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December 15, 2022

Mr. Eric Donaldson, P.E.
Rib Mountain Metropolitan Sewerage District
151401 Aster Road
Wausau, WI 54401

Re: Wastewater Treatment Plant Facilities Plan and Phosphorus Final Compliance Alternatives Plan
Rib Mountain Metropolitan Sewerage District

Dear Mr. Donaldson:

Enclosed is the final copy of the Wastewater Treatment Plant Facilities Plan and Phosphorus Final Compliance Alternatives Plan for your review and comment. Pending the public hearing on January 10, 2022, Section 10: Public Participation will be added to the report at a later date.

Please call 608-251-4843 with questions.

Sincerely,

STRAND ASSOCIATES, INC.®

Randy Langer, P.E.

Enclosure: Report

c/enc: Andy Heise, Rib Mountain Metropolitan Sewerage District

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Wastewater Treatment Plant Facilities Plan and Phosphorus Final Compliance Alternatives Plan

Report

Rib Mountain

Metropolitan Sewerage

District, Wisconsin

December 2022

STRAND ASSOCIATES®

Report for

Rib Mountain Metropolitan Sewerage District

Wastewater Treatment Plant Facilities Plan and Phosphorus Final Compliance Alternatives Plan

WISCONSIN
RANDY J LANGER
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PROFESSIONAL ENGINEER

Randy J. Langer
12/15/2022

Prepared by:

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December 2022

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EXECUTIVE SUMMARY

SUMMARY OF REPORT

This Wastewater Treatment Plant Facilities Plan and Phosphorus Final Compliance Alternatives Plan report (Facilities Plan) includes a cost-effectiveness analysis and environmental information document in compliance with the Wisconsin Department of Natural Resources (WDNR) Administrative Code requirements for reviewable projects. The report does the following for use by the WDNR in its review of the Facility Plan:

1. Reviews the existing Rib Mountain Metropolitan Sewerage District (RMMSD) interceptor sewer (Section 2).

2. Reviews existing treatment facilities, flows, and loadings (Section 3).

3. Develops proposed design flows and loadings (Section 4).

4. Discusses the current and anticipated permit requirements (Section 5).

5. Evaluates the existing facilities and identifies plant needs (Section 6).

6. Evaluates alternatives for selected unit processes, provides opinions of probable cost for improvements, and recommends an implementation plan (Section 7).

7. Presents the recommended alternatives, recommended implementation schedule, and fiscal impact analysis (Section 8).

8. Includes an environmental impact summary (Section 9).

9. Documents the public participation efforts (Section 10)*.

**Pending public hearing*

This executive summary focuses on key elements of the Facilities Plan including the following:

1. Documentation of Needs
2. Recommended Plan Summary
3. Proposed Project Opinion of Probable Capital Costs
4. Impact of Recommended Plan on Operational, Replacement and Maintenance Costs
5. Proposed Plan Project Financing
3. Proposed Plan Fiscal Impact
4. Proposed Plan Implementation Schedule
5. Recommendations for RMMSD Commission

DOCUMENTATION OF NEEDS

The review of the plant performance, conditions, assessment anticipated regulatory requirements, and plant hydraulics identified the following critical needs:

1. Phosphorus Removal Requirements

   More stringent phosphorus limits as a result of the Wisconsin River total maximum daily load (TMDL) have been finalized that require increased phosphorus removal by chemical addition, tertiary filtration, or another solution.

2. Age of the Equipment and Facilities

   Since most of the processes and facilities were constructed as a part of the original plant in 1986, these facilities have exceeded the typical design life of 20 years and are nearing 40 years in service. Each facility and/or process was reviewed for structural, mechanical, and electrical (including instrumentation and controls) adequacy.

3. Biosolids Disposal Challenges

   RMMSD has been experiencing increased difficulty in finding and securing sites for land application, in addition to shortened application windows due to changing cropping practices and weather patterns. This has, and will continue to, result in RMMSD needing more land for the same amount of biosolids, which increases biosolids disposal costs. This Facilities Plan explores cost-effective alternatives for beneficial reuse of biosolids.

These challenges need to be addressed to satisfy the long-term facilities planning needs for the RMMSD Wastewater Treatment Plant (WWTP).

RECOMMENDED PLAN SUMMARY

RMMSD completed the Phase 1 WWTP Upgrades in 2018. The recommended plan presented in detail in Section 8 of the Facilities Plan addresses all the documented needs for the RMMSD WWTP and provides effective reuse of existing facilities along with appropriate modifications and additions to allow for successful operation for the next 20 years and beyond. The recommended second phase project involves updating aging facilities and processes at the WWTP. Phase III includes modifications to existing processes to address upcoming future total nitrogen limits and future stresses to the liquids biosolids program. Figure ES-1 depicts the key recommended plan elements for phases II and III. The recommended plan includes the following items (Phase III recommended improvements are shown in italics):

1. Improve the Influent Pumping Station with new variable frequency drives, wet well floats and transducers, a new force main to the Preliminary Treatment Building and dry well heating, ventilation, and air conditioning (HVAC) improvements.

2. Improve electrical facilities across the site by replacing motor control centers (MCCs) and supervisory control centers, replacing the backup generator, and installing a new MCC in the Preliminary Treatment Building.

3. Improve the Preliminary Treatment Building with a new mechanical screen and wash press, slide gate replacement, HVAC replacement, and concrete repairs in the aerated grit tank.

4. Improve Primary Sedimentation with new primary clarifier drives, new primary sludge pumps, and repowering the primary clarifier equipment from the new MCC in the Preliminary Treatment Building.

5. Improve the Aeration Basins by replacing diffusers and air piping in Tanks 1, 2, and 3.

6. *Replace the final clarifier mechanisms and add energy dissipating inlets.*

7. Improve the biosolids processes by replacing dissolved air flotation device equipment, replacing HVAC in the Biosolids Processing Building, and replacing a biosolids holding tank mixer.

8. Address upcoming phosphorus limits by adding a second chemical storage tank in a new room within the Solids Processing Building.

9. Improve the anaerobic digesters and digester complex by replacing digester covers, replacing the primary digester mixing pump, constructing a new room adjacent to the digester complex to house replaced gas safety and handling equipment, replacing the waste gas burner, removing the biogas engine generators, and replacing HVAC.

10. *Improve the anaerobic digesters and digester complex by replacing the boiler/heat exchanger for the digesters, replacing the HVAC boiler, and replacing the recirculation pumps.*

11. Replace the nonpotable water system.

12. Replace tunnel HVAC.

13. Replace phosphorus removal chemical yard piping.

14. *Improve the aeration basins with expanded capacity for future total nitrogen limits.*

15. *Improve the biosolids management program by implementing dewatering or drying before disposal of biosolids.*

PROPOSED PROJECT OPINION OF PROBABLE CAPITAL COSTS

The opinion of probable costs for each major component of project Phases II and III are shown in Table ES-1. The opinion of probable capital costs for Phase II is $20,813,000. The opinion of probable capital costs for Phase III is $2,742,000.

	Opinion of Capital Costs	
Item	**Phase II**	**Phase III**
Alternative P1	$1,356,000	$72,000
Influent Pumping Station	$2,817,000	$0
Preliminary Treatment	$2,922,000	$0
Primary Clarifiers	$799,000	$0
Aeration Tanks	$935,000	$0
Final Clarifiers	$0	$696,000
Biosolids	$2,643,000	$0
Anaerobic Digestion	$8,806,000	$1,974,000
Miscellaneous	$532,000	$0
Total	**$20,813,000**	**$2,742,000**

Table ES-1 Phased Project Costs

IMPACT OF RECOMMENDED PLAN ON OPERATIONAL, REPLACEMENT, AND MAINTENANCE COSTS

The Phase II improvements are expected to have a neutral effect on the operation, maintenance, and replacement costs. With the replacement of many aged equipment items, it is very likely that the overall maintenance costs will be decreased through adoption of the recommended plan. However, the upcoming phosphorus limits will increase operational costs as chemical usage increase to meet these limits.

As part of the loan application and closing process for each phased project, a new replacement fund annual deposit will be calculated by subtracting any abandoned or removed equipment allocations and adding appropriate allocations for new equipment. RMMSD reviews its rates on an annual basis. Any operation, maintenance, and replacement costs that increase over time and require additional revenue can be included in annual rate modifications. The annual rate reviews would address needs from impacts such as inflation, increased electrical and natural gas rates, and increase staff compensation or benefit expenses.

PROPOSED PLAN PROJECT FINANCING

The proposed project will be financed by the State of Wisconsin Clean Water Fund Program (CWFP). Table ES-2 provides a summary of the anticipated funding components, an anticipated loan rate, and an estimated annual debt service payment.

	Phase II Improvements
Opinion of Probable Cost[1]	$22,412,000
CWFP Loan Amount	$22,412,000
Anticipated Loan Rate	2.145%
Estimated Annual Debt Service Payment	$1,390,000

[1]Opinion of probable cost projected to the anticipated cost at loan closing.

Table ES-2 Summary of Funding for Phase I Improvements (Fourth Quarter, 2022 Dollar Basis)

PROPOSED PLAN FISCAL IMPACT

Based on the projected debt service payment of $1,390,000, a preliminary analysis of the impact on sewer user charges was made. The first principal and interest payment would be due around substantial completion of the project (June 2027). Therefore, sewer rate increases could be phased in over the next 4 years. The current annual revenue for RMMSD is $2,300,000. Based on the estimated increase in annual debt service required for the project, a total increase in revenue of approximately 60 percent is required. Projected operation and maintenance expenses for 2023 are approximately $1,718,963. Existing debt service is $261,948 annually. New debt service associated with this project is anticipated to be approximately $1,390,000 based on current interest rates. An annual reserve of approximately $550,000 is anticipated in 2023 to fund the required annual equipment replacement fund deposit and provide other necessary reserve funds. With the anticipated annual reserves, the annual debt coverage ratio would be greater than the minimum 1.1 debt coverage ratio required by the CWFP.

PROPOSED PLAN IMPLEMENTATION SCHEDULE

This section presents a recommended plan for implementation of the Phase II project, consistent with applicable Wisconsin CWFP requirements. Table ES-3 presents a proposed implementation schedule based on completing construction of the phosphorus portion of the project by December 2025. All aspects of the planning and design of this project need to be completed and approved by the WDNR to secure the CWFP loan and implement the recommended plan.

Task	Schedule Date
Public Hearing on Facilities Plan	January 2023
Submit Final Facilities Plan and FCAP to WDNR	January 2023
Begin Design	February 2023
Site Survey	March 2023
Soil Borings	March 2023
Pass Reimbursement Resolution	March 2023
Submit Drawings and Specifications to WDNR	November 2023
Submit CWF Program Loan Application	November 2023
WDNR Plan and Specification Approval	February 2023
Publish Advertisement to Bid	March 2024
Bid Opening	April 2024
Begin Construction	June 2024
Complete Phosphorus Alternative Construction	December 2025
Complete Construction	June 2027

Note: FCAP=Final Compliance Alternatives Plan

Table ES-3 Proposed Project Implementation Schedule

RECOMMENDATIONS–RMMSD COMMISSION ACTION

1. Submit Draft Facilities Plan to WDNR for review.

2. Schedule a public hearing on the Facilities Plan for January 2023.

3. Prepare a Record of Public Hearing following the public hearing. The record will address comments and suggestions made by the public, and any modifications to the proposed report as a result of public comment will be identified. The hearing records should then be sent to the WDNR for its review in conjunction with the Environmental Information Document and Cost-Effective Analysis. RMMSD should pass a motion to accept the Facilities Plan.

4. The North Central Regional Planning Commission should pass a reimbursement resolution in compliance with CWFP requirements for purposes of funding the project prior to the CWFP loan closing.

5. Begin preparation of drawings and specifications for the recommended Phase II improvements to allow obtaining a CWFP loan on a timely basis.

6. Submit a CWFP loan application document with the drawings and specifications. The submittal needs to include proposed modifications to the user charge system.

SECTION 1
INTRODUCTION

This section describes the purpose and scope of this report and the location of the study area. It also summarizes previous and related studies and reports. A list of definitions is provided as an aid to the reader.

1.01 PURPOSE AND SCOPE OF REPORT

The Rib Mountain Metropolitan Sewerage District (RMMSD) operates a wastewater treatment plant (WWTP) that treats primarily domestic wastewater. This facility and the RMMSD's interceptor sewer began operation in January 1986.

This Wastewater Treatment Facilities Plan (Facilities Plan) was prepared for the purpose of developing an overall plan for wastewater management at the RMMSD WWTP for the next 20 years. This Facilities Plan must be implemented to meet the requirements of federal and state regulations related to water quality in the Wisconsin River and to maintain the significant investment RMMSD has made at the WWTP.

This Facilities Plan additionally serves as the Final Compliance Alternatives Plan (FCAP) for RMMSD. This plan must be submitted to meet the requirements of the Water Quality Based Effluent Limits (WQBELs) for phosphorus detailed in RMMSD's Wisconsin Pollutant Discharge Elimination System (WPDES) permit.

The treatment facility consistently achieves compliance with all WPDES requirements. Average wastewater flows and pollutant loadings to the treatment plant have generally been below the WWTP's rated capacity (refer to Appendix A for a copy of the WPDES permit). However, several issues require a comprehensive review of the facility including:

1. Phosphorus Removal Compliance

   More stringent phosphorus limits as a result of the Wisconsin River total maximum daily load (TMDL) are being proposed that RMMSD must meet in the compliance schedule included in the WPDES permit.

2. Age and Use of the Equipment and Facilities

   Since most of the processes and facilities were constructed as a part of the original WWTP in 1986, these facilities have exceeded the typical design life of 20 years and are more than 30 years old. Each facility and/or process was reviewed for structural, mechanical, and electrical (including instrumentation and controls) adequacy.

1.02 LOCATION OF STUDY

The RMMSD WWTP serves five communities of Marathon County in a region known as the 208 Sewer Service Area that contributes wastewater to the RMMSD WWTP. These five communities include parts of the Town of Rib Mountain (Rib Mountain), the Village of Rothschild (Rothschild), part of the Village of Weston (Weston), the Village of Kronenwetter (Kronenwetter), and the City of Mosinee (Mosinee). The

208 Sewer Service Area is shown in Figure 1.02-1. An aerial photograph of the existing RMMSD WWTP is shown in Figure 1.02-2.

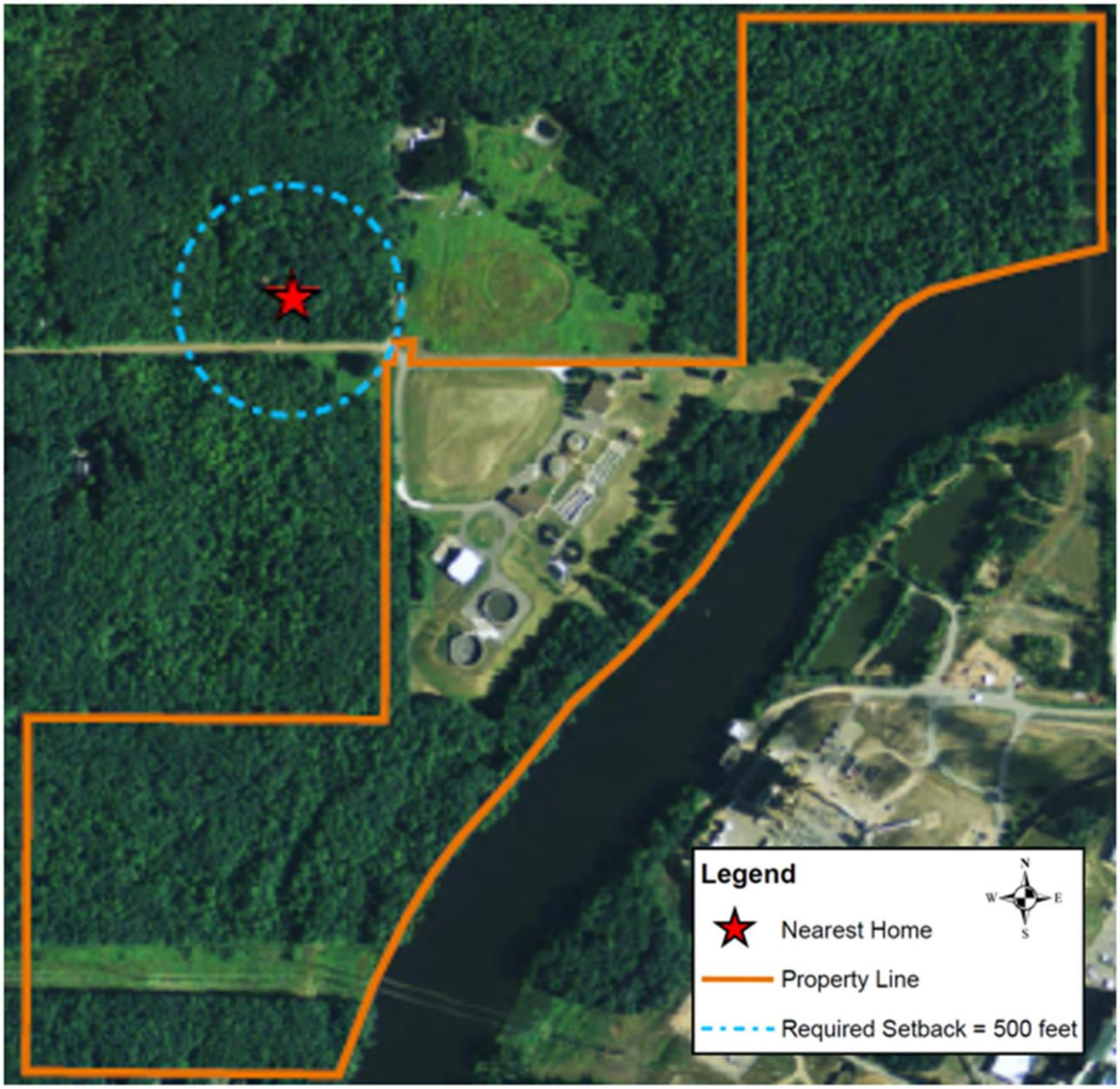
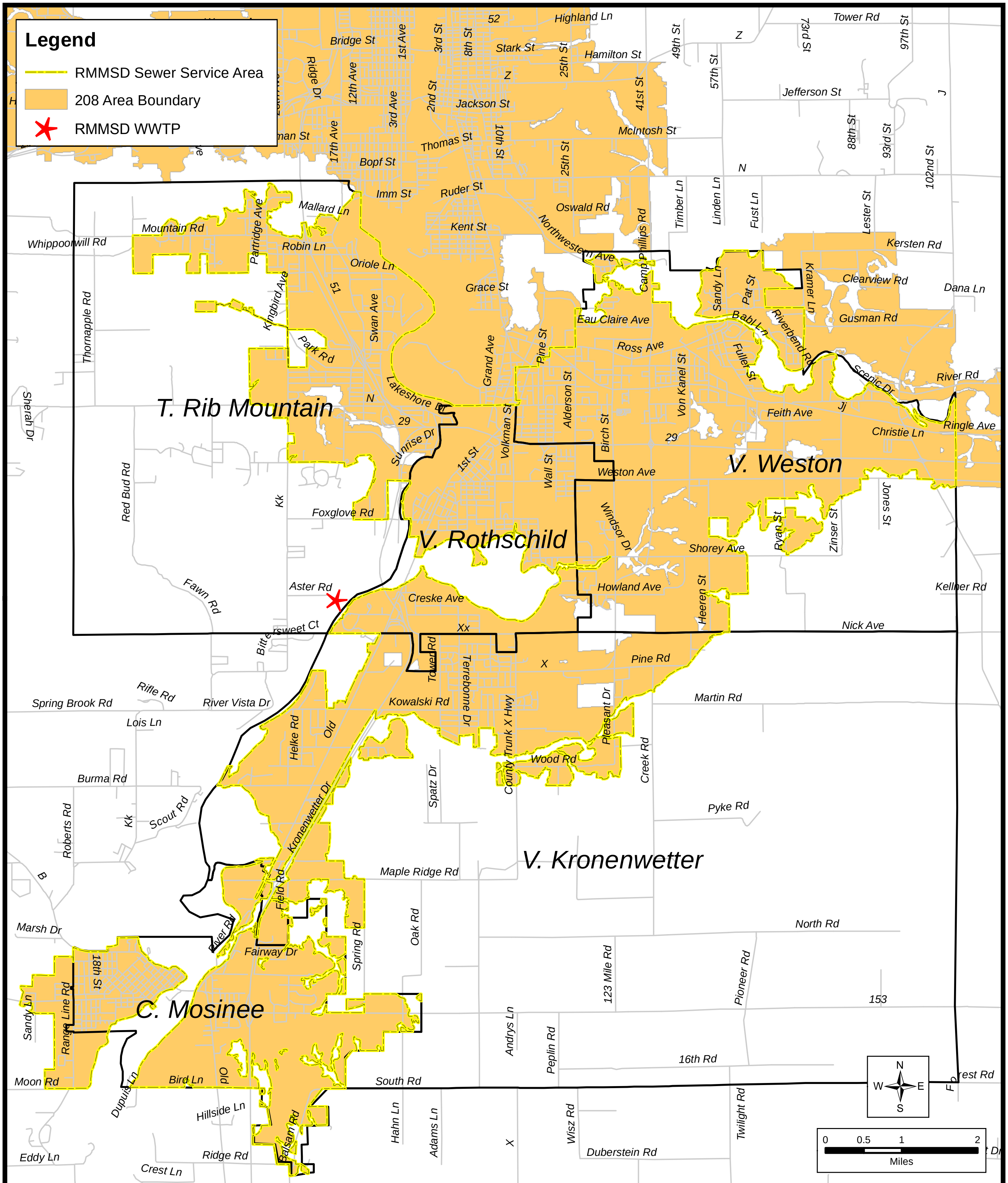


Figure 1.02-2 Aerial Photograph of Existing RMMSD WWTP

1.03 RELATED STUDIES AND REPORTS

The following drawings, specifications, and reports were used in the preparation of this Facilities Plan for background information, existing design criteria, and other information as required.



RMMSD SEWER SERVICE AREA

FACILITY PLANNING
RIB MOUNTAIN METROPOLITAN SEWERAGE DISTRICT
MARATHON COUNTY, WISCONSIN

Information provided by Marathon County Planning and Zoning

STRAND ASSOCIATES®

FIGURE 1.02-1
1165.020

A. Phase I WWTP Upgrades, drawings prepared by Strand Associates Inc. ® (Strand), December 2018.

B. *Wastewater Facilities Plan*, Strand, December 2015.

C. *Interceptor Capacity Evaluation,* Strand, 2011.

D. *Facilities Upgrade and Long-Range Strategic Plan*, Strand, December 2009.

E. *Rib Mountain UV Disinfection Facilities for the Rib Mountain Metropolitan Sewerage District*, drawings prepared by Strand, August 2009.

F. *Sludge Storage Facilities for the Rib Mountain Metropolitan Sewerage District*, drawings prepared by Strand, January 2009.

G. *2025 Wausau Urban Area Sewer Service Plan*, Becher-Hoppe Associates, Inc., June 2007.

H. *Facilities Upgrade and Long-Range Strategic Plan*, Strand, October 2001.

I. *Wastewater Treatment Plant Improvements for the Rib Mountain Metropolitan Sewerage District*, drawings prepared by Strand, March 2001.

J. *Sludge Storage Facilities for the Rib Mountain Metropolitan Sewerage District*, drawings prepared by Strand, November 1999.

K. *Report of Sludge Storage Facilities Planning Amendment*, Strand, July 1999.

L. *Petenwell and Castle Rock Flowages Comprehensive Management Plan*, PubI-WR0422-95, Wisconsin Department of Natural Resources (WDNR), January 1996.

M. *Operation and Maintenance Manual for Wastewater Treatment Rib Mountain Metropolitan Sewerage District*, Strand, August 1985.

N. *Water Pollutions Control Facilities for Rib Mountain Metropolitan Sewerage District, Marathon County, Wisconsin*, drawings prepared by Strand, January 1984.

1.04 ABBREVIATIONS AND DEFINITIONS

°F	Fahrenheit
μg/L	micrograms per liter
A/O	anoxic-oxic
ACL	alternative concentration limit
AM	adaptive management
ATS	automatic transfer switch
BMP	best management practices

BOD_5	five-day biochemical oxygen demand
BPR	biological phosphorus removal
cfs	cubic feet per second
cfu/100 mL	colony forming units per 100 milliliters
CMAR	Compliance Maintenance Annual Report
CMOM	Compliance, Management, Operation, and Maintenance
COD	chemical oxygen demand
CPR	chemical phosphorus removal
cu ft	cubic feet
CWF	Clean Water Fund
DAFT	dissolved air flotation device
DO	dissolved oxygen
Facilities Plan	Wastewater Treatment Plant Facilities Plan
FCAP	Final Compliance Alternatives Plan
FOE	Focus on Energy
fps	feet per second
ft	feet
ft/ft	feet per foot
ft^2	square feet
FTU	formazine turbidity unit
gal/ft/day	gallons per foot per day
gfd	gallons per square foot per day
gpcd	gallons per capita per day
gpd/sq ft	gallons per day per square foot
gpm	gallons per minute
HGL	hydraulic grade line
HMI	Human Machine Interface
HVAC	heating, ventilation, and air conditioning
I/I	infiltration and inflow
in	inches
lb/day	pounds per day
lb/hr	pounds per hour
lb/sq ft/h	pounds per square foot per hour
LED	light-emitting diode
MCC	motor control center
MDV	multidischarger variance
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MGD	million gallons per day
MH	manhole
MHI	medium household income
ML	mixed liquor
MLE	Modified Ludzack-Ettinger
MLSS	mixed liquor suspended solids
MPN	most probable number

MS4s	municipal separate storm sewer systems
NFPA	National Fire Protection Administration
ng/L	nanograms per liter
NH_3-N	ammonia nitrogen
NRDC	Natural Resources Defense Council
NTU	turbidity units of measurement
O&M	operation and maintenance
OPCC	opinion of probable capital cost
OTE	oxygen transfer efficiency
PAC	poly-aluminum chloride
pcd	pounds per capita per day
PERF	Priority Evaluation and Ranking Form
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PI	plant influent
PLC	programmable logic controller
PMP	pollutant minimization program
POTW	publicly owned treatment works
PRE	primary effluent
PRF	process return flow
PRS	primary sludge
psig	pounds per square inch gauge
PVC	polyvinyl chloride
RAS	return activated sludge
RMMSD	Rib Mountain Metropolitan Sewerage District
RW	raw wastewater
SCADA	supervisory control and data acquisition
SCC-E	supervisory control center
scfm	standard cubic feet per minute
SE	secondary effluent
SES	Service Entrance Switchboard
sq ft	square feet
SSO	sanitary sewer overflow
Strand Associates, Inc.®	Strand
su	standard unit
TKN	total Kjeldahl nitrogen
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
TPAD	temperature-phased anaerobic digestion
TSS	total suspended solids
TU_a	toxic unit acute
TWAS	thickened waste activated sludge
USEPA	United States Environmental Protection Agency

UV	ultraviolet
VFA	volatile fatty acids
VFD	variable frequency drive
WAC	Wisconsin Administrative Code
WAS	waste activated sludge
WAS/lb	waste activated sludge per pound
WDNR	Wisconsin Department of Natural Resources
WDOA	Wisconsin Department of Administration
WEF	Water Environment Federation
WET	whole effluent toxicity
WLA	waste load allocation
WPDES	Wisconsin Pollutant Discharge Elimination System
WQBEL	water quality-based effluent limit
WQT	water quality trading
WWTP	wastewater treatment plant

SECTION 2
EVALUATION OF EXISTING INTERCEPTOR SEWER

2.01 BACKGROUND

RMMSD owns and maintains the interceptor sewer that brings wastewater to the WWTP. The sewer was constructed in 1986 and has been maintained routinely since installation. The original interceptor location plan is shown in Figure 2.01-1. The sewer extends 9,967 feet in length and has 51 manholes (MH). The interceptor is 36 inches in diameter from MH 1 to MH 7 and is set at a 0.14 slope with a capacity of 16.2 million gallons per day (MGD). From MH 7 to MH 14, the interceptor is 36 inches in diameter and is set at a 0.11 percent slope with a capacity of 14.4 MGD. The remaining portion of the interceptor from MH 14 to MH 21 is 30 inches in diameter and is set at a 0.17 percent slope with a capacity of 11 MGD. From MH 21 to MH 22, the interceptor is 24 inches in diameter and is set at a 0.16 percent slope with a capacity less than 11 MGD. Beyond the interceptor, individual communities own their collection systems.

The interceptor condition is routinely monitored by televised inspections. It is in good condition and identified issues are addressed as soon as possible. The interceptor was evaluated in 2011 as part of adding Mosinee to RMMSD. Rehabilitation of the interceptor segments from MHs 6 to 8 was completed in 2021 using cure-in-place pipe lining. MH 7 was rehabilitated in 2020 using a cure-in-place manhole liner.

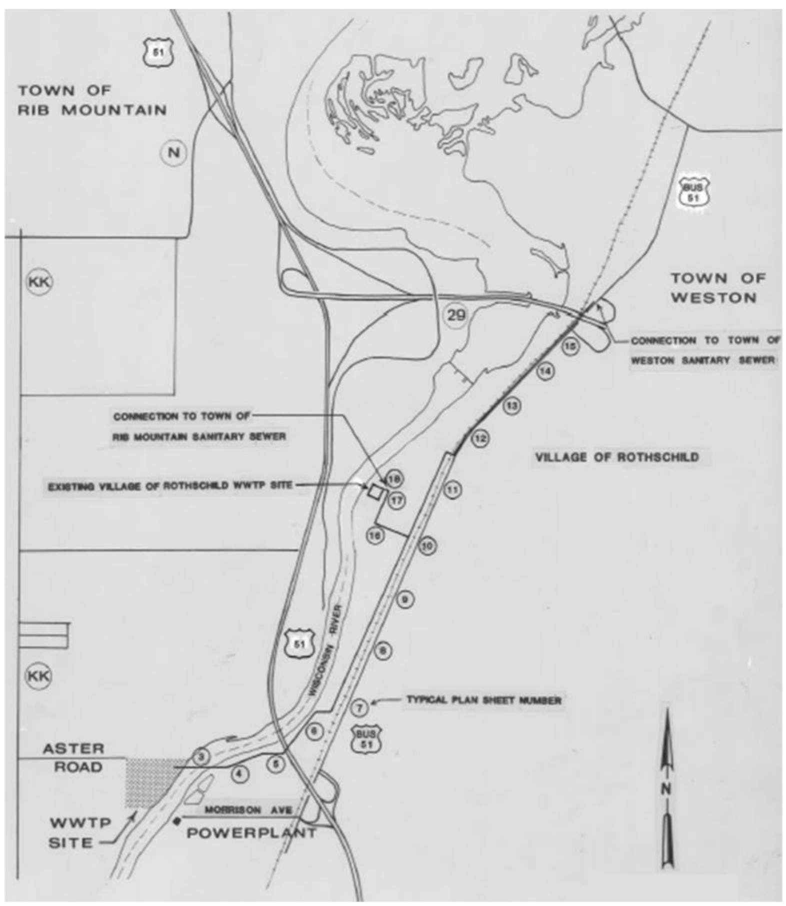


Figure 2.01-1 Sewer Interceptor Location Plan

2.02 INFILTRATION AND INFLOW EVALUATION

Per capita infiltration and inflow (I/I) are identified in Section 4 of this report using the metered flow method. The peak day flow is approximately twice the average dry weather flow. This is comparable to other similar facilities and does not indicate there is excessive I/I.

2.03 PLANNED FUTURE INTERCEPTOR SEWER IMPROVEMENTS

The interceptor capacity was evaluated in 2011 for 2030 and 2050 flows. At the time of the evaluation, the 2030 peak hour instantaneous flow was 9.8 MGD, the 2030 peak instantaneous flow was 14.1 MGD, the 2050 peak hour instantaneous flow was 14.7 MGD, and the 2050 peak instantaneous flow was 21.3 MGD. The conclusions of that capacity analysis are included in Table 2.03-1. The interceptor was projected to have sufficient capacity for 2030 and 2050 flows. When the capacity is compared to the 2050 system flow, capacity is exceeded in the MH 20 to MH 14 section of the interceptor. Flow from the Cedar Creek Pumping Station will need to be relocated to MH 14 before this. The hydraulic grade line of the system in 2050 after relocating the Cedar Creek flow from MH 19 to MH 14 is shown in Figure 2.03-1. Calculations in this figure use Manning's equation to calculate velocity for a full-flowing pipe. The interceptor has sufficient capacity through 2045, which is the timeline of this Facilities Plan. During the interim, RMMSD should continue to monitor and maintain the interceptor and meet the requirements of the Compliance, Management, Operation, and Maintenance (CMOM) program as outlined in Section 5 of this Facilities Plan.

