Permit Fact Sheet

General Information

Permit Number	WI-0021644-10-0
Permittee Name and Address	VILLAGE OF PARDEEVILLE 114 Lake Street P O Box 217, Pardeeville, WI 53954
Permitted Facility Name and Address	Pardeeville Wastewater Treatment Facility 111 LYNCH STREET, PARDEEVILLE, WISCONSIN
Permit Term	January 01, 2027 to December 31, 2031
Discharge Location	Pardeeville Wastewater Treatment Facility, 111 Lynch St., Pardeeville, WI 53954. NE ¼, SE ¼, Section 4, T12N R10E, Town of Wyocena, Columbia County
Receiving Water	Groundwaters of the Swan Lake Watershed (UF15) in the Upper Fox River Basin in Columbia County
Stream Flow ($Q_{7,10}$)	N/A
Stream Classification	N/A
Discharge Type	Existing Continuous
Annual Average Design Flow (MGD)	0.314 MGD
Industrial or Commercial Contributors	None
Plant Classification	A4 - Ponds, Lagoons and Natural Systems; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Village of Pardeeville operates an aerated lagoon wastewater treatment facility that discharges to an absorption pond system. The facility consists of a comminutor, two aerated lagoons that are operated in series and a polishing pond with treated effluent discharged to any of three absorption ponds. All three lagoons are synthetically lined and cover an area of about two acres. Lagoons 1 and 2 have a capacity of about 3 million gallons and Lagoon 3 has a capacity of about 1.4 million gallons. Pardeeville WWTF discharged an average of 45 MG/yr from 2021 – 2025. The absorption ponds are surrounded by a groundwater monitoring system consisting of nine groundwater monitoring wells. Discharge to the absorption ponds migrates into shallow groundwater and at least partially enters Spring Lake and the adjacent wetlands.

Substantial Compliance Determination

After a desktop review of all discharge monitoring reports, groundwater monitoring reports, CMARs, compliance schedule items, and an off-site inspection meeting with the operator in charge (Beau Zeihen) on 9/29/2026, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Tanner Connors on September 29, 2026.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	46.4 MG/yr in 2025	Influent: 24-Hr flow proportional sampler located in the influent channel. Flow meter located in the pump room above wet well area.
001	45.1 MG/yr in 2025	Land Treatment: Representative grab samples collected from the polishing pond effluent manhole, prior to discharge to the absorption ponds. Flow meter located 1,000 feet west of the WWTF between the polishing pond and absorption ponds.
002	30,000 gallons in 2023	Sludge: Representative lagoon biosolids shall be obtained from the lagoons and combined into a single composite grab. Additional sampling may be needed if land application is proposed.

Sample Point Designation For Groundwater Monitoring System			
System	**Sample Pt Number**	**Well Name**	**Comments**
Absorption Ponds	801	MW-1 (801)	
	802	MW-2 (802)	
	803	MW-2B (803)	
	804	MW-3 (804)	
	805	MW-4 (805)	
	806	MW-5 (806)	
	807	MW-6 (807)	
	808	MW-7 (808)	
	809	MW-7B (809)	

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- INFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
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, Ammonia (NH3-N) Total		mg/L	Monthly	24-Hr Flow Prop Comp	
Nitrogen, Organic Total		mg/L	Monthly	Calculated	
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	

1.1.1 Changes from Previous Permit:

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

1.1.2 Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD5 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.

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 as outlined in ch. NR 206, Wis. Adm. Code.

2 Land Treatment – Monitoring and Limitations

2.1 Sample Point Number: 001- EFFLUENT

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

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
CBOD5	Monthly Avg	45 mg/L	Weekly	Grab	
Suspended Solids, Total		mg/L	Weekly	Grab	
pH Field		su	Weekly	Grab	
Nitrogen, Nitrite + Nitrate Total		mg/L	Monthly	Grab	
Nitrogen, Ammonia (NH3-N) Total		mg/L	Monthly	Grab	
Nitrogen, Organic Total		mg/L	Monthly	Calculated	
Nitrogen, Total		mg/L	Monthly	Calculated	
Chloride		mg/L	Monthly	Grab	
Phosphorus, Total		mg/L	Monthly	Grab	
Solids, Total Dissolved		mg/L	Monthly	Grab	

2.1.1 Changes from Previous Permit:

Total Kjeldahl Nitrogen removed from list of monitoring requirements.

2.1.2 Explanation of Limits and Monitoring Requirements

Requirements for land treatment of municipal wastewater are determined in accordance with ch. NR 206 Wis. Adm. Code. Based on the treatment plant type (large-scale soil absorption system) and date of the system approval by the department (1984), the Pardeeville WWTF is subject to the s. NR 206.05(1) Table 1, Wis. Adm Code effluent limit for BOD_5 (50 mg/l) and the groundwater quality standards in ch. NR 140, Wis Adm. Code. Thus, there are no effluent limits for total dissolved solids, total nitrogen or chloride. In 2004, the department approved effluent concentrations of CBOD rather than BOD to the seepage cells to s. NR 210.07(4)(a), Wis. Adm. Code was granted. This is continued for this permit term.

Total Kjeldahl Nitrogen removed from list of monitoring requirements as organic nitrogen and ammonia nitrogen are reported individually.

3 Groundwater – Monitoring and Limitations

3.1 Groundwater Monitoring System for Absorption Ponds

Location of Monitoring system: NEQ, SEQ, SEC 4, T12N, R10E, WYOCENA TWP

Groundwater Monitoring Well(s) to be Sampled: MW-1 (801), MW-2 (802), MW-2B (803), MW-3 (804), MW-4 (805), MW-7 (808), MW-7B (809), MW-5 (806), MW-6 (807)

Groundwater Monitoring Well(s) Used to Evaluate Background Groundwater Quality: MW-5 (806), MW-6 (807)

Groundwater Monitoring Well(s) Used for Point of Standards Application:

Parameter	Units	Preventative Action Limit	Enforcement Standard	Frequency
Depth To Groundwater	feet	N/A	N/A	Quarterly
Groundwater Elevation	feet MSL	N/A	N/A	Quarterly
Chloride Dissolved	mg/L	125	250	Quarterly
Nitrogen, Nitrite + Nitrate (as N) Dissolved	mg/L	2.0	10	Quarterly
Nitrogen, Ammonia Dissolved	mg/L	0.97	9.7	Quarterly
Nitrogen, Organic Dissolved	mg/L	2.3	N/A	Quarterly
Phosphorus, Total Dissolved	mg/L	N/A	N/A	Quarterly
Solids, Total Dissolved	mg/L	620	N/A	Quarterly
COD, Filtered	mg/L	N/A	N/A	Quarterly
pH Field	su	8.3	N/A	Quarterly

3.1.1 Changes from Previous Permit:

Groundwater 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.

- Alternative concentration limit for chloride, nitrite + nitrate and ammonia removed and replaced with NR 140 Groundwater Standards.
- Preventative action limit for pH, total dissolved solids and organic nitrogen updated.
- Chemical oxygen demand (COD) added to the monitoring requirements.
- Monitoring of total Kjeldahl nitrogen removed.
- MW-1 and MW-2 added to list of monitoring wells sampled for groundwater chemistry.

3.1.2 Explanation of Limits and Monitoring Requirements

For more information, please refer to the Groundwater Evaluation dated October 7, 2026 by Zach Watson.

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)

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	n/a	n/a	Land Application	n/a

Does sludge management demonstrate compliance? **Yes. Lagoons desludged in 2011.**

Is additional sludge storage required? **No, greater than 180 days storage is available in the lagoons.**

Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? **No**

If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility

Is a priority pollutant scan required? **No**

Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.

4.1 Sample Point Number: 002- LAGOON SLUDGE/SOLIDS

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	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
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 (NH4-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		mg/kg	Once	Composite	Once in 2028.
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.

4.1.1 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.

PFAS – Monitoring is required once pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code.

To maintain compliance with General Permit, WI-0012345-0, "PFAS Monitoring for Sewage Sludge (Biosolids) Generators" language has been added to the permit to restate that monitoring for PFOA+PFOS is required by June 30, 2027.

- An additional sentence has been added to the Monitoring Requirements and Limitations table for the parameter PFOA+PFOS table note (yellow highlight above).
- Permit section 3.2.1.1 "Requirements for Potential and/or Unscheduled Land Application of Sludge" has been updated to include PFOA+PFOS in the potential monitoring scenarios.

If the PFOA+PFOS result is under 20 ug/kg General Permit, WI-0012345-0, "PFAS Monitoring for Sewage Sludge (Biosolids) Generators" will be discontinued. If the results are over 20 ug/kg, General Permit section 5.4 must be followed (See link https://dnr.wisconsin.gov/sites/default/files/topic/Wastewater/PFASMonitoringforSewageSludgeGenerators-GeneralPermit.pdf). Based on the requirements of this section the Individual Permit may be modified to include additional sludge PFAS conditions.

4.1.2 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), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7), Wis. Adm. Code for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k), Wis. Adm. Code.

List 2 Nutrient – 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 Land Application Management Plan Schedule (see schedules for more information). List 2 nutrient sampling is only required when land application occurs. No monitoring is required if land application does not occur during the permit term.

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 s. 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.

5 Schedules

5.1 Chloride Source Reduction Measures (SRMs) for Groundwater Discharges

Required Action	Due Date
Annual Progress Report: The permittee shall complete and submit a chloride reduction plan (CRP) for Department review and approval. The CRP shall evaluate all applicable source reduction measures (SRMs) and establish appropriate implementation activities for the SRMs. The CRP shall include a schedule for implementing the selected SRMs.	01/31/2028

Second Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	01/31/2029
Third Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	01/31/2030
Fourth Annual Progress Report: Submit progress report in implementing the chloride reduction plan (CRP).	01/31/2031

5.1.1 Explanation of Schedule

Pardeeville WWTF needs to continue to reduce the amount of chloride discharged to the absorption ponds. Pardeeville WWTF must submit annual chloride reduction reports outlining the steps they have been and will be taking to reduce the concentration of chloride in the effluent.

5.2 Land Treatment Management Plan

A management plan is required for the land treatment system.

Required Action	Due Date
Land Treatment Management Plan Submittal: Submit a management plan for the seepage cell land treatment system. The land treatment system shall be operated in accordance with the approved management plan.	01/31/2028

5.2.1 Explanation of Schedule

Per NR 206.07(2)(h)(1), Wis. Adm. Code, a land treatment management plan is required.

Attachments

NR 140 Groundwater Evaluation Report dated October 7, 2026

Prepared By: Zach Watson Hydrogeologist Date: October 7, 2026

No changes following Fact Check period ending November 9, 2026.

CORRESPONDENCE/MEMORANDUM

DATE: October 7, 2026

TO: File

FROM: Zach Watson Hydrogeologist - SCR

SUBJECT: Groundwater Evaluation for Pardeeville WWTF WI-0021644-09

General Information and Treatment System Description

The Village of Pardeeville operates an aerated lagoon wastewater treatment facility that discharges to an absorption pond system. The facility consists of a comminutor, two aerated lagoons that are operated in series and a polishing pond with treated effluent discharged to any of three absorption ponds. All three lagoons are synthetically lined and cover an area of about two acres. Lagoons 1 and 2 have a capacity of about 3 million gallons and Lagoon 3 has a capacity of about 1.4 million gallons. Pardeeville WWTF discharged an average of 45 MG/yr from 2021 – 2025. The absorption ponds are surrounded by a groundwater monitoring system consisting of nine groundwater monitoring wells.

An additional monitoring well nest (MW-7 and MW-7B) was installed during the current permit term on September 6, 2022. The monitoring wells were installed downgradient of monitoring well nest MW-2/MW-2B and close to the edge of the Spring Lake wetlands. The 2021 groundwater evaluation stated…

"The "well nest" is being required to effectively assess/demonstrate if the land treatment system is a potential an indirect surface water discharge and remain eligible for the NR 140.28 special case groundwater quality exemption."

