sample collection practices, but permit conditions are being met or are in the process of being corrected as needed as new staff become more familiar with the facility and permit requirements. A schedule to address issues of noncompliance is not necessary in the reissued permit.

After a desk top review of all discharge monitoring reports, CMARs, land app reports, and management plans (O&M plan, CMOM, etc), and a two-part site visit by Eric deVenecia, WDNR, conducted on 7/27/2023 (including Kay Curtin from WRWA) and 8/1/2023 (focus on CMOM, reporting, etc), the Village of Solon Springs has been found to be in substantial compliance with their current permit.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)
701	INFLUENT – SOLON SPRINGS An average of 0.065 MGD (June 2019 - June 2024 data)	Representative samples of the flow from the Village of Solon Springs shall be taken at the designated flow meter within control structure CS101 (influent metering station).
702	INFLUENT – GORDON An average of 0.007 MGD (June 2019 - June 2024 data)	Representative samples of the flow from the Gordon Sanitary District shall be taken at the designated flow meter within control structure CS101 (influent metering station).
703	INFLUENT – COMBINED An average of 0.104 MGD (June 2019 - June 2024 data)	Representative samples of the combined flow of 701, 702 and 704 shall be taken from control structure CS102. Total volume shall be calculated through the summation of flows from 701, 702 and 704.
704	INFLUENT – USCLSD An average of 0.032 MGD (June 2019 - June 2024 data)	Representative samples of the flow from Upper St. Croix Lake Sanitary District (USCLSD) shall be taken at the designated flow meter within control structure CS101 (influent metering station).
001	EFFLUENT – TO SEEPAGE An average of 0.597 MGD during periods of discharge. Discharges occurred May, October and November. (June 2019 - June 2024 data)	Representative samples shall be collected at the effluent control structure CS106 (effluent metering station) after the third stabilization pond.
002	SLUDGE Last removed in August 2011. Not scheduled to be removed this term.	Representative samples shall be taken by compositing several samples across primary pond 1.

Sample Point Designation For Groundwater Monitoring Systems	
Sample Point Number & Well Name	Comments
806 (MW-1R)	Upgradient background well used to calculate PALs
807 (MW-4R)	Down gradient well located southeast of the seepage cells.
808 (MW-5R)	Down gradient Point of Standard Well located south of the seepage cells.

1 Influent – Monitoring Requirements

Sample Point Number: 701- INFLUENT SOLON SPRINGS; 702- INFLUENT GORDON SAN DIST, and 704- INFLUENT USCLSD

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Total Daily	

Changes from Previous Permit:

Influent 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

The Solon Springs WWTP accepts waste from Solon Springs, Gordon Sanitary District and Upper St. Croix Lake Sanitary District (USCLSD). Recording the separate influent flows will assist in determining loading and narrow down potential locations of Infiltration and Inflow (I/I). 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).

Sample Point Number: 703- COMBINED INFLUENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Calculated	
BOD5, Total		mg/L	2/Month	Grab	
Suspended Solids, Total		mg/L	2/Month	Grab	
Nitrogen, Total Kjeldahl		mg/L	2/Month	Grab	
Nitrogen, Organic Total		mg/L	2/Month	Calculated	Organic Nitrogen = Total Kjeldahl Nitrogen (mg/L) - Ammonia Nitrogen (mg/L)
Nitrogen, Ammonia (NH3-N) Total		mg/L	2/Month	Grab	

Changes from Previous Permit:

Influent 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

The combined influent from all three sources are sampled for BOD5, Suspended Solids, and the nitrogen series. The flow rate is calculated from the combined flows from all three contributing communities. Influent monitoring is needed to assess loading to the facility and treatment performance. The parameters and sampling frequency are appropriate for a land treatment system (s. NR 206.09(2), Wis. Adm. Code).

2 Land Treatment – Monitoring and Limitations

Sample Point Number: 001- EFFLUENT TO SEEPAGE POND

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	2/Month	Grab	
Suspended Solids, Total		mg/L	2/Month	Grab	
pH Field		su	2/Month	Grab	
Nitrogen, Total Kjeldahl		mg/L	Monthly	Grab	
Nitrogen, Organic Total		mg/L	Monthly	Calculated	Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia Nitrogen
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	Grab	
Nitrogen, Nitrite + Nitrate Total		mg/L	Monthly	Grab	
Solids, Total Dissolved		mg/L	Monthly	Grab	
Chloride		mg/L	Monthly	Grab	
Nitrogen, Total		mg/L	Monthly	Calculated	Total Nitrogen = Total Kjeldahl Nitrogen + (Nitrite + Nitrate) Nitrogen

Changes from Previous Permit:

Effluent 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

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) Adm. Code. More information on the limitations can be found in the

“Village of Solon Springs – Land Disposal System Evaluation Report, WPDES Permit # WI-0061115” memo dated August 13, 2024.