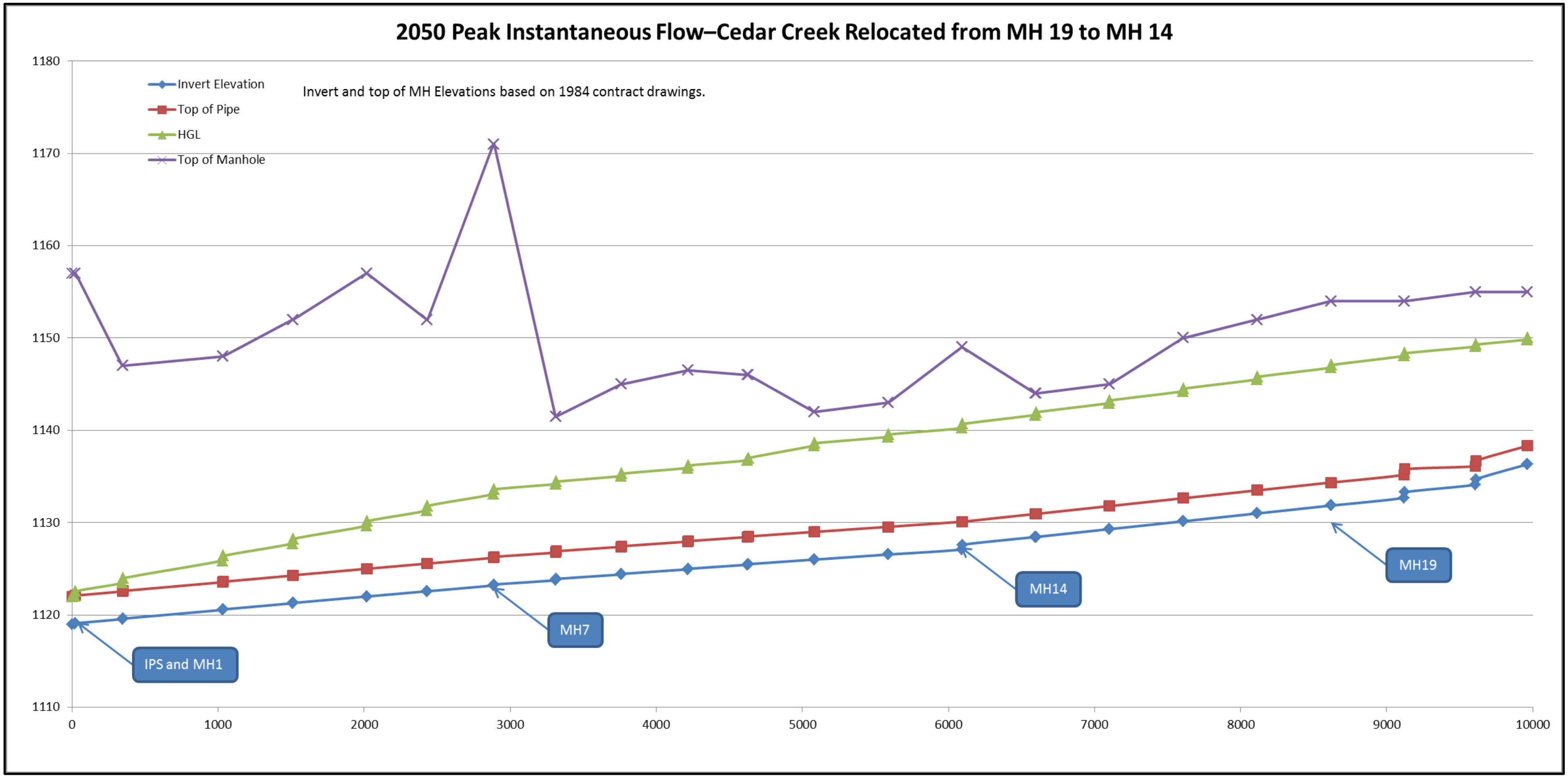
Table 2.03-1 RMMSD Interceptor Capacity Calculation

Manhole Identification		Upstream Manhole		Downstream Manhole		Pipe Length (ft)	Pipe Size (in)	Pipe Slope		Pipe Area (ft^2)	Mannings Number	Calculated Velocity (fps)	Calculated Capacity		
Upstream Manhole	Downstream Manhole	Rim Elevation	Outgoing Pipe Elevation	Rim Elevation	Incoming Pipe Elevation			(%)	ft/ft				(cfs)	(gpm)	(MGD)
MH 20 to MH 14 (30-inch segment at 0.17%)															
20	19	1,154.00	1,132.70	1,154.00	1,131.85	500	30	0.17	0.0017	4.91	0.014	3.21	15.75	7,067	10.18
19	18	1,154.00	1,131.85	1,152.00	1,131.00	500	30	0.17	0.0017	4.91	0.014	3.21	15.75	7,067	10.18
18	17	1,152.00	1,131.00	1,150.00	1,130.15	500	30	0.17	0.0017	4.91	0.014	3.21	15.75	7,067	10.18
17	16	1,150.00	1,130.15	1,145.00	1,129.30	500	30	0.17	0.0017	4.91	0.014	3.21	15.75	7,067	10.18
16	15	1,145.00	1,129.30	1,144.00	1,128.45	500	30	0.17	0.0017	4.91	0.014	3.21	15.75	7,067	10.18
15	14	1,144.00	1,128.45	1,149.00	1,127.60	500	30	0.17	0.0017	4.91	0.014	3.21	15.75	7,067	10.18
MH 14 to MH 7 (36-inch segment at 0.11%)															
14	13	1,149.00	1,127.10	1,143.00	1,126.55	500	36	0.11	0.0011	7.07	0.014	2.91	20.60	9,244	13.31
13	12	1,143.00	1,126.55	1,142.00	1,126.00	500	36	0.11	0.0011	7.07	0.014	2.91	20.60	9,244	13.31
12	11	1,142.00	1,126.00	1,146.00	1,125.50	450	36	0.11	0.0011	7.07	0.014	2.93	20.70	9,290	13.38
11	10	1,146.00	1,125.45	1,146.50	1,125.00	405	36	0.11	0.0011	7.07	0.014	2.93	20.70	9,290	13.38
10	9	1,146.50	1,124.95	1,145.00	1,124.45	450	36	0.11	0.0011	7.07	0.014	2.93	20.70	9,290	13.38
9	8	1,145.00	1,124.39	1,141.50	1,123.90	445	36	0.11	0.0011	7.07	0.014	2.92	20.61	9,248	13.32
8	7	1,141.50	1,123.76	1,171.00	1,123.30	420	36	0.11	0.0011	7.07	0.014	2.91	20.55	9,224	13.28
MH 7 to MH 1 (36-inch segment at 0.14%)															
7	6	1,171.00	1,123.20	1,152.00	1,122.57	450	36	0.14	0.0014	7.07	0.014	3.29	23.24	10,428	15.02
6	5	1,152.00	1,122.57	1,157.00	1,122.00	410	36	0.14	0.0014	7.07	0.014	3.28	23.15	10,392	14.96
5	4	1,157.00	1,122.00	1,152.00	1,121.30	500	36	0.14	0.0014	7.07	0.014	3.29	23.24	10,428	15.02
4	3	1,152.00	1,121.27	1,148.00	1,120.60	475	36	0.14	0.0014	7.07	0.014	3.30	23.32	10,467	15.07
3	2	1,148.00	1,120.55	1,147.00	1,119.60	680	36	0.14	0.0014	7.07	0.014	3.28	23.21	10,417	15.00
2	1	1,147.00	1,119.55	1,157.00	1,119.10	320	36	0.14	0.0014	7.07	0.014	3.29	23.29	10,452	15.05

Summary	Calculated Capacity		
	(cfs)	(gpm)	(MGD)
MH 20 to MH 14 (30-inch segment at 0.17%)	**15.75**	**7,067**	**10.18**
MH 14 to MH 7 (36-inch segment at 0.11%)	**20.64**	**9,262**	**13.34**
MH 7 to MH 1 (36-inch segment at 0.14%)	**23.24**	**10,431**	**15.02**

Notes: Calculations use Manning's equation to calculate velocity for a full-flowing pipe.
ft=feet; in=inches; ft/ft=feet per foot; ft^{2}=square feet; fps=feet per second; cfs=cubic feet per second, gpm=gallons per minute

Figure 2.03-1 Interceptor 2050 Peak Instantaneous Flow–Cedar Creek Relocated



Note: HGL=hydraulic grade line

SECTION 3
DESCRIPTION OF EXISTING WASTEWATER TREATMENT FACILITIES

3.01 BACKGROUND

RMMSD owns and operates the RMMSD WWTP that provides wastewater treatment to the residents and businesses in portions of Rib Mountain, Rothschild, parts of Weston, Kronenwetter, and Mosinee. The WWTP has been operating since January 1986. The facility has had interim upgrades for biosolids storage, wastewater screening, phosphorus removal, and ultraviolet (UV) disinfection. The facility underwent an improvements project in 2018 that included influent dry pit piping replacement, electrical lighting replacements, removal of the belt filter presses, and construction of a new operations building, but much of the WWTP processes are the same as they were originally installed.

The current liquid treatment facilities include influent pumping, raw wastewater screening and grit removal, primary sedimentation, activated sludge treatment with chemical phosphorus removal (CPR), final clarification, UV disinfection, and cascade aeration. The solids processing facilities include waste activated sludge (WAS) thickening by dissolved air floatation (DAFT), primary and secondary stage anaerobic digestion of primary and thickened waste active sludge (TWAS), and liquid biosolids storage. Biogas generated during anaerobic digestion is used to fire a hot water boiler that provides heat to the digestion process, digester building, and solids processing building. In addition, excess biogas is occasionally used to operate gas generators during peak electrical demand hours.

The facilities were designed for a design average flow of 4.41 MGD and an average daily five-day biochemical oxygen demand (BOD_5) loading of 8,529 pounds per day (lb/day). The average daily design total suspended solids (TSS) is 9,798 lb/day. Figure 3.01-1 shows a process flow diagram. Existing design criteria is included in Appendix B.

3.02 UNIT PROCESS DESCRIPTIONS

This subsection summarizes the WWTP unit processes.

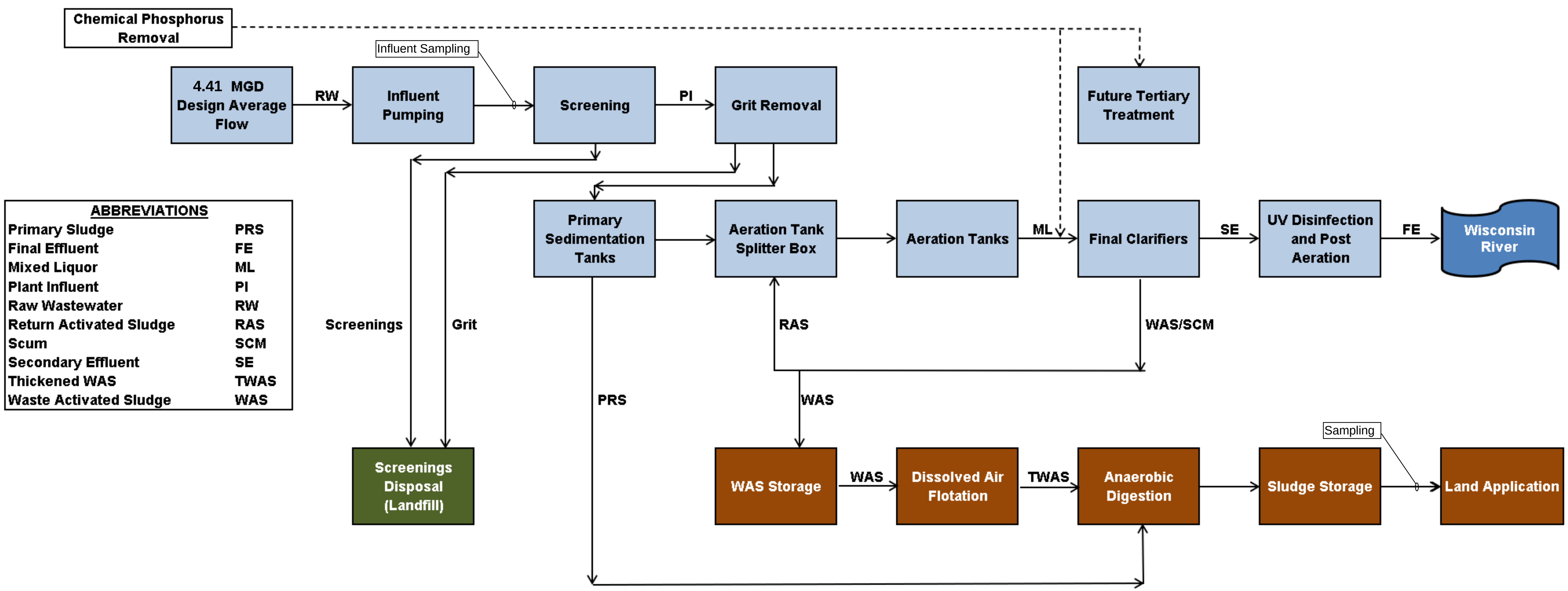
A. Influent Pumping Station

In the influent wet well, raw wastewater (RW) is mixed with plant sewer recycle flows. This mixture of wastewater, called plant influent (PI), is pumped via a 20-inch-diameter force main to the preliminary treatment facilities. There are five pumps (four plus one backup) in the dry well. The pumps share two variable frequency drives (VFDs).

B. Preliminary Treatment

PI is discharged to an open channel and flows through a mechanical step screen. The step screen removes rags and large solids from the wastewater. Screenings discharge to a wash press that partially cleans and compresses the screenings before discharge to a bagged disposal unit. The screenings are then hauled to a landfill. A bypass bar screen is also provided. After passing through the step screen, the PI is metered using a Parshall flume and discharged into the aerated grit tank. Coarse inorganic material is removed in the grit tank, partially dewatered, and discharged to a bagging unit. This material is also hauled to a landfill. From the grit tank, PI flows to a division box where it is split into three equal streams and flows to the primary sedimentation tanks.

RIB MOUNTAIN METROPOLITAN SEWERAGE DISTRICT - PROCESS SCHEMATIC



PROCESS SCHEMATIC
RIB MOUNTAIN, WISCONSIN

STRAND ASSOCIATES®

FIGURE 3.01-1
1165.020

C. Primary Sedimentation

The three primary sedimentation tanks allow removal of a portion of the settable solids, and with this material, approximately 50 percent of the influent BOD_5 is removed; this is greater than the typical removal rate of approximately 30 percent. Typical TSS removal through primary sedimentation is 50 percent. Removal of TSS through RMMSD's primary sedimentation is expected to exceed the typical rates based on the high BOD_5 removal rates. Settled solids are pumped to the primary digester as raw primary sludge (PRS). Clarified wastewater that leaves the tanks, called primary effluent (PRE), flows to the aeration tanks for biological treatment.

D. Activated Sludge Treatment and Phosphorus Removal

Before entering the four aeration tanks, the PRE is mixed with return activated sludge (RAS) to form mixed liquor (ML). Within the aerated ML, an active mass of organisms is produced and sustained that stabilizes organic material. The ML flows out of the aeration tanks and into the final clarifiers. Phosphorus removal chemical is added at the division box before the final clarifiers to meet WPDES permit effluent phosphorus limits. RMMSD currently uses polyaluminum chloride (PAC) to chemically remove phosphorus.

E. Final Clarification

Two center-feed clarifiers remove solids from the ML leaving the aeration tanks. Settled solids from the clarifiers are returned to the aeration tanks as RAS or wasted as WAS to the DAFT tanks. Clarified wastewater flows to the UV disinfection system as secondary effluent (SE).

F. Disinfection

SE enters the UV disinfection channel and is disinfected by an open-channel, low-pressure, high-intensity UV lamp system. A Parshall flume meters the flow before discharge to a cascade aerator. The cascade aerator at the south end of the tank functions as a postaeration system to add oxygen to the plant effluent. The UV disinfection system operates seasonally from May through October.

G. Solids Processing

The existing solids handling system includes DAFT tanks for WAS thickening. TWAS and primary sludge are pumped to the primary digester for anaerobic digestion. The primary digester is mixed with a pumped jet mixing system and heated to mesophilic temperatures of approximately 95 Fahrenheit (°F). The biosolids are transferred to the secondary digester where it is allowed to settle. After digestion, the digested biosolids are pumped to the biosolids storage tanks for storage. RMMSD land-applies biosolids for beneficial reuse on agricultural land for final disposal.

H. Electrical

1. Power Distribution Equipment

The service entrance switchboard (SES) for the incoming electrical service is installed in the Solids Processing Building and is used to power the individual structures and motor control centers (MCCs) throughout the WWTP. The SES is a General Electric (GE) 8000 Series switchboard consisting of circuit breakers and analog metering.

Throughout the WWTP at each of the individual structures, MCCs are installed to serve loads associated with each building and adjacent areas of the site. MCCs are also manufactured by GE and include feeder breakers, motor starters, and limited relay-based control logic for operation of equipment within the WWTP.

In order to provide standby power to the WWTP, a generator is installed in the Influent Pumping Station Building and this generator, by design, serves only limited equipment throughout the plant. Each of the individual MCCs includes dedicated "emergency" sections that can be powered by the standby generator in the event of a power failure.

2. Supervisory Control and Data Acquisition (SCADA) System

The WWTP is currently controlled with a programmable logic controller (PLC)-based system using Allen-Bradley PLCs and a personal computer as the operator interface. The PLCs were installed after the original installation of equipment and communicate between the various buildings using fiber-optic cabling. The operator interface computer provides monitoring and control of the system, as well as history of alarms, data, and a means to generate WWTP reports. The PLC network, SCADA computer, and associated software were upgraded in approximately 2008 and again in 2022.

3.03 INFLUENT FLOWS AND LOADINGS

A. Influent Flows

Influent flow to the RMMSD WWTP is measured in the screening building by an 18-inch Parshall flume. Monthly average influent flows for 2018 through December 2021 are presented in Table 3.03-1. Figure 3.03-1 graphically depicts daily influent flows for the same period. The maximum monthly average flow was 4.15 MGD in April 2019. RMMSD experienced a decrease in flow to the WWTP in 2020 due to the impacts of the COVID-19 pandemic. 2021 was a drought year for some areas of Wisconsin and RMMSD experienced lower average flow for the summer months in 2021 because of this. The current design peak hourly flow is 8.09 MGD and the current design peak instantaneous flow is 12.29 MGD.

B. Influent Loadings

Summaries of the influent wastewater concentrations and loadings for BOD_5 and TSS are shown in Table 3.03-2 and Table 3.03-3, respectively. These data are presented as monthly averages of daily influent values. Figure 3.03-2 shows the monthly average loadings for BOD_5 and TSS in comparison with the maximum monthly design loadings for each of these characteristics. Average monthly BOD_5 loadings exceeded the maximum month design loading once in October 2019. TSS loadings have not exceeded the maximum month design loading in the 4-year period. The annual average loadings for BOD_5, and TSS decreased in 2020 and 2021 from the 2019 values due to the decrease in flow observed in 2020. Summaries of the influent wastewater concentrations and loadings for ammonia and phosphorus are shown in Table 3.03-4 and Table 3.03-5, respectively from January 2018 to December 2021.

	2018	**2019**	**2020**	**2021**
January	3.22	2.63	2.81	2.41
February	3.10	2.69	2.73	2.44
March	3.14	3.34	3.40	2.58
April	3.25	4.15	3.14	2.63
May	2.95	3.65	2.77	2.55
June	2.74	3.07	3.14	2.52
July	2.51	3.10	2.87	2.63
August	2.48	2.83	2.57	3.23
September	2.69	3.10	2.51	2.61
October	3.18	3.28	2.44	2.41
November	2.95	2.86	2.53	2.41
December	2.77	2.81	2.47	2.50
Average	2.92	3.13	2.78	2.58
Maximum	3.25	4.15	3.4	3.23
Minimum	2.48	2.63	2.44	2.41

Table 3.03-1 Monthly Average Daily Influent Flows (MGD)

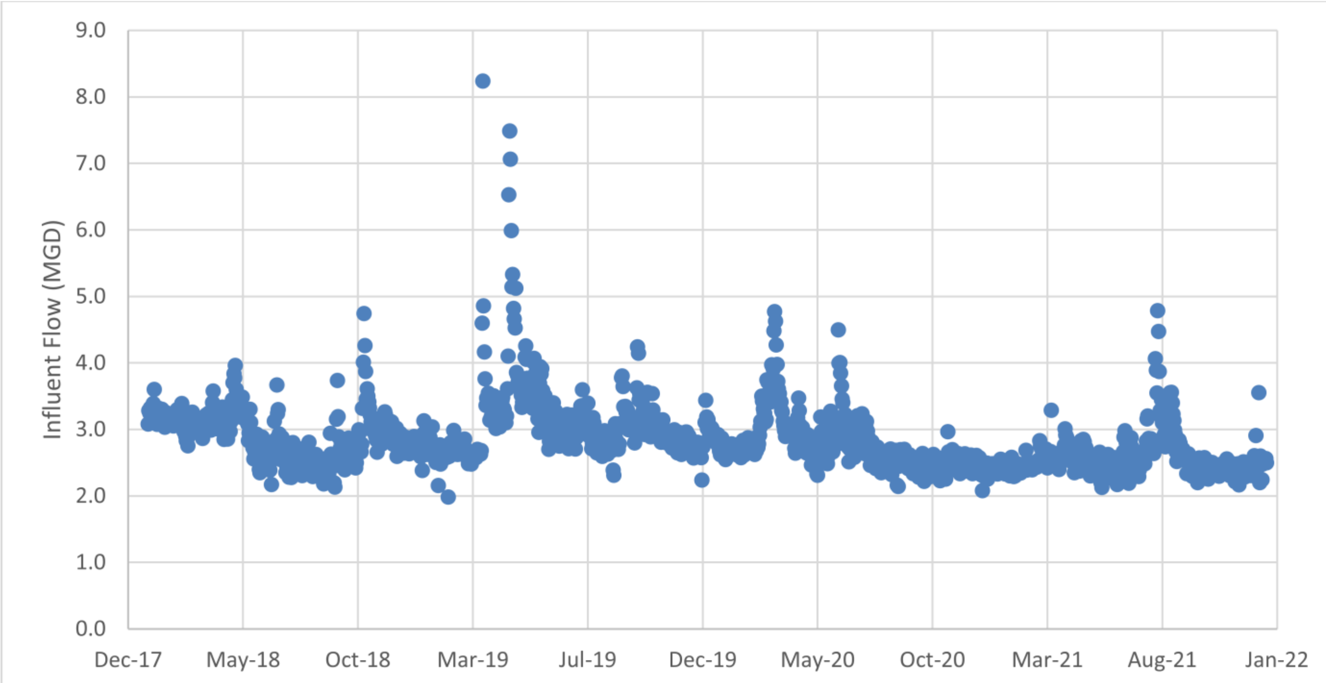


Figure 3.03-1 Daily Influent Flow (2018 to 2021)

	2018		2019		2020		2021	
	mg/L	**lb/day**	**mg/L**	**lb/day**	**mg/L**	**lb/day**	**mg/L**	**lb/day**
January	260	7,022	260	5,721	283	6,663	316	6,413
February	275	7,153	295	6,602	267	6,111	280	5,702
March	259	6,793	268	7,360	239	6,574	266	5,743
April	240	6,492	212	6,822	244	6,427	263	5,819
May	246	6,121	249	7,719	260	6,088	269	5,800
June	253	5,886	276	7,106	261	6,825	295	6,326
July	277	5,879	270	7,098	338	8,304	291	6,492
August	286	6,007	295	7,108	369	8,080	251	6,694
September	265	6,001	261	6,752	315	6,668	302	6,617
October	251	6,651	319	**9,008**	325	6,725	305	6,240
November	264	6,579	288	6,944	319	6,765	319	6,471
December	285	6,599	284	6,681	294	6,115	257	5,446
Average	263	6432	273	7,077	293	6,779	285	6,147
Maximum	286	7153	319	**9,008**	369	8,304	319	6,694
Minimum	240	5879	212	5,721	293	6,088	251	5,446

Note: mg/L=milligrams per liter
Bold indicates exceedance of design loading of 8.945 lb/day.

Table 3.03-2 Monthly Average Influent BOD_5 Concentration and Loadings

	2018		2019		2020		2021	
	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day
January	285	7,696	284	6,252	306	7,298	377	7,659
February	298	7,769	298	6,701	305	6,986	312	6,363
March	283	7,479	293	8,071	269	7,393	299	6,451
April	268	7,228	240	7,908	295	7,641	311	6,912
May	309	7,692	276	8,566	309	7,245	305	6,577
June	303	7,048	360	9,228	317	8,274	363	7,785
July	345	7,352	319	8,313	370	9,067	353	7,928
August	330	6,958	335	8,084	495	10,836	297	7,986
September	333	7,614	316	8,191	467	9,901	358	7,851
October	365	8,043	335	9,438	433	9,001	354	7,252
November	319	7,982	295	7,138	346	7,352	302	6,141
December	319	7,381	303	7,151	374	7,792	307	6,500
Average	313	7520	304	7,920	357	8,232	328	7,117
Maximum	365	8043	360	9,438	495	10,836	377	7,986
Minimum	268	6958	240	6,252	269	6,986	297	6,141

Note: Bold indicates exceedance of design loading of 11,620 lb/day.

Table 3.03-3 Monthly Average Influent TSS Concentration and Loadings

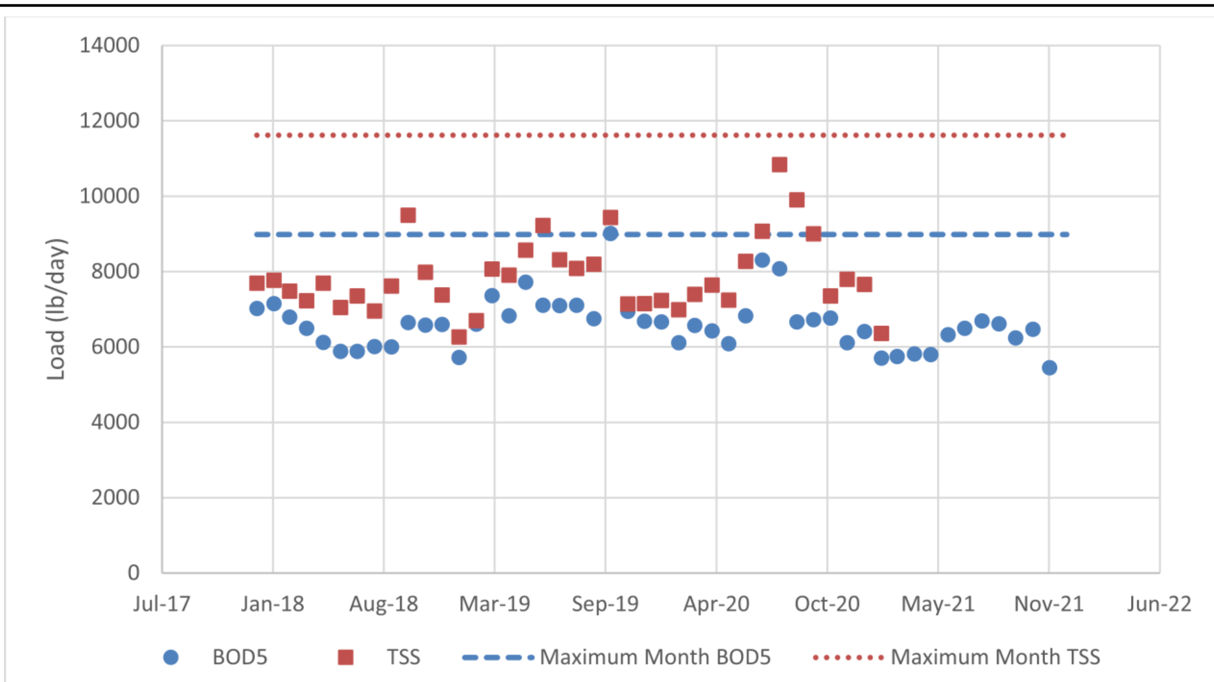


Figure 3.03-2 Monthly Influent BOD_5 and TSS Loadings

	2018		2019		2020		2021	
	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day
January	ND	ND	49	1,092	ND	ND	54	1,107
February	ND	ND	54	1,186	49	1,132	42	860
March	ND	ND	57	1,844	44	1,148	121	ND
April	ND	ND	32	1,045	41	1,079	ND	ND
May	ND	ND	36	1,118	ND	ND	40	813
June	ND	ND	34	850	44	1,093	45	1,089
July	ND	ND	31	781	48	1,194	50	1,347
August	ND	ND	43	970	ND	ND	30	890
September	ND	ND	55	1,425	ND	ND	48	984
October	ND	ND	39	1,104	45	980	45	884
November	ND	ND	42	1,002	38	851	ND	ND
December	ND	ND	46	1,083	65	1,415	ND	ND
Average	---	---	43	1,125	47	1,111	53	1,255
Maximum	---	---	57	1,844	65	1,415	121	3,321
Minimum	---	---	31	781	38	851	30	884

Note: ND=No Data Available

Table 3.03-4 Monthly Average Influent Ammonia Concentration and Loadings

	2018		2019		2020		2021	
	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day
January	7.5	202	7.4	162	6.8	159	8.3	166.9
February	6.9	178	7.6	170	7.1	162	7.6	154.8
March	6.7	176	6.7	187	7.4	210	6.8	146.2
April	6.3	171	6	208	6.2	162	7	153.5
May	7	172	6.3	192	6.5	150	6.9	147.0
June	5.8	133	7.5	192	6.4	168	7.3	153.3
July	6.9	145	7	181	6.8	163	7.6	166.9
August	7.1	147	7.2	170	7.4	159	6	161.7
September	7.1	159	7	181	8.5	178	7.3	159.1
October	5.1	135	8.4	230	8.2	167	7.8	156.9
November	7.8	192	6.7	160	7.1	150	8.6	173.2
December	8.8	202	7.1	162	7.85	159	7.9	166.9
Average	6.9	168	7.1	183	7.2	166	7.4	159
Maximum	8.8	203	8.4	230	8.5	210	8.3	173
Minimum	5.1	133	6	160	6.2	150	6	146

Table 3.03-5 Monthly Average Influent Phosphorus Concentration and Loadings

3.04 RECYCLE FLOWS

There are several sources that contribute to plant recycle flow and loadings at the RMMSD WWTP, including the subnatant from the DAFT WAS thickeners, supernatant from the biosolids storage tanks, supernatant from the anaerobic digesters, and scum from the primary and secondary clarifiers. All are discharged to the WWTP sewer system and metered in a 3-inch Parshall flume at the Influent Pumping Station before being discharged to the influent wet well. Recycle flows are included in the influent sampling. This flow averaged 0.14 MGD from 2018 through 2021.

3.05 WPDES REQUIREMENTS

The WPDES permit limits currently in effect at the RMMSD WWTP are presented in Table 3.05-1. A copy of the current permit, No. WI- 0035581-07-1, is provided in Appendix A. The WWTP is operating under a WPDES permit that became effective on January 1, 2019, and expires December 31, 2023. The permit requires monthly monitoring for mercury and once a year monitoring for acute whole effluent toxicity (WET) testing. The permit includes compliance schedules for a mercury pollutant minimization program, mercury source reduction and phosphorus water quality based effluent limitation program.

Table 3.05-1 RMMSD WWTP WPDES Permit Limits

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD_5, Total	Monthly Average	30 mg/L	5/Week	24-Hour Flow Prop Comp	
BOD_5, Total	Weekly Average	45 mg/L	5/Week	24-Hour Flow Prop Comp	
BOD_5, Total	Daily Maximum	1,163 lb/day	5/Week	Calculated	Limit applies May through October.
TSS	Monthly Average	30 mg/L	5/Week	24-Hour Flow Prop Comp	
TSS	Weekly Average	45 mg/L	5/Week	24-Hour Flow Prop Comp	
pH Field	Daily Maximum	9.0 su	5/Week	Grab	
pH Field	Daily Minimum	6.0 su	5/Week	Grab	
TP	Monthly Average	1.0 mg/L	5/Week	24-Hour Flow Prop Comp	This is an interim limit.
TP		lb/day	5/Week	Calculated	
TP		lb/day	Monthly	Calculated	
TP		lb/day	Monthly	Calculated	
Fecal Coliform	Geometric Mean–Monthly	400 cfu/100 mL	Weekly	Grab	Limit and monitoring apply May through September.
Fecal Coliform	Geometric Mean–Weekly	656 cfu/100 mL	Weekly	Grab	Limit and monitoring apply May through September.
Mercury, Total Recoverable	Daily Maximum	7.0 ng/L	Monthly	Grab	See subsections 3.2.1.6, 3.2.1.7, and 5.2 in Appendix A.
Nitrogen, Ammonia Variable Limit	-	mg/L	3/Week	See Table in Appendix A.	See subsection 3.2.1.8 in Appendix A.
NH_3-N	Daily Maximum–Variable	mg/L	3/Week	24-Hour Flow Prop Comp	
NH_3-N	Weekly Average	108 mg/L	3/Week	24-Hour Flow Prop Comp	
NH_3-N	Monthly Average	108 mg/L	3/Week	24-Hour Flow Prop Comp	
TKN		mg/L	Quarterly	24-Hour Flow Prop Comp	Monitoring only
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hour Flow Prop Comp	Monitoring only
TN		mg/L	Quarterly	Calculated	Monitoring only
Acute WET	-	TU_a	See Listed Quarter(s)	24-Hour Flow Prop Comp	See subsection 3.2.1.9 in Appendix A.

Notes: su=standard units
TU_a=toxic unit–acute
ng/L=nanograms per liter
NH_3-N=ammonia nitrogen
TN=total nitrogen
TKN=total Kjeldahl nitrogen
TP=total phosphorus

3.06 WWTP PERFORMANCE

Tables 3.06-1, 3.06-2, 3.06-3, and 3.06-4 summarize the average monthly effluent BOD_5, TSS, phosphorus, and NH_3-N concentrations, respectively, from the RMMSD WWTP.

The RMMSD WWTP consistently meets the effluent limits dictated in the WPDES permit producing high-quality effluent. For the period reviewed, there have been no effluent permit violations.

Table 3.06-5 shows the monthly geometric mean for fecal coliforms for the months when disinfection is required. The data show there have been no exceedances in the period analyzed.

	2018	2019	2020	2021
January	12	9	23	16
February	13	13	14	15
March	14	8	10	10
April	10	5	7	10
May	8	9	11	7
June	9	8	8	9
July	9	8	8	6
August	8	8	7	8
September	12	11	9	7
October	17	19	18	23
November	15	14	16	23
December	11	16	18	26
Average	11	11	12	13
Maximum	17	19	23	26
Minimum	8	5	7	6

Table 3.06-1 Average Monthly Effluent BOD_5 Concentrations (mg/L)

	2018	2019	2020	2021
January	8	9	9	6
February	5	13	9	7
March	13	7	8	7
April	11	4	9	6
May	7	13	11	7
June	5	9	9	8
July	11	7	10	7
August	9	8	8	8
September	13	7	11	9
October	7	6	9	14
November	9	6	9	8
December	9	8	8	10
Average	9	8	9	8
Maximum	13	13	11	14
Minimum	5	4	8	6

Table 3.06-2 Average Monthly Effluent TSS Concentrations (mg/L)

	2018	2019	2020	2021
January	0.8	0.7	0.8	0.7
February	0.8	0.9	0.8	0.8
March	0.7	0.6	0.7	0.7
April	0.8	0.5	0.7	0.7
May	0.6	0.9	0.7	0.7
June	0.6	0.5	0.7	0.7
July	0.9	0.6	0.6	0.6
August	0.8	0.6	0.5	0.7
September	0.8	0.8	0.6	0.8
October	0.7	0.8	0.7	0.8
November	0.8	0.8	0.6	0.7
December	0.7	0.8	0.6	0.8
Average	0.8	0.7	0.7	0.7
Maximum	0.9	0.9	0.8	0.8
Minimum	0.6	0.5	0.5	0.6

Table 3.06-3 Average Monthly Effluent Phosphorus Concentrations (mg/L)

	2018*	2019	2020	2021
January	41.0	52.6	39.8	48.2
February	44.1	53.1	38.5	46.9
March	34.9	53.1	46.0	50.1
April	30.2	50.6	48.4	48.4
May	31.3	48.6	50.7	47.5
June	19.2	51.5	49.7	46.3
July	7.2	49.4	50.8	48.0
August	20.0	50.4	52.8	47.6
September	21.6	50.4	49.3	49.7
October	10.9	46.8	47.4	47.5
November	22.1	51.5	45.0	49.7
December	15.6	40.7	44.3	44.4
Average	24.8	49.9	46.9	47.8
Maximum	44.1	53.1	52.8	50.1
Minimum	7.2	40.7	38.5	44.4

*In 2018 effluent ammonia samples were taken monthly.

Table 3.06-4 Average Monthly Effluent Ammonia Concentrations (mg/L)

	2018	2019	2020	2021
May	ND	144	67	58
June	ND	65	10	132
July	ND	141	73	50
August	ND	48	25	157
September	ND	43	63	27
Average	---	88	47	85
Maximum	---	144	73	157
Minimum	---	43	10	27

Note: cfu/100 mL=colony forming units per 100 milliliters

Table 3.06-5 Monthly Geometric Mean Fecal Coliforms When Disinfection is Required (cfu/100 mL)

3.07 BIOSOLIDS QUANTITY AND QUALITY

Tables 3.07-1 and 3.07-2 summarize the annual biosolids production for 2018 through 2021. Biosolids are well within the WDNR quality requirements, and the low metals content allows flexibility when meeting the lifetime metals accumulation requirements for land application sites.

	Biosolids Load-Out Volume (gallons)	Average Percent Total Solids (%)	Loads Hauled
2018	3,938,000	716	716
2019	3,514,500	639	639
2020	4,642,000	844	844
2021	4,301,000	782	782

Table 3.07-1 Annual Biosolids Load-Out Volume and Percent Solids

Parameter	mg/kg Dry Weight Basis			High Quality Limit
	April	July	October	
Arsenic	2.4	4.9	2.8	41
Cadmium	1.3	1.1	1.4	39
Copper	510	470	530	1,500
Lead	13	13	15	300
Mercury	1.3	2.5	.89	17
Molybdenum	9.8	10	12	-
Nickel	130	37	35	-
Selenium	5.9	12	7.2	-
Zinc	770	780	900	2,800

Note: mg/kg=milligrams per kilogram

Table 3.07-2 2021 Biosolids Quality

SECTION 4
WASTELOAD AND FLOW FORECASTS

This section develops wastewater flow and loading projections for evaluating future WWTP capacity and needs. Data from current conditions have been used together with population forecasts and development trends to project design flows and loads for the RMMSD WWTP through 2045.

4.01 SEWER SERVICE AREA

The current sewer service area for the RMMSD WWTP is presented in Figure 1.02-1. It is anticipated the overall area served by the RMMSD WWTP will remain as identified.

4.02 POPULATION AND GROWTH PROJECTIONS

Population projections for the RMMSD WWTP are presented in Figure 4.02-1. These projections were based on Wisconsin Department of Administration (WDOA) population projections completed in 2013. This report projects the growth through 2045. The North Central Regional Planning Commission (NCWRPC) was contacted in regard to using WDOA population projections for estimating future flows and loadings at RMMSD. NCWRPC uses WDOA population projections for their area-wide planning and concurred with using these population projections for this Facilities Plan.

The year 2010 census population was approximately 32,807 using the WDOA data. Mosinee's population was added in 2012 to 2013. Future year 2035 population projection is 46,660 and 2045 population projection is 49,937. The current and future industrial and commercial contributions are minimal with no significant growth expected, so they are accounted for in the per capita estimates.