Table 1 – Monitoring Requirements and Limitations – Outfall 001 – Effluent to Absorption Ponds

Parameter	Current and Proposed Permit WI-0021644-09 and WI-0021644-10		
	Limit Type	Limits and Units	Sample Frequency
Flow Rate		MGD	Total Daily
CBOD5	Monthly Avg	45 mg/l	Weekly
Total Suspended Solids		mg/l	Weekly
pH Field		su	Weekly
Nitrite + Nitrate Nitrogen		mg/l	Monthly
~~***Total Kjeldahl Nitrogen**~~		~~**mg/l**~~	~~**Monthly**~~
Ammonia Nitrogen		mg/l	Monthly
Total Organic Nitrogen		mg/l	Monthly
Total Nitrogen		mg/l	Monthly
Total Dissolved Solids		mg/l	Monthly
Chloride		mg/l	Monthly
Total Phosphorus		mg/l	Monthly

***Recommended changes for upcoming permit**

Table 2 – Groundwater Monitoring System for Absorption Ponds

Sample Point	Well Name	Current Permit and Proposed WI-0021644-09 and WI-0021644-10	
		Well Location	Well Designation
***801**	**MW-1**	**Sidegradient**	**Non-Point of Standards**
***802**	**MW-2**	**Downgradient**	**Non-Point of Standards**
803	MW-2B	Downgradient	Non-Point of Standards
804	MW-3	Sidegradient	Non-Point of Standards
805	MW-4	Sidegradient	Non-Point of Standards
806	MW-5	Upgradient	Background Non-Point of Standards
807	MW-6	Upgradient	Background Non-Point of Standards
808	MW-7	Downgradient	Non-Point of Standards
809	MW-7B	Downgradient	Non-Point of Standards

***Institute regular quarterly monitoring at MW-1 and MW-2.**

Table 3 – Absorption Pond Groundwater Standards

Parameter	Current Permit WI-0021644-09		Proposed Permit WI-0021644-10	
	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
Chloride Dissolved	150 mg/l	250 mg/l	***125 mg/l**	250 mg/l
Nitrite+Nitrate Dissolved	2.3 mg/l	10 mg/l	***2.0 mg/l**	10 mg/l
~~***Total Kjeldahl Nitrogen**~~	~~**N/A**~~	~~**N/A**~~	~~**N/A**~~	~~**N/A**~~
Ammonia Dissolved	1.2 mg/l	9.7 mg/l	***0.97 mg/l**	9.7 mg/l
Organic Nitrogen Dissolved	2.5 mg/l	N/A	***2.3 mg/l**	N/A
Total Dissolved Phosphorus	N/A	N/A	N/A	N/A
Total Dissolved Solids	640 mg/l	N/A	***620 mg/l**	N/A
pH Field	6.3 – 8.3 su	N/A	***6.3 – 8.3 su**	N/A
***Chemical Oxygen Demand**	**N/A**	**N/A**	**N/A**	**N/A**

***Recommended changes for upcoming permit**

Indicator Parameter PALs

Indicator Parameter PALs are developed following the procedures described in s. NR 140.20(2), Wis. Adm. Code and "Calculating Preventive Action Limits and Evaluating Groundwater Quality Exemptions for Groundwater Dischargers". 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 PALs for this facility were calculated using whichever of the two following methods provides a greater PAL.

- ∑ [Background groundwater quality + (Standard Deviation of results x 3)]
- ∑ [Background groundwater quality + Minimum Increase (NR 140.20 Table 3)]

Indicator parameter PALs for the current permit term were calculated using monitoring data from MW-5 and MW-6 during the prior permit term. The indicator parameter PALs for use in the upcoming permit WI-0021644-10 are presented in **Table 3** and were calculated using results from MW-5 and MW-6 (July 1, 2021 – June 30, 2026). The indicator parameter PALs were calculated individually and averaged for pH, organic nitrogen and total dissolved solids.

Alternative Concentration Limits

Alternative concentration Limits (ACLs) can be developed and provided for a groundwater monitoring system to replace the PAL or ES (s. NR 140.28, Wis. Adm. Code). ACLs are provided if the conditions at the background monitoring well(s) indicate that it is appropriate. The methodology and considerations for developing and providing ACLs are outlined in the guidance document "Calculating Preventive Action Limits and Evaluating Groundwater Quality Exemptions for Groundwater Dischargers". ACLs were not provided in this permit as the concentration of chloride, nitrite + nitrate, and ammonia are low to non-detect at monitoring wells MW-5 and MW-6.

Hydrogeology

The bedrock below the site is Cambrian aged sandstones from the Mt. Simon formation to the Trempealeau Formation. Surface soils are the Boyer loamy sand. The boring logs for MW-7 and MW-7B indicate that the overburden is primarily fine to medium grained sand with some layers containing portions of silt and/or gravel to a depth of at least 35 feet below ground surface. Regional groundwater flows to the west towards the Wisconsin River. Groundwater at the site flows north northeast towards the wetlands and Spring Lake. Groundwater flow paths are more complex than as presented in the water table flow map. Depth to water is approximately 5 – 20 feet below ground surface. Groundwater elevations varied between 792 – 800 feet above mean sea level. The average vertical hydraulic gradient at the MW-7/MW-7B well nest is downward at 0.011 foot/foot. The average vertical hydraulic gradient at the MW-2/MW-2B nest is downward 0.027 ft/ft. The change in vertical gradient between the MW-7 nest and the MW-2 nest may indicate that the hydraulic gradient becomes more upward as you move towards the shoreline and Spring Lake surface.

The water table is expressed as the surface of Spring Lake and the wetlands. A figure showing the approximate bathymetry of Spring Lake adjacent to the absorption pond system is included as an attachment for reference. The bottom of Spring Lake changes from approximately 788 feet above mean sea level at the shoreline to 756 feet above mean sea level at its deepest point as you migrate northward from the absorption ponds. The bottom of Spring Lake essentially drops off like a cliff as you migrate from the absorption ponds to the middle of the lake. Given the groundwater flow directions, moderate vertical hydraulic gradients observed at the monitoring well nests and the elevation of the Spring Lake bottom relative to the absorption pond plume, it is likely that some portion of the discharge consistently enters Spring Lake and the adjacent wetlands.

Land Treatment Effluent Quality and Loading Rates

Pardeeville WWTF discharged a total of 42.7 – 50.3 MG/yr from 2021 – 2025. The concentration of chloride was consistent, and the average concentrations of chloride ranged between 222 – 261 mg/l. The annual load of chloride discharged ranged between 81,991 – 95,227 lbs/yr. The speciation of nitrogen discharged to the absorption ponds is primarily ammonia nitrogen. The annual average concentration of ammonia nitrogen ranged between 22.8 – 39.3 mg/l. Annual average total nitrogen concentrations generally decreased over the period of 2021 – 2025. The total mass of nitrogen discharged annually ranged between 11,662 – 17,521 lbs/yr. The concentration of phosphorus in the discharge was mostly consistent with annual average concentrations ranging between 5.4 – 6.8 mg/l. The annual load of phosphorus discharged to the absorption ponds was 2,265 – 2,422 lbs/yr.

Table 4 – Annual Average Effluent Results (mg/l)

Year	Chloride	Ammonia Nitrogen	Nitrite + Nitrate	Organic Nitrogen	Total Nitrogen	Phosphorus	CBOD5
2021	222	39.3	0.9	13.9	49.2	6.8	17.0
2022	261	38.6	1.5	4.8	46.1	6.6	17.4
2023	226	26.1	5.6	4.5	36.2	6.5	16.9
2024	227	22.8	4.0	2.0	27.8	5.4	13.2
2025	231	29.0	3.5	3.9	34.8	6.1	20.6

Table 5 – Annual Absorption Pond Loading Rates

Year	Annual Discharge (MG/yr)	Total Nitrogen (lbs/yr)	Chloride (lbs/yr)	Phosphorus (lbs/yr)
2021	42.7	17,521	79,058	2,422
2022	43.1	16,571	93,818	2,372
2023	43.5	13,133	81,991	2,358
2024	50.3	11,662	95,227	2,265
2025	45.1	13,089	86,887	2,294

Background Groundwater Quality

Background groundwater quality is defined by the results from samples collected at monitoring wells MW-5 and MW-6. The results for chloride at MW-5 and MW-6 are low (i.e., > 20 mg/l) and typical of unimpacted naturally occurring background concentrations. The concentration of nitrite + nitrate at MW-5 and MW-6 are also low and mostly non-detect. An increase in nitrite + nitrate occurred at MW-6 in 2023 – 2024 where the concentration increased to 2 mg/l and back down to non-detect. The results for ammonia, organic nitrogen and dissolved phosphorus are non-detect at both MW-5 and MW-6. Total dissolved solids at MW-5 and MW-6 were most often 400 – 500 mg/l and 200 – 300 mg/l, respectively.

Downgradient Groundwater Quality

Monitoring well nests MW-2/MW-2B and MW-7/MW-7B are the best downgradient receptors of impacted groundwater. Monitoring wells MW-3 and MW-4 are located sidegradient of the discharge. Monitoring wells MW-1 and MW-2 are only monitored for depth to water and groundwater elevation. Monitoring wells MW-2B, MW-3, MW-4, MW-7 and MW-7B all show clear impacts from the discharge as evidenced by the concentration of chloride which ranges from 100 – 300 mg/l at these monitoring wells. Historically, the concentration of ammonia was elevated and variable (i.e., 1 – 27 mg/l) at monitoring wells MW-2B and MW-3. The concentration of ammonia at both monitoring wells has generally declined over the past ten years and ammonia has remained below 7 mg/l over the past 2.5 years at MW-2 and MW-3. The concentration of ammonia at MW-4 is mostly non-detect with periodic detections up to 15 mg/l. The concentration of ammonia at MW-7 and MW-7B is variable and ranged from non-detect to 7.5 mg/l since installed in 2022. The concentration of nitrite + nitrate at the downgradient and sidegradient monitoring wells is variable with results at times moving more than 20 mg/l between sampling events. The average concentration of nitrite + nitrate was 13.5 mg/l, 8.4 mg/l, 15.2 mg/l, 10.5 mg/l and 14.9 mg/l at MW-2B, MW-3, MW-4, MW-7 and MW-7B, respectively. The results for organic nitrogen at the downgradient and sidegradient monitoring wells are most often between 2 – 6 mg/l. Higher results for organic nitrogen are generally associated with higher results for ammonia. Dissolved phosphorus is routinely reported in samples collected at the downgradient and sidegradient monitoring wells with results ranging between 1 – 7 mg/l over the past ten years.

Treatment System Impact to Groundwater Quality

The impact from the discharge to the absorption ponds on local groundwater quality is apparent in the results for chloride, nitrite + nitrate, ammonia and dissolved phosphorus.

With respect to chloride, the concentration in the discharge is most often at a value close to the NR 140 enforcement standard of 250 mg/l. As the discharge migrates into shallow groundwater, it dilutes and disperses to concentrations below the NR 140 enforcement standard and surface water quality standards. However, approximately 90,000 pounds of chloride are discharged annually meaning that Pardeeville should still work to bring the concentration and total mass of chloride discharged down over time.

Pardeeville WWTF discharges approximately 2,300 lbs/yr of phosphorus. Dissolved phosphorus is detected routinely in all downgradient and sidegradient monitoring wells. The addition of monitoring well nest MW-7/MW-7B has shown that phosphorus is continuing to migrate both horizontally towards Spring Lake and vertically into deeper groundwater. The concentration of phosphorus at monitoring well MW-2B, which is upgradient of MW-7/MW-7B, is higher and more variable (2 – 5 mg/l) than at MW-7/MW-7B (2 – 3 mg/l). This shows that phosphorus is partially attenuated and treated as groundwater migrates towards Spring Lake. The box and whisker plot comparing the concentration of phosphorus in the effluent and groundwater shows that approximately two thirds of the discharged phosphorus is bound up as it migrates into and through groundwater.

The WQBEL memo written in 2021 provided potential limitations on phosphorus if the discharge were entering the wetlands and Spring Lake. A waste load allocation was calculated and determined to be 114 lbs/yr of phosphorus. 114 lbs/yr of phosphorus would equate to approximately 5% of the total discharged phosphorus from the facility. Additionally, the water quality criteria for Spring Lake is 30 µg/l, which is approximately 1% of the concentration observed at monitoring well nest MW-7/MW-7B.

Pardeeville WWTF discharges approximately 11,000 – 18,000 lbs/yr of total nitrogen. The nitrogen discharged is primarily in the form of ammonia. The concentration of nitrite + nitrate and ammonia at the sidegradient and downgradient monitoring wells are often above the NR 140 enforcement standard. The concentration of nitrite + nitrate at the monitoring wells is often above what is observed in the discharge, indicating that nitrification is occurring within the absorption pond system and vadose zone. While there are no nearby downgradient receptors of this impacted groundwater, or a monitoring well system to accurately characterize what concentrations would be outside of the 250-foot DMZ, the consistent contribution of both nitrite + nitrate and ammonia has resulted in exceedances of the NR 140 groundwater standards and potential detrimental impacts to surface water quality.