BOD – Limitations are consistent with facilities approved or modified post January 1, 1990 (NR 206.05 Wis. Adm. Code). Monitoring for BOD5 is included to track changes in wastewater characteristics and to assess the organic load discharged to the treatment system. Monitoring for BOD5 is included to track changes in wastewater characteristics. Monitoring is also included to assess the organic load discharged to the treatment system.

Total Nitrogen – The facility was granted a variance from the total nitrogen effluent standard after the facility upgrade, completed in 2012. The facility was designed to treat nitrogen and there is no reasonable potential under current conditions for the facility to exceed any discharge thresholds. The variance will continue this permit term. Based on available data groundwater levels are well below standards and the quality of the effluent is considered excellent. The waiver will be reevaluated as part of the next permit reissuance.

Note: Any on-going chronic exceedances of the 9.7 mg/L ammonia and/or 10 mg/L nitrate groundwater enforcement standards will likely require initiation of appropriate enforcement action potentially resulting in additional operational and/or treatment system improvements.

Total Dissolved Solids and Chloride - Required by NR 206.09(1). Per NR 206.05 Table 1 a total dissolved solids limit for a facility built after 1/1/1990 concentrations may not exceed a monthly average limit of 500 mg/L and chloride may not exceed a daily limit of 250 mg/L. Groundwater monitoring well levels are consistently below the limits without treatment efforts, therefore, limits are not included this permit term.

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 Groundwater Monitoring Well System

Location of Monitoring system: Perimeter of the seepage cells

Groundwater Monitoring Well(s) to be Sampled: MW 806 (MW-1R), MW 807 (MW-4R), MW 808 (MW-5R)

Groundwater Monitoring Well(s) Used to Evaluate Background Groundwater Quality: MW 806 (MW-1R)

Groundwater Monitoring Well(s) Used for Point of Standards Application: MW 808 (MW-5R)

Parameter	Units	Preventative Action Limit	Enforcement Standard	Frequency
Depth To Groundwater	feet	N/A	N/A	1/ 6 Months
Groundwater Elevation	feet MSL	N/A	N/A	1/ 6 Months
Nitrogen, Nitrite + Nitrate (as N) Dissolved	mg/L	2.9	10	1/ 6 Months
Chloride Dissolved	mg/L	125	250	1/ 6 Months
pH Field	su	7.0	N/A	1/ 6 Months

Nitrogen, Total Kjeldahl Dissolved	mg/L	N/A	N/A	1/ 6 Months
Nitrogen, Ammonia Dissolved	mg/L	0.97	9.7	1/ 6 Months
Nitrogen, Organic Dissolved	mg/L	2.5	N/A	1/ 6 Months
Solids, Total Dissolved	mg/L	260	N/A	1/ 6 Months

Changes from Previous Permit:

Groundwater 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.

- **pH lab** is not required this permit term. pH field provides the needed information.
- The preventative action limits (PALs) for **nitrite + nitrate, organic nitrogen, and total dissolved solids** have been adjusted per NR 140 Wis. Adm. Code.

Explanation of Limits and Monitoring Requirements

Groundwater limits and requirements are determined in accordance with ch NR 140 Wis. Adm. Code. Indicator parameter Preventative Action Limit (PAL) values are established per ch NR 140.20 Wis. Adm. Code. For more information, please refer to the “Village of Solon Springs – Land Disposal System Evaluation Report, WPDES Permit # WI-0061115” memo dated August 13, 2024.

Changes to Permit Issuance - 10

Parameter	Permit Issuance - 09		Permit Issuance - 10	
	Preventive Action Limit	Enforcement Standard	Preventive Action Limit	Enforcement Standard
Nitrogen, Nitrite + Nitrate (as N) Dissolved	2.0 mg/L	10 mg/L	2.9 mg/L	10 mg/L
Nitrogen, Organic Dissolved	2.6 mg/L	N/A	2.5 mg/L	N/A
Solids, Total Dissolved	296 mg/L	N/A	260 mg/L	N/A

Sampling Frequency – Semiannual monitoring has been retained, the sampling periods are defined as April – May and October – November.