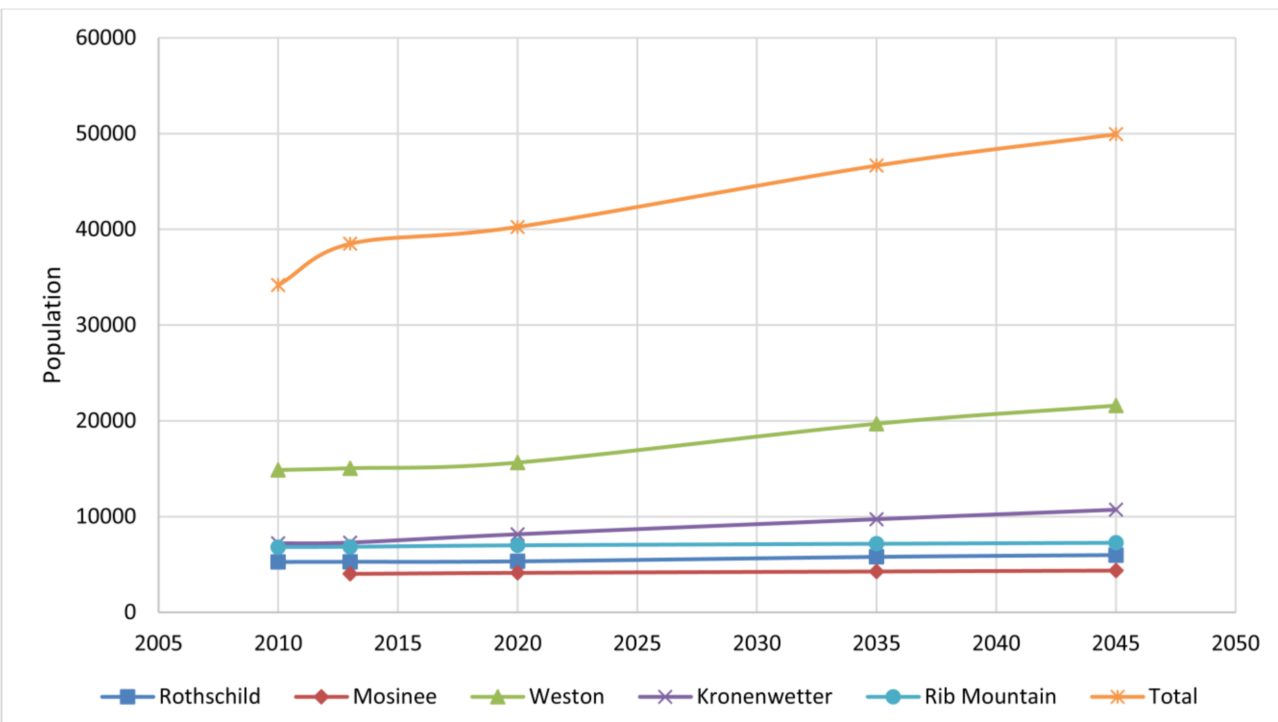


Figure 4.02-1 RMMSD WWTP Population Projections

4.03 PROJECTED FLOWS

Projecting future wastewater flow requires identification of residential/commercial and industrial wastewater flow, base flows, I/I, peaking factors, and anticipated residential/commercial and industrial growth in areas tributary to the RMMSD WWTP. The data used in these evaluations includes daily flow measurements from the plant's influent flow metering flume from January 2018 through December 2021. It should be noted that the plant influent flow meter includes the plant process return flow that ranges in quantity between 0.2 and 0.8 MGD.

A. Dry Weather Base Flows and Per Capita Flows

Since January 2018, the annual average daily flow treated at the RMMSD WWTP has ranged from a low of approximately 2.58 MGD in 2021 to a high of 3.13 MGD in 2019. This decrease in flow coincides with the COVID-19 pandemic effects that were perceived at the WWTP and the drought in 2021. Over the 3-year time period, the maximum month flow was 4.15 MGD in April 2019, the maximum week flow was 6.05 MGD in April 2019, and the maximum day flow was 8.24 MGD on March 14, 2019. The high daily flow occurred in conjunction with a significant rainfall event, and the maximum month and week flows occurred in conjunction with a particularly wet month. Table 4.03-1 summarizes flow patterns for the period from January 2018 to December 2021.

To project future design average and maximum flows, an evaluation was made to establish average dry weather flows to the WWTP and generate an estimate of I/I levels to establish future maximum design flows.

The average dry weather flow, which includes background dry weather infiltration, was established from a review of the WWTP influent flows. Weekly average flows for 2018 through 2021 were reviewed, and the minimum average weekly flow to the WWTP was established as the average dry weather flow for each year. The annual average dry weather flow over this period was 2.85 MGD, with a range of 2.58 MGD to 3.13 MGD. This flow rate is assumed to contain the minimum amount of I/I expected from RMMSD's collection system.

To determine per capita dry weather flow (sometimes referred to as base flow), the average hauled waste flow components were subtracted from the dry weather flow, and this was divided by the contributing population. Industrial contribution is negligible. The per capita flow was calculated in this manner for 2018 through 2021 and averaged through the period to determine the per capita flow. The average dry weather per capita flow was calculated to be 59 gallons per capita per day (gpcd).

Because the current and historic per capita flows are lower than expected values, the per capita flow of 100 gpcd from Wisconsin Administrative Code (WAC) NR 110 was used to estimate future dry weather base flows from the projected growth in the number of residential and commercial customers. Hauled waste flows were estimated separately but excluded from base flows. I/I components used to estimate wet weather flows were also estimated separately, but these were also excluded from dry weather base flows.

B. Design Flow Projections–Wet Weather Design Flows

The daily flow data from 2018 through 2021 were used to develop wet weather design flows. For each year, the maximum month flows were calculated, and these values were used as the average total wet weather flow. The dry weather base flow and hauled waste flow were subtracted from each of the calculated wet weather flows to estimate wet weather I/I volumes. Table 4.03-1 presents a summary of the various flow determinations 2018 through 2021, including estimates for I/I for each flow category.

	2018	2019	2020	2021	Average
Population	39,406	39,793	40,257	40,920	
Average Dry Weather Flows					
Total Dry Weather Flow (MGD)	2.39	2.52	2.33	2.38	2.41
Average Hauled Waste Flow (MGD)	0.031	0.034	0.034	0.037	
Total Dry Weather Flow without Hauled Waste Flows	2.36	2.48	2.30	2.35	
Per Capita Dry Weather Flows (gpcd)	60	62	57	57	59
Average Annual Flows					
Total Average Annual Flow (MGD)	2.92	3.13	2.78	2.58	2.85
Average Hauled Waste Flow (MGD)	0.0310	0.0340	0.0340	0.0370	
Total Flow without Hauled Waste Flows	2.88	3.09	2.75	2.54	
Per Capita Average Annual Flows (gpcd)	73	78	68	62	70
Average Annual I/I (MGD)	0.49	0.57	0.42	0.16	0.41
Average Wet Weather Flows (Maximum Month)					
Maximum Month Flow (MGD)	3.25	4.15	3.40	3.23	3.51
Average Hauled Waste Flow (MGD)	0.0310	0.0340	0.0340	0.0370	
Total Flow without Hauled Waste Flows	3.22	4.11	3.37	3.19	
Per Capita Maximum Month Flows (gpcd)	82	103	84	78	87
Maximum Month I/I (MGD)	0.83	1.60	1.03	0.81	1.07
Maximum Week Flows					
Maximum Week Flow (MGD)	3.92	6.05	4.29	2.48	4.19
Average Hauled Waste Flow (MGD)	0.0310	0.0340	0.0340	0.0370	
Total Flow without Hauled Waste Flows	3.89	6.02	4.25	2.45	
Per Capita Maximum Week Flows (gpcd)	99	151	106	60	104
Maximum Week I/I (MGD)	1.50	3.50	1.92	0.06	1.75
Maximum Day Flows					
Maximum Day Flow (MGD)	4.74	8.24	4.77	4.79	5.64
Average Hauled Waste Flow (MGD)	0.0310	0.0340	0.0340	0.0370	
Total Flow without Industrial/Hauled Waste Flows	4.71	8.21	4.74	4.75	
Per Capita Maximum Day Flows (gpcd)	120	206	118	116	148
Maximum Day I/I (MGD)	2.32	5.69	2.41	2.37	3.47

Table 4.03-1 Existing Per Capita Flows and I/I Calculations

C. Design Flow Development

Design flows for 2035 and 2045 were developed by multiplying the projected populations for each year by the average dry weather per capita flow of 59 gpcd for current population and 100 gpcd for future population to obtain dry weather residential/commercial base flows of approximately 3.33 MGD and 3.69 MGD, respectively. The amount of I/I in the collection system for each of the design wet weather flows (maximum month and maximum week) was assumed to remain constant as ongoing CMOM efforts aim to keep I/I to a minimum. Hauled waste volumes were assumed to increase by 5 percent and 10 percent for 2035 and 2045, respectively, which would also accommodate any unforeseen industrial flows. A 10 percent allowance for unforeseen growth has been included in the design flows as well to account for additional unforeseen industrial, residential, or commercial growth. Table 4.03-2 summarizes the projected design flows. For average wet weather flow (maximum month), maximum week flow, and maximum day the maximum of the data set was used rather than the average of the data set to be conservative.

	2035	2045
WDOA Population Projection	46,660	49,937
Residential/Commercial Dry Weather Flows (includes dry weather I/I)		
Per Capita Flow Existing (gpcd)	59	59
Per Capita Flow Future (gpcd)	100	100
Average Dry Weather Flow (MGD)	3.00	3.32
I/I		
Average Day (MGD)	0.41	0.41
Maximum Month (MGD)	1.60	1.60
Maximum Week (MGD)	3.50	3.50
Maximum Day (MGD)	5.69	5.69
Hauled Waste and Unforeseen Growth		
Current Hauled Waste (MGD)	0.0340	0.0340
Unforeseen Hauled Waste (MGD)	0.002	0.003
Unforeseen Growth (MGD)	0.300	0.332
Design Flow Summary		
Average Dry Weather Flow (MGD)	3.33	3.69
Average Annual Flow (MGD)	3.74	4.10
Maximum Month (MGD)	4.93	5.29
Maximum Week Flow (MGD)	6.83	7.19
Maximum Day Flow (MGD)	9.02	9.38

Table 4.03-2 Design Flow Development

D. Peak Hourly and Instantaneous Flow

Flow data from days with significant rainfall events were reviewed to determine peak hourly and peak instantaneous flows. These are summarized in Table 4.03-3. Of the five peak hourly flows shown in Table 4.03-3, the March 14, 2019, flow of 11.40 MGD was the highest. This day also corresponds to the maximum day flow of 8.24 MGD for 2019. This peak hourly flow is greater than the current design peak hourly flow of 8.09 MGD. However, this flow occurred on a day where there was 2 feet of snow on the ground, the temperature rose above freezing, and there was a 1/2 inch of rain as well as an additional 1/2 inch of rain the two previous days. A wet weather event of this magnitude is extremely rare. Therefore, the April 18, 2019, and March 19, 2019, events are used for estimating peak hourly flows. Of the five peak instantaneous flows shown in Table 4.03-3, the March 14, 2019, flow of 12.13 MGD was the highest. This was less than the 1984 design peak hourly flow of 12.29 MGD.

Date	Hourly Flow (MGD)	Instantaneous Flow (MGD)
March 14, 2019	11.40	12.13
April 18, 2019	8.94	11.75
March 19, 2019	8.89	11.29
August 11, 2021	8.22	9.85
June 20, 2020	6.24	9.88

Table 4.03-3 Peak Flows

Projected 2045 flows are presented in Table 4.03-4 alongside 2045 design criteria and 2022 existing design criteria for RMMSD. Since the average dry weather and average annual flows for RMMSD projected for 2045 are lower than the current rated design flows of the WWTP, the 2045 design criteria remains unchanged. The peak hourly flow for 2045 was calculated using the NR 110 hydraulic loading peaking factor of 2.5 for the population that RMMSD serves.

	2022 Existing Design Capacity (MGD)	2045 Projected Flows (MGD)	2045 Design Criteria (MGD)
Average Dry Weather Flow	3.98	3.69	3.98
Average Annual Flow	4.41	4.10	4.41
Maximum Month	5.03	5.29	5.29
Maximum Daily Flows	---	---	---
Maximum Hourly Flows	8.09	10.25	10.25
Maximum Instantaneous	12.29	12.29	12.29

Table 4.03-4 Future Flow Design Criteria

4.04 PROJECTED LOADINGS

The per capita and future design loadings for RMMSD were developed using an analysis similar to that employed for the flow projections. Per capita loadings for BOD_5, TSS, NH_3-N and TP were determined using existing data for plant influent and hauled waste. Projections of future loadings were developed using populations projected by WDOA, typical planning value per capita loadings, and current hauled waste loadings.

A. Calculated Per Capita Loadings

The per capita WWTP loading estimates for BOD_5, TSS, ammonia, and phosphorus are based on data collected from 2018 to 2021. Estimates of the per capita loadings are presented in Table 4.04-1 for BOD_5, TSS, ammonia and phosphorus. The average per capita BOD_5 load (no hauled wastes) was calculated as 0.155 pounds per capita per day (pcd), which is less than the typical range of 0.17 to 0.22 pcd. The average per capita TSS load of 0.160 pcd is also less than the normal range for TSS of 0.20 to 0.25 pcd. The per capita loadings for ammonia and phosphorus during this time averaged 0.027 pcd and 0.004 pcd, respectively.

	2018	2019	2020	2021	Average
Population	39,406	39,793	40,257	40,920	
Total BOD_5 (lb/day)	6,426	7,077	6,784	6,149	6,609
Hauled Waste BOD_5 (lb/day)	346	380	380	413	
Residential/Commercial (lb/day)	6,080	6,698	6,404	5,736	6,230
Per Capita Loading (pcd)	0.154	0.168	0.159	0.140	0.155
Total TSS (lb/day)	7,521	7,927	8,232	7,119	7,700
Hauled Waste TSS (lb/day)	1,182	1,297	1,297	1,411	
Residential/Commercial TSS (lb/day)	6,338	6,630	6,935	5,707	6,403
Per Capita TSS Loading (pcd)	0.161	0.167	0.172	0.139	0.160
Total Ammonia (lb/day)	ND	1,037	1,111	997	1,048
Hauled Waste Ammonia (lb/day)[1]	ND	73.7	81.1	88.4	
Residential/Commercial Ammonia (lb/day)	ND	963	1,030	908	967
Per Capita Ammonia Loading (pcd)	ND	0.024	0.026	0.022	0.024
TP (lb/day)	168	183	166	159	169
Hauled Waste TP (lb/day)[2]	21	23	23	25	
Residential/Commercial TP (lb/day)	147	160	143	133	146
Per Capita TP Loading (pcd)	0.004	0.004	0.004	0.003	0.004

[1]Assumed hauled waste ammonia loadings for 2018 were the same as loadings from 2016 Facilities Plan and loadings increased by 20 percent over 4 years similar to BOD and TSS.
[2]Assumed hauled waste phosphorus loadings for 2018 were the same as loadings from 2016 Facilities Plan and loadings increased by 20 percent over 4 years similar to BOD and TSS.

Table 4.04-1 Per Capita Loading Calculations

B. Projected Per Capita Loadings

The projected average design loadings for BOD_5 and TSS were developed using current calculated per capita loadings for current populations and the midpoint of the typical ranges of the per capita loads (as noted previously) for future population and adding the current waste hauler loadings. Hauled waste loadings were assumed to increase by 5 percent and 10 percent for 2035 and 2045, respectively, which would also accommodate any unforeseen industrial loadings. A 10 percent allowance for unforeseen growth has been included in the design loadings to account for additional unforeseen industrial, residential, or commercial growth. The projected ammonia and phosphorus average design loadings were calculated similarly; however, the per capita loadings calculated above were used for the residential/commercial portion of the projections. Table 4.04-2 presents the projected design loadings for BOD_5, TSS, ammonia, and phosphorus for 2035 and 2045.

	2035	**2045**
WDOA Population Projection	46,660	49,937
Per Capita BOD_5 Loading (pcd)	0.195	0.195
Residential/Commercial BOD_5 (lb/day)	7,481	8,120
Hauled Waste BOD_5 (lb/day)	413	413
Unforeseen Hauled Waste BOD_5 (lb/day)	21	41
Unforeseen Growth BOD_5 (lb/day)	748	812
Total BOD_5 Loading (lb/day)	8,663	9,387
Per Capita TSS Loading (pcd)	0.225	0.225
Residential/Commercial TSS (lb/day)	7,653	8,391
Hauled Waste TSS (lb/day)	1411	1411
Unforeseen Hauled Waste TSS (lb/day)	71	141
Unforeseen Growth TSS (lb/day)	765.3	839.1
Total TSS Loading (lb/day)	9901	10782
Per Capita Ammonia Loading (pcd)	0.024	0.024
Residential/Commercial Ammonia (lb/day)	1120	1199
Hauled Waste Ammonia (lb/day)	88.4	88.4
Unforeseen Hauled Waste Ammonia (lb/day)	4.4	8.8
Unforeseen Growth Ammonia (lb/day)	56.0	119.9
Total Ammonia Loading (lb/day)	1269	1416
Per Capita Loading TP (pcd)	0.004	0.004
Residential/Commercial TP (lb/day)	169.7	181.6
Hauled Waste TP (lb/day)	25.4	25.4
Unforeseen Hauled Waste TP (lb/day)	1.3	2.5
Unforeseen Growth TP (lb/day)	17.0	18.2
TP Loading (lb/day)	213	228

Table 4.04-2 Projected Average Design Loading

Annual average-based peaking factors were developed for the maximum month, maximum week, and maximum day loading conditions using the approach outlined in the WDNR peaking factor worksheet. However, the peaking factors were not averaged over the data period and the maximum year peaking factor was chosen to be conservative. These peaking factors were then applied to the 2035 and 2045 average loading projections to develop the maximum design loadings for the future design years. Table 4.04-3 presents the calculated peaking factors for BOD_5, TSS, ammonia, and phosphorus and summarizes the 2021 existing rated capacity of the WWTP with the projected 2035 and 2045 loadings, design maximum month, week, and day loadings.

	Peaking Factor	**Existing 2021 Capacity**	**Projected 2035**	**Projected 2045**
Average Day BOD_5 Loading (lb/day)	---	8,529	**8,663**	**9,387**
Maximum Month BOD_5 Loading (lb/day)	1.27	8,985	**11,002**	**11,921**
Maximum Week BOD_5 Loading (lb/day)	1.59	---	13,774	14,925
Maximum Day BOD_5 Loading (lb/day)	2.71	---	23,477	25,437
Average Day TSS Loading (lb/day)	---	9,798	**9,901**	**10,782**
Maximum Month TSS Loading (lb/day)	1.32	11,620	**13,069**	**14,233**
Maximum Week TSS Loading (lb/day)	1.77	---	17,524	19,085
Maximum Day TSS Loading (lb/day)	2.45	---	24,256	26,416
Average Day Ammonia Loading (lb/day)	---	---	1,269	1,416
Maximum Month Ammonia Loading (lb/day)	1.27	---	1,611	1,798
Maximum Week Ammonia Loading (lb/day)	---	---	---	---
Maximum Day Ammonia Loading (lb/day)	1.48	---	1,878	2,095
Average Day P Loading (lb/day)	---	---	213	228
Maximum Month P Loading (lb/day)	1.27	---	271	289
Maximum Week P Loading (lb/day)	---	---	---	---
Maximum Day P Loading (lb/day)	2.34	---	499	533

Table 4.04-3 Peaking Factors and Design Loadings

4.05 SUMMARY OF DESIGN FLOWS AND LOADS

Table 4.05-1 summarizes the design flows and loads that will be used as the basis for the process and equipment evaluations in the remainder of this Facilities Plan.

	Average Day	**Maximum Month**	**Maximum Week**	**Maximum Day**	**Peak Hourly**
Flow (MGD)	4.41	**5.29**	7.19	9.38	10.25
BOD_5 Load (lb/day)	**9,387**	**11,921**	14,925	25,437	---
TSS Load (lb/day)	**10,782**	**14,233**	19,085	26,416	---
TP Load (lb/day)	226	287	---	528	---

Note: Bold text indicates exceedance of current WWTP design flows and loadings.

Table 4.05-1 Design Flow and Load Summary (Year 2045)

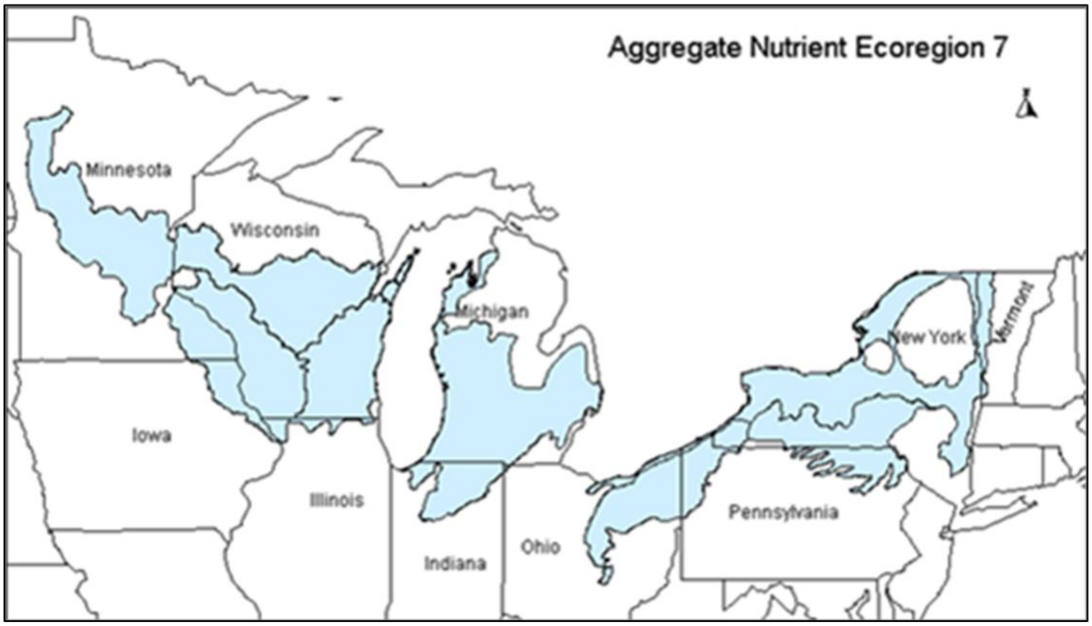
SECTION 5
WATER QUALITY STANDARDS AND DISCHARGE PERMIT REQUIREMENTS

Permit limits and regulatory standards are revised as society's understanding of its environmental impact grows. Implementation of new permit limits and regulatory standards can require substantial changes in WWTP operations and treatment facility needs. New regulations affect effluent limits and the disposal of biosolids, among other things. This section discusses current and anticipated future national and state regulatory strategies and how these might apply to the WWTP. It also recommends provisions that should be included in any proposed WWTP modifications to address these future regulatory concerns.

5.01 NATIONAL NUTRIENT STRATEGY

In December 2000, the United States Environmental Protection Agency (USEPA) published recommended regional water quality criteria with the goal of reducing the impact of excess nutrients to waterbodies. The USEPA is now working with states to adopt appropriate water quality criteria for nutrients. States were expected to adopt the recommended water quality criteria or develop their own by 2004, but this schedule was revised to allow states more time to develop rules.

The RMMSD WWTP discharges to the Wisconsin River downstream of Wausau and upstream of the Mosinee Flowage. This discharge location is in Rivers and Streams Ecoregion VII as shown in Figure 5.01-1. The USEPA's recommended aggregate criteria for rivers and streams in this ecoregion are presented in Table 5.01-1. Permit limits will sometimes be higher than a criterion because consideration can be given to dilution of the effluent with the receiving water. In the case where the receiving water's background water quality is higher than the criterion, or the receiving water's dilutional flow is low, the permit limit may be set at the criterion.



Source: USEPA *Ambient Water Quality Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria for Rivers and Streams in Ecoregion VII*, Washington, D.C.: GPO, 2000) 7.

Figure 5.01-1 Aggregate Nutrient Region for Region VII Rivers and Streams

Parameter	Nutrient Criteria
TP	33 μg/L
TN	0.54 mg/L
Chlorophyll *a*	1.54 μg/L
Turbidity	1.7 NTU, 2.32 FTU

Note: μg/L=micrograms per liter
NTU=nephelometric turbidity unit
FTU=formazine turbidity unit

Table 5.01-1 USEPA Recommended Nutrient Criteria for Rivers and Streams in Ecoregion VII

In 2007, an environmental advocacy group, the Natural Resources Defense Council (NRDC), petitioned the USEPA to revise its secondary treatment regulations to include numeric effluent limitations for discharges of nitrogen and phosphorus. The petition proposes an effluent limit of 0.3 mg/L for TP and 3 to 8 mg/L for TN. It is possible these or similar effluent limitations would be adopted instead of, or in addition to, water quality-based criteria.

Concern over the Gulf of Mexico hypoxia could impact nutrient limits, particularly nitrogen. On June 16, 2008, the USEPA and other agencies submitted an action plan to the United States Congress that outlined a strategy to reduce the size of the hypoxic zone off the coast of Louisiana. The hypoxic zone was approximately 7,900 square miles at that time. Nutrients from the Mississippi River Basin, which includes the Wisconsin River, are identified as one of the causes of hypoxia. Hypoxia refers to a condition where dissolved oxygen (DO) concentrations in the water drop to a level that does not adequately support fish and other desirable aquatic species. To decrease the size of the hypoxic zone, the action plan depends on incentives and voluntary-based approaches to reduce agricultural runoff and restore wetlands. Additionally, permitting authorities within the Mississippi River Basin may require publicly owned treatment works (POTWs) to remove nutrients to reduce loadings. (*Mississippi River/Gulf of Mexico Watershed Nutrient Task Force 2008 Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico*, Washington, D.C.)

5.02 WISCONSIN NUTRIENT STRATEGY

According to the WDNR, nutrients, particularly phosphorus, will remain a primary focus of regulatory concern.

A. Phosphorus Regulations

Phosphorus rule revisions were passed by the Wisconsin State Legislature and became effective on December 1, 2010. These regulations established numeric water quality criteria for phosphorus. The criterion for the Wisconsin River is 0.1 mg/L. The Wisconsin River has adequate dilution and meets the water quality criteria for phosphorus in the Wisconsin River at the RMMSD WWTP discharge location.

The RMMSD WWTP WPDES permit that expires on December 31, 2023, includes the phosphorus limits based on the 2010 rule revisions and includes a 1.0 mg/L interim phosphorus limit. The interim effluent phosphorus limit of 1.0 mg/L will be in effect until the TMDL limit of 4,919 pounds as a yearly limit becomes effective on January 1, 2026, with a maximum monthly average limit of 15 lb/day.

Because the TMDL-based TP limits are mass-based and were determined assuming a WWTP design average flow of 4.41 MGD, the associated maximum discharge concentrations are currently not as stringent as they will be in the future. The TMDL-based limits will make the maximum discharge concentrations become more stringent if the service area continues to develop and flows to the WWTP increase.

Wisconsin Administrative Code (WAC) Chapter NR 217.16 indicates that TMDL-based limitations may be included in a permit in addition to, or in lieu of, the WAC Chapter NR 217.13 water quality based effluent limits (WQBEL) at the discretion of the WDNR. The current WWTP permit has incorporated the TMDL-based mass limits in lieu of NR 217.13-based limits and these limits become effective in January 2026.

Several phosphorus compliance options are available in WAC Chapter NR 217. These include watershed adaptive management (AM), water quality trading (WQT), the state-wide multidischarger variance (MDV), or other variances. RMMSD has previously completed the reporting requirements during the compliance schedule that was provided in previous WPDES permits. This report also serves as the FCAP and will provide a final review of compliance alternatives.

B. Anticipated Impact of New Phosphorus Regulations on the WWTP

The current City WPDES permit limit is 1.0 mg/L as a monthly average for effluent phosphorus. The current WPDES permit indicates the WWTP will need to complete construction and be in compliance with the final phosphorus TMDL limitation of 4,919 pounds as a yearly limit by January 1, 2026. Potential effluent limits and options for the WWTP are further discussed.

1. Interim Effluent Limit Compliance

Based on 2018 through 2021 performance, the WWTP is capable of continuing to meet the current 1.0-mg/L interim limit.

2. Watershed AM

A watershed AM option is available to WWTPs when 50 percent of the phosphorus load to the receiving water comes from nonpoint sources and permitted municipal separate storm sewer systems (MS4s), when the phosphorus criterion is exceeded in the receiving stream, and when filtration or equivalent technology is required to meet the proposed or new phosphorus limit. WWTPs must apply to the WDNR for this option. If accepted, it will allow up to four extra permit terms before the TMDL-based limit goes into effect. During the interim time period, WWTPs are expected to optimize the WWTP process, work with other dischargers in the watershed to reduce point and nonpoint sources of phosphorus, and monitor phosphorus in the surface water and report results to WDNR.

According to WDNR's Pollutant Load Ratio Estimation Tool (PRESTO) model, greater than 50 percent of the phosphorus loading in the Wisconsin River at the WWTP outfall comes from nonpoint sources. However, filtration or equivalent technology may not be required to meet the proposed new phosphorus limit. For this reason, RMMSD is not pursuing AM as a compliance option at this time.

3. WQT

Once a WQBEL or other (i.e., technology-based) effluent limit is included in a WPDES permit, WQT may be an option for compliance. In this alternative, the RMMSD would pay for land or modified agricultural or urban practices that would reduce the amount of phosphorus reaching the Wisconsin River upstream of the WWTP. A trade ratio of about 2 to 1 typically would apply. This means nonpoint load reduction actions would need to remove twice the phosphorus (in pounds) than the WWTP would have needed to remove. The trade ratio is used because of uncertainties associated with nonpoint source phosphorus reduction modeling, lack of required in-stream monitoring, and other factors. This option may be favorable for some dischargers because it is often more cost effective to remove nonpoint sources of phosphorus using best management practices (BMPs) than trying to meet very low limits using WWTP treatment technologies. WQT may be used to meet some or all of required phosphorus reduction and could be implemented along with additional treatment facilities or after watershed AM has been implemented.

4. Legislative Variance

An option for phosphorus compliance is the multidischarger variance (MDV). This option includes up to a 20-year variance that would require RMMSD to pay approximately $54.99 per pound for the amount of TP that is discharged over 0.2 mg/L or implement a third-party watershed project. The variance also includes interim effluent limits of 0.8 mg/L, 0.6 mg/L, and 0.5 mg/L, or other attainable limit as determined by WDNR, for each of the next three (five-year duration) permit terms, respectively. USEPA may adjust this effluent limit based on plant performance and capability to meet the limit.

RMMSD's rates are currently too low to qualify for the MDV permit. For this reason, RMMSD is not pursuing the MDV at this time.

5. WWTP Capital Improvements

Finally, RMMSD can choose to upgrade their plant to meet the TMDL-based TP limits. RMMSD has previously evaluated CPR, biological phosphorus removal (BPR) with chemical polishing, and cloth disc filtration as part of the WPDES permit's compliance schedule. Each of these is expected to meet the final phosphorus TMDL limits. These alternatives are further evaluated in this plan.

C. TN, Chlorophyll *a*, and Turbidity

The USEPA is expecting states to develop water quality standards for TN and other nutrient-related parameters in addition to phosphorus. The WDNR's surface water quality studies have not shown good correlations between TN concentrations and algae or other biological impairments. Phosphorus is generally understood to be the limiting nutrient and, therefore, the nutrient that requires control in Wisconsin surface waters. In the past, the WDNR has stated that it may use a different approach to TN control than it did for phosphorus such as requiring a certain percent reduction for Mississippi River Basin dischargers. The required reductions would be based on regional goals for the Gulf of Mexico hypoxia control. This approach may not be acceptable to the USEPA, however. While the WDNR's approach and schedule are currently uncertain, new TN effluent limits appear likely within approximately the next 10 to 20 years for RMMSD. For 20-year planning purposes, limits in the treatment technology-based range of 3 to 8 mg/L can be assumed. It appears likely the WDNR will allow watershed-based solutions such as watershed AM or WQT to be used for TN effluent limit compliance.

5.03 AMMONIA REGULATIONS

Ammonia surface water quality standards were previously revised by the WDNR to agree with promulgated USEPA criteria. According to the January 4, 2010, water quality effluent limits memorandum, RMMSD's associated ammonia-nitrogen effluent limit has been calculated by the WDNR, and the daily maximum limit is based on pH. RMMSD's limit is based on a variable limit depending on pH.

The current state and federal water quality standards for ammonia are based primarily on toxicity to fish. The USEPA developed more stringent ammonia criteria for surface waters that have the ability to support mussels and snails that are more sensitive to ammonia. The USEPA mussel- and snail-based ammonia criteria are final, and states should be adopting them in the near future. It appears this initiative will result in more stringent effluent ammonia-nitrogen limits for the RMMSD WWTP within approximately the next five to ten years.

5.04 CHLORIDE REGULATIONS

Several years ago, the WDNR reviewed chloride regulations and the way chloride limits are implemented. These regulations will not likely impact the RMMSD WWTP because of the soft groundwater in the area and the large dilution of treated effluent in the Wisconsin River. The primary source of chlorides in wastewater in Wisconsin comes from water softening. Since the groundwater is already soft, communities served by RMMSD do not need to soften their water and hence do not add enough chlorides to significantly affect the WWTP.

RMMSD should continue to track its effluent chloride concentrations as required with each WPDES permit application.

5.05 MERCURY REGULATIONS

The effluent limits for mercury included in the January 4, 2010, water quality memorandum are based on wildlife and human threshold criteria and are set equal to the criteria in accordance with WAC NR 106.06(6) because the background concentration in the Wisconsin River exceeds the wildlife and human threshold criteria. RMMSD's 30-day P99 was 16 nanograms per liter (ng/L), which is above the Wisconsin wildlife criterion for mercury of 1.3 ng/L. In lieu of an effluent limit, WAC NR 106.145 allows a variance for mercury in light of its ubiquitous presence in the environment. An alternative concentration limit (ACL) has been calculated for RMMSD equal to the 1-day P99 of 7.0 ng/L and expressed as a daily maximum limit. This ACL is included in RMMSD's permit.

RMMSD has partnered with the Marathon County Health Department and is voluntarily implementing a mercury pollutant minimization program (PMP). The PMP includes requiring dental offices to install and maintain amalgam separators because this is known to be a source of mercury in collection systems, a thermometer exchange program, and a public education campaign.

The WDNR has asserted that the primary source of mercury in most systems is dental offices. Past discharges from other various sources including schools, medical laboratories, and residences may also contribute mercury since small amounts remaining in portions of the collection system may dissolve slowly over a long time frame. Additional surveys, inspections, and discussions with customers with regard to mercury may be required if RMMSD has difficulty complying with its mercury ACL.

5.06 THERMAL STANDARDS

The State of Wisconsin has adopted thermal standard rule revisions in WAC NR 102 and WAC NR 106. The rules have an effective date of October 1, 2010. Chapter NR 102 was revised to create water quality standards for heat in surface waters. Chapter NR 106 was revised to include procedures to implement the thermal standards in WPDES permits issued to point sources discharging to surface waters of the state. The WDNR has stated that it does not expect the thermal standards to have an impact on existing POTWs except in unusual situations or where there is a high-temperature industrial discharge to the POTW. The WDNR staff has been active in developing guidance documents and training modules to help interested parties understand the various elements of the thermal rule revisions. Thermal dissipative cooling evaluations are an option for POTWs to show that temperature dissipates quickly in the receiving stream such that effluent limits are not required. The WWTP is currently monitoring effluent temperature in accordance with the guidelines. Once the monitoring is complete, RMMSD should determine its potential to exceed the proposed limits. Because of the large amount of dilution available in the Wisconsin River, it is unlikely that RMMSD's effluent causes a thermal disruption that warrants a limit. At this time, it appears unlikely that RMMSD's reissued permit will include temperature limits.

5.07 ANTIDEGRADATION ANALYSIS

Within the USEPA's framework of water quality criteria, the nation's waterbodies are to be protected through compliance with water quality standards. Water quality standards are comprised of the following:

1. Designated uses.
2. Instream water quality criteria (both numeric and narrative) required to support the designated use.
3. An antidegradation policy intended to prevent waterbodies that do meet water quality criteria from deteriorating beyond their current condition.

The WDNR intends to update its antidegradation rules in the near future.