Spring Lake, its wetlands and the water table as monitored by Pardeeville WWTF's groundwater monitoring network are all hydraulically connected. The elevations reported at the groundwater monitoring network and at Spring Lake are consistent in that groundwater contributes to Spring Lake and that this absorption pond discharge is reasonably considered a short flow path to surface water. The portion of the absorption pond groundwater plume that enters Spring Lake is unknown and difficult to quantify. Routine sampling of the wetlands and Spring Lake should occur throughout the next permit to aid in the assessment of how much phosphorus, ammonia, nitrite + nitrate and chloride is contributed from the discharge to the absorption ponds and if additional limitations should be placed on the discharge to ensure Spring Lake water quality is protected.

Historical References

WI-0021644-06 (Reissued 2004)

- From the 0021644-06 Permit Section 2.2.1.2: "Effluent limitations are not included in this permit for total nitrogen or chloride. In accordance with s. NR 206.06, Wis. Adm. Code, no effluent limits for these parameters have been established for this site, based on substantial compliance with ch. NR 140, Wis. Adm. Code requirements. A determination has been made by the Department that, at this site, the ch. NR 140 (Enforcement Standard) point of standards application is beyond the point at which groundwater flow discharges into surface water. Total nitrogen and chloride effluent limits are therefore not needed to assure compliance with NR 140 groundwater quality Enforcement Standards. Groundwater monitoring is required at this site to assure that the flow of groundwater into surface water will not cause surface water quality standards contained in chs. NR 102 to 105 to be attained or exceeded."
- From the 0021644-06 Permit Section 3.1.2.1: "At this site the facility discharge plume flows into surface water before reaching the discharge site (NR 140 Enforcement Standard) point of standards application. This has allowed the Department to make a determination of compliance with NR 140 groundwater quality Enforcement Standards at the site. This determination was made based on an evaluation conducted during the last permit term and allowed the Department to set alternative effluent limits (per NR 206.06) for the facility discharge to seepage cells. Continued discharge site groundwater monitoring is required to document groundwater flow into surface water and to monitor both, the effectiveness of site soil treatment processes, and the quality of impacted groundwater flowing into surface water."
- From the 2004 Groundwater Evaluation: "We recommend this discharge be treated as an indirect surface water discharge by granting the requested surface water variance submitted February 2003 by Ayres Associates on behalf of Pardeeville (Engineering Report " Compliance Determination for Groundwater Quality Parameters") and approved by Dan Heim, Hydrogeologist, 3/24/03. The reasons for this conclusion and recommendation are that the system meets the conditions listed in the Department guidance document: "Wastewater Land Application Systems Located in Areas of Groundwater Discharge to Surface Water" (5/16/96). Specifically:
    - Groundwater flows north-northeast directly to Spring Lake and its surrounding wetland. There are no groundwater wells between the system and the slough.
    - The land application system meets all applicable Code design requirements.
    - The land application system is located so that the NR 140 Point of Standards Application (250 ft.) is at a point at which groundwater flow is discharging to surface water (Spring Lake and its surrounding wetland). Pardeeville also owns the land between the WWTP and Spring Lake.
    - The discharge of impacted groundwater would not adversely effect surface water quality on the lake.
    - The facility performs all required effluent and groundwater monitoring."

WI-0021644-07 (Reissued 2010)

- From the 2009 Groundwater Evaluation: "In the current permit it was determined that the facility discharge plume enters surface water, a wetland, before reaching the NR 140 point of standards application. Therefore Pardeeville is in compliance with NR 140 enforcement standards even though NO2-NO3,N are substantially higher than 10 mg/l in downgradient monitoring wells located near the absorption ponds (seepage cells). I concur with that determination. Of note is the detection of ammonia nitrogen in double digit concentrations in downgradient monitoring wells 803 (MW-2B) and 804 (MW-3) during the past five years. The presence of ammonia nitrogen tends to indicate saturated soil conditions for a period of time beneath the absorption ponds. Since ammonia nitrogen can be toxic to aquatic organisms it would seem prudent that Pardeeville manage the distribution of

effluent to the absorption ponds so that the effluent is nitrified before reaching groundwater if it is possible with the existing absorption pond system."

WI-0021644-08 (Reissued 2016)

- From the 0021644-08 Permit Section 2.2.1.3: "Effluent limitations are not included in this permit for total nitrogen or chloride. In accordance with s. NR 206.06, Wis. Adm. Code, no effluent limits for these parameters have been established for this site, based on substantial compliance with ch. NR 140, Wis. Adm. Code requirements. A determination has been made by the Department that, at this site, the ch. NR 140 (Enforcement Standard) point of standards application is beyond the point at which groundwater flow discharges into surface water. Total nitrogen, total dissolved solids and chloride effluent limits are therefore not needed to assure compliance with NR 140 groundwater quality Enforcement Standards. Groundwater monitoring is required at this site to assure that the flow of groundwater into surface water will not cause surface water quality standards contained in chs. NR 102 to 105 to be attained or exceeded."
- From the 2016 Groundwater Evaluation: "Phosphorus readily adsorbs to soil particles but there are a finite number of anion exchange locations in the sediment between the Village of Pardeeville seepage cells and the surface water. Monitoring total phosphorus in the groundwater monitoring wells will reveal when/if the exchange sites are fully occupied. The data from down gradient wells shows Phosphorous impacts to groundwater and potential indirect surface water discharge to Spring Lake. The down gradient groundwater phosphorus levels averaged 1.9 mg/L (MW-2), 2.0 mg/L (MW-3) and 3.4 mg/L (MW-4) during the permit term. Since the phosphorus groundwater concentrations collected to date are likely above the phosphorous water quality based effluent limit (WQBEL) for a direct discharge to Spring Lake, additional monitoring will be required to see if the indirect levels pose a threat to the Lakes water quality."

WI-0021644-09 (Reissued 2021)

- From the 2021 WQBEL: "Pardeeville Wastewater Treatment Facility has historically been permitted as a groundwater discharge. Although the seepage cells discharge to groundwater, it is suspected that an indirect discharge to the surrounding wetland and Spring Lake is occurring. Therefore, it is appropriate to evaluate surface water limits as the facility undergoes facility planning as well as assess the water quality further from the seepage cells. The Department will also be evaluating whether surface criteria are being met. This memo assumes that the immediate receiving water is the wetland complex north of the seepage cells. If an outfall is constructed directly to Spring Lake or if the wetland were to become channelized due to the discharge, the limits would need to be reevaluated and may become more restrictive." – 2021 WQBEL
- From the Permit Fact Sheet Section 3.1: "Groundwater limits and requirements are determined in accordance with ch. NR 140, Wis. Adm. Code. The Enforcement Standards (ES) listed are only included for reference as the downgradient monitoring wells are all located within the design management zone. Indicator parameter Preventive Action Limit (PAL) values are established per s. NR 140.20 Wis. Adm. Code. Alternative Concentration Limits as allowed under s. NR 140.28 Wis. Adm. Code, are established on a case by case basis. The groundwater evaluation was reviewed and recently finalized on June 7, 2021 for this permit reissuance."

Conclusions, Recommendations and Schedule Requirements

- After reviewing the groundwater evaluations from 2004, 2009, 2016 and 2021, there is little to no information regarding why the only monitoring requirements at MW-2 is for depth to water and groundwater elevation. It is assumed that this monitoring well (piezometer) was installed for the assessment of vertical hydraulic gradients and interpretation of how groundwater migrates into Spring Lake. However, none of the groundwater evaluations to date have made any interpretation

regarding vertical hydraulic gradients. Monitoring the groundwater quality at MW-2 will allow for additional information regarding how the discharge impacts groundwater quality over space and time. Regular quarterly monitoring should occur at monitoring well MW-2.

- MW-1 was formerly the background groundwater monitoring well for the absorption pond system. The 2009 groundwater evaluation noted that MW-1 was not representative of unimpacted groundwater quality and a new background monitoring well was requested to be installed. The author of the 2009 groundwater evaluation did not believe that the elevated concentrations of chloride and nitrite + nitrate were due to the discharge to the absorption ponds or leaking lagoons. Regular monitoring of water quality should also occur at this monitoring well to assess how groundwater quality changes sidegradient of the discharge and near the lagoons.
- Total Kjeldahl Nitrogen does not need to be reported as ammonia, organic nitrogen and nitrite + nitrate are reported individually at the same frequency. Remove Total Kjeldahl Nitrogen from the monitoring requirements for both the effluent and groundwater.
- Add chemical oxygen demand to the monitoring requirements for groundwater to provide information on how the discharge impacts oxygen demand in shallow groundwater.
- Require that Pardeeville submit an updated Land Treatment Management Plan by the end of the first year of the permit term.
- Require that Pardeeville continue to submit annual chloride source reduction reports.
- The regulation of Pardeeville WWTF's discharge has remained in a mostly grey area between the regulations for surface water and groundwater discharge for a few reasons.
    - A 250-foot DMZ would extend into Spring Lake and therefore point of standards application monitoring wells cannot be installed.
    - Prior groundwater evaluations have made the case that the impacted groundwater flows into Spring Lake prior to reaching the point of standards application and therefore an exemption via NR 206.06 would apply.
    - The impact to groundwater quality, which has been significant, has been allowed because of the reasons mentioned above.
    - The impact to surface water quality has been considered by the addition of monitoring well nests, monitoring for phosphorus in the discharge and groundwater, a WQBEL written in 2021.
- The assigned wastewater compliance engineer and hydrogeologist should develop and oversee a routine monitoring program executed by WDNR Water Resources personnel for Spring Lake and the adjacent wetlands. Because the quantity of impacted groundwater that enters Spring Lake and the wetlands is difficult to determine, the monitoring program should collect data that will demonstrate whether there are elevated concentrations in Spring Lake and the wetlands that are associated with the discharge. The monitoring program would ideally be quarterly throughout the next permit term. If the monitoring program demonstrates that, in the surface water adjacent to the absorption ponds, there are concentrations above surface water quality standards for parameters such as chloride, phosphorus, ammonia and nitrite + nitrate, appropriate limits on the absorption pond discharge might be warranted.

Water Table Flow Map October 7, 2025
Pardeeville WWTF (WI-0021644-09)



Site Location

114 Lake Street
Pardeeville, WI

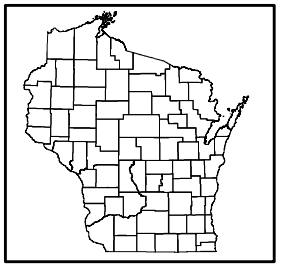
Legend

- Water Table Contour (10/7/2025 - 1' FAMSL)
- Groundwater Flow Direction
- Approximated discharge area
- Design Management Zone (DMZ)

Notes

Water table contours are hand drawn using the reported elevations in feet above mean sea level collected on October 7, 2025.