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)
002	B	Liquid	Sludge was last removed in 2011 and removal is not anticipated this permit term. If removal is needed see the land application and schedule			

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)
			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. 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 Douglas County.						
Is a priority pollutant scan required? No						

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	

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
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	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Monitoring is required in 2026.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.

Changes from Previous Permit:

Sludge limitations and monitoring requirements were 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.

- List 1 (Metals), PCB, and PFOA+PFAS monitoring is required during the second year of the permit term (2026).
- 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 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 (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).

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

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

Change in form submittal – In prior permit reissuances when it has been noted in the application that sludge would not be removed during the permit term, the department required sampling during the second year of the permit term and the sludge characteristic report (3400-049) would be generated only during that year. Due to moving to electronic submittal of forms via Switchboard, forms 3400-049 (“Characteristics Report”), 3400-052 (“Other Methods of Disposal”) and 3400-055 (“Annual Land Application”) will now be generated by the department and the permittee will be required to submit all three reports each year of the permit term. This change was adopted to provide the permittee flexibility because many lagoon desludging projects can be unexpected, are delayed or staggered over multiple years. Additionally, it is used to officially report that no land application of sludge has occurred, and annual submittal of the forms is required per the standard requirements section.

- 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 indicating information can be entered on the report.

5 Schedules

5.1 Land Treatment Management Plan

A management plan is required for the land treatment system.

Required Action	Due Date
Land Treatment Management Plan Submittal: 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.	03/31/2025

5.2 Sludge Management Plan

Required Action	Due Date
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Submit a Sludge Management Plan: The permittee shall submit a 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

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 Schedules

Land Treatment Management Plan – The Land Management Plan has been approved, but updated plans are required if there are management changes.

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 created in 2013

“Village of Solon Springs – Land Disposal System Evaluation Report, WPDES Permit # WI-0061115” memo dated August 13, 2024

Expiration Date:

December 31, 2029

Justification Of Any Waivers From Permit Application Requirements

N/A – Groundwater discharger

Prepared By: Sheri A. Snowbank Wastewater Specialist

Date: August 14, 2024

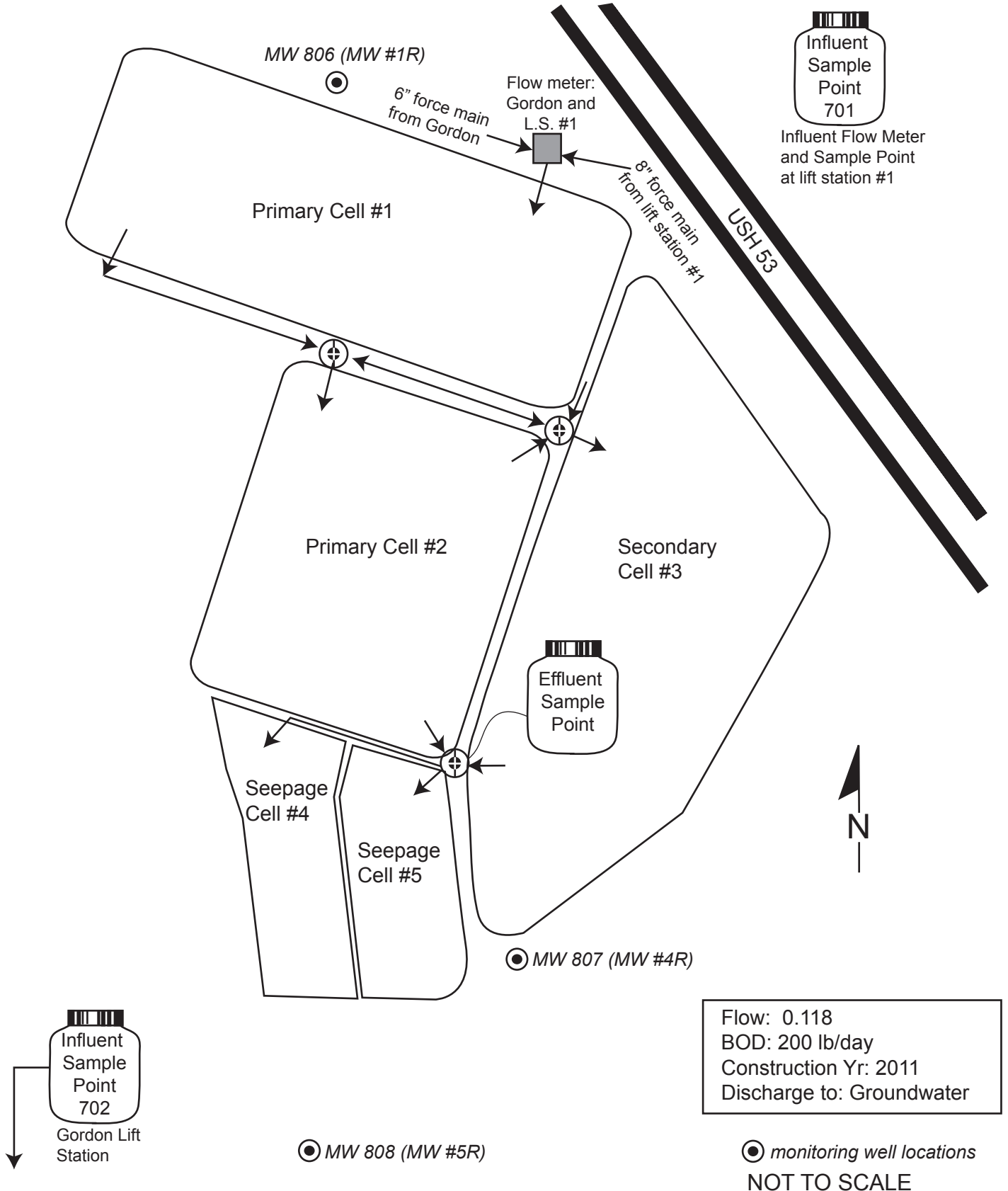
Date updated based on Factcheck comments: No comments received (September 18, 2024)