The RMMSD WWTP permit does not currently include mass limits related to antidegradation, except for a mass limit for daily maximum BOD_5. It is only in effect from May to October and is intended to limit future impacts upon the stream caused by population growth. Currently, the RMMSD WWTP effluent easily meets permit limits for both BOD_5 and TSS. Since the 20-year flow projections will only increase the design average flow by a limited amount, it is unlikely that the antidegradation policy will have a large impact on the RMMSD WWTP within the next 20 years. This policy may play a larger role in the distant future (beyond 20 years) when effluent filtration or other means may be required to meet decreasing concentration limits that will result from increasing design flows.

5.08 BIOSOLIDS HANDLING AND BENEFICIAL REUSE

Biosolids handling at the RMMSD WWTP follows the requirements of WAC NR 204, Domestic Sewage Sludge Management. RMMSD generates Class B biosolids, which by definition has a higher level of pathogenic bacteria than Class A. The digested biosolids fecal coliform count at the RMMSD WWTP is consistently below 2,000,000 Most Probable Number (MPN) required by WAC NR 204 for Class B biosolids. Additionally, the anaerobic digester typically meets the 38 percent volatile solids reduction requirement in WAC NR 204 and/or biosolids are incorporated into the soil as required. Local farmers have accepted the Class B biosolids for disposal on agricultural land. The majority of POTWs in Wisconsin produce Class B biosolids. A WDNR official indicated the department likely would not require WWTPs to produce a Class A biosolids in the foreseeable future. However, the official stated that the decision to produce a Class A biosolids is a local one based on local conditions.

To be considered Class A, the sludge must undergo certain processes to further reduce pathogens. The processes might include temperature-phased anaerobic digestion (TPAD), lime stabilization, composting, heat drying, thermophilic aerobic digestion, heat treatment, pasteurization, or an equivalent process. Class A biosolids must have a fecal coliform concentration of less than 1,000 MPN. They also must meet high quality criteria for metals, if they are to be labeled “exceptional quality.” Biosolids that are considered “exceptional quality”, or Class A, do not need to meet the lifetime cumulative metal loadings to be land-applied according to WAC NR 204. Land application site evaluation reports would not be required. No bulk biosolids land application reports would need to be filed with the WDNR, and the WWTP would not need to receive approval from the WDNR before applying biosolids. More sites would potentially be available to apply the biosolids. Since Class A biosolids have lower levels of pathogens, there is a lower threat to human health, and therefore, fewer measures are required to minimize human contact with the sludge.

The USEPA periodically conducts surveys and investigations of biosolids content including metals, organics, inorganic ions, and other targeted pollutants. Data from these surveys help determine exposure to target pollutants in biosolids and whether target pollutants may need to be regulated pursuant to 40 CFR 503. New standards for molybdenum or other compounds may result. The USEPA is also assessing the potential use of various microbial risk assessment models such as salmonella via the ingestion pathway. This assessment is ongoing and may eventually affect the way RMMSD monitors pathogens and manages biosolids.

The WDNR and other states have also been considering requiring agronomic phosphorus application rates, which could make phosphorus the limiting nutrient for land application of biosolids instead of nitrogen. There has been some discussion of restricting sludge application to the amount of TP required for plant growth, and some farms are now required to or choose to develop nutrient management plans that may restrict phosphorus application. This restriction is intended to reduce the amount of phosphorus runoff from agricultural land into surface waters. The increasing concern over nutrients in surface water and groundwater may result in lower sludge application rates in the future (meaning more area and longer hauling distances will be required), more careful selection of land application sites, and possibly installation of BMP at biosolids application sites to reduce soil erosion and runoff. These requirements will likely result in higher future costs for biosolids disposal.

Concerns over per- and polyfluoroalkyl substances (PFAS) in biosolids could also impact the way RMMSD manages its biosolids in the future. The USEPA is currently completing a Risk Assessment for PFAS in biosolids that may provide insight into the future of biosolids PFAS limits in the next few years. It appears likely the WDNR will have new PFAS standards in the near future.

Changing weather patterns and farming practices could also impact RMMSD biosolids land application program. Many agricultural producers have relatively small windows of time in the spring and fall when they will accept biosolids, because of concerns regarding soil compaction or coordination with planting and harvesting. Extreme weather events have made these windows even smaller for several Wisconsin communities in recent years.

RMMSD has been experiencing increasing difficulty in finding and securing sites for land application. Local farmers, feeling pressure from nutrient management planning, have been considering limiting land application of biosolids. This may result in RMMSD needing up to five times more land for the same amount of biosolids which would present a challenge. RMMSD should evaluate biosolids handling alternatives to determine the most sustainable and cost-effective means of disposing biosolids.

5.09 SANITARY SEWER OVERFLOW (SSO) RULES

On August 1, 2013, new regulations pertaining to sewage collection systems became effective. These rules, typically referred to as the “SSO Rules,” are intended to focus attention on the proper operation of collection systems. The regulations will not only impact the RMMSD, but they will also impact the satellite communities that discharge to the WWTP. The rules include the following key components:

1. RMMSD was required to develop a CMOM program. The goal of a CMOM program is to make sure that the collection system is properly managed, operated and maintained, and that the system has adequate capacity to convey peak flows, even during wet weather. All feasible steps are to be taken to reduce I/I, eliminate SSOs, and mitigate the effects of SSOs.

2. When SSOs or chronic basement backups occur, the rules require the following:

    a. Notification of the WDNR within 24 hours of the occurrence, with a written follow-up report within 5 days.

    b. Public notification of SSO events is required.

    c. If drinking water systems will be impacted, notification of the impacted parties is also required.

    d. Satellite communities are required to notify downstream collection and treatment systems. This would mean that Mosinee, Kronenwetter, Rothschild, Weston, and Rib Mountain Sanitary District would need to notify the RMMSD if an SSO event occurred within their systems. Satellite communities were issued a general permit in October 2013.

3. CMOM compliance and SSO events will be documented on the Compliance Maintenance Annual Report (CMAR) reports that RMMSD is required to submit each year. A plan to address such events will be required and must be documented in the CMAR.

For many entities, the impact of the new regulations will be administrative. The new rules place an emphasis on documentation of SSO events and CMOM program elements. Many communities that have good operation and maintenance (O&M) programs in place do not necessarily have them well documented. Standard Operating Procedures (SOPs) will need to be developed for the major O&M activities and records maintained regarding maintenance activities. For some entities, ordinances may need to be reviewed and updated, especially the ordinances that address I/I sources and their removal.

5.10 MICROCONSTITUENTS AND OTHER EMERGING ISSUES

According to the Water Environment Federation (WEF) Government Affairs Committee, the main issues emerging at the national level are sustainability, financing, nutrients, and microconstituents. Nutrient regulations are probably the most imminent issue affecting the RMMSD WWTP and were discussed earlier in this section.

Microconstituents are also known as “compounds of emerging concern.” They include pharmaceuticals, PFAS, personal care products, and other compounds that are currently not specifically regulated in wastewater. The WDNR currently has the ability to regulate microconstituents in WWTP effluent only if a specific problem such as a directly linked adverse impact on aquatic life is demonstrated. Eventually, advanced oxidation processes or membrane treatment may be required to treat some of these microconstituents. Some communities have taken a pollution prevention approach and have implemented drug take-back programs to help reduce the concentrations of pharmaceuticals in wastewater. Successful drug take-back programs have been implemented in many Wisconsin communities.

PFAS have been a prominent concern in the news in recent years. These compounds are pervasive and bioaccumulating in the environment and are believed to be harmful to human health. The WDNR has convened a PFAS Technical Advisory Group to explore the concerns and consider potential regulations associated with these compounds. Several states have implemented drinking water, groundwater, or surface water standards. Some states have imposed biosolids land application moratoriums while reviewing the need for better controls. In Wisconsin, there is a proposed groundwater standard for two PFAS compounds. Additional Wisconsin information may be found here: https://dnr.wi.gov/topic/Contaminants/PFASGroup.html. At this time, it is too soon to predict whether PFAS regulations will have a major impact on the WWTP during the planning period included in this report, but it appears likely there will be some impact. There are few economical options for treatment of PFAS in wastewater. Granular activated carbon filtration, anion exchange, or reverse osmosis are technically feasible but come with concerns related to cost and residuals management. The best approach would appear to be source identification and control. Local limits for PFAS compounds could be considered and associated surcharges potentially imposed if warranted.

The WDNR has begun the process to develop human health surface water quality criteria for several PFAS compounds, including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). The WDNR held several preliminary hearings on the Statement of Scope for the proposed rule development in late 2019. The Statement of Scope was approved by the Natural Resources Board at its January 2020 meeting. WDNR has proposed rules which are under legislative review or have been reviewed by the publication of this report. For PFOS the proposed level of public health significance is 8 ng/L and for PFOA the proposed levels of public health significance are 20 ng/L in water classified as public water supplies under WAC NR 104 and 95 ng/L for other surface waters. RMMSD was told by WDNR officials that PFAS effluent monitoring will be added in the next permit term. RMMSD should monitor the progress of rule development to determine how proposed rules will impact the WWTP.

5.11 CURRENT WPDES PERMIT STATUS

The WWTP is currently operating under a WPDES permit that was issued on January 1, 2019, and expires on December 31, 2023. Effluent limitations required by this permit are presented in Section 3. A permit reissuance application will need to be submitted to WDNR at least 180 days before expiration of the current permit.

5.12 CONCLUSIONS

This review has identified the following major areas that may be affected by changes in the regulatory climate in the foreseeable future:

1. RMMSD's current WPDES permit includes TMDL-based effluent limits that become effective in January 2026.

2. TN limits are possible within the next decade or so. Depending on how stringent the limits are, these may have significant impacts on upgrades that need to be performed at the WWTP. TN can be removed using biological nitrification-dentrification processes or through WQT.

3. PFAS and other compounds of emerging concern may require monitoring and local pretreatment limits in the short-term (during the 20-year planning period), and, potentially, tertiary treatment in the long-term.

4. A pH-dependent maximum day ammonia limit based on acute toxicity is included in the current permit. Revised ammonia criteria or rerating of the WWTP to increase the WWTP's design flows may result in lower effluent limits in the future. New ammonia limits may require modifications of the outfall, pH adjustment, or possibly increased nitrification capabilities.

5. Programs and regulations related to phosphorus and PFAS in surface waters and groundwater may reduce the allowable biosolids application rate or may make land application site criteria more restrictive. This may result in the need for more land and/or longer hauling distances over the next several years and associated higher disposal costs. Changing weather patterns and farming practices may also adversely impact the biosolids land application program. RMMSD may consider diversifying its biosolids management program and set itself up for eventual biosolids drying or other biosolids treatment technologies.

6. Ongoing application and conformance of RMMSD's CMOM program is required. RMMSD's should continue to actively maintain the collection system and address any additional sources of I/I that are discovered.

SECTION 6
EVALUATION OF EXISTING FACILITIES

This section presents an evaluation of the ability of the existing WWTP to treat the projected future flows and loadings developed in Section 4 while meeting the anticipated future WPDES permit requirements. This section also presents a compliance evaluation of the current facilities with the current WDNR NR 110 design standards and other applicable design criteria. The review focuses on the rated capacity, age, reliability, and other factors related to operating and maintaining the existing facilities. Appendix B includes the design criteria for the current WWTP. Table 6.01-1 summarizes the current existing design capacity and 2045 design flows and loads for the facility.

6.01 UNIT PROCESS EVALUATION

A. Influent Pumping Station

The influent pumping station houses five centrifugal influent pumps each with a capacity of 2,135 gpm (3.07 MGD), a Palmer-Bowlus flume with an automatic sampler for process return flow (PRF) metering and sampling, and a backup generator. The pumps have a capacity of 12.29 MGD with the largest unit out of service, which is the WWTP's peak instantaneous design flow including the recycle flow. This flow rate exceeds the 2045 design peak flow requirements and meets the requirements set forth in WDNR NR 110. The diesel generator only serves the influent pumps, emergency lighting, and components of the disinfection process during periods when the main power fails.

The influent pumps were replaced in 2018 and the motors were reused as shown in Figure 6.01-1. Replacement of the pumps has significantly reduced issues with clogging due to rags. RMMSD has two backup pumps in storage that are ready to be installed if a current pump fails. The influent pumping station was updated in the 2018 project, which included replacing the original Parshall flume for the PRF metering with a Palmer-Bowlus flume and new influent gates in the wet well. The PRF sampler was also replaced since the WWTP's original construction. The discharge piping and wet well heating, ventilation, and air conditioning (HVAC) were also replaced with the 2018 project. The wet well has been relined since the WWTP's original construction. The remaining influent pumping station equipment has been in service since the WWTP's original construction in 1986.

	2022 Existing Design Capacity	2045 Projected Flows and Loadings	2045 Design Criteria
Average Annual Flow (MGD)	4.41	4.10	4.41
Maximum Month Flow (MGD)	5.03	5.29	5.29
Peak Hourly Flow (MGD)	8.09	10.25	10.25
Peak Instantaneous Flow (MGD)	12.29	12.29	12.29
Average Day BOD_5 Loading (lb/day)	8,529	9,390	9,390
Maximum Month BOD_5 Loading (lb/day)	8,985	11,920	11,920
Average Day TSS Loading (lb/day)	9,798	10,780	10,780
Maximum Month TSS Loading (lb/day)	11,620	14,230	14,230

Table 6.01-1 Design Flows and Loads

Figure 6.01-1 Influent Pumps

RMMSD has expressed concerns with its current wet well floats. These floats are original and located in a location that makes them difficult to maintain and are not intrinsically safe. The wet well floats should be replaced and relocated in a position to provide ease of maintenance and replacement. Other electrical and HVAC issues at the pumping station are discussed in Section 6.03.

A single 30-inch force main serves the pumping station, discharging flow to the preliminary treatment building. This force main has been in service since WWTP construction in 1986. Because of the high criticality of the force main and the lack of redundancy, RMMSD should consider assessing the condition of the pipe to gain confidence in its continued longevity or to identify any deficiencies that may exist.

B. Preliminary Treatment

The preliminary treatment processes at the RMMSD WWTP include mechanical step screening and aerated grit removal. Screenings are discharged to a wash press for washing and bagging and are disposed at a landfill; grit is dewatered and bagged for disposal as well. The mechanical step screen was installed in 2002, and the grit equipment was upgraded in 2001.

The mechanical step screen (shown in Figure 6.01-2) and wash press have a capacity of 13 MGD, are both nearing the end of their useful service lives, and should be replaced or rebuilt within the next 5 years. A new mechanical screen and a new wash press with a peak capacity exceeding the

12.29-MGD design capacity are recommended. The screen should be able to meet the design flow with a maximum blinding rate of 40 percent. This new screen would have 1/8-inch (3-millimeter [mm]) openings, and it would be installed in the other existing channel that currently has a manual screen. RMMSD is planning on rebuilding the existing screen and using it as the backup once the new screen is installed and operational.

Figure 6.01-2 Mechanical Step Screen

The aerated grit removal tank (shown in Figure 6.01-4) and associated equipment were designed for a maximum daily flow of 4.94 MGD, a peak hour flow of 12.96 MGD, and have surpassed their design life. The grit classifier was replaced within the last 5 years, as shown in Figure 6.01-5. The chain and bucket system in the aerated grit tank was replaced in approximately 2019. The WDNR NR 110 design standards require that the detention time not exceed 3 minutes at the maximum design flow rate. Under the peak instantaneous design flow of 12.29 MGD, the detention time is 2.7 minutes. The aerated grit tank appears to be sized appropriately. WWTP staff have indicated that the aerated grit system performs at an acceptable level. Considering this as well as recent equipment replacements, no major changes to grit removal are recommended.

The concrete columns downstream of the aerated grit tank baffle are eroded in areas. These areas should be repaired.

Figure 6.01-3 Aerated Grit Tank

Figure 6.01-4 Grit Classifier

C. Primary Sedimentation

The three primary sedimentation tanks pictured in Figure 6.01-6, were constructed in 1984 and placed in service in January 1986. WDNR NR 110 requires that primary clarifiers have a surface settling rate of 1,000 gallons per day per square foot (gpd/sq ft) or less at average design flow and 1,500 gallons per day per square foot (gpd/sq ft) at maximum hourly flow. It also requires that the weir overflow rate be less than 10,000 gallons per day per foot (gpd/ft) at the design average flow. The clarifiers will have a surface loading rate of 510 gpd/sq ft at the 2045 design average day flow and a rate of 1,086 gpd/sq ft at the 2045 peak hourly flow with all units operating. The clarifiers will have a weir overflow rate of 7,350 gallons per day per foot (gpd/ft) at the 2045 design average flow rate with all units operating. The clarifier chains and flights have been replaced, but the drives and scum skimmers are original. The blower has been replaced in the last 10 years. Costs for the replacement of clarifier drives and equipment are included in Section 7.

The drives current electric feed is from the Digester Building. The location at which the conduit lies at the base of the primary sedimentation tanks is a low spot in the yard. For this reason, the conduit frequently floods with water when rainfall events cause flooding at the WWTP site. It is recommended that when the drives are replaced, they are fed from the grit and screenings building to eliminate the water in the conduit.

Figure 6.01-5 Primary Sedimentation Tanks

D. Activated Sludge Treatment

The four aeration tanks and their equipment were constructed in 1984. Figure 6.01-7 shows the aeration tanks.

The four tanks will be loaded at approximately 32 pounds of BOD/1,000 cu ft at the projected 2045 average day BOD_5 loading of 9,387, assuming a 35 percent BOD_5 removal in the primary clarifiers. WDNR NR 110 allows up to 40 lb/1,000 cu ft for conventional activated sludge systems. If the WWTP needs to accomplish BOD_5 and nitrogen removal in the activated sludge process, then WDNR NR 110 allows up to 15 lb/1,000 cu ft of volumetric loading for BOD_5. With possible future total nitrogen limits, RMMSD will not have the aeration tank capacity required.

In terms of food to microorganism (F:M) ratio, RMMSD's aeration tanks will be loaded at a 0.21 ratio at the projected 2045 maximum month BOD_5 loading. This is assuming RMMSD operates at its current mixed liquor suspended solids (MLSS) concentration of 1,760 mg/L, assuming a 35 percent BOD_5 removal in the primary clarifiers, and assuming a yield of 0.8 lb WAS/lb of BOD_5 in the activated sludge treatment. WDNR NR 110 allows between 0.2 to 0.5 F:M ratio for non-nitrifying plants. If total nitrogen limits are implemented, then RMMSD will need to reduce its F:M ratio to between 0.05 to 0.15. RMMSD will not have capacity in its aeration tanks if total nitrogen limits are implemented and operation continues at the current MLSS concentration.

Air is supplied by two positive displacement blowers and one turbo blower. The positive displacement blowers were installed when the WWTP was originally constructed. Each are 100 horsepower (hp), have a capacity of 1,700 standard cubic feet per minute (scfm) at 8 pounds per square inch gauge (psig) discharge pressure and operate on VFDs. The 75-hp turbo blower (installed in 2014) is has a capacity of 1,275 scfm at 8 psig discharge pressure and runs on a VFD. The turbo blower generally runs in a lag position to the positive displacement blowers. The total firm capacity of the blowers is 2,975 scfm.

WDNR NR 110 requires that conventional activated sludge aeration tanks are supplied with 1.1 pounds of oxygen per pound of BOD_5. At the 2045 projected maximum month BOD_5 loading of 11,921 pounds, the required firm capacity of the blowers would be 2,984 scfm, assuming a 35 percent BOD_5 removal in the primaries and an oxygen transfer efficiency (OTE) of 11.5 percent.

If TN limits are implemented, the air requirements mandated by WDNR NR 110 would change to 1.5 pounds of oxygen per pound of BOD_5. At the 2045 projected maximum month loadings, the required firm capacity of the blowers would be 3,670 scfm, assuming a 35 percent BOD_5 removal in the primaries, 15 percent TKN removal in the primary clarifiers, an OTE of 11.5 percent, and a 1.3 TKN:ammonia ratio from special sampling performed at the WWTP.

Power consumption could be reduced using more efficient aeration blowers. If TN limits are required, new blowers will be needed to meet the requirements outlined in WDNR NR 110, which equals approximately 3,670 scfm. The capacity of the existing blowers is not sufficient to meet the future design requirements with one unit out of service.

The air piping should be considered for replacement when new blowers are installed. The polyvinyl chloride (PVC) air piping in Tank Nos. 1, 2, and 3 is original to WWTP construction. The PVC air piping was replaced in Tank No. 4. The PVC air piping in Tank Nos. 1, 2, and 3 should be replaced in the near term. The ceramic diffusers in Tank Nos. 1 and 4 were replaced in the past, but the diffusers in Tank Nos. 2 and 3 are original to WWTP construction. Diffuser age and pattern will be considered with the alternatives to be evaluated.

The WWTP monitors DO in the aeration tanks using DO probes. The air supply is controlled to maintain a DO of 1.8 to 2.0 mg/L. If the lead blower reaches its capacity and the system still senses an oxygen deficit, the lag blower is called to run.

Because of the current high variable effluent ammonia limit based on effluent pH, nitrification should not be required at the WWTP until TN limits are implemented. In addition, RMMSD has noticed that the alkalinity drops excessively when it nitrifies and causes operational challenges. Once TN limits are implemented, RMMSD will need to nitrify and denitrify. Possible alternatives for TN limits are discussed further in Section 7 of this report.

Figure 6.01-6 Aeration Tanks

E. Final Clarification and RAS Pumping

Two 85-foot-diameter final clarifiers (Figure 6.01-8) with a side water depth of 14 feet were constructed in 1984 and still operate with all original internal equipment and RAS pumps that have been maintained or rebuilt at regular intervals. RMMSD is planning to install Stamford baffles and launder covers as well as replace the weirs and scum baffles in the final clarifiers in late 2022.

WDNR NR 110 requires that activated sludge final clarifiers have a surface overflow rate of 1,200 gpd/sq ft or less at maximum hourly flow. At the 2045 maximum hourly flow of 10.25 MGD, the clarifiers would have a surface overflow rate of 903 gpd/sq ft. WDNR NR110 requires final clarifiers have a solids loading rate of 1.4 pounds per square foot per hour (lb/ft^2/h) or less at average design flow and 2.0 lb/ft^2/h or less at maximum hourly design flow. Based on the current MLSS concentration of 1,760 mg/L, the clarifiers have a solids loading rate of 0.58 lb/ft^2/h and 0.91 lb/ft^2/h at average design flow and peak hourly flows, respectively. WDNR NR 110 also requires a weir overflow rate of 10,000 gal/ft/day or less at the average design flow for clarifiers following activated sludge treatment. At the 2045 design flows and loading rates and a total weir length of 534 feet for both clarifiers, these clarifiers would have weir overflow rate of 8258 gal/ft/day. The clarifiers meet the WDNR NR 110 requirements at the 2045 design flows and, therefore, no additional clarification capacity is required. Structurally, the clarifiers appear to be in good condition. The clarifier drives and collector mechanisms were examined by an equipment manufacturer in late 2022 and were deemed in good condition with a remaining service life of 10 to 15 years.

The RAS pumps were rebuilt in approximately 2020 and are generally in good condition.

Figure 6.01-7 Final Clarifiers

F. Disinfection

The RMMSD WWTP uses UV light for effluent disinfection. The UV disinfection system was installed in 2010 (Figure 6.01-9). The UV system was designed as a phased project with the first phase having a peak-hour capacity of 4.34 MGD and the second phase doubling the capacity for a total peak-hour capacity of 8.68 MGD. Upsizing the effluent flume should be considered as part of the proposed improvements.

RMMSD recently acquired a second bank of UV disinfection lamps and were installed in the UV channel as shown in Figure 6.01-9. This second bank is equal to the bank installed in 2010. This bank can be turned on at full power while the first bank modulates with flow.

While the new peak hourly flow for the plant is 10.25 MGD and the current capacity is 8.68 MGD, RMMSD does not need a disinfection upgrade. The single bank that was installed in 2010 has never powered on to full since its installation. The UV disinfection was sized conservatively using a lower UV transmittance than is typically experienced at RMMSD. The current UV disinfection capacity is sufficient for the future 2045 flows.

Figure 6.01-8 UV Disinfection and Postdisinfection Settling

G. <u>WAS Thickening</u>

The two dissolved air flotation thickening tanks were constructed in 1984 and are shown in Figure 6.01-10. New air entraining recirculation pumps were installed in 2014. The submerged equipment was replaced 3 years ago. The remaining internal equipment is from the original installation. Structurally, the tanks appear to be in good condition; however, the associated equipment and controls are reaching the end of their design life. The unsubmerged equipment should be replaced within the next 5 years.

The DAFT tanks have a design solids loading rate of 560 pounds per hour (lb/hr), assuming they operate for 12 hours a day, 5 days per week, which is a solids surface loading rate of 0.42 pounds per hour per square foot. These design loadings are based on a WWTP total TSS loading of 9,460 lb/day. At the 2045 design TSS loading of 10,782 lb/day, RMMSD may need to operate the DAFTs more frequently than the design hours to maintain the original design solids loading rate.

Figure 6.01-9 Dissolved Aeration Flotation Tanks

H. Solids Processing

Solids are processed in the anaerobic digesters (Figure 6.01-11). Sludge is heated to mesophilic temperatures in the primary digester and then transferred to the secondary digester for storage and further processing. The primary digester has a recirculated pumping mixing system and is heated. The secondary digester is not mixed or heated.

Much of the digestion equipment is nearing the end of its useful service life and may need replacement in the near term. The digester equipment and covers should be inspected to determine their remaining life. For planning purposes, covers on the primary and secondary digesters, the combination boiler/heat exchanger, two transfer pumps, two recirculation pumps, digester gas safety equipment, and the waste gas burner are being included for replacement. Additionally, the nozzles on the primary digester mixing system are stuck in place and need service. The mixing system was installed in 2003 and the mixing pump was replaced in 2021.

The digestion complex does not meet the standards for wastewater treatment facilities as published in the National Fire Protection Administration's (NFPA) Section 820. This is mostly because of the gas handling equipment (i.e., accumulators, drip traps, and valves), which require a Class 1, Division 1 rating for the space. This is further reviewed in subsection 6.02 Electrical Evaluation.

The primary digester was designed for a solids retention time of 22.5 days with a volatile solids loading rate of 78.9 pounds of volatile solids per day per 1,000 cubic feet (lb VS/day/1,000 cu ft). At the 2045 design loading rate, the primary digester will have a solids retention time of 26 days and a volatile solids loading rate of 75 lb VS/day/1,000 cu ft based on 70 percent volatile solids in the feed sludge and future TMDL-based phosphorus limit, resulting in additional chemical sludge production. The actual percent of volatile solids would be lower since the sludge would contain more inert chemical sludge than the current feed sludge. Therefore, the existing primary digester is adequate to provide the required volatile solids loading rate (less than 80 lb VS/1,000 cu ft) and detention time (greater than 15 days) outlined in WDNR NR 110.

Figure 6.01-10 Anaerobic Digesters

I. Biosolids Storage and Land Application

RMMSD has two biosolids storage tanks that each have a capacity of 1.93 million gallons and meet the 180-day storage requirement of WDNR NR 110. The first tank was constructed in 2000 and the second tank was constructed in 2009. Pumped mixing was included in each tank and a new sludge load-out pump was also installed as part of the 2009 project. Liquid sludge is currently land-applied; however, it has been increasingly difficult to identify land for the application of biosolids. The WWTP would like to consider alternatives to land application. Biosolids disposal alternatives to land application are discussed in Section 7.

6.02 ELECTRICAL EVALUATION

This subsection discusses the electrical components associated with various parts of the WWTP and provides recommendations for improvements to the electrical system.

1. Influent Pumping Station

The existing MCC in the Influent Pump Station was originally installed in 1984 and has exceeded its typical working life of 20 to 30 years. Because of the age of this equipment, replacement parts will become more difficult to obtain and more expensive in the future. Therefore, Strand recommends the replacement of the MCC within the next 5 years. The conductors feeding this MCC were replaced during the 2018 project.

The five existing influent pumps are currently operated from two VFDs. One VFD is able to power pump Nos. 1, 3, and 5 and the second VFD is able to power pump Nos. 2 and 4. When not operating from the VFD, the pumps are operated from full-voltage nonreversing starters. The two existing VFDs are Allen-Bradley Powerflex 700 drives and were installed in 2009. These VFDs are approaching the end of their useful service lives. Therefore, Strand recommends replacing the influent pump starter and VFD panels with a dedicated VFD for each pump installed in the new MCC. This will provide more operating flexibility when a VFD is out of service and will simplify the control of the pumps. Bypass starters could be considered for some or all of the pumps to provide a means to start the pumps should one or more of the VFDs fail.

The existing submersible level transducers and back-up floats used for control of the influent pumps are old and in need of replacement. For replacement of the submersible level transducers, it is recommended that alternative noncontact level measurement devices such as radar-type level devices be installed. Redundant back-up floats and level transducers are desired. Junction boxes for termination of the new float and transducer cables should be installed outside of the wet well on the building exterior.

The existing diesel generator is also part of the originally installed equipment from 1984. While the generator is not necessarily past its useful service life based on the hours of operation on the unit, replacement parts will become more difficult to obtain and more expensive in the future. While the generator feed was previously routed into MCC-A in the Influent Pumping Station, it was rerouted to the main switchboard in the Solids Handling Building in the 2018 project. The transfer switch that previously accepted the generator feed in MCC-A remains and could function as a manual transfer switch should a portable generator be needed to power the influent pumps in an emergency. While WWTP staff noted that the utility service from Wisconsin Public Service is generally reliable, replacing the generator is recommended. The new generator can be sized to power additional WWTP loads as desired by the WWTP staff, and the WWTP SCADA system can be used to shut down noncritical loads when the WWTP is operating under generator power. The WWTP SCADA system is currently programmed to shut down noncritical loads when under generator power to provide the WWTP staff with the flexibility to use generator capacity for only critical equipment.

The interior and exterior building-mounted lighting at the Influent Pumping Station is light-emitting diode (LED) and in good condition.

2. Tunnel

The tunnel lighting was replaced with LED fixtures in the 2018 project.

3. Digester Building

The existing MCC in the Digester Building is the originally installed equipment from 1984 and has exceeded its typical service life of 20 to 30 years. Because of the age of this equipment, replacement parts will become more difficult to obtain and more expensive in the future. Therefore, it is recommended to replace the MCC within the next 5 years. The conductors feeding this MCC were replaced during the 2018 project.

The interior and exterior building-mounted lighting at the Digester Building is LED and in good condition.

In accordance with NFPA 820, certain spaces of the Digester Building should have a hazardous location rating. Reference Section 6.03, Item H. for additional discussion regarding NFPA 820.

4. Solids Processing Building

The existing MCCs in the Solids Processing Building are originally installed equipment from 1984 and have exceeded their typical service life of 20 to 30 years. Because of the age of this equipment, replacement parts will become more difficult to obtain and more expensive in the future. Therefore, Strand recommends the replacement of the MCCs within the next 5 years. The conductors feeding this MCC were replaced during the 2018 project. To aid in constructability and to accommodate a smoother start up with less downtime, the new MCCs could be installed in the location of the old main switchboard (which was demolished in the 2018 project) directly adjacent to existing MCC-B1 and B2.

The service entrance switchboard in the Solids Processing Building was installed in the 2018 project and incorporates an automatic transfer switch (ATS) to interface with the existing standby generator. Because all of the WWTP MCCs are powered from this switchboard, all critical WWTP loads can potentially run on generator power. WWTP staff indicate there is no phase loss or imbalance protection in the ATS controller. This should be added in the next project.

As discussed previously, a new standby generator is recommended. The most cost-effective location for the new standby generator is in the vicinity of the Solids Process Building because it will feed into the service entrance switchboard and ATS. The new standby generator could be located on the exterior of the Solids Processing Building in a weather-protective enclosure or possibly in the abandoned chlorine storage and chlorinator rooms (with some structural modifications). In order to determine whether installation of the new standby generator in the abandoned chlorine storage room is a viable option, the required size kilowatts (kW) of the generator will need to be determined.

The interior and exterior building-mounted lighting at the Solids Processing Building is LED and in good condition.

5. SCADA system

The PLCs used for the SCADA system were replaced in 2022 and are now Allen-Bradley CompactLogix series. This is a current model and replacement parts are readily available.

New SCADA computers and Human Machine Interface (HMI) software were provided in the 2018 project, along with wall-mounted SCADA displays in the Main Building and Operations Building. WWTP staff are notified of alarm conditions from a software alarm dialer (TopView) and hardware alarm dialer (GuardDog cellular). A control panel with an operator interface panel was added in the Influent Pumping Station adjacent to the influent pump control panel, and a supervisory control center (SCC-E) was added in the Grit Building. SCC-E was added onto the WWTP SCADA network via a fiber optic cable that was pulled into an existing conduit that was installed in the 2018 project. Because the Grit Building is a hazardous location, it is recommended that SCC-E be relocated to an unclassified area in the next project.

6. Miscellaneous

The networked telephone and paging system was installed in the 2018 project and remains in good condition. Based on Strand's discussion with WWTP staff, it is Strand's understanding the fire alarm and intrusion systems are operating satisfactorily and do not need to be upgraded at this time.

The WWTP internet service speed is very slow and the connection is not reliable. If not addressed by WWTP staff in the interim, alternative internet service methods and/or suppliers should be investigated during the next project.

While there has been some interest is implementing solar photovoltaic generation at the WWTP, preliminary payback calculations were not favorable. Solar land lease may be an option to generate revenue without requiring any electrical tie-in with the WWTP distribution system.

6.03 HVAC EVALUATION

A. Influent Pumping Station

The majority of the existing equipment within this structure was installed as a part of the original construction and is at the end of its useful service life. Strand recommends the replacement of the existing supply fan, exhaust fan, the original gas unit heaters, and the damper actuators. It has been noted there is a new gas unit heater on the first floor that may be reused. If a new generator is constructed in a new location, the HVAC in the generator room should be replaced and designed for the future use of that space. The existing dampers, louvers, and ductwork appear to be in good condition and they may be reused.

B. Preliminary Treatment Building

The environment within this structure is corrosive and generally causes the life of HVAC equipment to be shortened. Strand recommends all HVAC equipment, fans, heaters, dampers, and actuators be replaced. As a part of any future HVAC design, Strand recommends increasing the ventilation rate to help extend the life of other equipment within the space and keep the environment fresh.

C. Digester Building

The existing equipment within this structure was installed as a part of the original construction. The HVAC equipment supplies the digester building and the tunnels with heat and ventilation. Strand recommends the replacement of the existing supply fans, hot water unit heaters, the damper actuators, hot water boiler, and associated pumping and piping. The existing louvers and ductwork appear to be in good condition and could potentially be reused in the future if design conditions permit. The existing ventilation system will be modified to accommodate any changes to the building layout based on an NFPA 820 review.

D. Solids Processing Building

The majority of the existing HVAC equipment within this structure was installed as a part of the original construction. The hot water unit heaters were replaced as part of the 2018 project. Strand recommends the replacement of the existing air handling units, supply fans, exhaust fans, and the damper actuators. As a part of any future HVAC design, Strand recommends increasing the ventilation rate within the Sludge Thickener Room to help extend the life of other equipment within the space and keep the environment fresh. The existing louvers and ductwork appear to be in good condition and could potentially be reused in the future if design conditions permit.

E. Administration Building

The existing equipment within this structure was installed as part of the 2018 construction project. No planned HVAC improvements are recommended at this time.

F. Main Building

The existing HVAC equipment within the administration portion of the building is original. No planned HVAC improvements are recommended for the administration portion at this time.

G. Tunnel

The tunnel connecting the Solids Processing Building and Main Building is improperly balanced and causes pressurization issues. The existing HVAC serving the tunnel and adjacent spaces should be replaced and/or reconfigured in the future if design conditions permit.

H. Miscellaneous

NFPA 820 is a design standard used within the wastewater industry to establish minimum requirements for protection against fire and explosion hazards in WWTPs. This standard prescribes ventilation rates for different spaces and an associated national electrical code classification based on the type of space and the ventilation rate. A preliminary NFPA 820 review was completed for each building during the 2018 project. A table showing results of the NFPA 820 review can be found in Appendix C. The most critical areas that should be addressed in future projects are described in the following:

1. The Influent Pumping Station dry well is currently ventilated at approximately three air changes per hour. NFPA 820 guidance indicates continuous ventilation at six air changes per hour is recommended for below-grade pumping station dry wells.

2. The DAFT Room should be rated Class I, Division 1 and not be physically connected to any other rooms. The doorway between the DAFT Room and Blower Room should be removed.

3. The lower level Pump Room at the Digester Building contains gas piping with valves and drip traps and should be rated Class I, Division 1. Because the tunnels are not physically separated, they should also be rated Class I, Division 1. Gas piping and drip traps could be relocated to a segregated space in a future project to keep the tunnels unclassified.