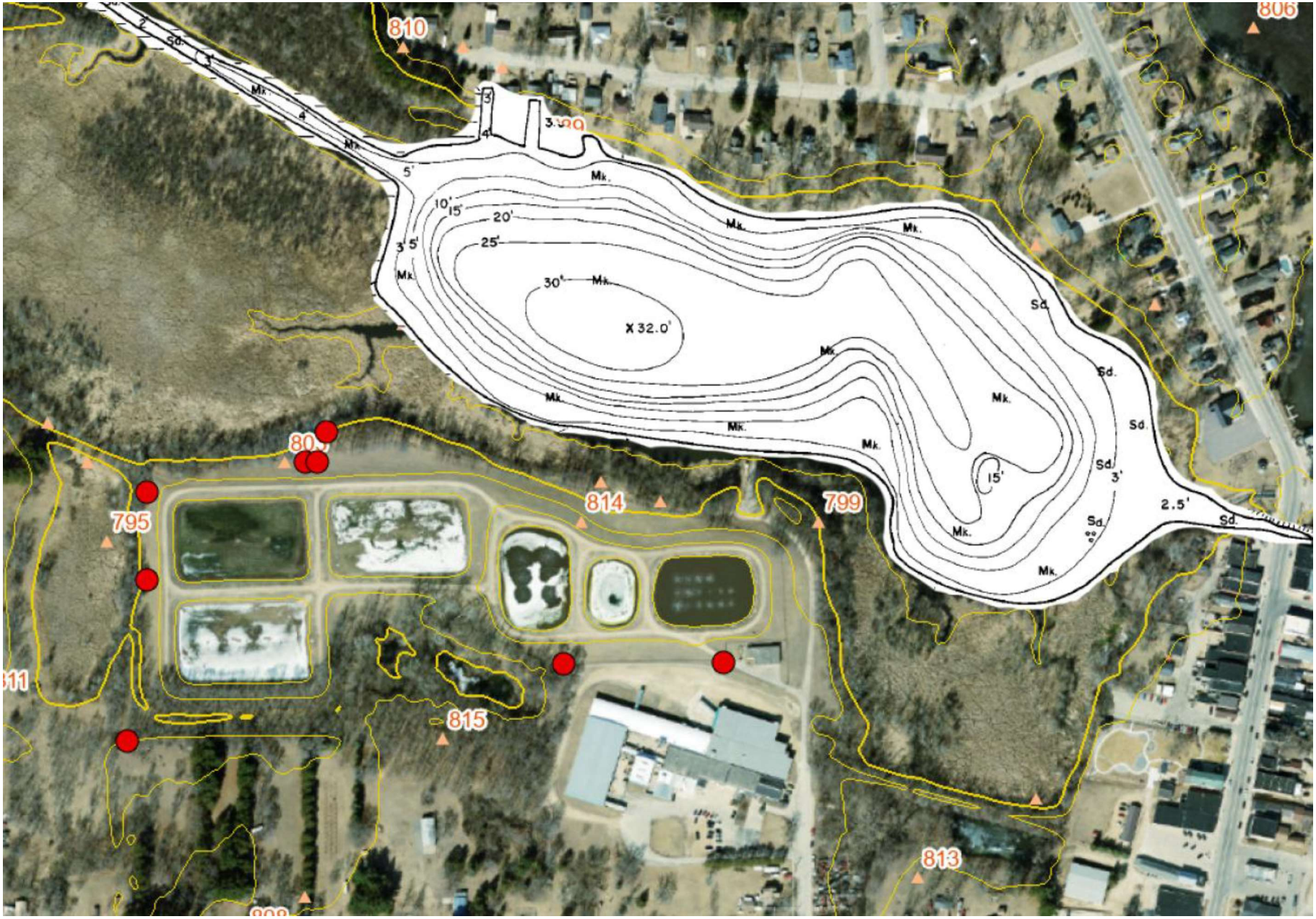
Created By: watsoz
Date: 8/10/2026



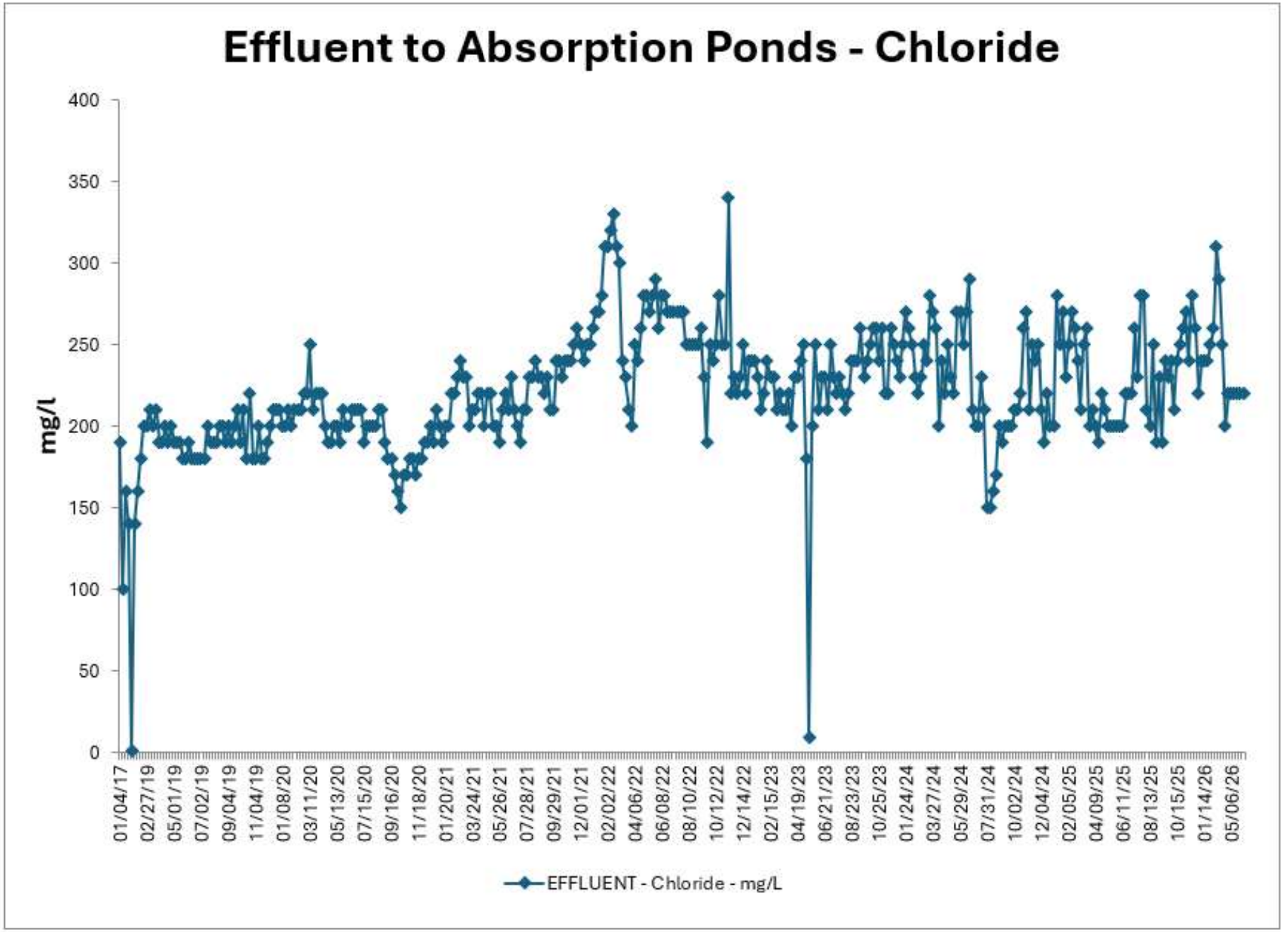
0 75 150 225 300 375 450 Feet

1:2,650

DISCLAIMER: This map is a user generated static output from the Wisconsin Department of Natural Resources. The contents herein are for reference purposes only and may or may not be accurate, current, or otherwise reliable. No liability is assumed for the data delineated herein either expressed or implied by the Wisconsin DNR or its employees. All land application must meet NR 113, NR 204, and NR 214 Wis. Adm. Code.



The bathymetry of Spring Lake in feet below water surface superimposed on an aerial image. The Spring Lake surface is 788 feet above mean sea level in this aerial. The elevation of Spring Lake at the time of the bathymetry map (May 1970) is unknown. This map is generated for use solely as a rough visual and is not accurate to scale.


Effluent to Absorption Ponds - Chloride
mg/l
400
350
300
250
200
150
100
50
0
01/04/17
02/27/19
05/01/19
07/02/19
09/04/19
11/04/19
01/08/20
03/11/20
05/13/20
07/15/20
09/16/20
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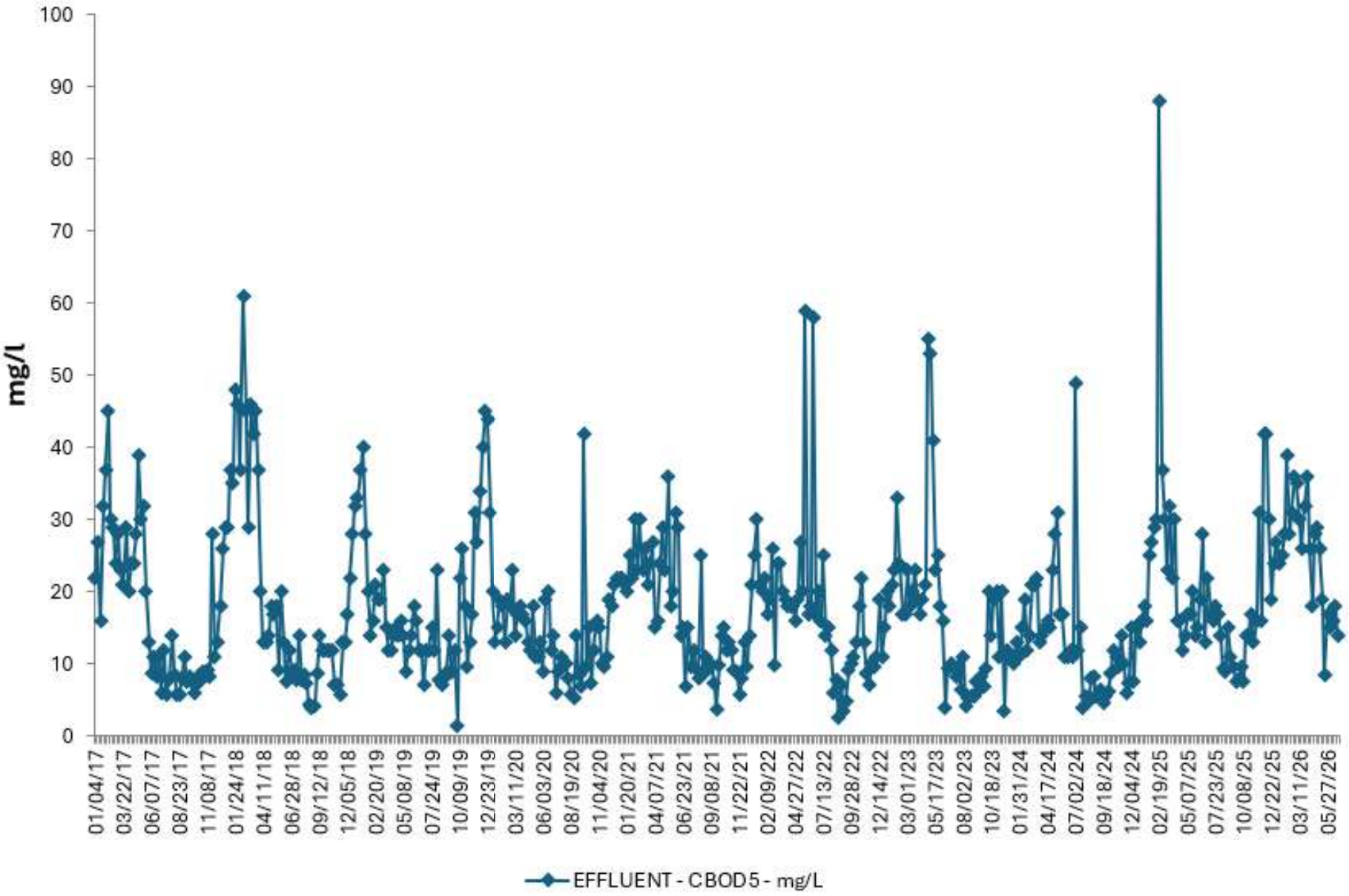
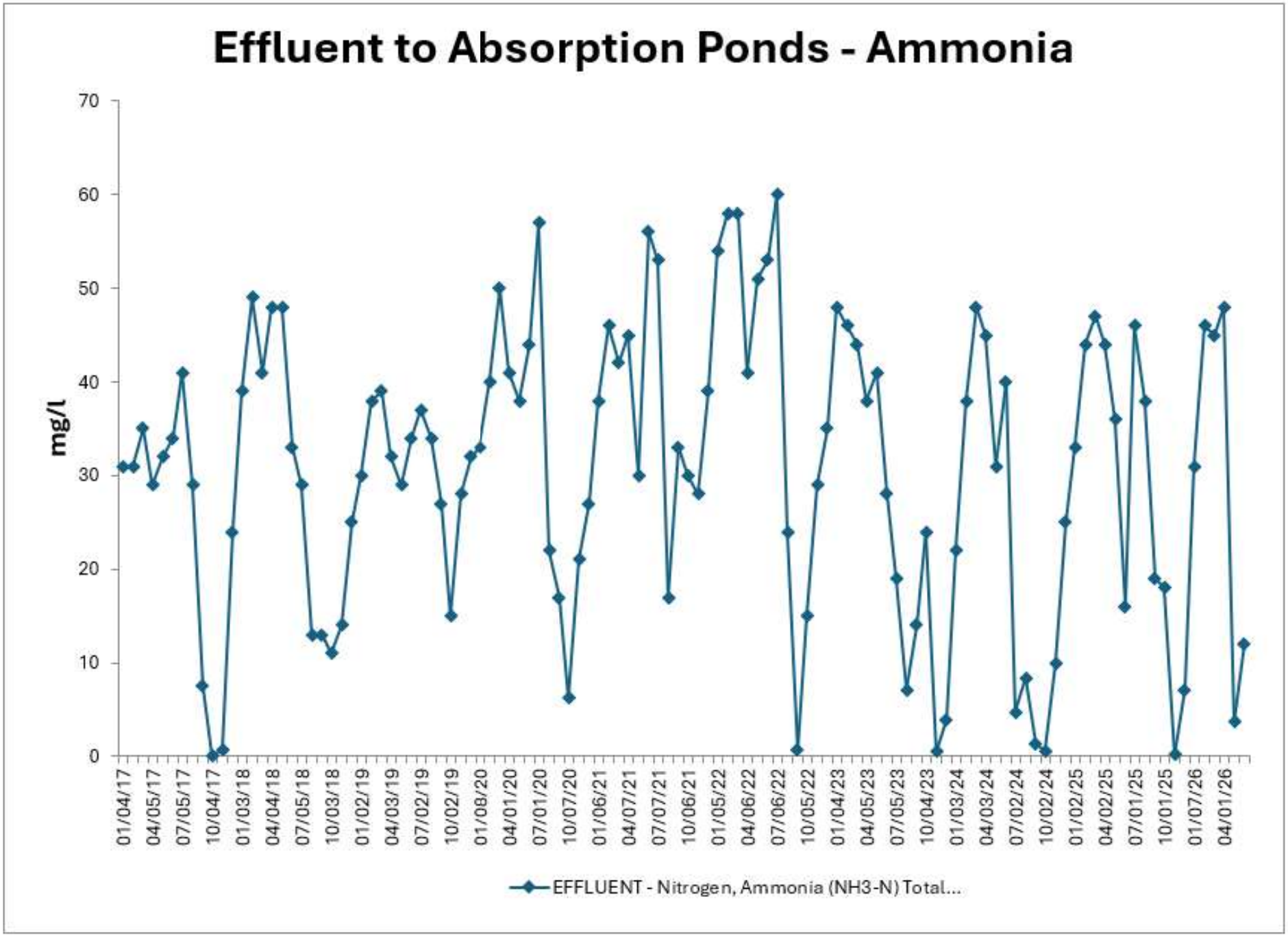
05/06/26
EFFLUENT - Chloride - mg/L