Date updated based on public notice comments:

Notice of reissuance was published in the Superior Telegram, 1410 Tower Ave, Superior, WI 54880.

Village of Solon Springs Wastewater Treatment Plant

The Village of Solon Springs operates a stabilization pond system with a discharge to groundwater via two seepage cells. The system is designed to treat 110,000 gallons per day of wastewater.



DATE: August 13, 2024

FILE REF: 5037

TO: File

FROM: Mike Chang - WCR *Michael Chang*
Woody Myers - WCR

SUBJECT: Village of Solon Springs - Land Disposal System Evaluation Report,
WPDES Permit # WI-0061115

Site Information

The Village of Solon Springs, a municipal facility is located at 12071 Holly Lucious Road, Solon Springs, Douglas County. Wastewater is currently treated and discharged to groundwater via infiltration by way of absorption ponds (seepage cells) located in the NW ¼ of the NE ¼ of Section 2, T44N, R12W, Town of Solon Springs.

Land Disposal Effluent & Groundwater Evaluation Summary

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

Parameter	Current Permit WI-0061115-09		Proposed Permit WI-0061115-10	
	Limits and Units	Limit Type	Limits and Units	Limit Type
Flow Rate	- MGD		- MGD	
BOD ₅	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, Organic	- mg/l		-	
Nitrogen, Ammonia	- mg/l		- mg/l	
Nitrogen, Nitrite + Nitrate	- mg/l		- mg/l	
Total Dissolved Solids	- mg/l		- mg/l	
Chloride	- mg/l		- mg/l	
Nitrogen, Total	- mg/l		- mg/l	

No 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
806 (MW-1R)	Up-gradient	Background	Up-gradient	Background
807 (MW-4R)	Down-gradient	Non-Point of Standard	Down-gradient	Non-Point of Standard
808 (MW-5R)	Down-gradient	Point of Standard	Down-gradient	Point of Standard

No 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	2.0 mg/l	10.0 mg/l	*2.9 mg/l	10.0 mg/l
Chloride	125 mg/l	250 mg/l	125 mg/l	250 mg/l
pH, Field	5.0-7.0 su	N/A	5.0-7.0 su	N/A
pH, Lab	7.0 su	N/A	*Not Required	
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	2.6 mg/l	N/A	*2.5 mg/l	N/A
Total Dissolved Solids	296 mg/l	N/A	*260 mg/l	N/A

* Proposed permit changes

Geology

The bedrock under this facility is expected to be the Freda, Nonesuch and Copper Harbor formations of the Oronto Group. They are comprised of feldspathic sandstone, siltstone, shale and conglomerate (*Bedrock Geologic Map of Wisconsin*, Wisconsin Geological and Natural History Survey (WGNHS), 1982). 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 1,655 feet northwest of Leo Creek and approximately 3,060 feet west of Upper St. Croix Lake. There is one well (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 BOD₅ loading summations for the Land Disposal System.