6.04 SCREENING OF POTENTIAL ALTERNATIVES

This section identifies alternatives to address current or future deficiencies resulting from upcoming reduced effluent limits, possible future biosolids disposal limitations, issues providing necessary treatment capacity for projected future flows and loading, and issues related to the age and/or condition of equipment. The alternatives considered range from short-term implementation to long-term considerations. This approach is being used to facilitate the coordination between short-term total phosphorus limits and possible long-term total nitrogen and biosolids limitations. The alternatives considered will provide the required capacity for the flow and loading projections for the year 2045, address age and condition issues, and provide the ability to meet anticipated future effluent limits.

A. Total Nitrogen Compliance, Primary Clarification, and Biosolids Digestion

While the exact timing of effluent TN limit implementation is unknown, correspondence with WDNR staff indicate that limits are likely within the 20-year planning period. For this reason, near-term improvements to the WWTP should not be completed without understanding the future implications and upgrades that are needed for compliance with future TN limits. Reviewing requirements for future TN compliance will minimize the likelihood of near-term improvements not also being suitable for use when TN limits are implanted.

In addition to TN limits, a long-term review of the continued use of primary clarification and anaerobic digestion will be completed. The anaerobic digestion process is a very equipment intensive process compared to aerobic digestion, and much of the equipment will likely need replacement within the planning period. In addition, there would be significant costs to bring the lower level of the digestion complex in compliance with NFPA 820 (e.g., moving the gas handling equipment to a segregated space). Eliminating anaerobic digestion would eliminate the need for most of this equipment replacement as well as the cost of compliance with NFPA 820.

Primary clarification is typically only present at WWTP's with anaerobic digestion, as digesting primary sludge aerobically can be odorous. Removing the primary clarifiers would also further simplify the WWTP. If the primary clarifiers are removed, the carbon that is associated with the primary sludge would feed the aeration basins, reducing the amount of supplemental carbon that might be needed for future denitrification.

These three items are very interrelated and the timing of changes to them may coincide with each other (e.g., need for TN removal may coincide with the timing of significant reinvestment in the anaerobic digestion process). Because of this, a high level look at these items is completed in this facility plan to help assess the suitability of other alternatives and to dictate timing on other common improvements. As an example, the MCC in the Digester Building is at the end of its useful life. If anaerobic digestion will be retained long term, replacement in the near term when other MCCs are being replaced would be recommended. However, if the WWTP eliminates anaerobic digestion in 10 to 20 years it may be more cost effective in the long term to not replace this MCC and keep it in operation until it is ultimately removed when shifting away from anaerobic digestion, despite the increased costs to find parts and keep the older MCC in service.

For long-term planning purposes, two alternatives will be developed and evaluated in Section 7 for consideration of future TN limits, primary clarification, and anaerobic digestion. These alternatives will be developed assuming a TN limit of 10 mg/L.

1. Alternative C1–Modified Ludzack-Ettinger (MLE) Process for TN Removal, Retain Primary Clarifiers and Anaerobic Digestion

This alternative consists of an expanding and modifying secondary treatment to implement the MLE process, while retaining primary clarifiers and anaerobic digestion. In this alternative, the primary clarifiers would remain in service at the WWTP, with rehabilitation or replacement of the clarifier drives and skimmers because of the age of the equipment. The secondary treatment capacity would need to be increased to incorporate an anoxic zone for denitrification as well as add additional aerobic volume to nitrify ammonia. The replacement of PVC air piping and diffusers would be considered for areas of the basins that would remain aerated and anoxic zones would have their diffusers and PVC air piping capped or removed. Additionally, BioWIN modeling suggests a carbon source such as methanol would need to be added upstream to facilitate denitrification. RMMSD would need to maintain the anaerobic digesters as they would be continued to be used to digest primary sludge and WAS. The digesters would need to be maintained, which includes the rehabilitation of covers, replacement of associated equipment, and possible NFPA 820 upgrades. If RMMSD decides that it wants to bring the digester complex into conformance with NFPA 820, then the digester gas piping would need to be separated from the tunnels underneath the complex that lead to the Administration Building. This alternative would affect the current WWTP operation in a minimal way with the major change being the conversion of the aeration basins to the MLE process. This alternative was modeled in BioWIN to determine the viability and the required approximate sizing of the anoxic and aerobic zones. Figure 6.04-1 shows a schematic of the BioWIN model for this alternative.

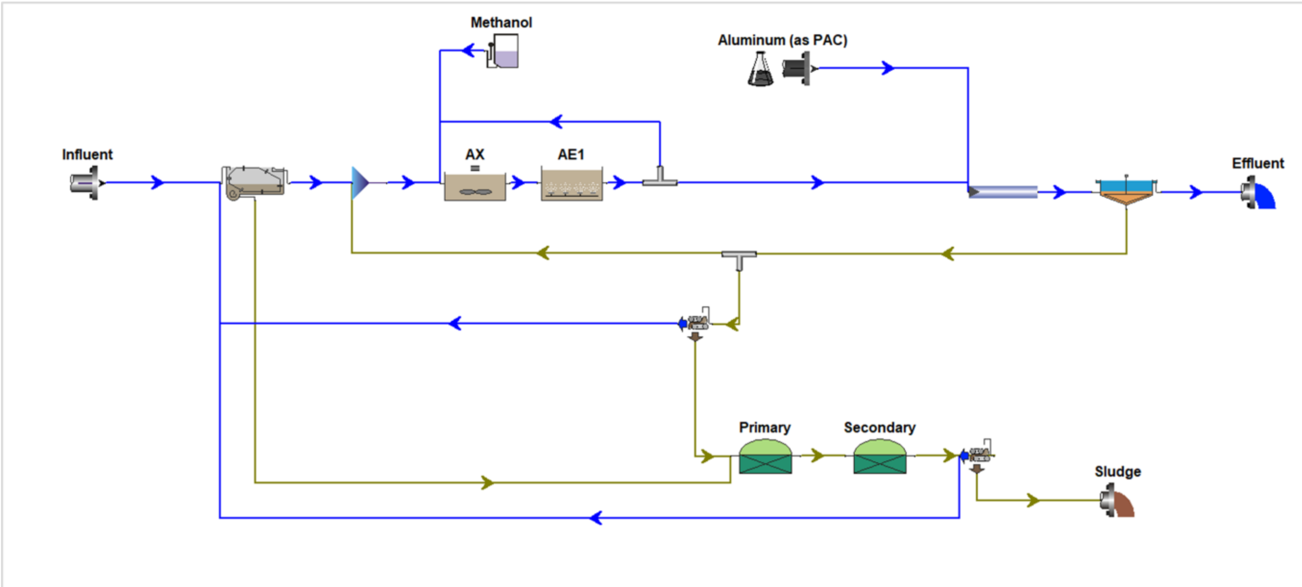
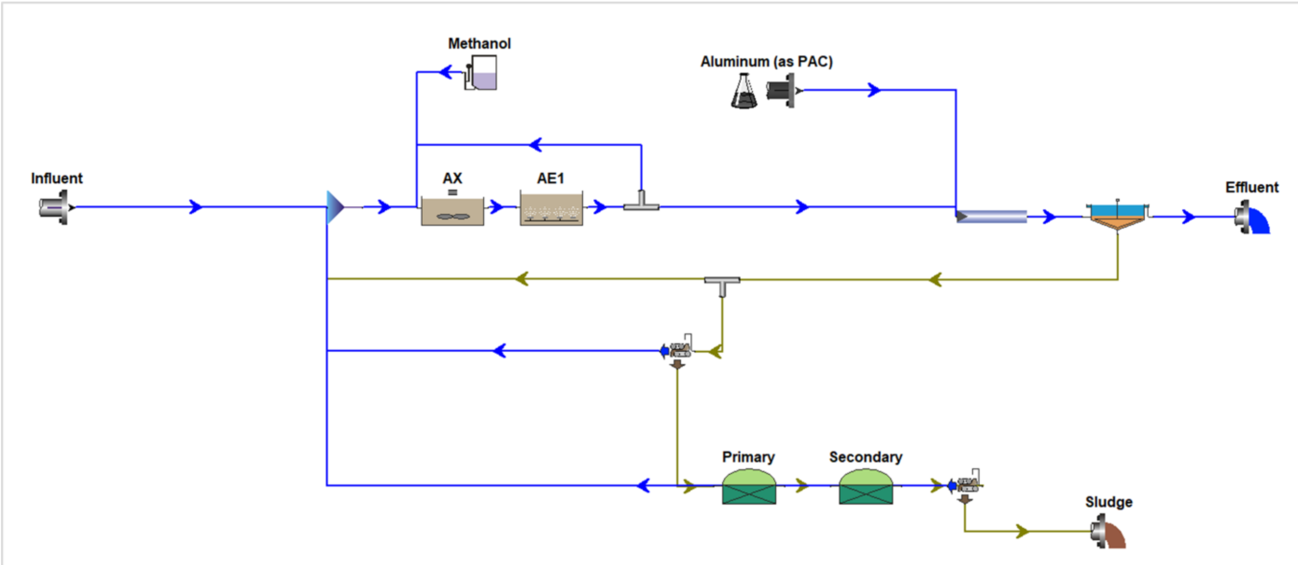


Figure 6.04-1 MLE with Primary Clarifiers and Anaerobic Digestion

2. Alternative C2–MLE Process without Primary Clarifiers, without Anaerobic Digestion

The second alternative would also include an MLE process for TN removal, but does not include primary clarification or anaerobic digestion. In this alternative, the primary clarifiers would be demolished (or potentially reused for RAS fermentation). After grit removal, flow would go directly to the anoxic zones in the aeration basins. Similar to the previous alternative, additional volume would need to be added to biological treatment. Without the primary clarifiers, a greater amount of volume would need to be added to the aerated zones and a larger anoxic zone would need to be added. However, less additional carbon would need to be added to the process to meet the future TN limits, as carbon that was otherwise removed in the primary clarifiers would be sent to secondary treatment. Because of the larger volume of the aeration basins, less phosphorus removal chemical would need to be added as well. Because the primary clarifiers would be removed from service or repurposed, the anaerobic digesters would be abandoned or repurposed as aerobic digesters or WAS holding tanks (depending on downstream biosolids handling processes). This alternative assumes they would be repurposed as aerobic digesters. The digested sludge would then be stored in the liquid sludge storage and land applied as is currently done at RMMSD. This alternative was modeled in BioWIN to determine the viability and the approximate sizing of the anoxic and aerobic zones. Figure 6.04-2 shows the BioWIN model of this forward flow alternative to address TN limits.



*Aerobic digesters were modeled as anaerobic digesters

Figure 6.04-2 MLE without Primary Clarification and Anaerobic Digestion

B. <u>TP Compliance</u>

RMMSD has an upcoming phosphorus compliance limit of 15 lb/day based upon the Wisconsin River TMDL and the associated site-specific criteria. RMMSD has previously evaluated possible TP compliance options in the *2022 Wastewater Treatment Plant Preliminary Compliance Alternatives Plan* (PCAP) prepared by Strand. These previously identified options are summarized here and options that will be further evaluated are identified.

1. Alternative A1–Watershed AM

Watershed AM can be used to address phosphorus compliance when 50 percent or greater of the phosphorus load at the WWTP outfall is from nonpoint sources. The AM option allows more time and flexibility for phosphorus compliance than the WWTP improvement alternative. However, the eligibility for AM requires that the proposed limit in the applicant's permit will require effluent filtration or equivalent technology to achieve compliance. RMMSD's TMDL-based limit is not considered "stringent" as defined by WDNR at their current influent flows and loadings. Additionally, the size of the Wisconsin River system would make implementing AM as a single party difficult. RMMSD should track any multi-WWTP AM initiatives and may wish to consider joining on to a larger group AM effort. However, this large-scale AM initiative does not seem likely to occur before these new phosphorus limits are added to RMMSD's permit; therefore, RMMSD will not be pursing this option and it will not be further evaluated in Section 7.

2. Alternative A2–WWQT

WQT would allow RMMSD to purchase phosphorus credits from participating nonpoint sources to meet its effluent limits. RMMSD had previously identified a potential trading partner in the 2022 PCAP; however, at this time the trade is not financially viable, especially as the lone method of compliance with the future phosphorus limit. If RMMSD finds a better phosphorus credit trade, it may decide to purchase credits as needed to provide a "buffer" and supplement other phosphorus compliance methods. At this time, no potential trades have been identified and this option will not be further evaluated in Section 7. However, it is recommended that RMMSD continually look for potential cost-effective trades to serve as a "buffer" to other phosphorus compliance methods.

3. Alternative A3–MDV

The MDV is an option for WWTP's to pay per pound of phosphorus discharged above their limit instead of other compliance options. RMMSD would need to meet the applicable requirements to qualify for the MDV. These include the need for a major facility upgrade for RMMSD to meet the effluent limits, the requirement to meet reducing interim limits and meeting five secondary screening economic criteria along with showing that user charges would increase to one percent of the median household income (MHI) in the service area because of the compliance with the TMDL. If RMMSD met these criteria they would need to pay the participating county in its hydrologic unit code (HUC) 8 watershed for the pounds of phosphorus over the limit, implement its own project, or pay a third party to implement a watershed project. During the third and fourth permit term, RMMSD would still need to work toward a final compliance option to meet the TMDL-based limits. RMMSD's rates are too low to qualify for the MDV and, therefore, it will not be further evaluated in Section 7.

4. Alternative A4–Chemical Phosphorus Removal

RMMSD currently uses the existing CPR system to meet the interim TP limits. Poly-aluminum chloride (PAC) is added upstream of the final clarifiers. RMMSD currently has one tank, but recent issues with PAC deliveries have caused concern with having enough chemical on-hand if a delivery is late, especially with the increased chemical use to meet lower TP limits. Additionally, the CPR system is already in use and chemical feed pumps and piping will likely need to be replaced within the 20-year planning period. This is expected to meet the final effluent phosphorus limit of 15 lb/day and therefore will be evaluated further in Section 7.

5. Alternative A5–BPR

RMMSD does not currently perform BPR. RMMSD has completed bench-scaled BPR potential testing in the past, with inconclusive results. Another round of bench-scale BPR potential testing in 2022 indicated that BPR may be possible. For this reason, special sampling was performed by RMMSD in June 2022 to better determine the influent characteristics and model the WWTP processes using BioWIN. This special sampling and modeling effort produced results that indicate that BPR may not be effective at RMMSD. The special sampling indicated that the readily biodegradable chemical oxygen demand (COD) to influent total phosphorus ratio was lower than desired for BPR. RMMSD's average ratio during the special sampling was 7:1. Literature values indicate that for BPR to be effective this ratio needs to be between 10:1 and 15:1. After the special sampling data was evaluated, the current processes were modeled in BioWIN to determine whether BPR might still be possible. Figure 6.04-3 shows a BioWIN schematic of the current WWTP retrofitted with an anoxic-oxic (A/O) process in the existing aeration tanks.

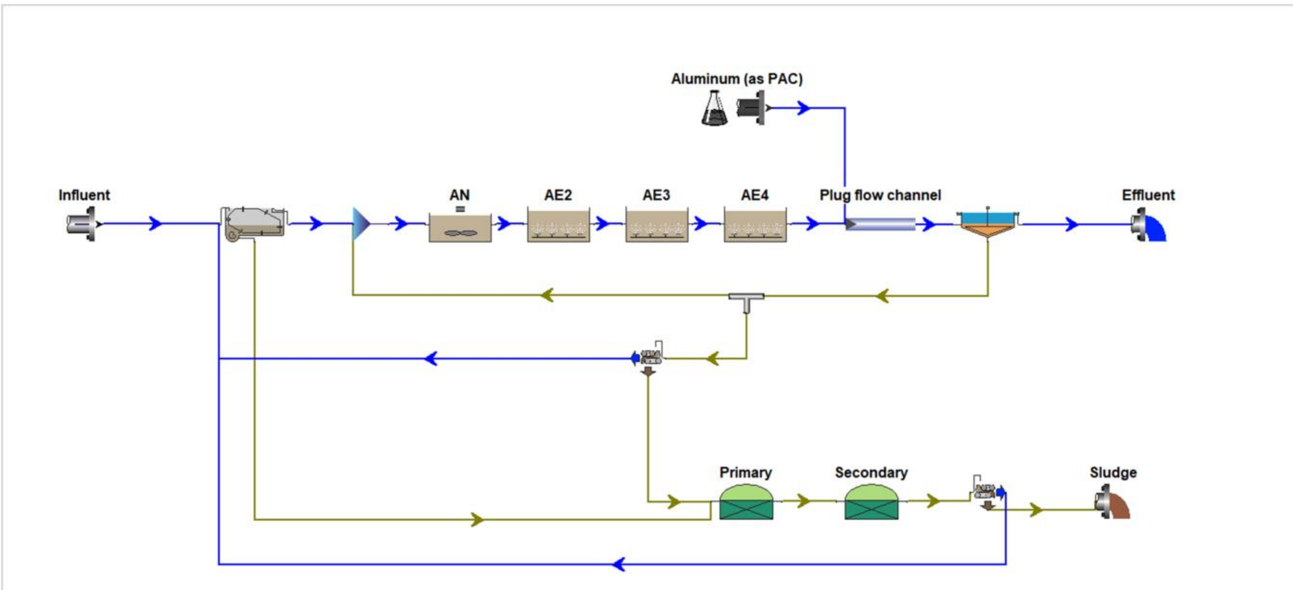


Figure 6.04-3 A/O Process with BPR

Modeling of the A/O process indicated that BPR would likely only be possible if the WWTP does not nitrify and the solids retention time remains low. However, it is very likely that RMMSD will need to nitrify in the future to comply anticipated future TN limits. Therefore, implementing BPR at the expense of not being able to nitrify is not recommended. It is recommended that RMMSD maintain the ability to nitrify in the future for purposes of meeting potential future TN limits. For this reason, BPR will not be pursued by RMMSD for final phosphorus limits and will not be further evaluated in Section 7.

6. Alternative A6–Cloth Disc Filtration

This option combines CPR with a cloth disc filtration system. The cloth disc filtration removes insoluble phosphorus that is flocculated with chemicals or is otherwise associated with the TSS. Chemical addition, including phosphorus removal chemical (PRC) and polymer, are required before the filter to condition the secondary effluent from the clarifiers. The system includes a rapid mix tank, a coagulation reaction tank, and a flocculation tank upstream of the filter. The equipment would be installed in a new filter building on the current WWTP site. The design flow for the filters would be 5 MGD. It is assumed that the filters would be installed in steel tanks within a concrete and masonry building. A new pumping station would be required to pump to the filters. Cloth disc filtration is expected to meet the final TMDL-based phosphorus limits and, therefore, will be evaluated further in Section 7.

C. Biosolids Program

RMMSD currently disposes of biosolids by land applying liquid sludge. RMMSD has been experiencing increased difficulty in finding sites for land application. Wetter weather and changing farming practices (e.g., more corn/bean rotations and less hay and winter wheat) have reduced the application windows in the spring and fall. There is also concern of reduced land availability because of the perception of emerging contaminants in the biosolids such as PFAS. These pressures on the current biosolids disposal program have resulted in RMMSD considering alternative options for disposing of biosolids.

1. Alternative B1–Continued Land Application Liquid Class B Biosolids

This alternative continues the land application of liquid biosolids. RMMSD already has the infrastructure to continue applying biosolids as a liquid. This alternative will include necessary equipment replacements to address age- and condition-related deficiencies with the associated equipment. This alternative will be further evaluated in Section 7.

2. Alternative B2–Dewatering and Landfill

Biosolids dewatering provides a different disposal method from the current liquids program. This would reduce the volume of biosolids produced at the WWTP. Currently, RMMSD spreads liquid biosolids at 4.5 percent solids and dewatering would bring the solids content to 20 percent in the dewatered cake. To further decrease the pressures of land applying biosolids, RMMSD may landfill the dewatered biosolids. RMMSD would need to install dewatering equipment in the Solids Processing Building. If emerging issues change the allowable spreading of biosolids, RMMSD may implement dewatering and landfilling cake biosolids as an intermediate step to drying. For this reason, dewatering and landfilling biosolids will be further evaluated in Section 7.

3. Alternative B3–Class A Biosolids Drying

Biosolids drying addresses many of the pressures on the current liquid biosolids disposal program by significantly reducing the volume of biosolids needing disposal and also producing a Class A product. A biosolids dryer reduces the volume of biosolids by removing the majority of the water. The current Class B liquid biosolids program produces biosolids at a solids concentration of approximately 4.5 percent. Class A dried biosolids need to have a minimum solids concentration of 90 percent. In addition, producing Class A biosolids would allow for much more flexibility with disposal. Class A biosolids do not require field approval and can be given away (or potentially sold) for multiple uses. If PFAS or other emerging contaminants in the biosolids exceeded acceptable thresholds, the dried biosolids could be disposed of at a landfill.

The reduced volume would significantly reduce landfill tipping fees as compared to dewatered biosolids.

To implement biosolids drying, RMMSD would install dewatering and drying equipment. This equipment could be installed in the Solids Processing Building. Class A biosolids drying will be further evaluated in Section 7.

6.05 COMMON IMPROVEMENTS

Performance and upgrade requirements of certain processes and facilities at the WWTP are independent of the alternatives previously discussed. Based on the evaluation of the existing facilities presented earlier, the following improvements along with recommended timeframes for implementation are shown in Table 6.05-1. These recommended improvements are common to all of the alternatives evaluated. Opinions of capital costs are included for each of the common improvement recommendations in Section 7.

Table 6.05-1 Recommended Common Improvements

Item	Recommended Timeframe	Notes
Replacements of influent pumping station floats and transducers in the wet well.	0 to 5 years	
Addition of a second force main from the influent pumping station to preliminary treatment.	6 to 10 years	
Influent pumping station MCC replacement, including new VFDs.	0 to 5 years	
Replacement of the generator.	0 to 5 years	
Phase loss/phase imbalance protection on ATS controller.	0 to 5 years	
Relocated the SCC-E to an unclassified area.	0 to 5 years	
Influent pumping station HVAC replacement (drywell only).	0 to 5 years	
Replacement of the influent screen and wash press.	0 to 5 years	
Concrete repairs in the aerated grit tank.	0 to 5 years	
New MCC Room and MCC in Preliminary Treatment Building	0 to 5 years	Replacement depends on TN alternative
Replacement of the primary clarifier drives and equipment; repower from preliminary treatment building to eliminate conduit flooding issue.	6 to 10 years	Replacement depends on TN alternative
Blowers, air piping, and diffusers.	11 to 15 years	Extent of replacement depends on TN alternative
Replacement of final clarifier mechanisms.	11 to 15 years	
Replacement of unsubmerged DAFT equipment.	6 to 10 years	
Replacement of digester covers.	0 to 5 years	Replacement depends on TN alternative
Replacement of the mixing pumps and fix nozzles in the primary digesters.	0 to 5 years	Replacement depends on TN alternative
NFPA 820 improvements to Digester Building basement.	0 to 5 years	Replacement depends on TN alternative
Replacement of the boiler/heat exchanger.	0 to 5 years	Replacement depends on TN alternative
Replacement of the recirculation pumps.	0 to 5 years	Replacement depends on TN alternative
Replacement of the Digester Building MCC.	0 to 5 years	Replacement depends on TN alternative
Replacement of the Solids Processing Building MCC.	0 to 5 years	Extent of replacement depends on biosolids alternative
Digester Building HVAC replacement.	0 to 5 years	Replacement depends on TN alternative
Replacement of the Solids Processing Building HVAC.	0 to 5 years	Timeframe depends on TN alternative
Replacement of any biosolids holding Tank 1 mixer.	11 to 15 years	Replacement depends on biosolids alternative
Addition of a second chemical storage tank.	0 to 5 years	
Replacement of the tunnel HVAC.	0 to 5 years	Timeframe depends on TN alternative

SECTION 7
TREATMENT PROCESS ALTERNATIVE EVALUATIONS AND COMMON IMPROVEMENTS CAPITAL COSTS

7.01 INTRODUCTION

An opinion of probable capital cost (OPCC) was developed for each alternative and common improvement included in Section 6. Additionally, total present worth costs were developed for each alternative where more than one viable alternative was identified. Capital costs were developed by obtaining equipment costs from equipment manufacturers or recent projects that had similar equipment. An installation factor of 35 percent was added to all equipment costs. New structures or structural modifications costs are included where necessary. The equipment subtotal was then used to develop cost estimates for demolition, electrical, mechanical (valves and piping), HVAC, and site work elements of the project based on typical factors. In some cases, actual mechanical and electrical costs were developed. Costs were then subtotaled, and 10 percent of that subtotal was added for the contractor's general conditions. This subtotal was multiplied by a factor of 40 percent to account for planning level contingencies and technical services.

All present worth evaluations were completed on a 20-year basis. A discount rate of 2.875 percent obtained from the WDNR for the fiscal year 2022 was used for the present worth evaluations. Please note, present worth evaluations were completed to compare alternatives, but may not include all the O&M costs for an alternative. For example, O&M costs are meant to represent the incremental difference in these costs between alternatives rather than the actual O&M costs of a specific alternative. Detailed present worth evaluations are included in Appendix D.

7.02 ALTERNATIVES EVALUATIONS

A. TN

As indicated in Table 6.05-1, many of the plant improvements are contingent on the long-term stratagem pursued by RMMSD. With TN limits on the horizon for this 20-year planning period, a TN alternative will be recommended in this section and further costs in this report will be contingent on the alternative selected here. The alternatives presented in Section 6 will be evaluated here on a 20-year total present worth cost analysis.

1. Alternative TN1–MLE Process

This alternative would expand the secondary treatment process to provide volume for nitrification and denitrification to occur. The primary clarifiers and anaerobic digesters would remain in place. Because of the age of the equipment in the primaries and digesters, there are capital costs included for replacing this aging equipment. Costs are included for replacing the primary clarifier drives and equipment in 10 to 15 years. The digester complex upgrades and repairs include mixing systems for both digesters, a new boiler/heat exchanger, two new covers, relocation of the waste gas burner, and new recirculation pumps. Costs for these replacement items are included with this alternative along with costs for bringing the digester complex in line with NFPA 820. Along with repair and upgrades to the primaries and digesters, there are significant costs included for upgrading the aeration tanks.

The number of aeration tanks would be increased to allow for a longer solids retention time (SRT) to facilitate nitrification and denitrification. The target SRT is approximately 10 days to allow for both processes to occur in the aerobic and anoxic zones. The additional volume of aerobic and anoxic tanks was based upon targeting the SRT to provide time for nitrification and denitrification to occur. The location of the new aeration and anoxic tanks is shown in Figure 7.02-1. The new aeration and anoxic tanks would be identical to the existing aeration tanks. The existing tanks would be modified by capping diffusers and rerouting flow with existing gates and channels to provide anoxic volume. Costs for new diffusers are included in this alternative, both for the existing tanks and the new ones. Along with additional aeration and anoxic tank volume, the blowers would need to be replaced to serve this greater aerated volume and mixers would need to be added to the anoxic tanks. Nitrate recycle pump costs are included for each train. Finally, rock excavation and rock blasting costs are included for the new aeration tanks due to their location on the site. The major O&M cost for this alternative is chemical including PAC and carbon in the form of methanol. The chemical required for this alternative is greater than the chemical required for Alternative TN2.

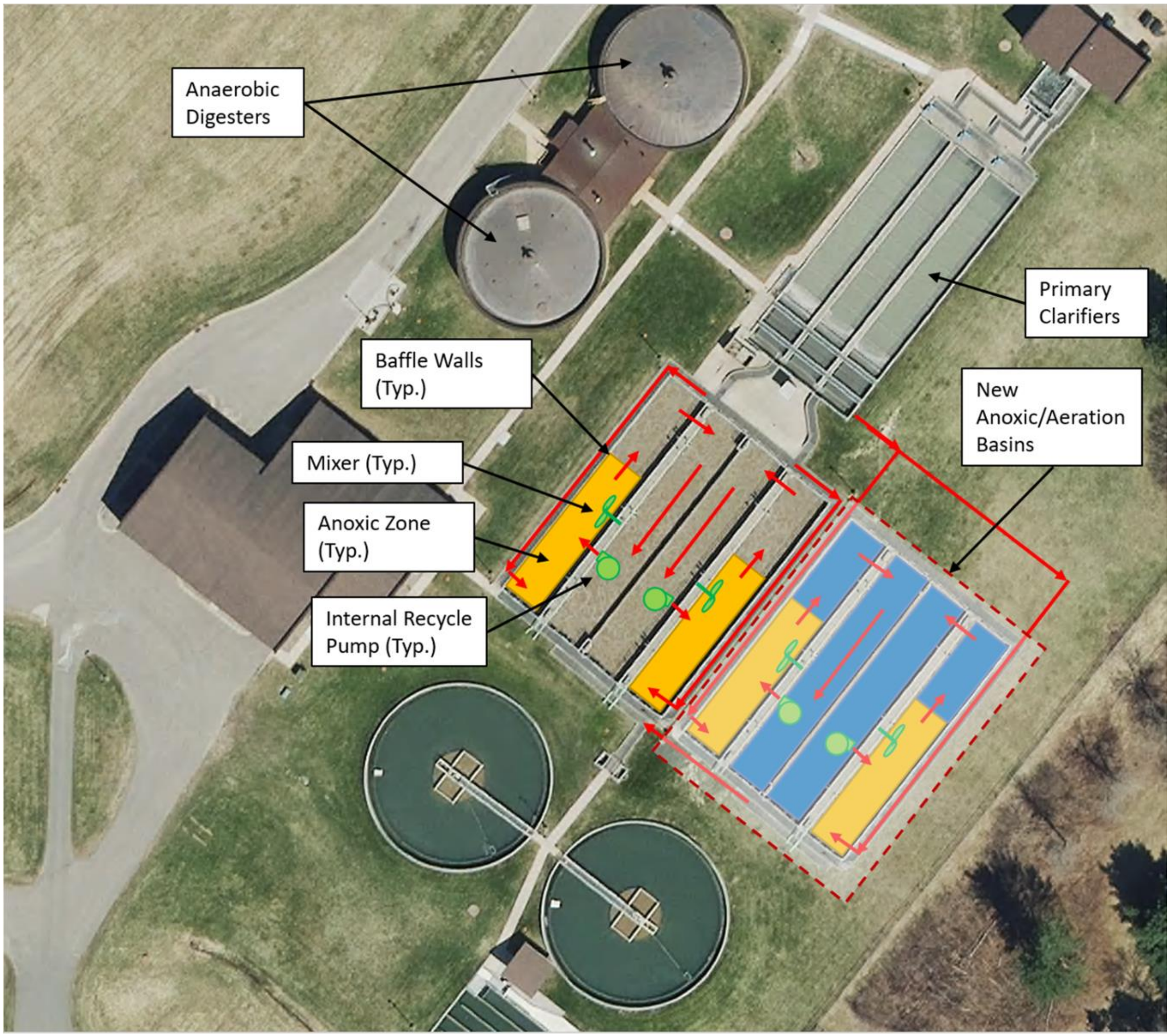


Figure 7.02-1 Alternative TN1 Site Location

2. Alternative TN2–MLE Process without Primary Clarifiers and Anaerobic Digestion

This alternative would expand the secondary treatment process to provide volume for nitrification and denitrification to occur; however, on a greater scale as shown in Figure 7.02-2. This is due to the removal of the primary clarifiers. The BOD removed in the clarifiers would need to be removed in secondary treatment; however, less carbon needs to be added to the process since it is not being removed in the primaries. Costs for demolishing the primaries and digesters are included in the total present worth analysis. This includes demolishing the equipment in the digester tanks themselves. In lieu of anaerobic digestion, the existing digesters would be converted to aerobic digesters. Costs for the conversion of the anaerobic digesters have been included in the total present worth analysis. These include multieductor draft tubes for both of the circular tanks to provide oxygen as well as blowers for the aerobic digesters.

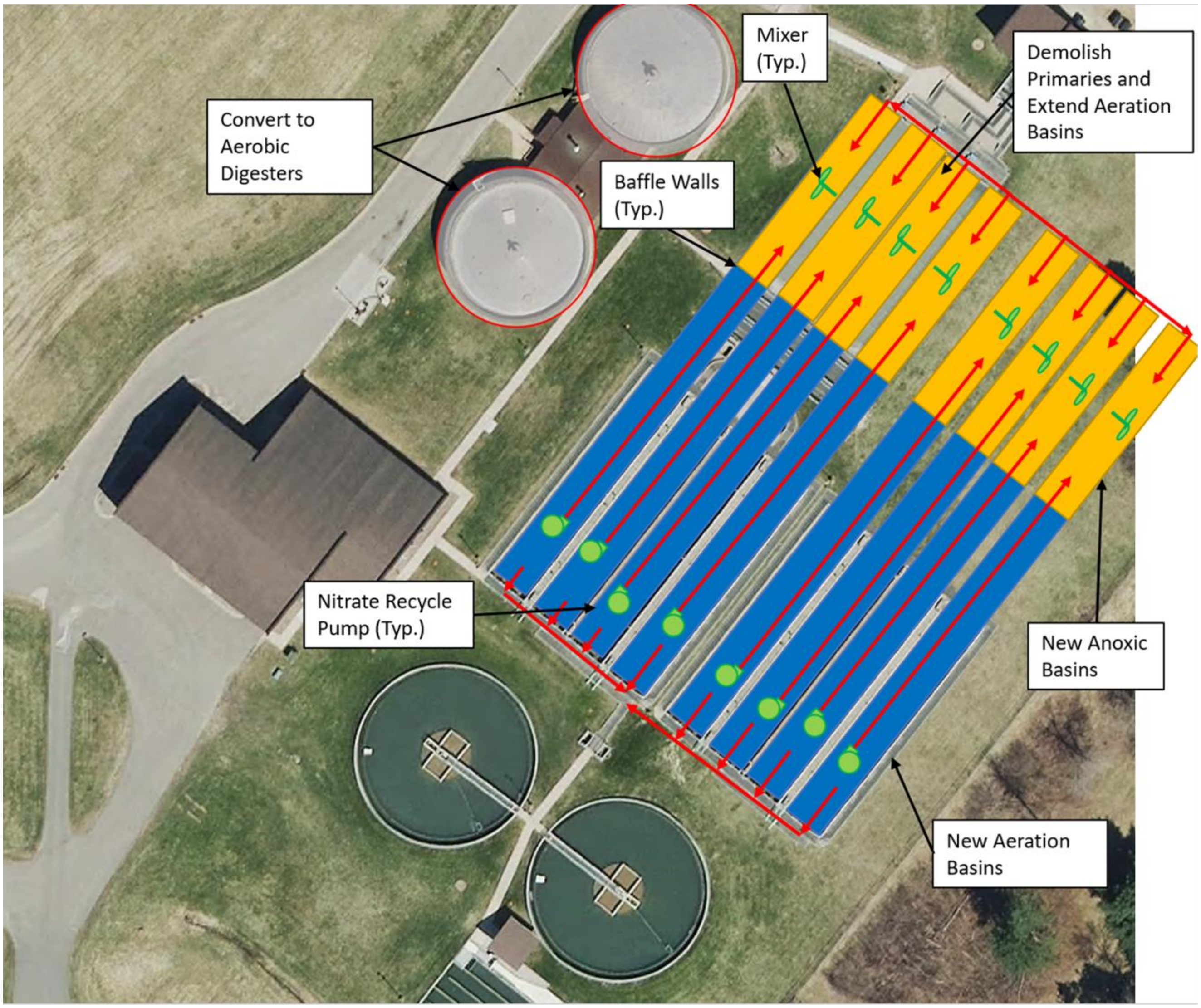


Figure 7.02-2 Alternative TN2 Site Location

Similar to the previous alternative, costs for adding aeration and anoxic tanks are included. These tanks would be located on the site as shown in Figure 7.02-2. These tanks were sized to allow for a longer SRT to facilitate nitrification and denitrification at the WWTP. Due to the removal of the primary clarifiers, more BOD will be removed in the aeration tanks and they need to be larger. Costs for the new tanks are included along with appropriately sized blowers for the higher loadings, nitrate recycle pumps, and anoxic mixers. Finally, the capital costs include rock excavation and blasting for the new tankage on-site. Like Alternative TN1, the major annual O&M cost is for PAC and methanol; however, the amount of chemical required for both products is less than Alternative TN1. In another respect, the power requirement is greater for this alternative due to the larger blowers and an additional set of blowers for the aerobic digesters. See Appendix D for detailed power analysis costs.