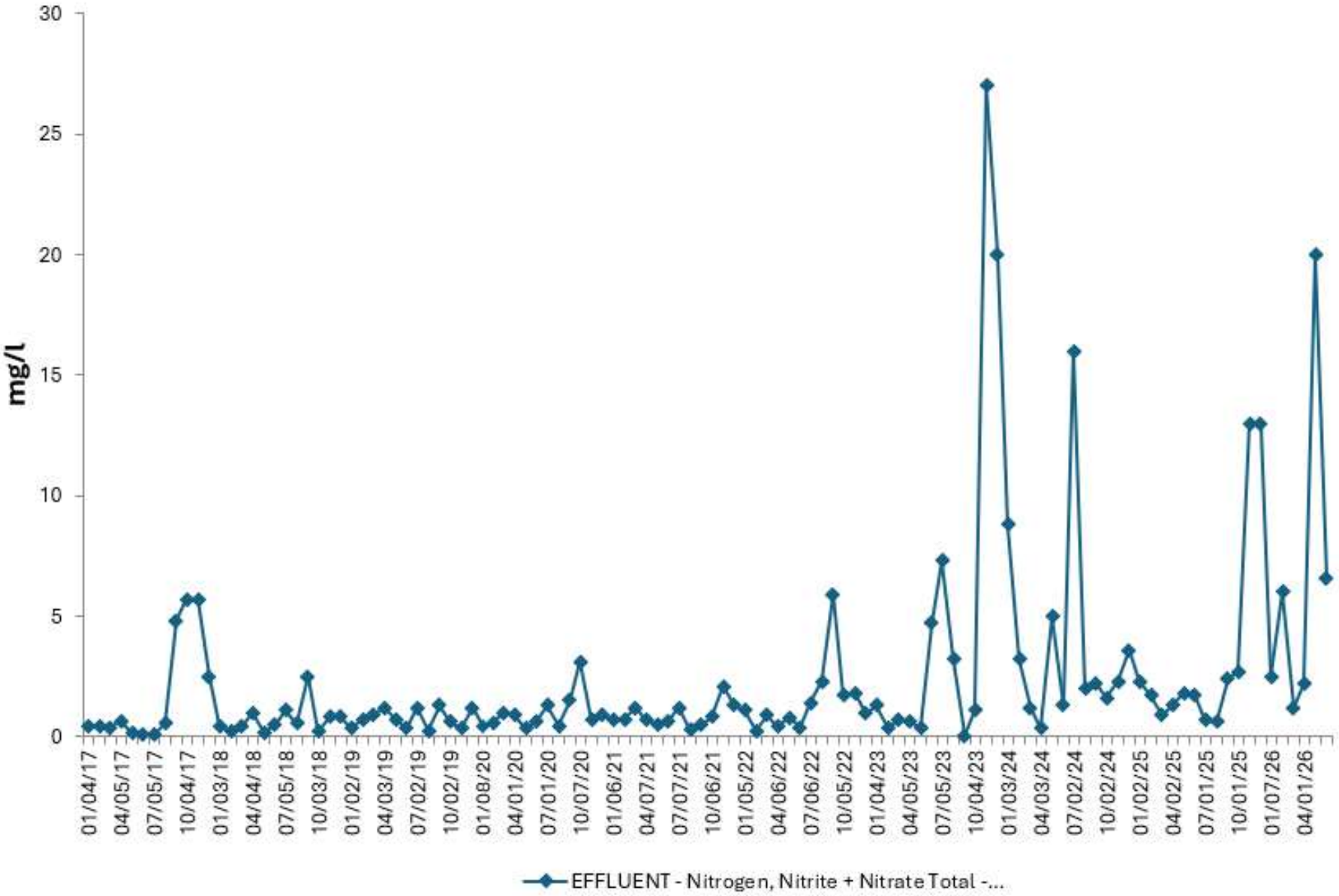
Effluent to Absorption Ponds - CBOD5



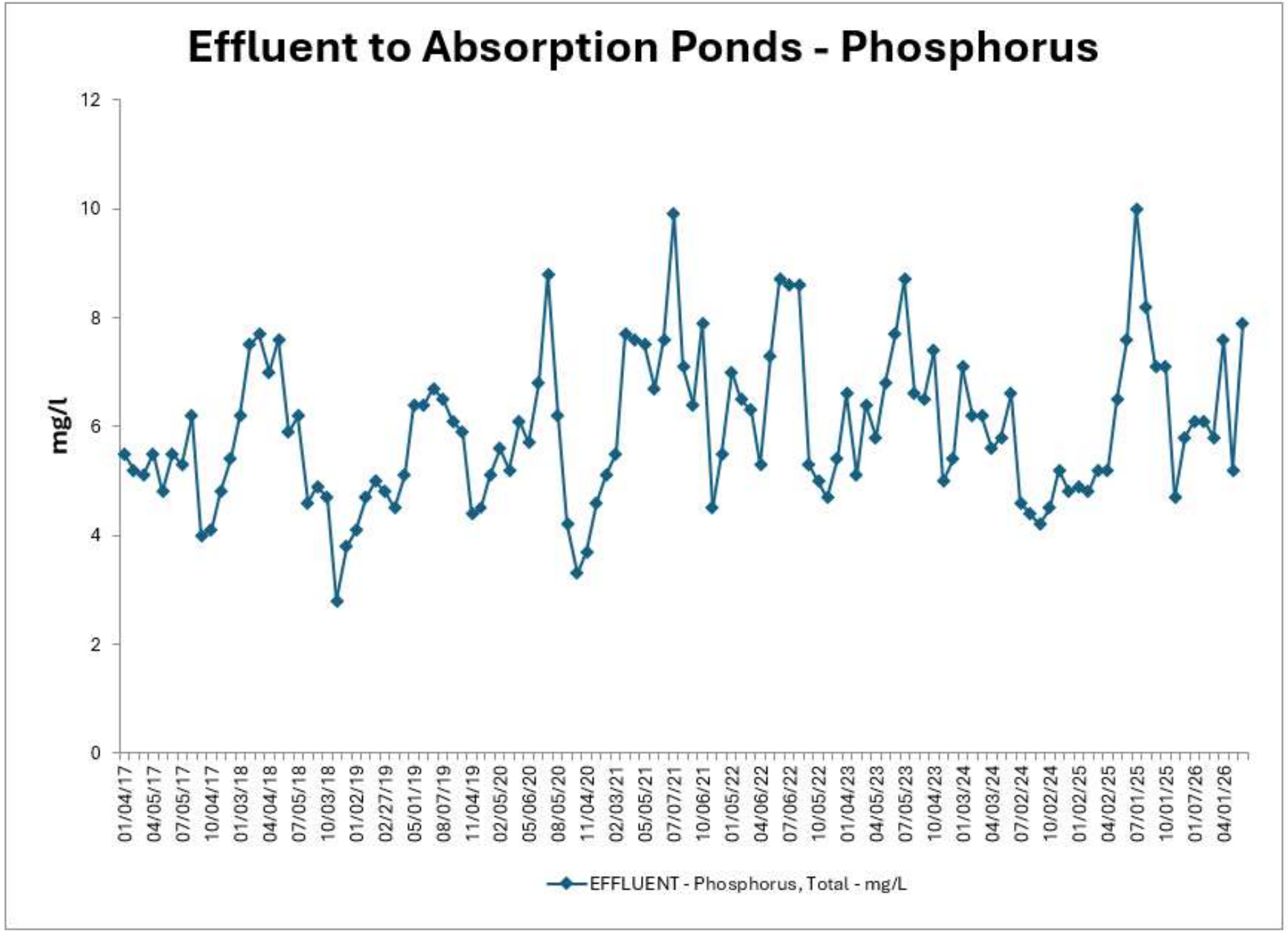
Effluent to Absorption Ponds - Ammonia

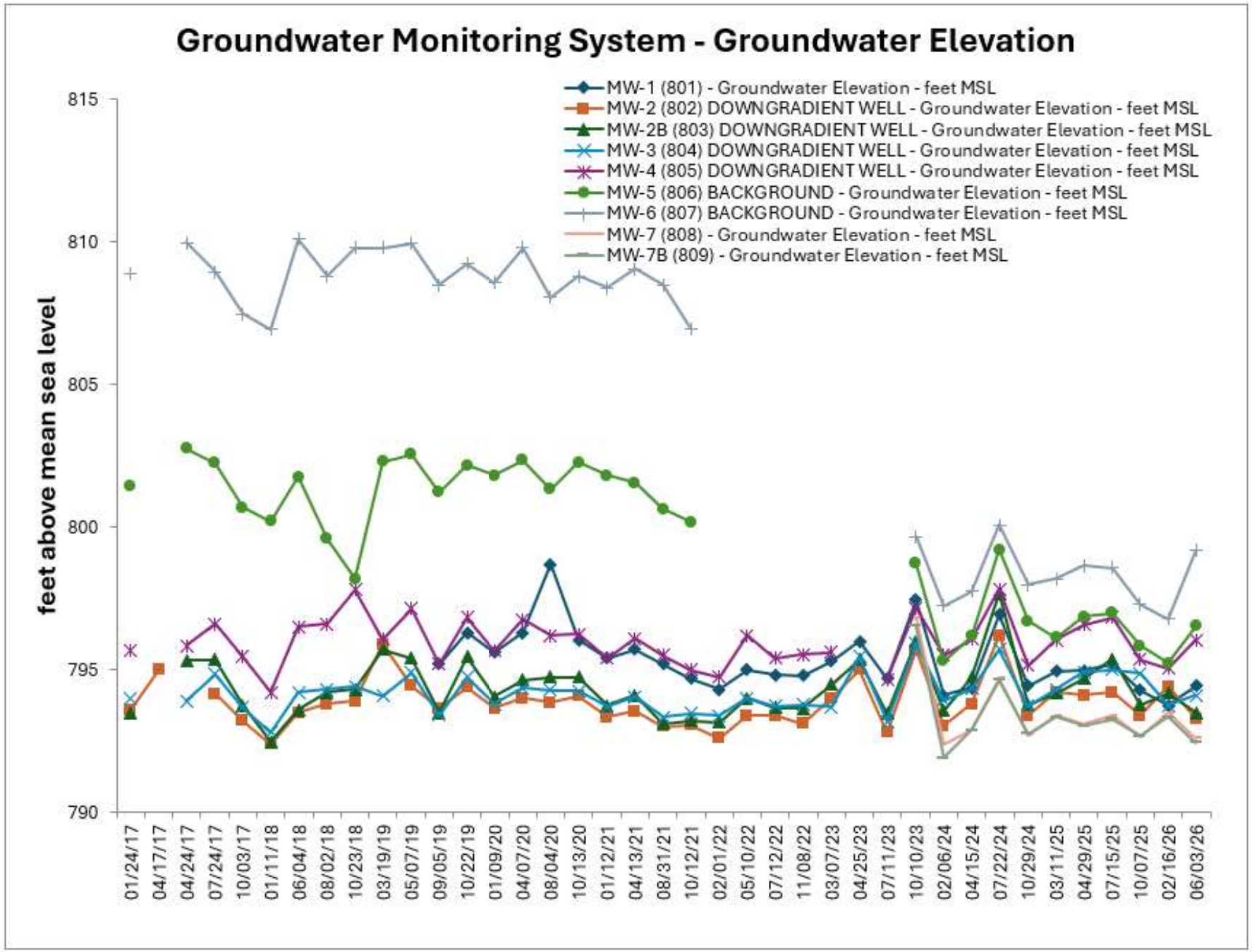


Effluent to Absorption Ponds - Nitrite + Nitrate



Effluent to Absorption Ponds - Phosphorus




Groundwater Monitoring System - Groundwater Elevation
MW-1 (801) - Groundwater Elevation - feet MSL
MW-2 (802) DOWNGRADIENT WELL - Groundwater Elevation - feet MSL
MW-2B (803) DOWNGRADIENT WELL - Groundwater Elevation - feet MSL
MW-3 (804) DOWNGRADIENT WELL - Groundwater Elevation - feet MSL