Table 4 Land Treatment Disposal Loading Averages

Year	Flow (MGD)	Nitrite + Nitrate (mg/l)	Chloride (mg/l)	BOD ₅ (mg/l)
2023	0.413	0.07	64	11.3
2022	0.532	0.40	72	18.0
2021	0.683	0.53	72	5.3
2020	0.611	0.35	55	14.0
2019	0.722	0.35	52	11.8

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 5 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	
806	MW-1R	1095.37	1093.2	1075.2	1065.2	10.0	28.0	WT
807	MW-4R	1078.43	1076.3	1043.3	1036.3	10.0	40.0	WT
808	MW-5R	1061.68	1059.5	1034.5	1019.5	15.0	25.0	P

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.

Non-Point of Standard (NPOS) Well 806 (MW-1R) shows results that are consistently below PAL and ES limits except for two PAL (2.0 mg/l) exceedances for Nitrite + Nitrate as N (2.9 mg/l on 9/19/19 and 2.4 mg/l on 9/30/20). Groundwater elevation is relatively consistent, ranging from 1070.17 – 1073.17 ft above msl. Parameters appear to be relatively stable in background groundwater quality and no significant trends were identified. No other exceedances of groundwater standards were reported.

Down-Gradient Groundwater Quality

Point of Standard (PoS) Well 808 (MW-5R) had six reported PAL exceedances of Nitrite + Nitrate. Five of these exceedances ranged from 2.7 mg/l to 7.1 mg/l, with an average of 4.8 mg/l. The highest result of 32.6 mg/l on 11/8/2023 is likely either an error in reporting or is an outlier. Average Nitrite + Nitrate concentrations in PoS Well 808 are 6.0 mg/l including the 32.6 mg/l “outlier” result, and 3.3 mg/l excluding the “outlier” result.

PoS Well 808 (MW-5R) shows slight increasing trends in chloride and TDS (See Figure 1 and Figure 2) All chloride results are below their respective PAL. Two PAL exceedances for TDS were reported at PoS Well 808: 311 mg/l on 10/7/2022 and 445 mg/l on 11/8/2023.

Groundwater elevations in PoS Well 808 show a slight decreasing trend. However, with groundwater elevations ranging from 1040 - 1043 ft. above msl and a screened interval of 1019.5 – 1034.5 ft. above msl, PoS Well 808 appears to have a submerged screen by 5.5 – 8.5 ft. and its ability to produce representative samples may be affected.

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. Background average concentrations of nitrite + nitrate in NPoS Well 806 (MW-1R) are 1.3 mg/l, and downgradient average concentrations of nitrite + nitrate in downgradient PoS Well 808 (MW-5R) are 6.0 mg/l including the 32.6 mg/l “outlier” result, and 3.3 mg/l excluding the “outlier” result. However, average effluent concentrations to the seepage cells are reported at 0.51 mg/l. Given these data, it is clear that PoS Well 808 is observing elevated concentrations of nitrite + nitrate, however, the effluent concentrations of nitrite + nitrate are too low to be the sole source or cause of nitrite + nitrate PAL exceedances.

Proposed Groundwater Monitoring Requirements

**Table 6 Groundwater Quality Sampling Frequency and Limits
Outfall 001 Permit WI-0060003-11**

Sample Point	Well Name	Sample Frequency	Well Designation
806	MW-1R	Semi-annually	Background
807	MW-4R	Semi-annually	Non-Point of Standard
808	MW-5R	Semi-annually	Point of Standard
Parameter	PAL	ES	Source
Depth to Groundwater	N/A	N/A	Measured
Groundwater Elevation	N/A	N/A	Measured
Nitrogen, Nitrite + Nitrate	*2.9 mg/l	10.0 mg/l	Calculated, NR 140 Table 1
Chloride	125 mg/l	250 mg/l	NR 140 Table 2
pH, Field	5.0-7.0 su	N/A	Calculated
pH, Lab	*Discontinue		
Nitrogen, Kjeldahl	N/A	N/A	Measured
Nitrogen, Ammonia	0.97 mg/l	9.7 mg/l	NR 140 Table 1
Nitrogen, Organic	*2.5 mg/l	N/A	Calculated
Total Dissolved Solids	*260 mg/l	N/A	Calculated