The opinion of total present worth costs for the two alternatives are shown in Table 7.02-1. A detailed cost analysis for each alternative is included in Appendix D. It is recommended that RMMSD pursue Alternative TN1 because of its lower 20-year opinion of total present worth.

	Alternative TN1–MLE Process	**Alternative TN2–MLE Process without Primary Clarifiers and Anaerobic Digestion**
Opinion of Capital Costs	$22,701,000	$36,088,000
Annual O&M Costs	$1,113,000	$934,000
Present Worth of O&M	$16,752,000	$14,058,000
Present Worth of Future Equipment	$65,000	$0
Present Worth of Salvage	($1,487,000)	($2,164,000)
Total Opinion of Total Present Worth	**$38,031,000**	**$47,982,000**
Percent of Lowest Alternative	100%	126%

Table 7.02-1 Opinion of Total Present Worth Cost for TN Alternatives

B. Phosphorus Removal

As previously discussed in this report, RMMSD has an upcoming phosphorus compliance limit. This report functions as a facilities plan and as part of the phosphorus compliance schedule serving as the Final Compliance Alternatives Plan. Following the discussion of six possible options identified in Section 6 of this report, these two alternatives were selected for further evaluation in Section 7. The alternatives will be evaluated on a total present worth basis for a 20-year planning period.

1. Alternative P1–Chemical Phosphorus Removal

RMMSD currently uses PAC to remove phosphorus from their effluent. Based on current concerns with PAC capacity and storage at the site, costs for this alternative include a second tank and modifications to the chemical storage area. The existing location will need to be modified to comply with current codes. The existing tank and new tank would need to be located in a new room within the Solids Processing Building. This new room would need chemical containment for the volume of both tanks as well as fire protection sprinkler volume. Fire protection sprinklers would need to be added to this room as well as supplemental HVAC equipment. Additional future costs are included for an orthophosphorus (OP) analyzer, energy dissipating inlets for the final clarifiers, and chemical pump replacements. These costs are 10 to 15 years out from the installation of a second chemical storage tank.

The total present worth costs include annual O&M costs alongside the capital costs associated with CPR. The largest annual cost would be in the chemical used at the plant to remove phosphorus from the effluent. This alternative would have less additional sludge disposal than the cloth disc filtration alternative.

2. Alternative P2–Cloth Disc Filtration

Cloth disc filters are the second option to be further evaluated for implementation at RMMSD. The cost for the filters includes steel tanks and the cloth media, as well as backwash pumps and valves. The filters would be installed in a new building on-site that would house the filter tanks as well as the effluent pumps required to install the filters in the existing hydraulic grade line of the WWTP. Costs for effluent pumps are included in the total present worth costs. The filters require a polymer system and rapid mix, coagulation, and flocculation tanks before the filters themselves. Costs for these items are included in the total present worth analysis along with costs for mixers for the tanks. This alternative includes costs included in Alternative P1 such as a second chemical storage tank and chemical building modifications to meet new code requirements and future chemical pumps and OP analyzer.

The annual O&M costs for this alternative are higher than for the previous alternative. These costs include annual power requirements for the effluent pumps, mixers, and filters. The largest cost again is chemical used to remove the phosphorus. This alternative would have more sludge to dispose of than the previous alternative due to the additional solids and polymer that would be trapped in the filters. The maintenance and supplies cost would also be higher as additional equipment would be added to the WWTP with this alternative.

The opinion of total present worth costs for the two alternatives are shown in Table 7.02-2. A detailed cost analysis for each alternative is included in Appendix D.

	Alternative P1–Chemical Phosphorus Removal	Alternative P2–Cloth Disc Filtration
Opinion of Capital Costs	$1,298,000	$11,091,000
Annual O&M Costs	$266,000	$329,900
Present Worth of O&M	$4,004,000	$4,965,000
Present Worth of Future Equipment	$92,000	$63,000
Present Worth of Salvage	($68,000)	($342,000)
Total Opinion of Total Present Worth	**$5,326,000**	**$15,777,000**
Percent of Lowest Alternative	100%	296%

Table 7.02-2 Opinion of Total Present Worth Cost for Phosphorus Removal Alternatives

RMMSD has an upcoming phosphorus compliance limit of 15 lb/day based upon the Wisconsin River TMDL and the associated site-specific criteria. Based on flows and loadings, this leads to target concentrations as presented in Table 7.02-3.

Flow (MGD)	Annual Average Concentration (mg/L)	Monthly Average Concentration (mg/L)	Target Concentration (mg/L)
2.4	0.67	0.75	0.60
2.9	0.56	0.62	0.50
3.4	0.48	0.53	0.42
3.9	0.41	0.46	0.37
4.4	0.37	0.41	0.33

Note: mg/L=milligrams per liter

Table 7.02-3 TP Concentrations at Various Flow Rates

It is recommended that RMMSD pursue Alternative P1 because of its lower 20-year opinion of total present worth. Alternative P2 may be necessary only if RMMSD has future issues meeting the effluent phosphorus limit with chemical alone.

C. Biosolids Disposal

As mentioned in Section 6, RMMSD is having a difficult time securing and locating land for the application of liquid sludge. Following the discussion of some possible disposal alternatives in Section 6, two alternatives were selected to be evaluated on a 20-year total present worth basis. The alternatives are described here.

1. Alternative B1–Liquid Land Application

RMMSD currently stores liquid biosolids in its biosolids storage tanks for injection land application in the spring and fall. This alternative evaluates the 20-year total present worth of continuing to land apply liquid biosolids. The capital costs associated with this alternative include replacement of pumps within the liquid biosolids process. This includes replacement of the pumped mixing equipment in the biosolids storage tanks, replacement of the decant pumps for the storage tanks, and replacement of the biosolids transfer pumps used to move sludge between the two tanks. RMMSD currently uses existing staff to coordinate application. RMMSD receives assistance from septage haulers to bring the biosolids to the fields after in-house staff coordinates application fields and windows. The largest annual O&M costs for this alternative consist of the hours RMMSD staff spends to coordinate and report biosolids application.

2. Alternative B2–Dewatering and Landfilling

RMMSD is considering dewatering and landfilling biosolids as a temporary phase between their current liquid program and drying. This may be necessary if current spreading rates change due to phosphorus or PFAS.

3. Alternative B3–Heat Drying

RMMSD is considering drying biosolids as it becomes more popular across the state. Heat drying of biosolids reduces the volume of biosolids that RMMSD would need to remove from the site; however, there are significant capital costs associated with this biosolids disposal alternative. The major capital costs for heat drying include the heat dryer and appurtenances and the dewatering equipment. For the purposes of this total present worth cost analysis, it was assumed that RMMSD would use a centrifuge for dewatering and a paddle dryer. The dewatering and drying equipment was sized for 2045 average day solids loading. Due to RMMSD's significant liquid storage volume, it was assumed RMMSD would use the liquid storage as a buffer during periods of higher solids loading. It was assumed that RMMSD would continue thickening WAS in the existing DAFTs and store liquid sludge in the existing sludge storage tanks when the dryer was not in operation. The sludge would then be fed to the centrifuge at 2 to 3 percent solids and be dewatered to 20 percent solids. This dewatered cake would be dried to approximately 90 percent solids. RMMSD would then store the dried biosolids in the existing dewatered cake storage on-site. The dewatered cake storage on-site is not fully enclosed and additional costs are included for enclosing the storage and adding ventilation, fire protection, and lighting to the buildings. The existing dewatered cake storage provides more than 2 months of storage of dried biosolids; however, it is assumed that RMMSD would have consistent removal of dried biosolids from storage by farmers and landscapers. RMMSD also has a significant volume of liquid biosolids storage to store biosolids before the drying process. Due to the liquid storage that RMMSD has, O&M costs assume that the dryer and dewatering equipment would not operate during the winter months. The largest O&M cost associated with this alternative is the maintenance and supplies for the expensive dewatering and drying equipment.

The opinion of total present worth costs for the three alternatives are shown in Table 7.02-4. A detailed cost analysis for each alternative is included in Appendix D.

	Alternative B1–Continued Liquid Land Application	Alternative B2–Dewatering and Landfill	Alternative B3–Heat Drying
Opinion of Capital Costs	$948,000	$2,999,000	$16,341,000
Annual O&M Costs	$220,300	$341,400	$259,000
Present Worth of O&M	$5,237,000	$5,138,000	$3,898,000
Present Worth of Future Equipment	$631,000	$0	$0
Present Worth of Salvage	($114,000)	($101,000)	($395,000)
Total Opinion of Total Present Worth	**$4,538,000**	**$8,036,000**	**$19,844,000**
Percent of Lowest Alternative	100%	120%	296%

Table 7.02-4 Opinion of Total Present Worth Cost for Biosolids Alternatives

A full alternatives evaluation of dewatering and drying technologies may be warranted when the pressures of land availability and other factors require dried biosolids. At this time, it is recommended that RMMSD continue operating as is and use private contractors, as needed, to provide additional equipment or labor during critical times.

7.03 COMMON IMPROVEMENTS

Regardless of selected alternatives, there are certain improvements that are recommended for RMMSD to pursue across the WWTP. These improvements are summarized here. These improvements are necessary regardless of other alternatives selected.

A. <u>Influent Pumping Station</u>

The condition and performance of some of the aged equipment in the influent pumping station necessitate replacement. Items discussed in Section 6.01, 6.02 and 6.03 are included in Table 7.03-1 with probable capital costs. The new generator would be outside near the Solids Building.

Improvements	Phase II	Phase III
Wet Well Floats and Transducers	$20,000	
Second Force Main from Influent Pumping Station to Preliminary Treatment	$223,000	
SCC-A and MCC-A Replacement	$275,000	
VFDs for Influent Pumps	$100,000	
Generator Replacement	$350,000	
Dry Well HVAC Replacement (NFPA 820)	$100,000	
Subtotal	$1,068,000	$0
Electrical (30%)	$320,000	$0
Mechanical (10%)	$107,000	$0
HVAC (0%)	$0	$0
Site Work (5%)	$53,000	$0
Subtotal	$1,548,000	$0
General Conditions (15%)	$232,000	$0
Supply Chain (15%)	$232,000	$0
Subtotal	$2,012,000	$0
Engineering and Contingencies (40%)	$805,000	$0
Project Total	**$2,817,000**	**$0**

Table 7.03-1 Influent Pumping Station Modifications

B. Preliminary Treatment

While there are no capacity issues related to any of the processes in this structure, the age, condition, and performance of some of the equipment necessitate replacement of the equipment or modification of the process. Probable capital costs are included in Table 7.03-2 for a new step screen and wash press. Additionally, included are a new MCC and concrete repairs in the aerated grit tank as mentioned in Section 6. The preliminary treatment building currently does not have an MCC. A new MCC would be added to a newly constructed add-on to the building. This would allow the primary clarifier to be powered from this building and help the flooding issues that the wiring currently has.

Improvements	Phase II	Phase III
Mechanical Screen and Wash Press	$384,000	
Motorized Slide Gate	$39,000	
New MCC-D	$200,000	
New MCC Room Addition	$139,000	
HVAC Replacement (NFPA 820)	$85,000	
Relocation of SCC-E to an unclassified area	$60,000	
Concrete Repairs in Aerated Grit Tank	$10,000	
Subtotal	$917,000	$0
Electrical (30%)	$275,100	$0
Mechanical (30%)	$275,000	$0
HVAC (10%)	$91,700	$0
Site Work (5%)	$45,900	$0
Subtotal	$1,604,700	$0
General Conditions (15%)	$241,000	$0
Supply Chain (15%)	$241,000	$0
Subtotal	$2,087,000	$0
Engineering and Contingencies (40%)	$835,000	$0
Project Total	**$2,922,000**	**$0**

Table 7.03-2 Preliminary Treatment Modifications

C. Primary Sedimentation

The recommended TN alternative TN1 uses the existing primaries on-site. As discussed in Section 6, the primary clarifiers have sufficient capacity to handle plant flows. However, the associated equipment should be evaluated for replacement within the next 6 to 10 years. Costs for the primary sedimentation tank upgrades are included in Table 7.03-3 and include the flights, chains, and primary sludge pumps. The costs also include the work required to repower the drives and primary sludge pumps from the new MCC in the preliminary treatment building instead of the digester complex.

Improvements	**Phase II**	**Phase III**
Replacement of Drives	$99,000	
Repower Primary Clarifier Equipment from Preliminary Treatment Building	$75,000	
Primary Sludge Pumps Replacement	$92,000	
Subtotal	$266,000	$0
Electrical (30%)	$79,800	$0
Mechanical (30%)	$80,000	$0
HVAC (0%)	$0	$0
Site Work (5%)	$13,300	$0
Subtotal	$439,100	$0
General Conditions (15%)	$66,000	$0
Supply Chain (15%)	$66,000	$0
Subtotal	$571,000	$0
Engineering and Contingencies (40%)	$228,000	$0
Project Total	**$799,000**	**$0**

Table 7.03-3 Primary Sedimentation Modifications

D. Activated Sludge Treatment

The two original aeration tank blowers are reaching the end of their useful service life and should be replaced within the next 11 to 15 years. Biological loading and primary clarifier removal rates should be verified before final blower selection to provide sufficient air capacity for peak conditions. Additionally, plastic air piping and diffusers in tanks 1 through 3 should be considered for replacement. Costs for three new blowers sized for future nitrogen limits are found in Table 7.03-4 along with diffuser and air piping costs.

Improvements	**Phase II**	**Phase III**
Replacement of Diffusers and Air Piping Internal to Tank	$367,000	
Subtotal	$367,000	$0
Electrical (30%)	$110,100	$0
Mechanical (10%)	$37,000	$0
HVAC (0%)	$0	$0
Site Work (0%)	$0	$0
Subtotal	$514,100	$0
General Conditions (15%)	$77,000	$0
Supply Chain (15%)	$77,000	$0
Subtotal	$668,000	$0
Engineering and Contingencies (40%)	$267,000	$0
Project Total	**$935,000**	**$0**

Table 7.03-4 Activated Sludge Modifications

E. <u>Final Clarification</u>

The final clarifiers have sufficient capacity and appear to be structurally sound, while the internal equipment should be replaced within the next 11 to 15 years because of age. The costs for upgraded final clarification equipment in Table 7.03-5 include two collector mechanisms.

Improvements	Phase II	Phase III
Replacement of Mechanisms		$306,000
Subtotal	$0	$306,000
Electrical (15%)	$0	$45,900
Mechanical (10%)	$0	$31,000
HVAC (0%)	$0	$0
Site Work (0%)	$0	$0
Subtotal	$0	$382,900
General Conditions (15%)	$0	$57,000
Supply Chain (15%)	$0	$57,000
Subtotal	$0	$497,000
Engineering and Contingencies (40%)	$0	$199,000
Project Total	**$0**	**$696,000**

Table 7.03-5 Final Clarification Modifications

F. Sludge Thickening and Solids Processing

Because of the age and condition of the equipment and controls, the DAFT units require equipment updates. Estimated costs for the rehabilitation are shown in Table 7.03-6. The costs include the internal equipment of sprockets, shafts, chains, air pumps, and valves. Additional solids processing costs included in Table 7.03-6 include MCC replacement in the Solids Processing Building and HVAC improvements in the same building. There are also costs presented for mixer replacement in one of the biosolids holding tanks.

Improvements	Phase II	Phase III
Replacement of Unsubmerged DAFT Equipment	$61,000	
Solids Processing Building MCC-B Replacement	$457,000	
Solids Processing Building HVAC	$150,000	
Demolition and Sealing of Doorway between DAFT Room and Blower Room (NFPA 820)	$75,000	
DAFT Pump Replacement	$92,000	
Biosolids Holding Tank No. 1 Mixer Replacement	$73,000	
Subtotal	$908,000	$0
Electrical (30%)	$272,400	$0
Mechanical (30%)	$272,000	$0
HVAC (0%)	$0	$0
Site Work (0%)	$0	$0
Subtotal	$1,452,400	$0
General Conditions (15%)	$218,000	$0
Supply Chain (15%)	$218,000	$0
Subtotal	$1,888,000	$0
Engineering and Contingencies (40%)	$755,000	$0
Project Total	**$2,643,000**	**$0**

Table 7.03-6 Sludge Thickening and Solids Processing Modifications

G. Anaerobic Digestion

The recommended TN Alternative TN1 uses the existing anaerobic digesters on site. Due to the recommendation to continue using the digesters and the age of the equipment, costs for replacement of digester equipment are included in Table 7.03-7. Items listed for replacement are included in Section 6.

Improvements	**Phase II**	**Phase III**
Primary Digester Cover Replacement	$507,000	
Secondary Digester Cover Replacement	$589,000	
Mixing Pump and Nozzles Primary Digester	$119,000	
Phase Loss/Phase Imbalance Protection on the ATS Controller	$10,000	
NFPA 820 Improvements to Digester Building Basement	$721,811	
Gas Safety and Handling Equipment Replacement	$274,000	
Boiler/Heat Exchanger Replacement		$328,000
Recirculation Pump Replacement		$146,000
Gas Flare Replacement and Relocation	$100,000	
HVAC Boiler Replacement		$164,000
Biogas Generators Demolition	$50,000	
Digester Building SCC-C and MCC-C Replacement	$325,000	
Digester Building HVAC Replacement	$150,000	
Subtotal	$2,846,000	$638,000
Electrical (30%)	$853,800	$191,400
Mechanical (30%)	$854,000	$191,000
HVAC (5%)	$142,300	$31,900
Site Work (5%)	$142,300	$31,900
Subtotal	$4,838,400	$1,084,200
General Conditions (15%)	$726,000	$163,000
Supply Chain (15%)	$726,000	$163,000
Subtotal	$6,290,000	$1,410,000
Engineering and Contingencies (40%)	$2,516,000	$564,000
Project Total	**$8,806,000**	**$1,974,000**

Table 7.03-7 Anaerobic Digestion Modifications

H. Miscellaneous

Other small improvements that are not associated with a specific process or building are included here.

Improvements	**Phase II**	**Phase III**
Replacement of the Tunnel HVAC	$60,000	
Nonpotable Water System	$174,000	
Subtotal	$234,000	$0
Electrical (15%)	$35,100	$0
Mechanical (10%)	$23,000	$0
HVAC (0%)	$0	$0
Site Work (0%)	$0	$0
Subtotal	$292,100	$0
General Conditions (15%)	$44,000	$0
Supply Chain (15%)	$44,000	$0
Subtotal	$380,000	$0
Engineering and Contingencies (40%)	$152,000	$0
Project Total	**$532,000**	**$0**

Table 7.03-8 Miscellaneous Plant Improvement Costs

SECTION 8–SELECTION OF RECOMMENDED ALTERNATIVES AND FISCAL IMPACT SUMMARY

Previous sections of this Facilities Plan presented background information, described and evaluated RMMSD's WWTP, projected flows and loadings, and reviewed alternatives necessary to meet the current and projected needs at the WWTP. This section presents a summary of the proposed modifications to RMMSD's WWTP, an overall cost summary, preliminary financing plan for the proposed improvements, and the fiscal impact of the recommended plan on RMMSD's user rates.

8.01 RECOMMENDED PLAN SUMMARY

The recommended plan includes modifications to many treatment processes at the WWTP. A brief summary of the recommended improvements follows. Phase I of the capital improvements were completed with the 2018 project. Phase II and Phase III of the capital improvements would be implemented in 0 to 5 years and 11 to 15 years, respectively. Projects recommended for implementation in Phase III are shown in *italics.*

A. TN Alternative

It is recommended that RMMSD continue with its current processes of primary clarification and anaerobic digestion (Alternative TN1) when potential future TN limits are issued. This decision to continue with the current processes has affected the improvements included here for the current facility needs. Improvements to the primary clarifiers and anaerobic digestion complex that were included with Alternative TN1 would be implemented in the near term and improvements to secondary treatment would be implemented in a future phase, likely when more stringent TN limits are required.

B. Biosolids Alternative

It is recommended that RMMSD continue with its current liquid biosolids program (Alternative B1) until outside pressures, including but not limited to PFAS: phosphorus-based land application rates, and mounting land application pressures increase the current program costs or no longer allow liquid application of biosolids. If these concerns grow large enough to illicit a change in the biosolids disposal program, RMMSD may pursue Alternatives B2 or B3. It is recommended that RMMSD revisit this issue with each permit reissuance.

C. Phosphorus Alternative

It is recommended that RMMSD proceed with Alternative P1 to meet upcoming phosphorus permit limits. A brief summary of the improvements included with Alternative P1 follows.

1. Add a second chemical storage tank.

2. Enclose existing chemical storage tank and new storage tank in new room within existing solids processing building.

3. Replace chemical yard piping.

4. Add an orthophosphate analyzer.

5. Add energy dissipating inlets to the final clarifiers.

6. Replace the chemical pumps.

D. <u>Influent Pumping Station</u>

1. Replace the wet well floats and transducers.

2. Add a second force main from the influent pumping station to the preliminary treatment building.

3. Replace MCC-A and SCC-A.

4. Replace existing VFDs for influent pumps with new VFDs for each pump.

5. Replace the standby generator. The new generator will be located outside near the digester complex.

6. Replace dry well HVAC to comply with NFPA 820 standards and WAC NR 110.

E. <u>Preliminary Treatment</u>

1. Add a new mechanical screen and wash press in the second influent channel.

2. Replace the existing slide gate with a motorized slide gate.

3. Add a new MCC-D.

4. Build a room addition to the building to house the new MCC and the relocated SCC-E.

5. Relocate SCC-E to an unclassified area.

6. Replace HVAC to comply with NFPA 820 standards.

7. Repair spalling concrete in channels following the aerated grit removal tank.

F. <u>Primary Clarification</u>

1. Replace the primary clarifier drives.

2. Repower the primary clarifier equipment from the new MCC-D in the preliminary treatment building.

3. Replace the primary sludge pumps.

G. Aeration Basins–Replace the diffusers and tank internal air piping in Tanks 1, 2, and 3.

H. Final Clarification–*Replace clarifier mechanisms.*

I. Biosolids Thickening and Biosolids Processing Building

1. Replace the unsubmerged DAFT equipment.
2. Replace MCC-B.
3. Replace HVAC in the building.
4. Demolish and seal the doorway between the DAFT room and the blower room to comply with NFPA 820 standards.
5. Replace the DAFT pumps.
6. Replace the biosolids holding tank mixer.

J. Anaerobic Digesters

1. Replace the primary digester cover.
2. Replace the secondary digester cover.
3. Replace the primary digester mixing pump and nozzles.
4. Add phase loss/phase imbalance protection on the ATS controller.
5. Construct a room adjacent to the digester complex basement to house the gas safety and handling equipment in accordance with NFPA 820 standards.
6. Replace gas safety and handling equipment.
7. *Replace boiler/heat exchanger for the digesters.*
8. *Replace recirculation pumps.*
9. Replace and relocate waste gas burner.
10. *Replace HVAC boiler.*
11. Demolish and remove biogas engine generators.

12. Replace MCC-C and SCC-C.

13. Replace HVAC in building complex.

K. Miscellaneous Improvements

1. Replace tunnel HVAC.

2. Replace non-potable water system.

8.02 OPINION OF CAPITAL COSTS AND PROJECT FINANCING

It is anticipated that the recommended improvements will be completed in two phases (0 to 5 years, and 10 to 15 years). The opinion of capital costs including contingencies and engineering for the recommended improvements associated with each phase are shown in Table 8.02-1 (fourth quarter 2022 costs basis). The detailed breakdown of these costs is presented in Section 7. The cost included for Alternative TN1 in Phase IV is less than the cost presented in Section 7. This is due to the exclusion of improvements included with the common improvements in Phases II and III.

Table 8.02-1 Summary of Recommended Improvement Costs

	Item	Opinion of Capital Cost Phase II	Phase III	Phase IV
Alternatives	Alternative P1			
	Add a second chemical storage tank.	$124,000		
	Enclose existing chemical storage tank and new storage tank in new room within existing solids processing building.	$815,000		
	Replace chemical yard piping.	$360,000		
	Add an orthophosphate analyzer.	$29,000		
	Add energy dissipating inlets to the final clarifiers.		$72,000	
	Replace the chemical pumps.	$29,000		
	Alternative TN1			
	MLE process with primary clarification and anaerobic digestion.			$16,710,000
	Alternative B3			
	Heat drying.			$16,341,000
Common Alternatives	Influent Pump Station			
	Replace the wet well floats and transducers.	$53,000		
	Add a second force main from the influent pumping station to the preliminary treatment building.	$588,000		
	Replace MCC-A and SCC-A.	$726,000		
	Replace existing VFDs for influent pumps with new VFDs for each pump.	$264,000		
	Replace the standby generator. The new generator will be located outside near the digester complex.	$924,000		
	Replace dry well HVAC to comply with NFPA 820 standards and WAC NR 110.	$264,000		
	Preliminary Treatment			
	Add a new mechanical screen and wash press in the second influent channel.	$1,223,000		
	Replace the existing slide gate with a motorized slide gate.	$124,000		
	Add a new MCC-D.	$637,000		
	Build a room addition to the building to house the new MCC and the relocated SCC-E.	$443,000		
	Relocate SCC-E to an unclassified area.	$271,000		
	Replace HVAC to comply with NFPA 820 standards.	$191,000		
	Repair spalling concrete in channels following the aerated grit removal tank.	$32,000		
	Primary Sedimentation			
	Replace the primary clarifier drives.	$297,000		
	Repower the primary clarifier equipment from the new MCC-D in the preliminary treatment building.	$225,000		
	Replace the primary sludge pumps.	$276,000		
	Activated Sludge			
	Replace the diffuser and tank internal air piping in Tanks 1, 2, and 3.	$935,000		
	Final Clarification			
	Replace clarifier mechanisms.		$696,000	
	Sludge Thickening and Solids Processing			
	Replace the unsubmerged DAFT equipment.	$178,000		
	Replace MCC-B.	$1,331,000		
	Replace HVAC in the building.	$437,000		
	Demolish and seal the doorway between the DAFT room and the blower room to comply with NFPA 820 standards.	$218,000		
	Replace the DAFT pumps.	$268,000		
	Replace the biosolids holding tank mixer.	$213,000		
	Anaerobic Digestion			
	Replace the primary digester cover.	$1,569,000		
	Replace the secondary digester cover.	$1,822,000		
	Replace the primary digester mixing pump and nozzles.	$368,000		
	Add phase loss/phase imbalance protection on the ATS controller.	$31,000		
	Construct a room adjacent to the digester complex basement to house the gas safety and handling equipment in accordance with NFPA 820 standards.	$2,233,000		
	Replace gas safety and handling equipment.	$848,000		
	Replace boiler/heat exchanger for the digesters.		$1,015,000	
	Replace recirculation pumps.		$452,000	
	Replace and relocate waste gas burner.	$309,000		
	Replace HVAC boiler.		$507,000	
	Demolish and remove biogas engine generators.	$155,000		
	Replace MCC-C and SCC-C.	$1,006,000		
	Replace HVAC in building complex.	$464,000		
	Miscellaneous			
	Replace tunnel HVAC.	$137,000		
	Replace non-potable water system.	$396,000		
	Total	**$20,813,000**	**$2,742,000**	**$33,051,000**

[1]All costs in fourth quarter 2022 dollars.

The opinion of probable cost of the Phase II improvements totals $20,755,000. Anticipating an early 2024 bid date and inflation of 8 percent per year results in an anticipated 2024 project cost of $22,412,000. It is anticipated the project will be funded by a Clean Water Fund (CWF) low interest loan. Table 8.02-2 shows the sources of funds that are anticipated to be used to fund the project.

Source	Amount
CWF Loan	$22,412,000
Total Project Cost	**$22,412,000**

Table 8.02-2 Sources of Funds for Phase II Water Pollution Control Facility Project

The effective rate for a CWF loan is a composite rate based on a blend of the subsidized interest rate (55 percent of the market rate as of the *SFY 2023 Intended Use Plan*) for the low interest rate eligible portions of the project and a market rate for market rate eligible portions of the project. The current market interest rate for the Wisconsin CWF program (as of November 2022) is 3.900 percent. Project elements needed for industrial capacity and future capacity (growth more than 10 years in the future) are not eligible for the subsidized rate. An effective interest rate of 2.145 percent was used, assuming a 100 percent parallel cost ratio, for estimating the annual debt service payment, which is expected to be approximately $1,390,000.

Additional grants from Focus on Energy will likely be available and applicable to components of the project that significantly reduce energy such as new VFDs, and more efficient lighting. The CWF program may also provide a match of any grants from Focus on Energy up to $50,000. These grants change annually based on the Focus on Energy's annual programs and the CWF program annual intended use plan. These additional grants are not included in the previous projections, but if additional grant funds are secured, the loan balance would be further reduced.

8.03 FISCAL IMPACT ANALYSIS

Based on the projected debt service payment of $1,390,000, a preliminary analysis of the impact on sewer user charges was made. The first principal and interest payment would be due around substantial completion of the project (June 2027). Therefore, sewer rate increases could be phased in over the next four years. The current annual revenue for RMMSD is $2,300,000. Based on the estimated increase in annual debt service required for the project, a total increase in revenue of approximately 60 percent is required. Impacts to the individual rate payers will vary according to customer community rate structures. Projected O&M expenses for 2023 are approximately $1,718,963. Existing debt service is $261,948 annually. New debt service associated with this project is anticipated to be approximately $1,390,000 based on current interest rates. An annual reserve of approximately $550,000 is anticipated in 2023 to fund the required annual equipment replacement fund deposit and provide other necessary reserve funds. With the anticipated annual reserves, the annual debt coverage ratio would be greater than the minimum 1.1 debt coverage ratio required by the CWF Program.

8.04 PROJECT IMPLEMENTATION SCHEDULE

The preliminary project implementation schedule for the Phase II improvements is presented in Table 8.04-1. This schedule was developed to allow the project to be bid in early 2024. The schedule assumes the project is funded through the fiscal year 2024 CWF program.

Task	Schedule Date
Public Hearing on Facilities Plan	January 2023
Submit Final Facilities Plan and FCAP to WDNR	January 2023
Begin Design	February 2023
Site Survey	March 2023
Soil Borings	March 2023
Pass Reimbursement Resolution	March 2023
Submit Drawings and Specifications to WDNR[1]	November 2023
Submit CWF Program Loan Application[1]	November 2023
WDNR Plan and Specification Approval	February 2024
Publish Advertisement to Bid	March 2024
Bid Opening	April 2024
Begin Construction	June 2024
Complete Phosphorus Alternative Construction	December 2025
Complete Construction	June 2027

[1]CWF Program Deadline for fiscal year 2024 Funding is September 30, 2023.
ITA=Intent to Apply, PERF=Priority Evaluation and Ranking Formula

Table 8.04-1 Project Implementation Schedule

SECTION 9
RESOURCE IMPACT SUMMARY

This section summarizes project environmental impacts and is included as an aid to the WDNR in its review of the project.

9.01 PROJECT IDENTIFICATION

Applicant:	Rib Mountain Metropolitan Sewerage District
Address:	2001 Aster Road, Wausau, WI 54401
Title of Proposal:	Wastewater Treatment Plant Facilities Plan
Project Location:	Rib Mountain Metropolitan Sewerage District Wastewater Treatment Plant

9.02 PROJECT DESCRIPTION

A. Why is this Project Needed?

The project will provide new and upgraded facilities for the WWTP required to provide adequate service for future growth, address aging equipment, and comply with current and future regulatory requirements. The recommended project generally consists of expanding phosphorus removal chemical storage and replacing various equipment throughout the facility.

B. What is to be Constructed and Where?

The new and modified facilities will be constructed at the existing WWTP site (see Figure 1.02-2). The following is a list of significant project elements:

1. Influent Pumping Station
    a. Replace the wet well floats and transducers.
    b. Add a second force main from the influent pumping station to the preliminary treatment building.
    c. Replace MCC-A and SCC-A.
    d. Replace existing VFDs for influent pumps with new VFDs for each pump.
    e. Replace the standby generator. The new generator will be located outside near the digester complex.
    f. Replace dry well HVAC to comply with NFPA 820 standards and WAC NR 110.
2. Preliminary Treatment
    a. Add a new mechanical screen and wash press in the second influent channel.
    b. Replace the existing slide gate with a motorized slide gate.

c. Add a new MCC-D.

d. Build a room addition to the building to house the new MCC and the relocated SCC-E.

e. Relocate SCC-E to an unclassified area.

f. Replace HVAC to comply with NFPA 820 standards.

g. Repair spalling concrete in channels following the aerated grit removal tank.

3. Primary Clarification

a. Replace the primary clarifier drives.

b. Repower the primary clarifier equipment from the new MCC-D in the preliminary treatment building.

c. Replace the primary sludge pumps.

4. Aeration Basins–Replace the diffusers and tank internal air piping in Tanks 1, 2, and 3.

5. Final Clarification

a. Replace clarifier mechanisms.

b. Add energy dissipating inlets to the final clarifiers.

6. Biosolids Thickening and Biosolids Processing Building

a. Replace the unsubmerged DAFT equipment.

b. Replace MCC-B.

c. Replace HVAC in the building.

d. Demolish and seal the doorway between the DAFT room and the blower room to comply with NFPA standards.

e. Replace the DAFT pumps.

f. Replace the biosolids holding tank mixer.

g. Add a second chemical storage tank.

h. Enclose existing chemical storage tank and new storage tank in new room within existing solids processing building.

i. Add an orthophosphate analyzer.

j. Replace the chemical pumps.

7. Anaerobic Digesters

a. Replace the primary digester cover.

b. Replace the secondary digester cover.

c. Replace the primary digester mixing pump and nozzles.

d. Add phase loss/phase imbalance protection on the ATS controller.

e. Construct a room adjacent to the digester complex basement to house the gas safety and handling equipment in accordance with NFPA 820 standards.

f. Replace gas safety and handling equipment.

g. Replace boiler/heat exchanger for the digesters.

h. Replace recirculation pumps.

i. Replace and relocate waste gas burner.

j. Replace HVAC boiler.

k. Demolish and remove biogas engine generators.

l. Replace MCC-C and SCC-C.

m. Replace HVAC in building complex.

8. <u>Miscellaneous Improvements</u>

a. Replace tunnel HVAC.

b. Replace nonpotable water system.

c. Replace phosphorus removal chemical yard piping.

Figure 9.02-1 presents the preliminary site plan for the recommended improvements at the existing site.

WASTEWATER TREATMENT FACILITY

RMMSD WWTP FACILITIES PLAN
RIB MOUNTAIN METROPOLITAN SEWERAGE DISTRICT
MARATHON COUNTY, WISCONSIN

STRAND ASSOCIATES®

FIGURE 9.02-1
1165.020

Path: S:\MAD\1100--1199\1165\020\Drawings\GIS\Rib Mountain WWTP\Rib Mountain WWTP.aprx User: danc Date: 12/5/2022 Time: 8:19 AM

C. What Area is to be Served (Service Area and Projected Population)?

The existing RMMSD sewer service area is shown in Figure 1.02-1. The existing population is 40,257 (2020 WDOA estimate). The projected year 2045 service population is 49,937.

D. What is the Design Flow and Loadings?

The design flow and loadings are summarized in Table 4.05-1.

E. What are the Applicable Stream Classifications and Effluent Limits?

The receiving water body is the Wisconsin River, which is classified as a river. Effluent limits are presented in Table 3.05-1 and a copy of the January 1, 2019, WPDES Permit is included in Appendix A.

F. How will the Project be implemented (Construction Schedules, Financing, and User Charges)?

Table 9.02-1 presents the proposed implementation schedule for the recommended projects and associated costs for each phase. Project funding and impacts to user rates are discussed in Section 8.

Project	Opinion of Capital Cost[1]
Phase II Improvements	$20,813,000
Phase III Improvements	$2,742,000

[1]All costs in fourth quarter 2022 dollars.

Table 9.02-1 Implementation Schedule and Project Capital Costs

9.03 AFFECTED ENVIRONMENT

A. Physical: Describe Existing Resource Features (Including Wetlands, Lakes, Streams, Shorelands, Floodplains, Groundwater, Soils, and Topography) That May be Affected by the Proposed Project.

1. Wetlands–There will be no lands classified as wetlands that will be affected by the proposed project.
2. Lakes–There will be no lands classified as lakes that will be affected by the proposed project.
3. Streams–The current discharge for the RMMSD WWTP is the Wisconsin River. The proposed project will provide improved WWTP reliability and performance.
4. Shorelands–No shorelands will be affected by the proposed project.
5. Floodplains– The project improvements will not be within the 100-year flood elevation.