MW-4 (805) DOWNGRADIENT WELL - Groundwater Elevation - feet MSL
MW-5 (806) BACKGROUND - Groundwater Elevation - feet MSL
MW-6 (807) BACKGROUND - Groundwater Elevation - feet MSL
MW-7 (808) - Groundwater Elevation - feet MSL
MW-7B (809) - Groundwater Elevation - feet MSL
feet above mean sea level
815
810
805
800
795
790
01/24/17
04/17/17
04/24/17
07/24/17
10/03/17
01/11/18
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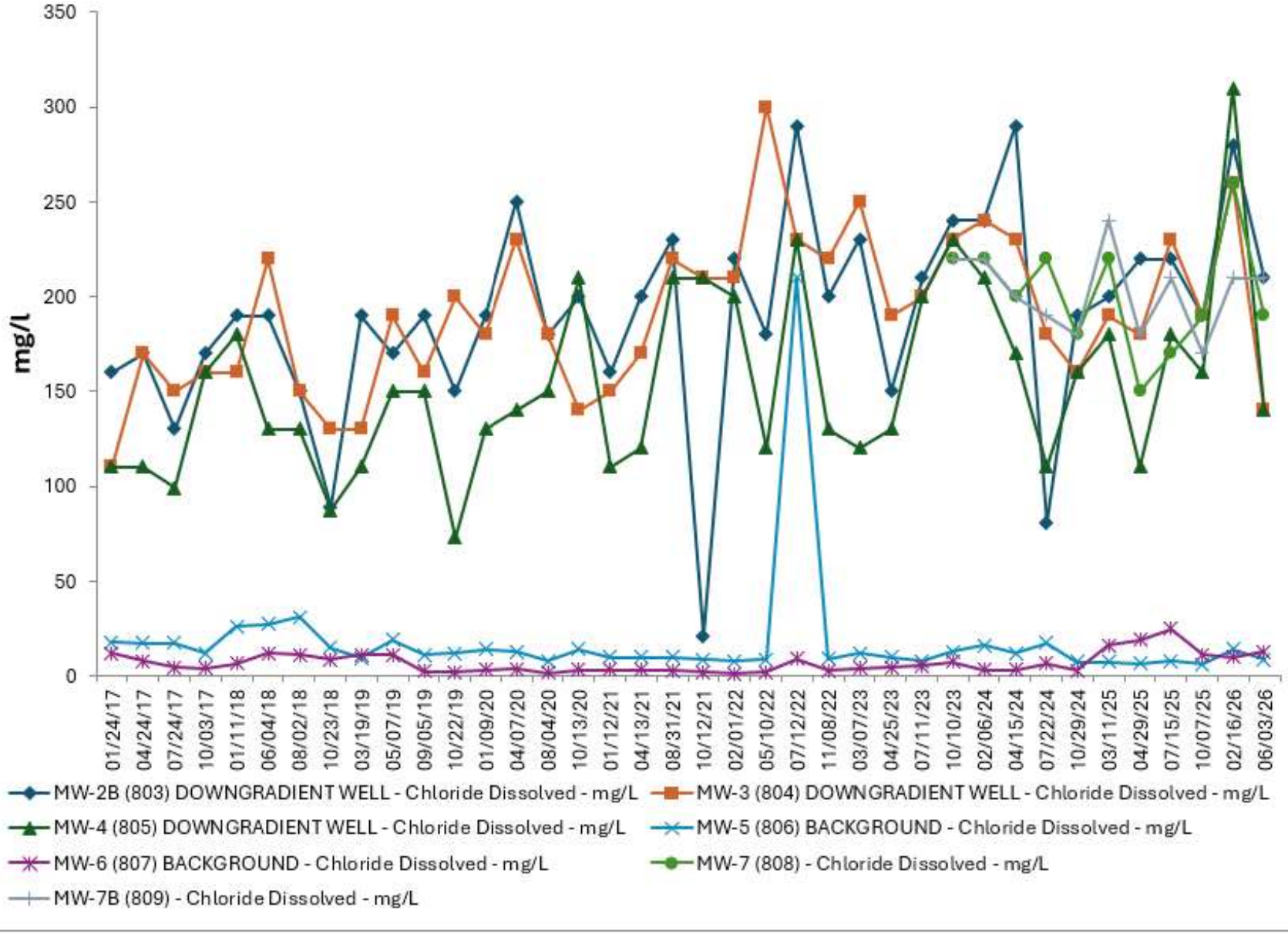
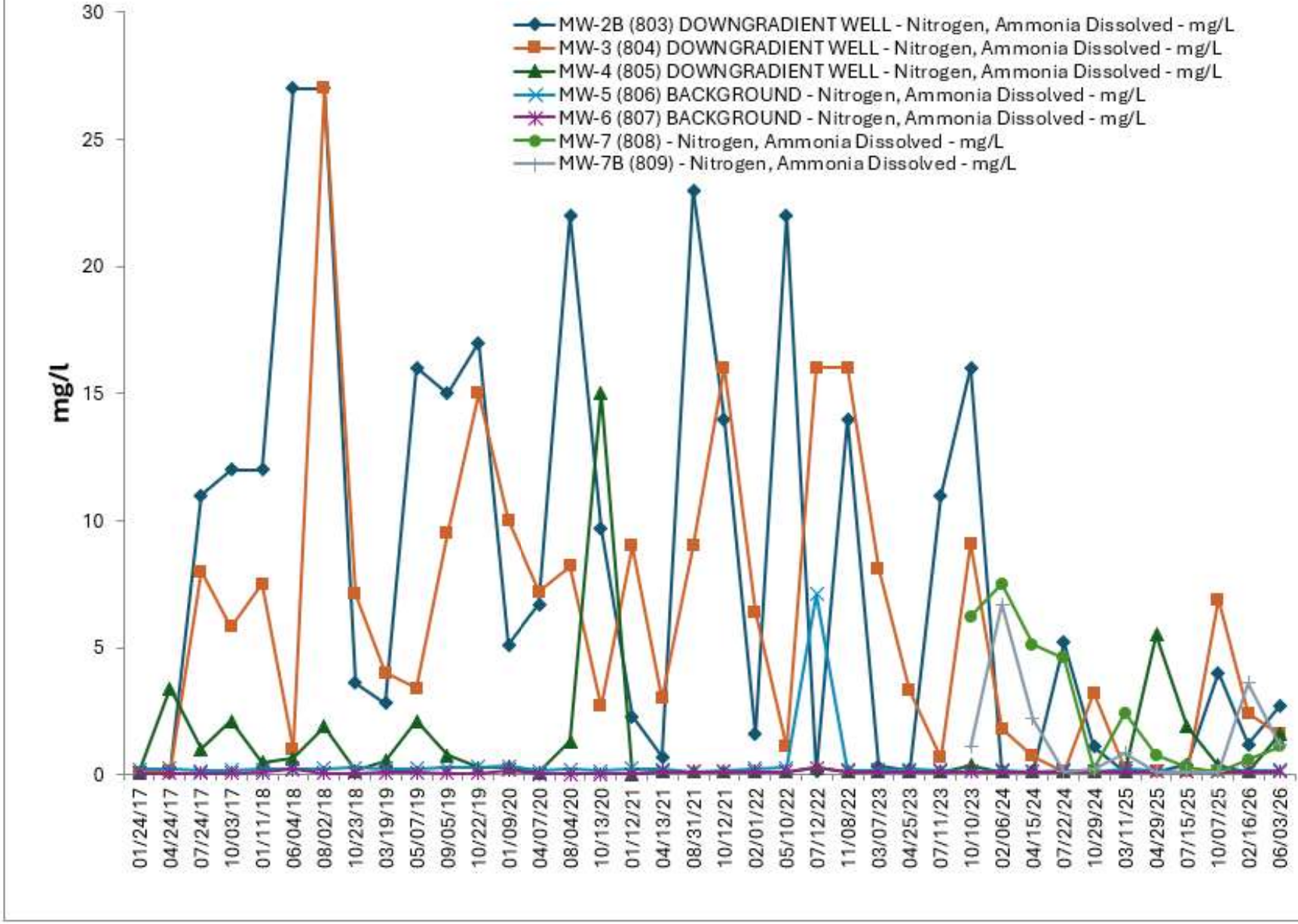
06/03/26

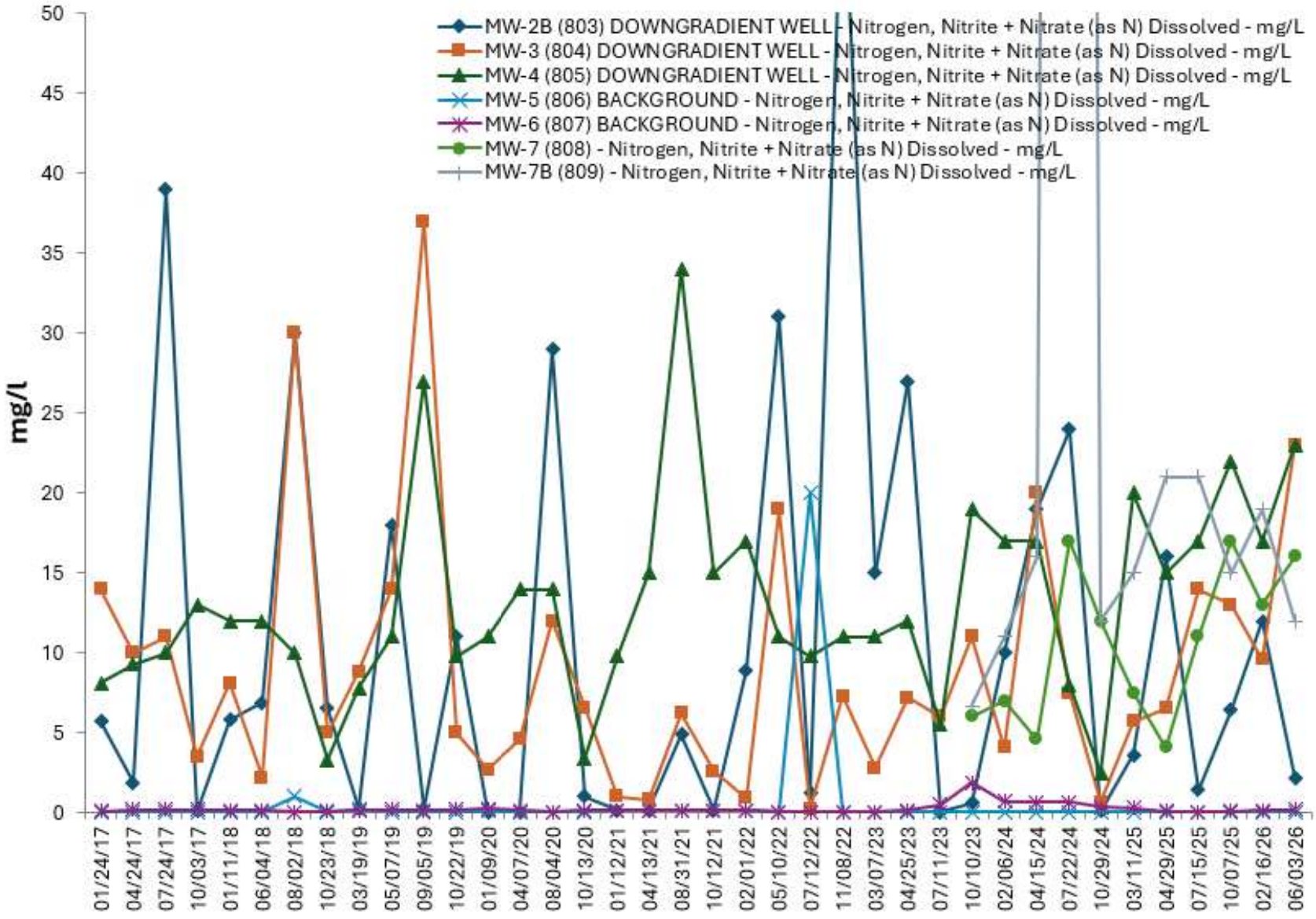
Groundwater Monitoring System - Chloride