* 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 following equations were used to calculate the indicator parameter PALs:

$$\sum [\text{Mean of the background groundwater quality} + \text{Minimum Increase (NR 140.20 Table 3)}] = \text{PAL}$$

And for pH:

$$\sum [\text{Mean of the background groundwater quality} \pm 1 \text{ su}] = \text{upper and lower PAL}$$

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. ACLs were calculated using the following equation:

$$\Sigma [\text{Mean of the background groundwater quality} + (2) \times \text{Standard Deviation of Results}] = \text{ACL}$$

Conclusions

Table 1:

There are no recommended changes to the effluent sampling parameters or the associated effluent limits.

Table 2:

There are no recommended changes to the locations or designations of the groundwater monitoring wells.

Table 3:

There are several proposed changes to the groundwater monitoring limits for the new permit.

- The PAL for Nitrogen, Nitrite + Nitrate is proposed to increase from 2.0 mg/l to 2.9 mg/l as calculated through changes in background groundwater quality via ACL.
- The PAL for pH, Lab is proposed to be removed so that both the PAL and ES are "N/A."
- The PAL for Nitrogen, Organic is proposed to decrease from 2.6 mg/l to 2.5 mg/l as calculated through changes in background groundwater quality via ACL.
- The PAL for Total Dissolved Solids is proposed to decrease from 296 mg/l to 260 mg/l as calculated through changes in background groundwater quality via ACL.

PoS Well 808 observed a decreasing trend of nitrite + nitrate concentrations (excluding one outlier sample). However, on average the concentrations of nitrite + nitrate at PoS Well 808 were above the PAL (six exceedances). Effluent sampling results for nitrite + nitrate average 0.51 mg/l, which would indicate that the treatment system is not the major contributing factor to the elevated nitrite + nitrate concentrations. Therefore, no s. NR 140.24 Wis. Adm. Code response action is required for the two PAL exceedances for Nitrite + Nitrate as N at Well 808.

No s. NR 140.24 Wis. Adm. Code response action is required for the two PAL exceedances for Nitrite + Nitrate as N at Well 806, or for the two TDS PAL exceedances at Well 808.

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.

Figures

Figure 1: Point of Standard Well 808 Chloride Concentrations

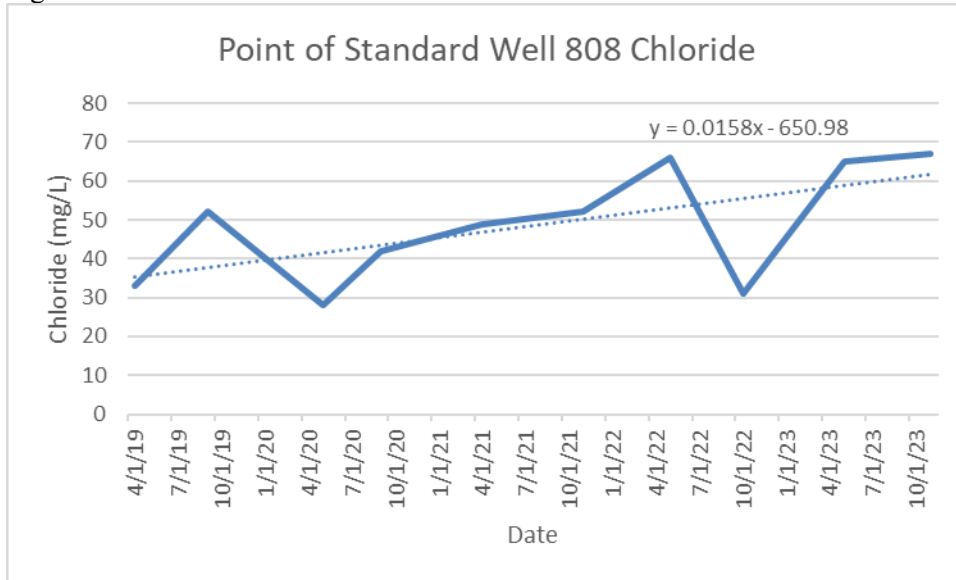


Figure 2: Point of Standard Well 808 Total Dissolved Solids (TDS) Concentrations