6. Groundwater–Groundwater elevations will possibly be affected during construction. No long-term impacts are expected as a result of the project.

7. Soils–The soils on the site will be disturbed for construction of new facilities.

8. Topography–There will be very minor changes to the topography at select locations on the site.

B. Biological: Identify Plant and Animal Communities in the Planning Area with an Emphasis Upon Those Species Likely to be Impacted. Threatened or Endangered Status Should be Discussed Where Applicable.

The existing project site is located in an area already designated for the WWTPs. No project work will be completed outside of the existing site.

C. Cultural: Describe Zoning and Land Use, Ethnic and Cultural Groups, and Archaeological and Historic Resources that May be Affected by the Proposed Project. Describe the Economic Setting of the Area.

1. Zoning and Land Use–The existing project site is located in an area already designated for WWTP. No project work will be completed outside of the existing site.

2. Ethnic and Cultural Groups–There will be no impact on ethnic or cultural groups.

3. Archaeological and Historic Resources–The proposed improvements on the existing WWTP site will have no known impacts on archaeological or historical resources.

4. Economic Setting–RMMSD serves five communities of Marathon County. These five communities include parts of the Town of Rib Mountain, the Village of Rothschild, part of the Town of Weston, the Village of Kronenwetter, and the City of Mosinee. These communities represent a stable and vibrant part of the county with several established business and commercial operations.

D. Other Resource Features: Identify Parks, Natural Areas, Prime Agricultural Land, etc.

The existing project site is located in an area already designated for the WWTP. No project work will be completed outside of the existing site.

9.04 PROJECT IMPACTS

A. Primary

1. Describe expected changes in surface water or groundwater quality. List any required Chapter 30 permits.

The proposed improvements will allow the WWTP to continue to produce an effluent quality required by the WPDES permit.

Groundwater quality will not be affected.
The proposed improvements do not include any stream crossings. It is unlikely a Chapter 30 permit will be required.

2. Describe construction-related impacts such as noise, traffic disruptions, and air emissions.

During the period of construction, there would likely be an unavoidable increase in noise levels, dust, and congestion near construction sites. In addition, the construction process may necessitate the disturbance of surface improvements and vegetation, excavation, storage of materials, and backfill operations. Movement of heavy equipment to and from the site, delivery of construction materials, and traffic of workers to and from the construction locations would also be necessary.

There will be no construction near residences.

3. Describe impacts on natural flora and fauna.

Construction on the WWTP site will not have an impact on the flora and fauna of the area because all construction occurs on lands currently used for wastewater treatment.

4. Describe loss of prime agricultural land or disruption of agricultural activities.

The project will not result in a loss of agricultural land.

5. Describe project impacts on wetlands and floodplains. Explain why such impacts are necessary.

There will be no impacts on wetlands or construction within the floodplain.

6. Describe project impacts upon scenic or other aesthetic resource features.

There are no scenic or unique areas that would be impacted by the proposed project.

7. Describe impacts on cultural, historic, and archaeological features.

There are no known resources that would be impacted.

B. Secondary–Describe the future environmental impacts resulting from increased urbanization and land use changes potentially induced by the availability of wastewater collection and treatment services. Special attention should be given to impacts upon wetlands and other surface water including those resulting from stormwater runoff and erosion. Other secondary impacts on flora, fauna, air quality, agriculture, urban services, science values, and cultural, historic, and archaeological resources should also be addressed.

The proposed project is consistent with anticipated and planned growth in the area. Providing adequate municipal WWTPs would promote controlled development.

9.05 MITIGATED MEASURES

Describe measures proposed to mitigate adverse primary and secondary impacts.

A. Construction Impacts

During construction, certain practices would be required of contractors including compliance with any applicable stormwater-related construction ordinances. These practices include backfill, reseeding, and restoration of excavated and disturbed areas as soon as possible after construction, as well as runoff control measures to minimize sediment runoff from construction sites, and appropriate scheduling of heavy equipment. Roadway access would be maintained during construction.

B. Noise

Equipment and processes having high noise levels are not included in the design. Construction activities would be expected to follow noise agreements the RMMSD WWTP has with its neighbors.

C. Odors and Visual Impacts

The proposed facilities will mitigate the impacts of odors and noise in the vicinity of the WWTP. Appropriate design features will be included to improve the overall appearance of both modified and new structures.

9.06 ALTERNATIVES CONSIDERED

A. Provide a Description and Cost Comparison of Alternatives Considered. List the Capital Cost, Annual O&M Cost, and Total Present Worth Cost for Each Alternative.

Section 7 of this Facilities Plan includes the alternatives that were considered, descriptions of the alternatives, and summaries of the present worth evaluations. Detailed present worth calculations are included in Appendix D. Project components that were necessary regardless of alternatives chosen were not evaluated on a present worth basis. Those project elements are listed in Section 7.

B. Describe the Environmental Impacts of the Nonselected Alternatives Identified Above that Differ from Those Expected for the Selected Alternative.

1. Impact evaluations for nonselected alternatives are included in Section 7 of this report.

2. No-Action Alternative–Should RMMSD not proceed with the construction of necessary facilities to comply with environmental protection regulations, there would be a number of negative impacts, such as the following:

   a. Additional maintenance of existing equipment will be required because of the age of the facility and current loadings. Costs for maintaining the existing equipment would deplete the existing funds for equipment replacement.
   b. Potential loss of benefits gained through labor efficiency.
   c. Potential loss of equipment reliability through advanced age.

9.07 CONTACTS

List agencies, groups, and individuals contacted regarding the proposed projects.

1. WDNR–Lisa Bushby, CWF Program Coordinator
2. RMMSD–Eric Donaldson, Plant Superintendent; Andy Heise, Lead Operator: Commissioners
3. North Central Wisconsin Regional Planning Commission–Darryl Landeau, Senior Planner

APPENDIX A
WPDES PERMIT

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

Rib Mountain Metro Sewage District WWTF

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
151401 Aster Road, Wausau, WI

to

the Wisconsin River in the Mosinee Flowage watershed of the Central Wisconsin River Basin in Marathon County

Outfall: 44.86282° N / 89.6566° W

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By ______________________
Geisa Thielen
Wastewater Field Supervisor

October 29, 2019
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - January 01, 2019
EXPIRATION DATE - December 31, 2023
MODIFICATION EFFECTIVE DATE- November 01, 2019

TABLE OF CONTENTS

1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
701	Representative influent samples shall be collected at the inlet to the aerated grit chamber

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 701 - INFLUENT @ GRIT CHAMBER

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD_5, Total		mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	5/Week	24-Hr Flow Prop Comp	
Mercury, Total Recoverable		ng/L	Monthly	24-Hr Flow Prop Comp	See subsection 1.2.1.1 for mercury monitoring requirements.

1.2.1.1 Mercury Monitoring

The permittee shall collect and analyze all mercury samples according to the data quality requirements of ss. NR 106.145(9) and (10), Wisconsin Administrative Code. The limit of quantitation (LOQ) used for the effluent and field blank shall be less than 1.3 ng/L, unless the samples are quantified at levels above 1.3 ng/L. The permittee shall collect at least one mercury field blank for each set of mercury samples (a set of samples may include combinations of intake, influent, effluent or other samples all collected on the same day). The permittee shall report results of samples and field blanks to the Department on Discharge Monitoring Reports.

2 In-Plant Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
101	The field blank shall be collected using standard handling procedures every day that mercury samples are collected at influent and effluent.

2.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point 101 - FIELD BLANK-MERCURY MONITORING

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total Recoverable		ng/L	Monthly	Blank	See subsection 2.2.1.1 for mercury monitoring requirements.

2.2.1.1 Mercury Monitoring

The permittee shall collect and analyze all mercury samples according to the data quality requirements of ss. NR 106.145(9) and (10), Wisconsin Administrative Code. The limit of quantitation (LOQ) used for the effluent and field blank shall be less than 1.3 ng/L, unless the samples are quantified at levels above 1.3 ng/L. The permittee shall collect at least one mercury field blank for each set of mercury samples (a set of samples may include combinations of intake, influent, effluent or other samples all collected on the same day). The permittee shall report results of samples and field blanks to the Department on Discharge Monitoring Reports.

3 Surface Water Requirements

3.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	Representative effluent samples shall be collected at the outfall after the UV disinfection channel and prior to discharge to the Wisconsin River.

3.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 001 - EFFLUENT TO WISCONSIN RIVER

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD_5, Total	Monthly Avg	30 mg/L	5/Week	24-Hr Flow Prop Comp	
BOD_5, Total	Weekly Avg	45 mg/L	5/Week	24-Hr Flow Prop Comp	
BOD_5, Total	Daily Max	1,163 lbs/day	5/Week	Calculated	Limit in effect May through October.
Suspended Solids, Total	Monthly Avg	30 mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	5/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
Phosphorus, Total	Monthly Avg	1.0 mg/L	5/Week	24-Hr Flow Prop Comp	This is an interim limit.
Phosphorus, Total		lbs/day	5/Week	Calculated	Monitoring only upon permit effective date. Final TMDL-based mass limits go into effect per the phosphorus compliance schedule. See Phosphorus section(s) below.

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the DMR. See Phosphorus section(s) below.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-Month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See Phosphorus section(s) below.
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	Weekly	Grab	Limit and monitoring in effect May through September.
Fecal Coliform	Geometric Mean - Wkly	656 #/100 ml	Weekly	Grab	Limit and monitoring in effect May through September.
Mercury, Total Recoverable	Daily Max	7.0 ng/L	Monthly	Grab	This is an Alternative Mercury Effluent Limit. See subsections 3.2.1.6 for mercury variance information, 3.2.1.7 for mercury monitoring requirements and 5.2 for the Mercury PMP compliance schedule.
Nitrogen, Ammonia Variable Limit		mg/L	3/Week	See Table	Using the daily effluent pH result, look up the daily maximum variable ammonia limit from the pH dependent table at subsection 3.2.1.8.
Nitrogen, Ammonia (NH_3-N) Total	Daily Max - Variable	mg/L	3/Week	24-Hr Flow Prop Comp	Report the daily maximum Ammonia result in the Nitrogen, Ammonia (NH3-N) Total column of the eDMR. Compare to daily maximum variable ammonia limit to determine compliance.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	108 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	108 mg/L	3/Week	24-Hr Flow Prop Comp	

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	Monitoring Only
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	Monitoring Only
Nitrogen, Total		mg/L	Quarterly	Calculated	Monitoring Only
Acute WET		TU_a	See Listed Qtr(s)	24-Hr Flow Prop Comp	See subsection 3.2.1.9 for Whole Effluent Toxicity (WET) testing dates and WET requirements.

3.2.1.1 Annual Average Design Flow

The annual average design flow of the permittee's wastewater treatment facility is 4.41 MGD.

3.2.1.2 Phosphorus Limits and The Wisconsin River TMDL

Approved TMDL: The Wisconsin River Basin TMDL Waste Load Allocation (WLA) for total phosphorus was approved by the U.S. Environmental Protection Agency on April 26, 2019. The approved TMDL phosphorus WLA for this permittee is 2759 lbs/year and results in calculated phosphorus mass limits of 24 lbs/day as a monthly average and 8.0 lbs/day as a 6-month average which go into effect pursuant to Compliance Schedule 5.1.

The 6-month average limit will be expressed as a seasonal average with averaging periods occurring from May through October and November through April when it goes into effect. Compliance with the 6-month average limit is evaluated at the end of each 6-month period on April 30th and October 31st annually. The 12-month rolling sum of total monthly phosphorus (lbs/yr) shall be reported each month for direct comparison to the facility's WLA.

The phosphorus limit of 1.0 mg/L is an interim limit set in accordance with s. NR. 217.17, Wis. Adm. Code. The interim limit will remain in effect unless a more stringent limit is required at a future permit issuance by ss. NR 217.13 and NR 217.16(2), Wis. Adm. Code, or the limit is relaxed following procedures outlined in ch. NR 207, Wis. Adm. Code. Sampling and reporting of phosphorus concentrations and masses discharged shall begin upon the permit effective date.

Effluent results shall be calculated as follows:

Monthly Average Concentration (mg/L): = the sum of all daily results for that month, divided by the number of results during that time period.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. The applicable periods are May through October and November through April. *(Remove for permits that don't need a 6-month average limit)*

Total Monthly Discharge (lbs/month): = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

12-Month Rolling Sum of Total Monthly Discharge (lbs/yr): = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

3.2.1.3 Phosphorus Water Quality Based Effluent Limitation(s)

The final TMDL based effluent limits for phosphorus are **8.0 lbs/day as a six-month average and 24 lbs/day as a monthly average** and will take effect per the Phosphorus Compliance Schedule unless:

(A) As part of the application for the next reissuance, or prior to filing the application, the permittee submits either: 1.) a watershed adaptive management plan and a completed Watershed Adaptive Management Request Form 3200-139; or 2.) an application for water quality trading; or 3.) an application for a variance; or 4.) new information or additional data that supports a recalculation of the numeric limitation; and

(B) The Department modifies, revokes and reissues, or reissues the permit to incorporate a revised limitation before the expiration of the compliance schedule*.

Note: The permittee may also submit an application for a variance within 60 days of this permit reissuance, as noted in the permit cover letter, in accordance with s. 283.15, Stats.

If Adaptive Management or Water Quality Trading is approved as part of the permit application for the next reissuance or as part of an application for a modification or revocation and reissuance, the plan and specifications submittal, construction, and final effective dates for compliance with the total phosphorus WQBEL may change in the reissued or modified permit. In addition, the numeric value of the water quality based effluent limit may change based on new information (e.g. a TMDL) or additional data. If a variance is approved for the next reissuance, interim limits and conditions will be imposed in the reissued permit in accordance with s. 283.15, Stats., and applicable regulations. A permittee may apply for a variance to the phosphorus WQBEL at the next reissuance even if the permittee did not apply for a phosphorus variance as part of this permit reissuance.

Additional Requirements: If a water quality based effluent limit has taken effect in a permit, any increase in the limit is subject to s. NR 102.05(1) and ch. NR 207, Wis. Adm. Code. When a six-month average effluent limit is specified for Total Phosphorus the applicable averaging periods are May through October and November through April.

*Note: The Department will prioritize reissuances and revocations, modifications, and reissuances of permits to allow permittees the opportunity to implement adaptive management or nutrient trading in a timely and effective manner.

Proposed Site-Specific Criteria for Phosphorus: The WRB TMDL report includes two sets of waste load allocations. The WLA in Appendix J of the report are based on the current promulgated water quality criteria and the allocations in Appendix K are based on proposed site-specific criteria (SSC) for Lakes Petenwell, Castle Rock, and Wisconsin. If the total phosphorus limits were to be calculated based on the proposed SSC in Appendix K, this would result in phosphorus limits that are different from those calculated above.
If the WLA presented in Appendix K based on the proposed SSC were used, the annual allocation would be 4919 pounds and the equivalent concentration would be 0.366 at the facility design flow of 4.41 MGD. The recommended mass effluent limit would be 15 lbs/day as a monthly average. It is important to note that implementation of the WLA contained in Appendix K can only occur if the SSC are promulgated by the State of Wisconsin and approved by USEPA. If this occurs, WDNR will notify stakeholders that adoption of the SSC has occurred and submit the necessary documentation to USEPA to confirm that the SSC-based WLAs will be implemented in future WPDES permits. From that point forward, SSC WLAs would be implemented in WPDES permits via permit modification or reissuance.

3.2.1.4 Alternative Approaches to Phosphorus WQBEL Compliance

Rather than upgrading its wastewater treatment facility to comply with WQBELs for total phosphorus, the permittee may use Water Quality Trading or the Watershed Adaptive Management Option, to achieve compliance under ch. NR 217, Wis. Adm. Code, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. The permittee may also implement an upgrade to its wastewater treatment facility in combination with Water Quality Trading or the Watershed Adaptive Management Option to achieve compliance, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. If the Final Compliance Alternatives Plan concludes that a variance will be pursued, the Plan shall provide information regarding the basis for the variance.

3.2.1.5 Submittal of Permit Application for Next Reissuance and Adaptive Management or Pollutant Trading Plan or Variance Application

The permittee shall submit the permit application for the next reissuance at least 6 months prior to expiration of this permit. If the permittee intends to pursue adaptive management to achieve compliance with the phosphorus water quality based effluent limitation, the permittee shall submit with the application for the next reissuance: a completed Watershed Adaptive Management Request Form 3200-139, the completed Adaptive Management Plan and final plans for any system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the permittee intends to pursue pollutant trading to achieve compliance, the permittee shall submit an application for water quality trading with the application for the next reissuance. If system upgrades will be used in combination with pollutant trading to achieve compliance with the final water quality-based limit, the reissued permit will specify a schedule for the necessary upgrades. If the permittee intends to seek a variance, the permittee shall submit an application for a variance with the application for the next reissuance.

3.2.1.6 Mercury Monitoring

The permittee shall collect and analyze all mercury samples according to the data quality requirements of ss. NR 106.145(9) and (10), Wisconsin Administrative Code. The limit of quantitation (LOQ) used for the effluent and field blank shall be less than 1.3 ng/L, unless the samples are quantified at levels above 1.3 ng/L. The permittee shall collect at least one mercury field blank for each set of mercury samples (a set of samples may include combinations of intake, influent, effluent or other samples all collected on the same day). The permittee shall report results of samples and field blanks to the Department on Discharge Monitoring Reports.

3.2.1.7 Mercury Variance – Implement Pollutant Minimization Plan

This permit contains a variance to the water quality-based effluent limit (WQBEL) for mercury granted in accordance with s. 283.15, Stats. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation specified in the table above, (b) implement the mercury pollutant minimization measures indicated below that are included in the "Rib Mountain Metropolitan Sewerage District Mercury Pollutant Minimization Plan – 2018-2023, (c) follow the Pollutant Minimization Plan and (d) perform the actions listed in the compliance schedule. (See the Schedules section herein.):

- Update the BMP forms for medical facilities;
- Contact all dental facilities in the service area regarding disposal of mercury wastes and programs in place for disposal of mercury waste;
- Contact all schools in the service area regarding programs in place for disposal of mercury waste, spill management and mercury elimination efforts;
- Continue to promote the Marathon County household hazardous waste and VSQG drop off sites and schedules
- Contact all industrial contributors regarding proper disposal of mercury waste and spill management every two years. Conduct mercury sampling on some of the larger industrial contributors that have process wastewater entering the collection system;
- Contact newly identified mercury contributors for implementation of BMPs;
- Monitoring of influent and effluent and sludge;
- Repeated contacts with customers that represent potential sources of mercury to confirm that BMPs have been implemented and remain in place;

- Repeated public education;
- Continued operation of the WWTP to optimize treatment for conventional pollutants, which will help optimize mercury removal; and
- Continue to evaluate the mercury content of chemicals used in the treatment plant.

3.2.1.8 Daily Maximum pH Variable Ammonia Limits

Effluent pH s.u.	NH_3-N Limit mg/L	Effluent pH s.u.	NH_3-N Limit mg/L	Effluent pH s.u.	NH_3-N Limit mg/L
$6.0 < pH \leq 6.1$	108	$7.0 < pH \leq 7.1$	66	$8.0 < pH \leq 8.1$	14
$6.1 < pH \leq 6.2$	106	$7.1 < pH \leq 7.2$	59	$8.1 < pH \leq 8.2$	11
$6.2 < pH \leq 6.3$	104	$7.2 < pH \leq 7.3$	52	$8.2 < pH \leq 8.3$	9.4
$6.3 < pH \leq 6.4$	101	$7.3 < pH \leq 7.4$	46	$8.3 < pH \leq 8.4$	7.8
$6.4 < pH \leq 6.5$	98	$7.4 < pH \leq 7.5$	40	$8.4 < pH \leq 8.5$	6.4
$6.5 < pH \leq 6.6$	94	$7.5 < pH \leq 7.6$	34	$8.5 < pH \leq 8.6$	5.3
$6.6 < pH \leq 6.7$	89	$7.6 < pH \leq 7.7$	29	$8.6 < pH \leq 8.7$	4.4
$6.7 < pH \leq 6.8$	84	$7.7 < pH \leq 7.8$	24	$8.7 < pH \leq 8.8$	3.7
$6.8 < pH \leq 6.9$	78	$7.8 < pH \leq 7.9$	20	$8.8 < pH \leq 8.9$	3.1
$6.9 < pH \leq 7.0$	72	$7.9 < pH \leq 8.0$	17	$8.9 < pH \leq 9.0$	2.6

3.2.1.9 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Wisconsin River

Instream Waste Concentration (IWC): N/A

Acute Mixing Zone Concentration: N/A

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.

WET Testing Frequency:

Acute tests shall be conducted once each year in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Acute:** 3rd quarter (July-Sep) 2019
  2nd quarter (Apr-Jun) 2020
  1st quarter (Jan-Mar) 2021
  3rd quarter (July-Sep) 2022
  1st quarter (Jan-Mar) 2023

Acute WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in 1st quarter (Jan-Mar) 2024.

Testing: WET testing shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during WET tests.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent

Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The Discharge Monitoring Report (DMR) form shall be submitted electronically by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: $TU_a = 100 \div LC_{50}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90 day reporting period shall begin the day after the test which showed a positive result. The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

4 Land Application Requirements

4.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
002	Representative liquid sludge samples shall be collected from the storage tank quarterly and monitored for Lists 1, 2, 3, & 4. Representative samples shall be collected once in 2019 and monitored for PCBs.

4.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

4.2.1 Sampling Point (Outfall) 002 - LIQUID SLUDGE

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

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Water Extractable		% of Tot P	Quarterly	Composite	
Potassium, Total Recoverable		Percent	Quarterly	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Jan 1, 2019 - Dec 31, 2019
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Jan 1, 2019 - Dec 31, 2019

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Quarterly**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Quarterly**

4.2.1.1 List 2 Analysis

If the monitoring frequency for List 2 parameters is more frequent than "Annual" then the sludge may be analyzed for the List 2 parameters just prior to each land application season rather than at the more frequent interval specified.

4.2.1.2 Changes in Feed Sludge Characteristics

If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, the permittee shall reanalyze the sludge for List 1, 2, 3 and 4 parameters each time such change occurs.

4.2.1.3 Sludge Which Exceeds the High Quality Limit

Cumulative pollutant loading records shall be kept for all bulk land application of sludge which does not meet the high quality limit for any parameter. This requirement applies for the entire calendar year in which any exceedance of Table 3 of s. NR 204.07(5)(c), is experienced. Such loading records shall be kept for all List 1 parameters for each site land applied in that calendar year. The formula to be used for calculating cumulative loading is as follows:

[(Pollutant concentration (mg/kg) x dry tons applied/ac) ÷ 500] + previous loading (lbs/acre) = cumulative lbs pollutant per acre

When a site reaches 90% of the allowable cumulative loading for any metal established in Table 2 of s. NR 204.07(5)(b), the Department shall be so notified through letter or in the comment section of the annual land application report (3400-55).

4.2.1.4 Sludge Analysis for PCBs

The permittee shall analyze the sludge for Total PCBs one time during **2019**. The results shall be reported as "PCB Total Dry Wt". Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with Table EM in s. NR 219.04, Wis. Adm. Code and the conditions specified in

Standard Requirements of this permit. PCB results shall be submitted by January 31, following the specified year of analysis.

4.2.1.5 Lists 1, 2, 3, and 4

List 1 **TOTAL SOLIDS AND METALS** See the Monitoring Requirements and Limitations table above for monitoring frequency and limitations for the List 1 parameters
Solids, Total (percent)
Arsenic, mg/kg (dry weight)
Cadmium, mg/kg (dry weight)
Copper, mg/kg (dry weight)
Lead, mg/kg (dry weight)
Mercury, mg/kg (dry weight)
Molybdenum, mg/kg (dry weight)
Nickel, mg/kg (dry weight)
Selenium, mg/kg (dry weight)
Zinc, mg/kg (dry weight)

List 2 **NUTRIENTS** See the Monitoring Requirements and Limitations table above for monitoring frequency for the List 2 parameters
Solids, Total (percent)
Nitrogen Total Kjeldahl (percent)
Nitrogen Ammonium (NH4-N) Total (percent)
Phosphorus Total as P (percent)
Phosphorus, Water Extractable (as percent of Total P)
Potassium Total Recoverable (percent)

List 3
PATHOGEN CONTROL FOR CLASS B SLUDGE
The permittee shall implement pathogen control as listed in List 3. The Department shall be notified of the pathogen control utilized and shall be notified when the permittee decides to utilize alternative pathogen control.

The following requirements shall be met prior to land application of sludge.

Parameter	**Unit**	**Limit**
Fecal Coliform*	MPN/gTS or CFU/gTS	2,000,000
OR, ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion	Air Drying	
Anaerobic Digestion	Composting	
Alkaline Stabilization	PSRP Equivalent Process	
* The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.		

List 4
VECTOR ATTRACTION REDUCTION

The permittee shall implement any one of the vector attraction reduction options specified in List 4. The Department shall be notified of the option utilized and shall be notified when the permittee decides to utilize an alternative option.

One of the following shall be satisfied prior to, or at the time of land application as specified in List 4.

Option	Limit	Where/When it Shall be Met
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

4.2.1.6 Daily Land Application Log

Daily Land Application Log

Discharge Monitoring Requirements and Limitations

The permittee shall maintain a daily land application log for biosolids land applied each day when land application occurs. The following minimum records must be kept, in addition to all analytical results for the biosolids land applied. The log book records shall form the basis for the annual land application report requirements.

Parameters	Units	Sample Frequency
DNR Site Number(s)	Number	Daily as used
Outfall number applied	Number	Daily as used
Acres applied	Acres	Daily as used
Amount applied	As appropriate * /day	Daily as used
Application rate per acre	unit */acre	Daily as used
Nitrogen applied per acre	lb/acre	Daily as used
Method of Application	Injection, Incorporation, or surface applied	Daily as used

*gallons, cubic yards, dry US Tons or dry Metric Tons

5 Schedules

5.1 Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

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

Required Action	Due Date
Operational Evaluation Report: The permittee shall prepare and submit to the Department for approval an operational evaluation report. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant during the period prior to complying with final phosphorus WQBELs and, where possible, enable compliance with final phosphorus WQBELs by January 01, 2022. The report shall provide a plan and schedule for implementation of the measures, improvements, and modifications as soon as possible, but not later than January 01, 2022 and state whether the measures, improvements, and modifications will enable compliance with final phosphorus WQBELs. Regardless of whether they are expected to result in compliance, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the operational evaluation report. If the operational evaluation report concludes that the facility can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the permittee shall comply with the final phosphorus WQBEL by January 01, 2022 and is not required to comply with the milestones identified below for years 3 through 9 of this compliance schedule ('Preliminary Compliance Alternatives Plan', 'Final Compliance Alternatives Plan', 'Final Plans and Specifications', 'Treatment Plant Upgrade to Meet WQBELs', 'Complete Construction', 'Achieve Compliance'). STUDY OF FEASIBLE ALTERNATIVES - If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs sooner than January 1, 2026.	01/31/2020
Compliance Alternatives, Source Reduction, Improvements and Modifications Status: The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.	01/31/2021
Preliminary Compliance Alternatives Plan: The permittee shall submit a preliminary compliance alternatives plan to the Department.	01/31/2022

If the plan concludes upgrading of the permittee's wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design report. If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan. If water quality trading will be undertaken, the plan must state that trading will be pursued.	
Final Compliance Alternatives Plan: The permittee shall submit a final compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code. If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	01/31/2023
Progress Report on Plans & Specifications: Submit progress report regarding the progress of preparing final plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	01/31/2024
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.) Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	01/31/2025
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	04/30/2025
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2025
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	01/01/2026

5.2 Mercury Pollutant Minimization Program

Required Action	Due Date
Annual Mercury Progress Reports: Submit an annual mercury progress report. The annual mercury progress report shall: Indicate which mercury pollutant minimization activities or activities outlined in the approved Pollutant Minimization Plan--"Rib Mountain Metropolitan Sewerage District Mercury Pollutant Minimization Plan 2018-2023"--have been implemented; Include an analysis of trends in monthly and annual total effluent mercury concentrations based on mercury sampling; and Include an analysis of how influent and effluent mercury varies with time and with significant loading of mercury such as loads from industries into the collection system. The first annual mercury progress report is to be submitted by the Due Date.	01/31/2019
Annual Mercury Progress Report #2: Submit a mercury progress report as defined above.	01/31/2020
Annual Mercury Progress Report #3: Submit a mercury progress report as defined above.	01/31/2021
Annual Mercury Progress Report #4: Submit a mercury progress report as defined above.	01/31/2022
Annual Mercury Progress Report #5: Submit a mercury progress report as defined above.	01/31/2023
Final Mercury Report: Submit a final report documenting the success in reducing mercury concentrations in the effluent, as well as the anticipated future reduction in mercury sources and mercury effluent concentrations. The report shall summarize mercury pollutant minimization activities that have been implemented during the current permit term and state which, if any, pollutant minimization activities from the approved pollutant minimization plan were not pursued and why. The report shall include an analysis of trends in monthly and annual total effluent mercury concentrations based on mercury sampling during the current permit term. The report shall also include an analysis of how influent and effluent mercury varies with time and with significant loading of mercury such as loads from industries into the collection system. If the permittee intends to reapply for a mercury variance per s. NR 106.145, Wis. Adm. Code, for the reissued permit, a detailed pollutant minimization plan outlining the pollutant minimization activities proposed for the upcoming permit term shall be submitted along with the final report.	06/30/2023
Annual Mercury Reports After Permit Expiration: In the event that this permit is not reissued on time, the permittee shall continue to submit annual mercury reports each year covering pollutant minimization activities implemented and mercury concentration trends.	

6 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

6.1 Reporting and Monitoring Requirements

6.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under ‘Recording of Results’. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The ‘eReport Certify’ page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

6.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

6.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

6.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD_5 and Total Suspended Solids shall be considered to be limits of quantitation

- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

6.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted and certified by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

The CMAR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The certification verifies that the electronic report is true, accurate and complete.

6.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings or electronic data records for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

6.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

6.1.8 Reporting Requirements – Alterations or Additions

The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

- The alteration or addition to the permitted facility may meet one of the criteria for determining whether a facility is a new source.
- The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification requirement applies to pollutants which are not subject to effluent limitations in the existing permit.
- The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use of disposal sites not reported during the permit application process nor reported pursuant to an approved land application plan. Additional sites may not be used for the land application of sludge until department approval is received.

6.2 System Operating Requirements

6.2.1 Noncompliance Reporting

Sanitary sewer overflows and sewage treatment facility overflows shall be reported according to the 'Sanitary Sewer Overflows and Sewage Treatment Facility Overflows' section of this permit.

The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:

- any noncompliance which may endanger health or the environment;
- any violation of an effluent limitation resulting from a bypass;
- any violation of an effluent limitation resulting from an upset; and
- any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

A scheduled bypass approved by the Department under the 'Scheduled Bypass' section of this permit shall not be subject to the reporting required under this section.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. **The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill**. **To report a hazardous substance spill, call DNR's 24-hour HOTLINE at 1-800-943-0003.**

6.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

6.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-555, Wis. Adm. Code.

6.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

6.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

6.2.6 Bypass

This condition applies only to bypassing at a sewage treatment facility that is not a scheduled bypass, approved blending as a specific condition of this permit, a sewage treatment facility overflow or a controlled diversion as provided in the sections titled ‘Scheduled Bypass’, ‘Blending’ (if approved), ‘SSO’s and Sewage Treatment Facility Overflows’ and ‘Controlled Diversions’ of this permit. Any other bypass at the sewage treatment facility is prohibited and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats. The Department may approve a bypass if the permittee demonstrates all the following conditions apply:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance. When evaluating feasibility of alternatives, the department may consider factors such as technical achievability, costs and affordability of implementation and risks to public health, the environment and, where the permittee is a municipality, the welfare of the community served; and
- The bypass was reported in accordance with the Noncompliance Reporting section of this permit.

6.2.7 Scheduled Bypass

Whenever the permittee anticipates the need to bypass for purposes of efficient operations and maintenance and the permittee may not meet the conditions for controlled diversions in the ‘Controlled Diversions’ section of this permit, the permittee shall obtain prior written approval from the Department for the scheduled bypass. A permittee’s written request for Department approval of a scheduled bypass shall demonstrate that the conditions for bypassing specified in the above section titled ‘Bypass’ are met and include the proposed date and reason for the bypass, estimated volume and duration of the bypass, alternatives to bypassing and measures to mitigate environmental harm caused by the bypass. The department may require the permittee to provide public notification for a scheduled bypass if it is determined there is significant public interest in the proposed action and may recommend mitigation measures to minimize the impact of such bypass.

6.2.8 Controlled Diversions

Controlled diversions are allowed only when necessary for essential maintenance to assure efficient operation. Sewage treatment facilities that have multiple treatment units to treat variable or seasonal loading conditions may shut down redundant treatment units when necessary for efficient operation. The following requirements shall be met during controlled diversions:

- Effluent from the sewage treatment facility shall meet the effluent limitations established in the permit. Wastewater that is diverted around a treatment unit or treatment process during a controlled diversion shall be recombined with wastewater that is not diverted prior to the effluent sampling location and prior to effluent discharge;
- A controlled diversion does not include blending as defined in s. NR 210.03(2e), Wis. Adm. Code, and as may only be approved under s. NR 210.12. A controlled diversion may not occur during periods of excessive flow or other abnormal wastewater characteristics;
- A controlled diversion may not result in a wastewater treatment facility overflow; and
- All instances of controlled diversions shall be documented in sewage treatment facility records and such records shall be available to the department on request.

6.2.9 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

6.2.10 Operator Certification

The wastewater treatment facility shall be under the direct supervision of a state certified operator. In accordance with s. NR 114.53, Wis. Adm. Code, every WPDES permitted treatment plant shall have a designated operator-in-charge holding a current and valid certificate. The designated operator-in-charge shall be certified at the level and in all subclasses of the treatment plant, except laboratory. Treatment plant owners shall notify the department of any changes in the operator-in-charge within 30 days. Note that s. NR 114.52(22), Wis. Adm. Code, lists types of facilities that are excluded from operator certification requirements (i.e. private sewage systems, pretreatment facilities discharging to public sewers, industrial wastewater treatment that consists solely of land disposal, agricultural digesters and concentrated aquatic production facilities with no biological treatment).

6.3 Sewage Collection Systems

6.3.1 Sanitary Sewage Overflows and Sewage Treatment Facility Overflows

6.3.1.1 Overflows Prohibited

Any overflow or discharge of wastewater from the sewage collection system or at the sewage treatment facility, other than from permitted outfalls, is prohibited. The permittee shall provide information on whether any of the following conditions existed when an overflow occurred:

- The sanitary sewer overflow or sewage treatment facility overflow was unavoidable to prevent loss of life, personal injury or severe property damage;

- There were no feasible alternatives to the sanitary sewer overflow or sewage treatment facility overflow such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or preventative maintenance activities;
- The sanitary sewer overflow or the sewage treatment facility overflow was caused by unusual or severe weather related conditions such as large or successive precipitation events, snowmelt, saturated soil conditions, or severe weather occurring in the area served by the sewage collection system or sewage treatment facility; and
- The sanitary sewer overflow or the sewage treatment facility overflow was unintentional, temporary, and caused by an accident or other factors beyond the reasonable control of the permittee.

6.3.1.2 Permittee Response to Overflows

Whenever a sanitary sewer overflow or sewage treatment facility overflow occurs, the permittee shall take all feasible steps to control or limit the volume of untreated or partially treated wastewater discharged, and terminate the discharge as soon as practicable. Remedial actions, including those in NR 210.21 (3), Wis. Adm. Code, shall be implemented consistent with an emergency response plan developed under the CMOM program.