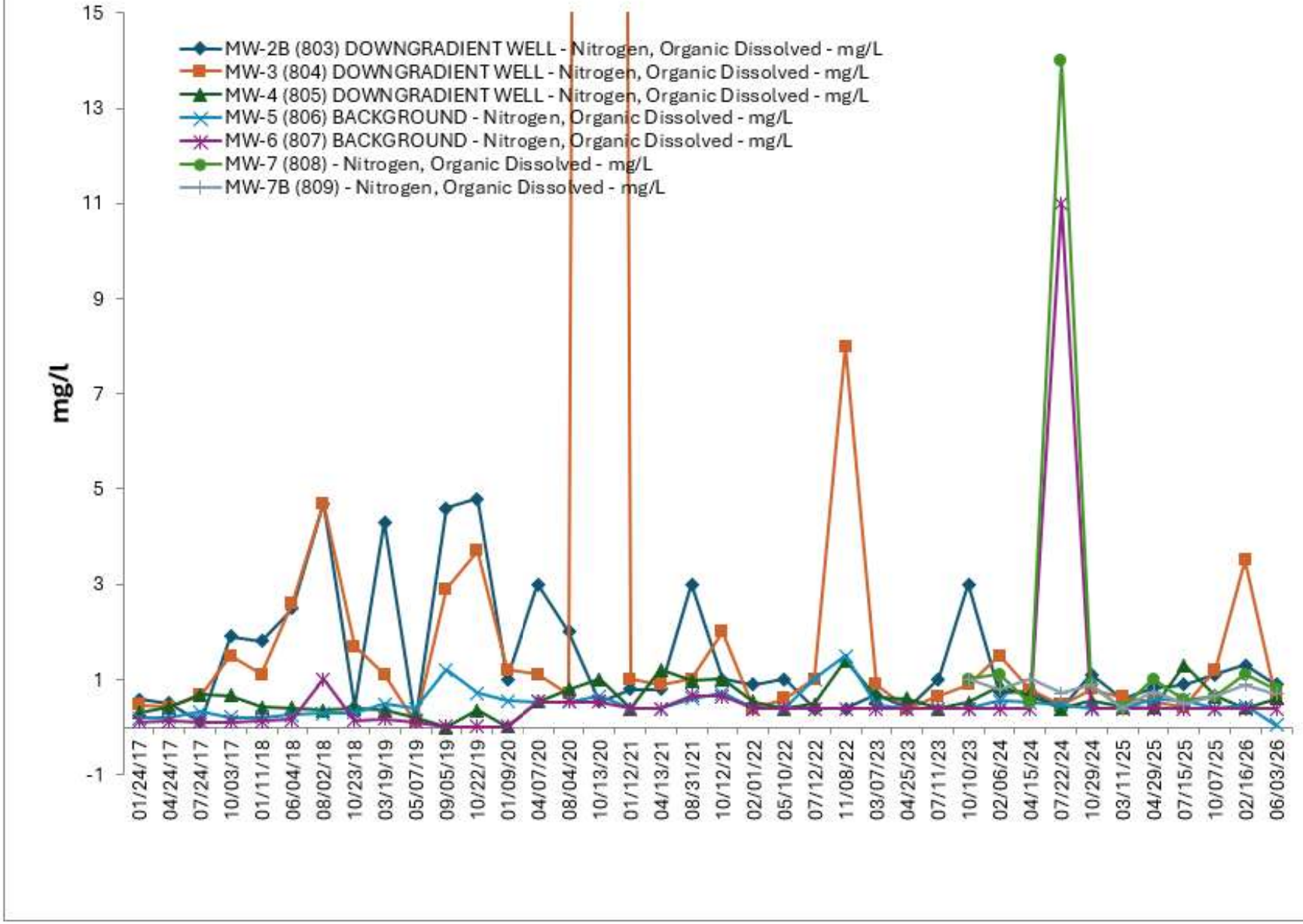
Groundwater Monitoring System - Ammonia



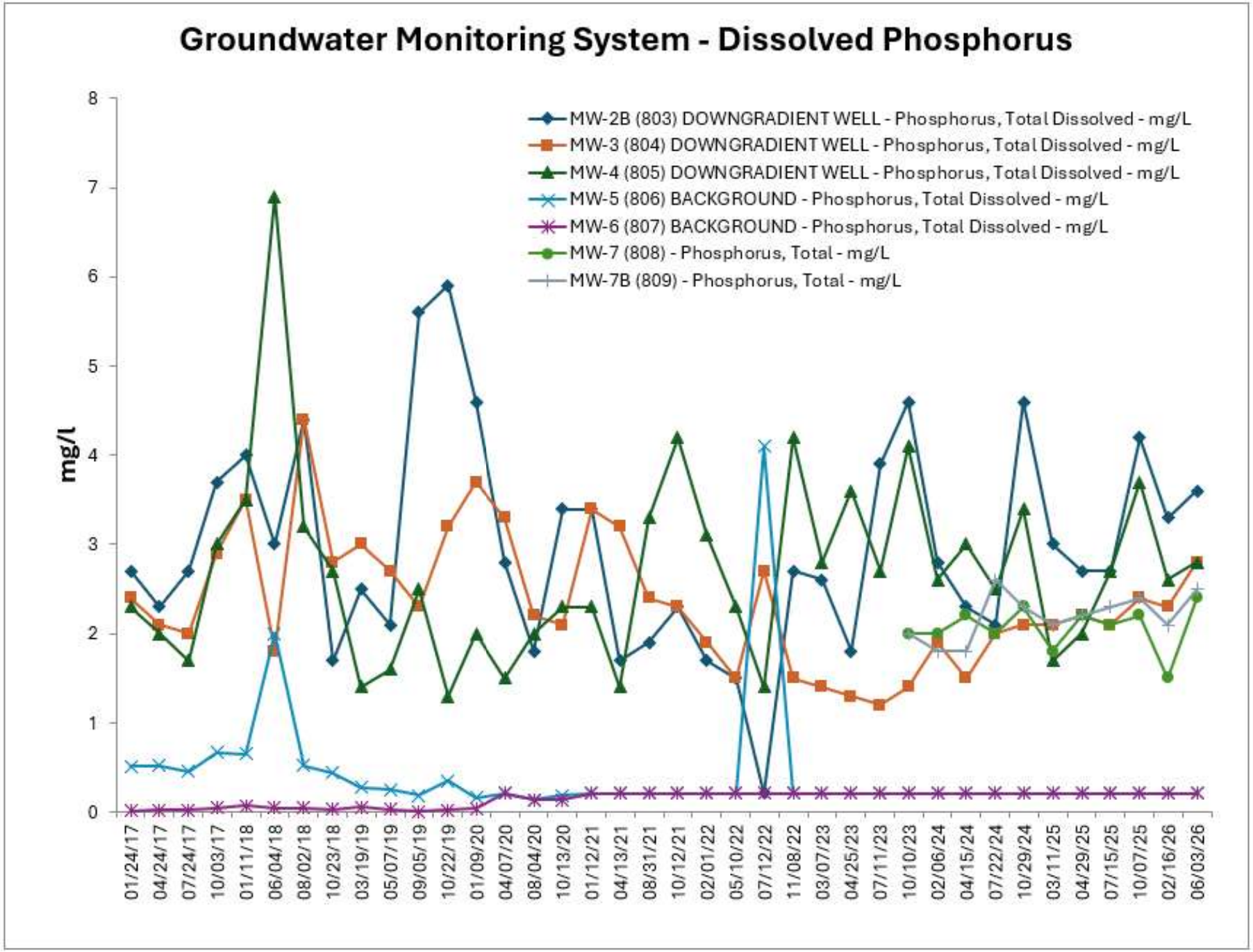
Groundwater Monitoring System - Nitrite + Nitrate

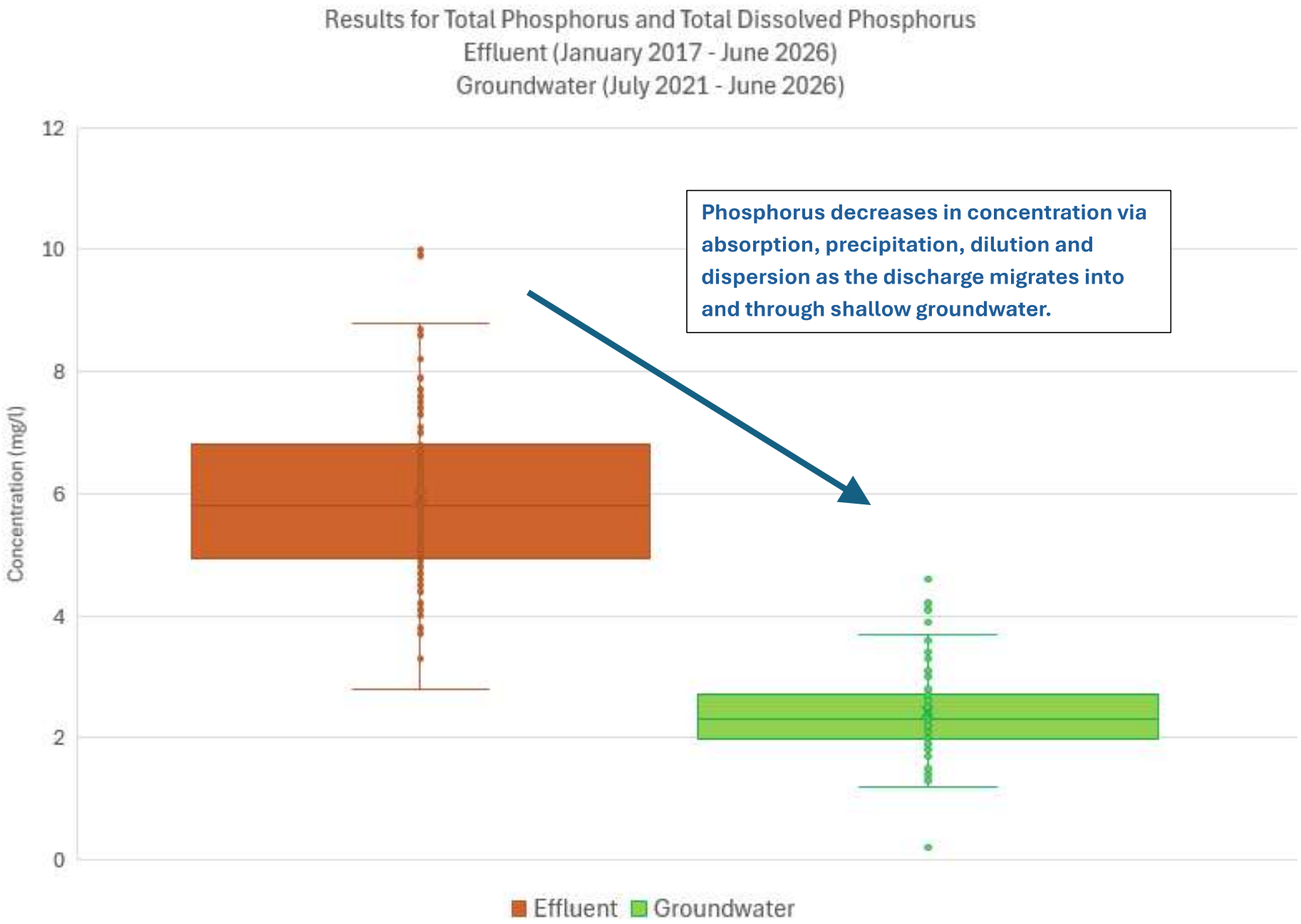


Groundwater Monitoring System - Organic Nitrogen

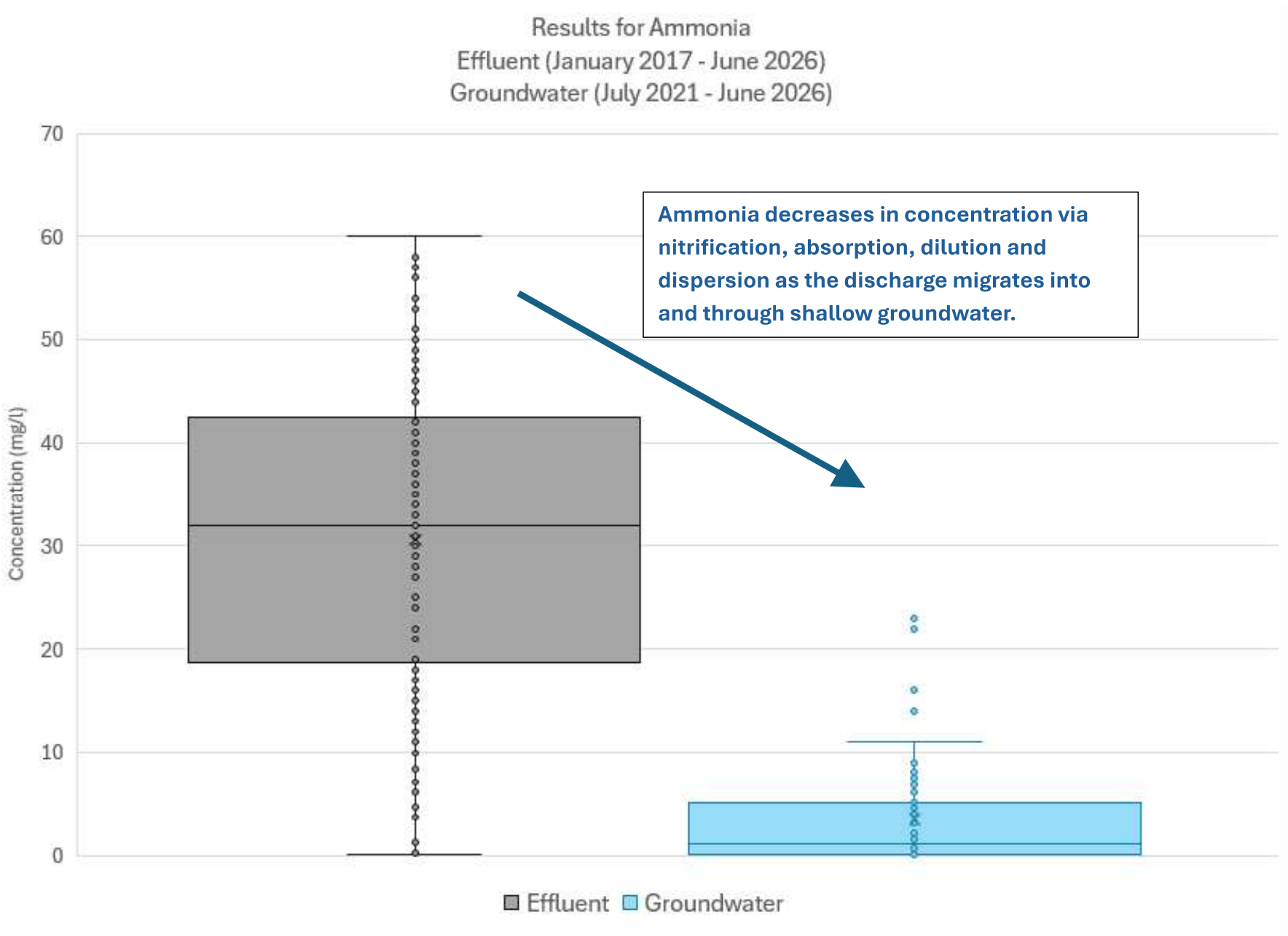


Groundwater Monitoring System - Dissolved Phosphorus





The results for groundwater are from the downgradient and sidegradient monitoring wells (MW-2B, MW-3, MW-4, MW-7 and MW-7B).



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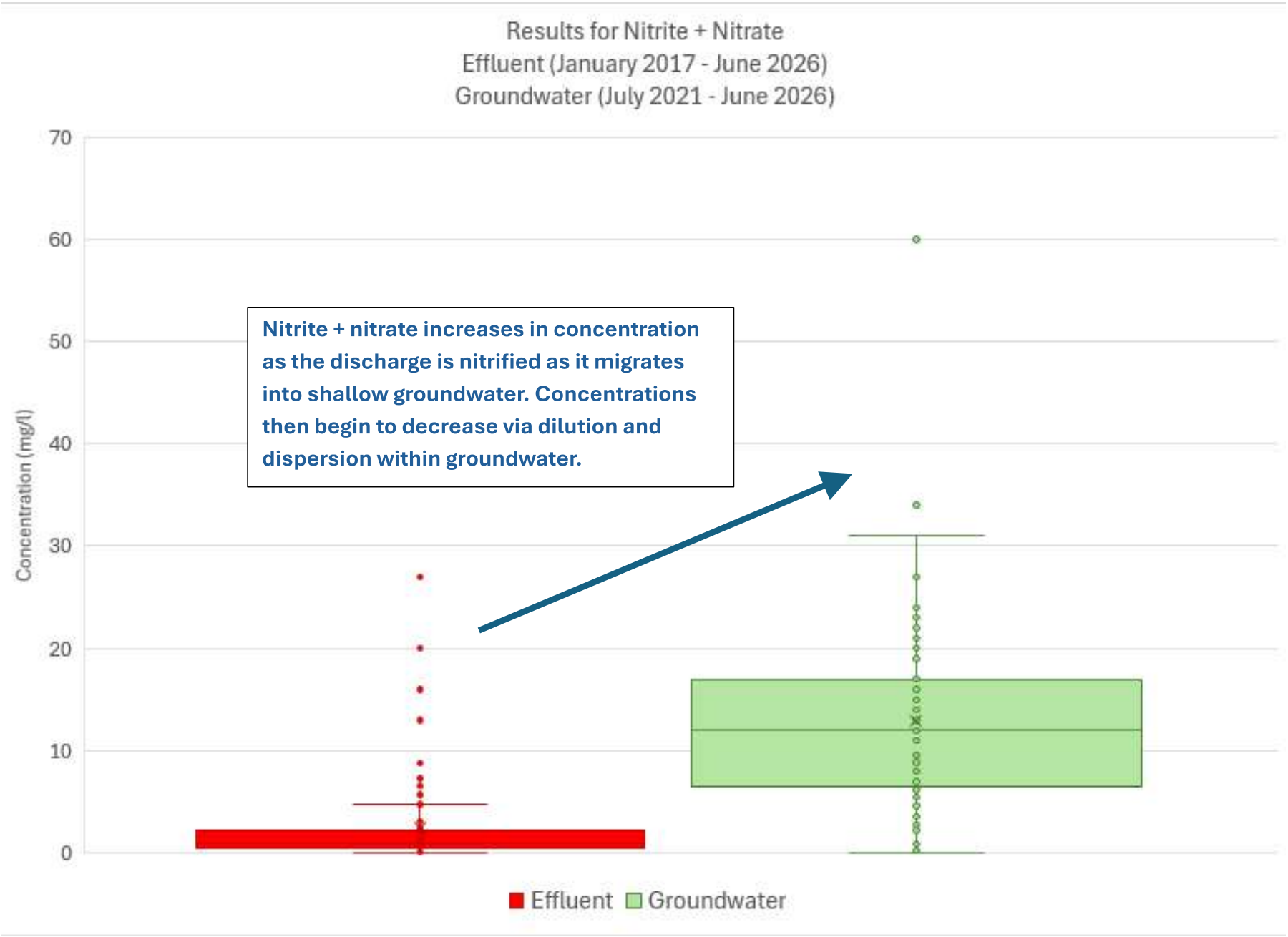

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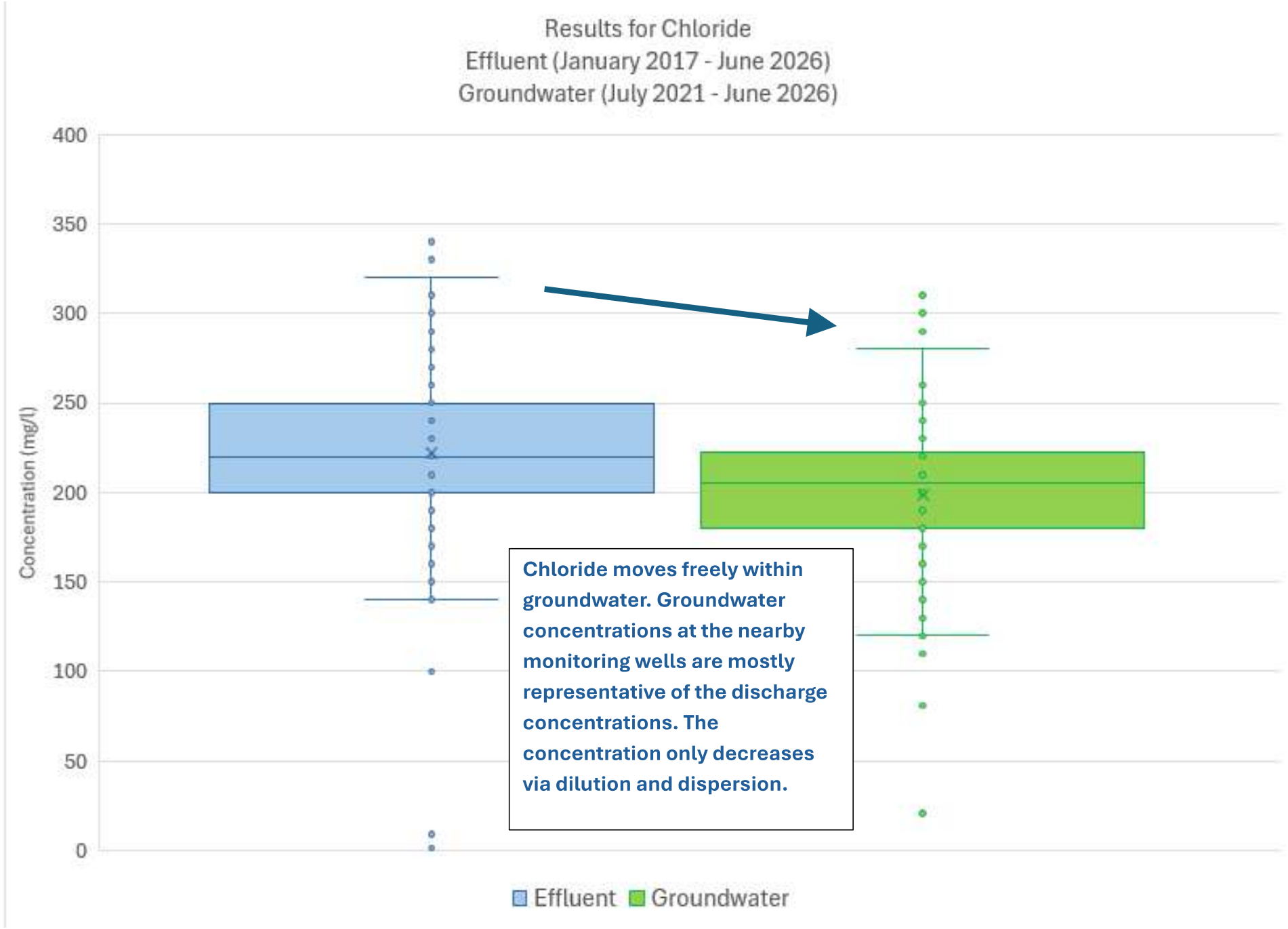

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