6.3.1.3 Permittee Reporting

Permittees shall report all sanitary sewer overflows and sewage treatment overflows as follows:

- The permittee shall notify the department by telephone, fax or email as soon as practicable, but no later than 24 hours from the time the permittee becomes aware of the overflow;
- The permittee shall, no later than five days from the time the permittee becomes aware of the overflow, provide to the department the information identified in this paragraph using department form number 3400-184. If an overflow lasts for more than five days, an initial report shall be submitted within 5 days as required in this paragraph and an updated report submitted following cessation of the overflow. At a minimum, the following information shall be included in the report:

  ◦The date and location of the overflow;
  ◦The surface water to which the discharge occurred, if any;
  ◦The duration of the overflow and an estimate of the volume of the overflow;
  ◦A description of the sewer system or treatment facility component from which the discharge occurred such as manhole, lift station, constructed overflow pipe, or crack or other opening in a pipe;
  ◦The estimated date and time when the overflow began and stopped or will be stopped;
  ◦The cause or suspected cause of the overflow including, if appropriate, precipitation, runoff conditions, areas of flooding, soil moisture and other relevant information;
  ◦Steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
  ◦A description of the actual or potential for human exposure and contact with the wastewater from the overflow;
  ◦Steps taken or planned to mitigate the impacts of the overflow and a schedule of major milestones for those steps;
  ◦To the extent known at the time of reporting, the number and location of building backups caused by excessive flow or other hydraulic constraints in the sewage collection system that occurred concurrently with the sanitary sewer overflow and that were within the same area of the sewage collection system as the sanitary sewer overflow; and
  ◦The reason the overflow occurred or explanation of other contributing circumstances that resulted in the overflow event. This includes any information available including whether the overflow was unavoidable to prevent loss of life, personal injury, or severe property damage and whether there were feasible alternatives to the overflow.

NOTE: A copy of form 3400-184 for reporting sanitary sewer overflows and sewage treatment facility overflows may be obtained from the department or accessed on the department's web site at http://dnr.wi.gov/topic/wastewater/SSOreport.html. As indicated on the form, additional information may be submitted to supplement the information required by the form.

- The permittee shall identify each specific location and each day on which a sanitary sewer overflow or sewage treatment facility overflow occurs as a discrete sanitary sewer overflow or sewage treatment facility overflow occurrence. An occurrence may be more than one day if the circumstances causing the sanitary sewer overflow or sewage treatment facility overflow results in a discharge duration of greater than 24 hours. If there is a stop and restart of the overflow at the same location within 24 hours and the overflow is caused by the same circumstance, it may be reported as one occurrence. Sanitary sewer overflow occurrences at a specific location that are separated by more than 24 hours shall be reported as separate occurrences; and
- A permittee that is required to submit wastewater discharge monitoring reports under NR 205.07 (1) (r) shall also report all sanitary sewer overflows and sewage treatment facility overflows on that report.

6.3.1.4 Public Notification

The permittee shall notify the public of any sanitary sewer and sewage treatment facility overflows consistent with its emergency response plan required under the CMOM (Capacity, Management, Operation and Maintenance) section of this permit and s. NR 210.23 (4) (f), Wis. Adm. Code. Such public notification shall occur promptly following any overflow event using the most effective and efficient communications available in the community. At minimum, a daily newspaper of general circulation in the county(s) and municipality whose waters may be affected by the overflow shall be notified by written or electronic communication.

6.3.2 Capacity, Management, Operation and Maintenance (CMOM) Program

- The permittee shall have written documentation of the Capacity, Management, Operation and Maintenance (CMOM) program components in accordance with s. NR 210.23(4), Wis. Adm. Code. Such documentation shall be available for Department review upon request. The Department may request that the permittee provide this documentation or prepare a summary of the permittee's CMOM program at the time of application for reissuance of the WPDES permit.
- The permittee shall implement a CMOM program in accordance with s. NR 210.23, Wis. Adm. Code.
- The permittee shall at least annually conduct a self-audit of activities conducted under the permittee's CMOM program to ensure CMOM components are being implemented as necessary to meet the general standards of s. NR 210.23(3), Wis. Adm. Code.

6.3.3 Sewer Cleaning Debris and Materials

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility.
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility.
- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste.

6.4 Surface Water Requirements

6.4.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

6.4.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average concentration limits and mass limits and total load limits:

Weekly/Monthly/Six-Month/Annual Average Concentration = the sum of all daily results for that week/month/six-month/year, divided by the number of results during that time period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Annual Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the entire year.

Total Monthly Discharge: = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

Total Annual Discharge: = sum of total monthly discharges for the calendar year.

12-Month Rolling Sum of Total Monthly Discharge: = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

6.4.3 Effluent Temperature Requirements

Weekly Average Temperature – The permittee shall use the following formula for calculating effluent results to determine compliance with the weekly average temperature limit (as applicable): Weekly Average Temperature = the sum of all daily maximum results for that week divided by the number of daily maximum results during that time period.

Cold Shock Standard – Water temperatures of the discharge shall be controlled in a manner as to protect fish and aquatic life uses from the deleterious effects of cold shock. ‘Cold Shock’ means exposure of aquatic organisms to a rapid decrease in temperature and a sustained exposure to low temperature that induces abnormal behavior or physiological performance and may lead to death.

Rate of Temperature Change Standard – Temperature of a water of the state or discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state.

6.4.4 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

6.4.5 Surface Water Uses and Criteria

In accordance with NR 102.04, Wis. Adm. Code, surface water uses and criteria are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

d) Substances in concentrations or in combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

6.4.6 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

6.4.7 Fecal Coliforms

The weekly and monthly limit(s) for fecal coliforms shall be expressed as a geometric mean.

6.4.8 Seasonal Disinfection

Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Whenever chlorine is used for disinfection or other uses, the limitations and monitoring requirements for residual chlorine shall apply. A dechlorination process shall be in operation whenever chlorine is used.

6.4.9 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

6.4.10 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;

- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:

  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)

- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;

- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

6.5 Land Application Requirements

6.5.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

6.5.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

6.5.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

6.5.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the ‘eReport Certify’ page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The ‘eReport Certify’ page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility’s DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

6.5.5 Calculation of Water Extractable Phosphorus

When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:
Water Extractable Phosphorus (% of Total P) =
[Water Extractable Phosphorus (mg/kg, dry wt) ÷ Total Phosphorus (mg/kg, dry wt)] x 100

6.5.6 Monitoring and Calculating PCB Concentrations in Sludge

When sludge analysis for “PCB, Total Dry Wt” is required by this permit, the PCB concentration in the sludge shall be determined as follows.

Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with the following provisions and Table EM in s. NR 219.04, Wis. Adm. Code.

- EPA Method 1668 may be used to test for all PCB congeners. If this method is employed, all PCB congeners shall be delineated. Non-detects shall be treated as zero. The values that are between the limit of detection and the limit of quantitation shall be used when calculating the total value of all congeners. All results shall be added together and the total PCB concentration by dry weight reported. **Note**: It is recognized that a number of the congeners will co-elute with others, so there will not be 209 results to sum.
- EPA Method 8082A shall be used for PCB-Aroclor analysis and may be used for congener specific analysis as well. If congener specific analysis is performed using Method 8082A, the list of congeners tested shall include at least congener numbers 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, and 206 plus any other additional congeners which might be reasonably expected to occur in the particular sample. For either type of analysis, the sample shall be extracted using the Soxhlet extraction (EPA Method 3540C) (or the Soxhlet Dean-Stark modification) or the pressurized fluid extraction (EPA Method 3545A). If Aroclor analysis is performed using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.11 mg/kg as possible. Reporting protocol, consistent with s. NR 106.07(6)(e), should be as follows: If all Aroclors are less than the LOD, then the Total PCB Dry Wt result should be reported as less than the highest LOD. If a single Aroclor is detected then that is what should be reported for the Total PCB result. If multiple Aroclors are detected, they should be summed and reported as Total PCBs. If congener specific analysis is done using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.003 mg/kg as possible for each congener. If the aforementioned limits of detection cannot be achieved after using the appropriate clean up techniques, a reporting limit that is achievable for the Aroclors or each congener for the sample shall be determined. This reporting limit shall be reported and qualified

indicating the presence of an interference. The lab conducting the analysis shall perform as many of the following methods as necessary to remove interference:

3620C – Florisil	3611B - Alumina
3640A - Gel Permeation	3660B - Sulfur Clean Up (using copper shot instead of powder)
3630C - Silica Gel	3665A - Sulfuric Acid Clean Up

6.5.7 Annual Land Application Report

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

6.5.8 Other Methods of Disposal or Distribution Report

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

6.5.9 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

6.5.10 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

6.5.11 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

6.5.12 Class B Sludge: Anaerobic Digestion

Treat the sludge in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35° C to 55° C and 60 days at 20° C. Straight-line interpolation to calculate mean cell residence time is allowable when the temperature falls between 35° C and 20° C.

6.5.13 Vector Control: Volatile Solids Reduction

The mass of volatile solids in the sludge shall be reduced by a minimum of 38% between the time the sludge enters the digestion process and the time it either exits the digester or a storage facility. For calculation of volatile solids reduction, the permittee shall use the Van Kleeck equation or one of the other methods described in "Determination of Volatile Solids Reduction in Digestion" by J.B. Farrell, which is Appendix C of EPA's *Control of Pathogens in Municipal Wastewater Sludge* (EPA/625/R-92/013). The Van Kleeck equation is:

$$VSR\% = \frac{VS_{IN} - VS_{OUT}}{VS_{IN} - (VS_{OUT} \times VS_{IN})} \times 100$$

Where: VS_{IN} = Volatile Solids in Feed Sludge (g VS/g TS)

VS_{OUT} = Volatile Solids in Final Sludge (g VS/g TS)

VSR% = Volatile Solids Reduction, (Percent)

7 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	Date	Page
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Operational Evaluation Report	January 31, 2020	14
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Compliance Alternatives, Source Reduction, Improvements and Modifications Status	January 31, 2021	14
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Preliminary Compliance Alternatives Plan	January 31, 2022	14
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Compliance Alternatives Plan	January 31, 2023	15
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Progress Report on Plans & Specifications	January 31, 2024	15
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Plans and Specifications	January 31, 2025	15
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Treatment Plant Upgrade to Meet WQBELs	April 30, 2025	15
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Complete Construction	December 31, 2025	15
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Achieve Compliance	January 1, 2026	15
Mercury Pollutant Minimization Program -Annual Mercury Progress Reports	January 31, 2019	16
Mercury Pollutant Minimization Program -Annual Mercury Progress Report #2	January 31, 2020	16
Mercury Pollutant Minimization Program -Annual Mercury Progress Report #3	January 31, 2021	16
Mercury Pollutant Minimization Program -Annual Mercury Progress Report #4	January 31, 2022	16
Mercury Pollutant Minimization Program -Annual Mercury Progress Report #5	January 31, 2023	16
Mercury Pollutant Minimization Program -Final Mercury Report	June 30, 2023	16
Mercury Pollutant Minimization Program -Annual Mercury Reports After Permit Expiration	See Permit	16
Compliance Maintenance Annual Reports (CMAR)	by June 30, each year	18
General Sludge Management Form 3400-48	prior to any significant sludge management changes	26

Characteristic Form 3400-49 and Lab Report	by January 31 following each year of analysis	26
Land Application Report Form 3400-55	by January 31, each year whether or not non-exceptional quality sludge is land applied	28
Other Methods of Disposal or Distribution Report Form 3400-52	by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied	28
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	17

Report forms shall be submitted electronically in accordance with the reporting requirements herein. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be submitted to the Bureau of Water Quality, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to:
West Central Region - Wausau, 5301 Rib Mountain Drive, Wausau, WI 54401

APPENDIX B
CURRENT DESIGN CRITERIA

Rib Mountain Metropolitan Sewerage District Wastewater Treatment Plant
Proposed Design Criteria

I. Design Flows and Loadings, Year 2035

Design Flows (mgd)

Average Dry Weather Flow	3.98
Average Annual Flow	4.41
Maximum Month Flow	5.03
Peak Hour Flow	8.09
Peak Instantaneous Flow	12.29

Design Average Influent Loadings (lbs/day)

BOD_5	8,529
TSS	9,798

Maximum Monthly Influent Loadings (lbs/day)

BOD_5	8,985
TSS	11,620

II. Unit Design Criteria

A. Influent Pumping

Type	Centrifugal, Dry Pit, Recessed Impellar
Number of Units	4 + 1 standby
Capacity, each (gpm)	2,135
Firm Station Capacity	
(gpm)	8,540
(mgd)	12.29
Control	Variable speed based on wet well level

B. Preliminary Treatment

Mechanically Cleaned Screen

Type	Stair Screen
Number of Units	1
Capacity (mgd)	13
Screen Opening Size (in)	0.25

Screenings Handling

Type	Wash Press
Number of Units	1
Capacity (cu ft/hour)	99

Manual Bypass Screen

Number of Units	1
Capacity, (mgd)	13.0
Screen Opening Size (in)	1.5

Grit Removal

Type	Aerated
Number of Units	1
Size, D x W x L (ft)	11 x 16.5 x 17.0
Volume (cu ft)	3,085
Detention Time/Overflow Rate	
@ Average Annual, 4.41 mgd (min)	7.53
@ Peak Instantaneous 12.29 mgd (min)	2.7
Weir Overflow Rate (4.41 mgd)	≤10,000 gpd/ft

Aeration Blowers

Number of Units	1
Capacity (cfm)	112
Air Application Rate (cfm/ft of length)	3.0 to 8.0
Diffusers	17

Grit Removal Equipment

Type	Screw Conveyor, with bucket elevator
Number of Units	1

Grit Washing Equipment

Type	Dewatering Screw
Number of Units	1

Influent Flow Meter

Type	Parshall Flume
Number of Units	1
Size (in)	18
Capacity (mgd)	15.9

Process Return Flow Meter

Type	Palmer-Bowlus Flume
Number of Units	1
Size (in)	12
Capacity (mgd)	1.08

C. Primary Sedimentation (Phase II)

Type	Rectangular-Chain & Scraper
Number of Tanks	3
Size, L x W x Avg. D, each (ft)	144 x 20 x 9
Area, each (sq ft)	2,880
Volume, total (cu ft)	77,760
Volume, total (gal)	581,700
Weir Length, each (ft)	200
Weir Length, total (ft)	600
Surface Settling Rate (gpd/sq ft)	
@ 4.41 mgd	510
@ 8.09 mgd	936
Weir Overflow Rate @ 4.41 mgd (gpd/ft)	7,350

D. Biological Treatment

Aeration Tanks

Type	Diffused Aeration
Number of Tanks	4
Size, each L x W x ave. SWD (ft)	133 x 24 x 15.2
Volume, total (cu ft)	194,100
Volume, total (gal)	1,452,000
Design Average BOD Load (lb/1,000 cu ft/day)	31
Diffusers	Fine Bubble
Number of Diffusers, per tank	480
Type	Ceramic

Aeration Blowers

Type	High Speed Turbo
Number of Units	2
Capacity, each @ 8 psig (scfm)	1,275
	1,700
Type	Positive displacement, rotary lobe
Number of Units	1
Capacity, each @ 8 psig (scfm)	1,700

(existing PD blower to be replaced with turbo blower during Phase II improvements.)

Final Clarifiers (Phase II)

Type	Circular, Suction Withdrawal
Number of Units	2
Diameter, each (ft)	85
Side Water Depth (ft)	14
Weir Length (ft)	267
Volume, each (cu ft)	79,443
Volume, each (gal)	594,000
Solids Loading Rate	
@ 4.41 mgd (lbs/sq ft * h)	0.43
@ 8.09 mgd (lbs/sq ft * h)	0.76
Surface Overflow Rate	
@ 8.09 mgd (gpd/sq ft)	713

RAS Pumping (Phase II)

Type	Non-clog, centrifugal
Number of Units	3
Capacity, each (gpm)	1,700 max, 400 min
Firm Capacity, (gpm)	3,400 or 100% of max day flow rate
Motor (hp)	20

E. Alum Feed

Storage Tank

Type	Fiberglass Reinforced Tank
Number of Units	1
Capacity (gal)	6,000

Chemical Feed Pumping

Type	Positive Displacement Diaphragm
Number of Units	2
Capacity, each (gph)	46

F. Disinfection System (Phase II)

Type	Ultraviolet, Low-Pressure, High Intensity, Variable Output
Number of Channels	1
Number of Banks	2
Capacity, total (mgd)	8.68
Number of Modules per Bank	8
Number of Lamps per Module	6
Total Number of Lamps	96
Minimum UV Transmittance @ 254 nm	0.65

Post Aeration

Type	Cascade

Final Effluent Flow Meter

Type	Parshall Flume
Number of Units	1
Size (in)	12
Capacity (mgd)	10.4

Outfall Sewer

Diameter (in)	36
Length (ft)	250

G. WAS Thickening (Phase II)

Type	Dissolved Air Flotation Thickeners
Number of Units	2
Size of Units, L x W (ft)	12 x 55
Design Solids Loading Rate, total (lb TSS/hr)	
(5 days/week, 12 hr/day)	560
Surface Loading Rate (lb/hr/sq ft)	0.42
Surface Skimmer Motor (hp)	1
Bottom Scraper Motor (hp)	0.5

Recycle Pumps

Type	Centrifugal
Number of Units	2
Capacity, each (gpm)	190 @ 150 ft TDH
Motor (hp)	15

Thickened Sludge Pump

Type	Positive Displacement, Rotary Lobe
Number of Units	2
Capacity, each (gpm)	125 @ 60 ft TDH

H. Digestion (Phase II)

Type	Anaerobic
Number of Units	2

Primary Digester

Type	Heated, Mixed, Mesophilic
Diameter (ft)	70
Side Water Depth (ft)	26
Volume (cu ft)	100,000
Solids Retention Time (days)	26
Volatile Solids Loading Rate	
(lbs VS/day/1,000 cu ft)	60
Mixing*	Pumped Vortex Mixing
Number of Pumps	1
Capacity (gpm)	2,700
TDH (ft)	40
Number of Nozzles	3
Heating*	Hot Water, External Heat Exchanger
Number	1
Boiler Output Capacity (BTU/hr)	1,500,000
Heat Exchanger Capacity (BTU/hr)	375,000
Solids Retention Time (days)	22.5

Secondary Digester

Type	Unheated, Mixed
Diameter (ft)	70
Side Water Depth (ft)	24
Volume (cu ft)	92,400
Cover Type	Fixed
Mixing*	
Number of Pumps	1
Capacity, each (gpm)	1,700-2,300
TDH (ft)	40
Number of Nozzles	3

(* Mixing and/or heating equipment capcities may be updated during Phase II)

Transfer Pump

Type	Positive Displacement, Rotary Lobe
Number of Units	2
Capacity, each (gpm)	250
Motor (hp)	TBD

Recirculation Pump

Type	Centrifugal
Number of Units	2
Capacity, each (gpm)	350
Motor (hp)	TBD

Flare

Type	Piloted Combustion
Number of Units	1
Size (in)	6
Capacity, each (scfm)	TBD

I. Liquid Sludge Storage

Number of Units	2
Diameter (ft)	120
Side Water Depth (ft)	21
Volume, each (gal)	1,930,000
Volume, total (gal)	3,860,000

Mixing

Type	Pumped Mixing
Number of Units	1
Capacity, each (gpm)	7,040
TDH (ft)	39

Biosolids Loadout Pump

Number of Units	1
Capacity, each (gpm)	1,075
TDH (ft)	32

J. Biosolids Disposal

Location	Land Application

K. Septage Receiving

Number of Tanks	2

NO.	REVISIONS	DATE:
0	RECORD DRAWINGS	12/21/2018

GENERAL DESIGN CRITERIA

PHASE I WWTP UPGRADES
RIB MOUNTAIN METROPOLITAN SEWERAGE DISTRICT
WAUSAU, WISCONSIN

JOB NO. 1165.012

PROJECT MGR. KEVIN HOPKINS

STRAND ASSOCIATES®

SHEET 3
00-G0.03

APPENDIX C
NFPA

PROJECT NAME: Rib Mountain WWTP

Digester Building

		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			
Room Number	**Description**	**NFPA 820 Section**	**Location and Function**	**NEC-Area Electrical Classification**	**Extent of Classified Area**	**Other Requirements**	**Ventilation Requirement to obtain NEC Area Electrical Classification**	**Code Article**	**NEC-Area Electrical Classification**	**Ventilation Requirement**	**Remarks**
	Lower Level	6.2.2 - Row 17a	Anaerobic Digester Control Building	Class I, Division 1, Groups C & D	Entire building	None	No ventilation, or <12 ACH continuous	NR 110.26(5)(d)(5)	Class I, Division 2, Group D	NR 110.26(3)(b) and NR 110.14(3)(c) - Forced air ventilation at 6 ACH continuous or 30 ACH intermittent. Or see exceptions NR 110.14(3)(c)(6)(a) and (b).	Existing ventilation rate is ~4 ACH. Existing electrical installation is not rated for a hazardous location.
	Tunnels	6.2.2 - Row 17b and 6.2.2 - Row 22	Anaerobic Digester Control Building and Tunnels	Class I, Division 1, Groups C & D	Entire tunnel and all physically connected spaces	None	No ventilation, or <12 ACH continuous	NR 110.26(5)(d)(5)	Class I, Division 2, Group D	NR 110.26(3)(b) and NR 110.14(3)(c) - Forced air ventilation at 6 ACH continuous or 30 ACH intermittent. Or see exceptions NR 110.14(3)(c)(6)(a) and (b).	Space is open to Digester Building Lower Level. Doors are located at the entrances to the Main Building and Solids Processing Building. Rating for tunnels matches rating for Lower Level because of physical connection. Existing electrical installation is not rated for a hazardous location.
	Primary Digester	6.2.2 - Row 16c	Anaerobic Digesters, both fixed roof and floating cover	Class I, Division 1, Groups C & D	Tank interior	None	None	-	-	-	
	Secondary Digester	6.2.2 - Row 16c	Anaerobic Digesters, both fixed roof and floating cover	Class I, Division 1, Groups C & D	Tank interior	None	None	-	-	-	
	Ground Floor	6.2.2 - Row 17a	Anaerobic Digester Control Building	Class I, Division 1, Groups C & D	Entire building	None	No ventilation, or <12 ACH continuous	NR 110.26(5)(d)(5)	Class I, Division 2, Group D	NR 110.26(3)(b) and NR 110.14(3)(c) - Forced air ventilation at 6 ACH continuous or 30 ACH intermittent. Or see exceptions NR 110.14(3)(c)(6)(a) and (b).	There is a door between the ground floor and the stairs to the Lower Level. Rating for Ground Floor matches rating for Lower Level because of physical connection. Existing electrical installation is not rated for a hazardous location.

Influent Pump Station

		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			SAI DESIGN CRITERIA
Room Number	**Description**	**NFPA 820 Section**	**Location and Function**	**NEC-Area Electrical Classification**	**Extent of Classified Area**	**Other Requirements**	**Ventilation Requirement to obtain NEC Area Electrical Classification**	**Code Article**	**NEC-Area Electrical Classification**	**Ventilation Requirement**	**Remarks**
	Wet Well	4.2.2 - Row 14a	Waste water pumping station wet wells	Class I, Division 1, Groups C & D	Entire enclosed space is Class I, Div 1; 18 inches above and within 3-feet of the hatch opening is rated Class I, Div 2	CGD required (mechanically ventilated)	None	NR 110.14(3)(e)	Class I, Division 1, Group D	NR 110.14(3)(c)	Supply fan provided for ventilation only when operators enter wet well. Owner has confined space entry procedures which require portable gas detectors are worn whenever anyone enters the wet well.
	Lower Levels	4.2.2 - Row 15a	Belowgrade or partially belowgrade wastewater pumping station dry well	Class I, Division 2, Groups C & D	Entire space	None	No ventilation, or <6 ACH continuous	-	-	NR 110.26(3)(b) and NR 110.14(3)(c) - Forced air ventilation at 6 ACH continuous or 30 ACH intermittent. Or see exceptions NR 110.14(3)(c)(6)(a) and (b).	Existing ventilation rate ~3 ACH. Existing electrical installation is not rated for a hazardous location. New ventilation rate shall be at 6 ACH continuously to derate space and meet NFPA 820.
	MCC Room	4.2.2 - Row 15a	Belowgrade or partially belowgrade wastewater pumping station dry well	Unclassified	Entire space	None	No ventilation, or <6 ACH continuous	-	-	NR 110.26(3)(b) and NR 110.14(3)(c) - Forced air ventilation at 6 ACH continuous or 30 ACH intermittent. Or see exceptions NR 110.14(3)(c)(6)(a) and (b).	Existing electrical installation is not rated for a hazardous location. Rating for MCC Room matches rating for Lower Level because of physical connection. Continuous ventilation of Lower Levels removes connected raiting of MCC Room

Solids Processing Building

		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			SAI DESIGN CRITERIA
Room Number	Description	NFPA 820 Section	Location and Function	NEC-Area Electrical Classification	Extent of Classified Area	Other Requirements	Ventilation Requirement to obtain NEC Area Electrical Classification	Code Article	NEC-Area Electrical Classification	Ventilation Requirement	Remarks
	Storage Room/Truck Bays (former BFP Room)	-	-	Unclassified	-	None	None	-	-	-	
	Sludge Thickener Room - DAF	6.2.2 - Row 8a	Sludge Thickener	Class I, Division 1, Groups C & D	Enclosed - entire space	CGD required	No ventilation, or <12 ACH continuous	-	-	NR 110.26(3)(b) and NR 110.14(3)(c) - Forced air ventilation at 6 ACH continuous or 30 ACH intermittent. Or see exceptions NR 110.14(3)(c)(6)(a) and (b).	Existing ventilation rate is ~12 ACH. Existing electrical installation is rated for a hazardous location. Ventilation to remain at 12 ACH continuous.
	Blower Room	-	-		-		None	-	-	-	
	Lower Level	6.2.2 - Row 9a (Sludge Pumping Station Dry Well)	Sludge Pumping Station Dry Well	Class I, Division 1, Groups C & D	Entire dry well when physically separated from a wet well or separate structures		No ventilation, or <6 ACH continuous	NR 110.21 (7)	-	-	See discussion above on Digester Lower Level/Tunnels. Rating for Solids Processing Lower Level matches rating for tunnel because of physical connection. Existing electrical installation is not rated for a hazardous location. New ventilation rate shall be at 6 ACH continuously to derate space and meet NFPA 820.
	Motor Control Room	-	-	Unclassified	-		None	-	-	-	
	Control Room/Maintenance Off	-	-	Unclassified	-		None	-	-	-	
	Men's Restroom	-	-	Unclassified	-		None	-	-	-	
	Women's Restroom	-	-	Unclassified	-		None	-	-	-	
	Generator Room	-	-	Unclassified	-		None	-	-	-	

Screening and Grit Removal Facility

		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			SAI DESIGN CRITERIA
Room Number	Description	NFPA 820 Section	Location and Function	NEC-Area Electrical Classification	Extent of Classified Area	Other Requirements	Ventilation Requirement to obtain NEC Area Electrical Classification	Code Article	NEC-Area Electrical Classification	Ventilation Requirement	Remarks
	Grit Washer Room	5.2.2 - Row 5a	Grit Removal Tank	Class I, Division 1, Groups C & D	Entire Space	CGD required	None	NR 110.17	Class I, Division 1, Group D	12 ACH continuous or 30 ACH intermittent	Existing electrical equipment is not rated for hazardous location. Room to be ventilated at 12 ACH continuous or 30 ACH intermittent.
	Screening Room	5.2.2 - Row 2a	Coarse and fine screen facilities	Class I, Division 1, Groups C & D	Entire Space	CGD required	None	NR 110.16	Class I, Division 1, Group D	Ventilation is required.	Existing ventilation rate is ~12 ACH. Existing electrical equipment is rated for hazardous location. Ventilation to remain at 12 ACH continuous.

Primary Sedimentation Tanks

		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			SAI DESIGN CRITERIA
Room Number	Description	NFPA 820 Section	Location and Function	NEC-Area Electrical Classification	Extent of Classified Area	Other Requirements	Ventilation Requirement to obtain NEC Area Electrical Classification	Code Article	NEC-Area Electrical Classification	Ventilation Requirement	Remarks
	Primary Sedimentation Tanks	5.2.2 - Row 7c	Primary Sedimentation Tanks	Class I, Division 2, Groups C & D	Interior of the tank from the minimum operating water surface to the top of the tank wall; envelope 0.46 m (18 in.) beyond the exterior wall; envelope 0.46 m (18 in.) above grade extending 3 m (10 ft) horizontally from the exterior tank walls.	None	None	NR 110.18	-	-	Open to atmosphere

Aeration Tanks

Room Number	Description	NFPA 820 Section	Location and Function	NEC-Area Electrical Classification	Extent of Classified Area	Other Requirements	Ventilation Requirement to obtain NEC Area Electrical Classification	Code Article	NEC-Area Electrical Classification	Ventilation Requirement	Remarks
		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			SAI DESIGN CRITERIA
	Aeration Tanks	5.2.2 - Row 8	-	Unclassified (Preceeded by primary sedimentation tanks)	-		None	NR 110.21 (4)	-	-	

Final Clarifier

Room Number	Description	NFPA 820 Section	Location and Function	NEC-Area Electrical Classification	Extent of Classified Area	Other Requirements	Ventilation Requirement to obtain NEC Area Electrical Classification	Code Article	NEC-Area Electrical Classification	Ventilation Requirement	Remarks
		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			SAI DESIGN CRITERIA
	Final Clarifier	5.2.2 - Row 16	Intermediate, secondary, or tertiary sedimentation tanks	Unclassified (Preceeded by primary sedimentation tanks)	-	None	None	NR 110.18	-	-	Open to atmosphere.

UV Disinfection

Room Number	Description	NFPA 820 Section	Location and Function	NEC-Area Electrical Classification	Extent of Classified Area	Other Requirements	Ventilation Requirement to obtain NEC Area Electrical Classification	Code Article	NEC-Area Electrical Classification	Ventilation Requirement	Remarks
		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			SAI DESIGN CRITERIA
	UV Building	-	-	Unclassified	-	None	None	NR 110.23 (3)	-	-	
	UV Channels	5.2.2 - Row 26	-	Unclassified	-	None	None	NR 110.23 (3)	-	-	

Sludge Storage Tanks

Room Number	Description	NFPA 820 Section	Location and Function	NEC-Area Electrical Classification	Extent of Classified Area	Other Requirements	Ventilation Requirement to obtain NEC Area Electrical Classification	Code Article	NEC-Area Electrical Classification	Ventilation Requirement	Remarks
		NFPA 820						NR 110 / TEN STATES / IL 370 / OTHER STATE CODES			SAI DESIGN CRITERIA
	Sludge Storage Tanks	6.2.2 - Row 10c	Sludge storage wet wells, pits, and holding tanks	Class I, Division 2, Groups C & D	Envelope 0.46 m (18 in.) above water surface and 3 m (10 ft) horizontally from wetted walls	None	None	NR 110.26(10)	-	-	Open to atmosphere

APPENDIX D
OPCC

Rib Mountain Metropolitan Sewerage District Facilities Plan
Alternative TN1 - MLE Process

ITEM	Initial Capital Cost	Replacement Cost	Replacment Interval (Yr)	Replacement P.W.	Service Life	20 yr Salvage Value	Salvage Value (P.W.)
Primary Clarifier Drive Replacement	$0	$99,000	15	$65,000	20	$0	$0
Additional Aeration/Anoxic Trains (1.75 MG)	$2,625,000	$0	20	$0	30	$875,000	$496,000
Splitter Structure	$108,000						
Blowers Replacement	$468,000				20	$0	$0
Anoxic Zone - Capping Diffusers in Existing Basins (0.37 MG)	$20,000				20	$0	$0
Anaerobic Digester Complex NFPA 820 Improvements							
Gas Handling and Safety Equipment Replacement	$274,000				20	$0	$0
New Separated Basement Room for Equipment	$721,811				30	$241,000	$137,000
Anoxic Mixers	$47,000				20	$0	$0
Diffuser Replacement	$539,000				20	$0	$0
Nitrate Recycle Pumps	$144,000				20	$0	$0
Primary Anaerobic Digester Mixing System	$119,000				20	$0	$0
Combination Digester Heater/Boiler Replacement	$328,000				20	$0	$0
Floating cover for primary digester	$507,000				30	$169,000	$96,000
Floating gas-holder cover for secondary digester	$589,000				30	$196,000	$111,000
Waste Gas Burner	$100,000				20	$0	$0
Digester Recirculation Pumps	$146,000				20	$0	$0
Primary Sludge Pumps Replacement	$92,000				20	$0	$0
Rock Excavation	$200,000				20	$0	$0
Rock Blasting	$100,000				20	$0	$0
Subtotal	$7,128,000						
Piping/Mechanical (30%)	$2,138,000			$0	30	$713,000	$404,000
Electrical (30%)	$2,138,000			$0	25	$428,000	$243,000
HVAC (10%)	$713,000			$0	20	$0	$0
Sitework (5%)	$356,000			$0	20	$0	$0
Subtotal	$12,473,000						
Contractor's General Conditions (15%)	$1,871,000						
Supply Chain (15%)	$1,871,000						
Total Construction Costs	$16,215,000						
Contingencies, Legal & Engineering Services (40%)	$6,486,000						
Total Capital Costs	**$22,701,000**	$99,000		$65,000		$2,622,000	$1,487,000

Estimated Annual O&M Costs	
Labor	$0
Energy	$114,000
Chemical	$930,000
Maintenance and Supplies	$34,000
Additional Sludge Disposal	$35,000
Total	$1,113,000
Present Worth of O&M	$16,752,000

Summary of Present Worth Costs	
Capital Cost	$22,701,000
Replacement	$65,000
O&M Cost	$16,752,000
Salvage Value	($1,487,000)
TOTAL PRESENT WORTH	**$38,031,000**
Annualized PW	$2,527,000

Notes:
All costs are fourth quarter 2022 dollars.
Present worth is calculated on a 20-year basis at discount rate shown.
Discount Rate (WDNR FFY 2022) 2.875%

Rib Mountain Metropolitan Sewerage District Facilities Plan

Alternative TN2 - MLE Process without Primary Clarifiers and Anaerobic Digestion

ITEM	Initial Capital Cost	Replacement Cost	Replacment Interval (Yr)	Replacement P.W.	Service Life	20 yr Salvage Value	Salvage Value (P.W.)
Demolition - Primary Clarifiers	$100,000	$0	20	$0	20	$0	$0
Demolition - Anaerobic Digester Covers	$170,000	$0	20	$0	20	$0	$0
Additional Aeration Basins (2.75 MG)	$4,125,000				30	$1,375,000	$780,000
Splitter Structure	$108,000						
Aeration Blowers	$780,000	$0	20	$0	20	$0	$0
Anoxic Zone Basins (1.25 MG)	$1,875,000				30	$625,000	$355,000
Anoxic Mixers	$76,000						
Diffuser Replacement	$635,000				20	$0	$0
Nitrate Recycle Pumps	$305,000						$0
Aerobic Digester Aeration System - Multi-Eductor Draft Tubes with Co	$2,052,000				20	$0	$0
Anaerobic Digesters Interior Equipment & Piping Demolition	$150,000						$0
Digester Blowers	$355,000				20	$0	$0
Rock Excavation	$400,000						$0
Rock Blasting	$200,000						$0
Subtotal	$11,331,000						
Piping/Mechanical (30%)	$3,399,000			$0	30	$1,133,000	$643,000
Electrical (30%)	$3,399,000			$0	25	$680,000	$386,000
HVAC (10%)	$1,133,000			$0	20	$0	$0
Sitework (5%)	$567,000			$0	20	$0	$0
Subtotal	$19,829,000						
Contractor's General Conditions (15%)	$2,974,000						
Supply Chain (15%)	$2,974,000						
Total Construction Costs	$25,777,000						
Contingencies, Legal & Engineering Services (40%)	$10,311,000						
Total Capital Costs	**$36,088,000**	$0		$0		$3,813,000	$2,164,000

Estimated Annual O&M Costs	
Labor	$0
Energy	$202,000
Chemical	$620,000
Maintenance and Supplies	$71,000
Additional Sludge Disposal	$41,000
Total	$934,000
Present Worth of O&M	$14,058,000

Summary of Present Worth Costs	
Capital Cost	$36,088,000
Replacement	$0
O&M Cost	$14,058,000
Salvage Value	($2,164,000)
TOTAL PRESENT WORTH	**$47,982,000**
Annualized PW	$3,188,000

Notes:
All costs are fourth quarter 2022 dollars.
Present worth is calculated on a 20-year basis at discount rate shown.
Discount Rate (WDNR FFY 2022) 2.875%

Rib Mountain Metropolitan Sewerage District Facilities Plan

Alternative P1 - Chemical Phosphorus Removal

ITEM	Initial Capital Cost	Replacement Cost	Replacment Interval (Yr)	Replacement P.W.	Service Life	20 yr Salvage Value	Salvage Value (P.W.)
Chemical Storage Tank	$39,000				20	$0	$0
Chemical Room in Solids Processing Building (HVAC, fire protection, containment)	$256,000				20	$0	$0
Chemical Yard Piping Replacement	$113,000				20	$0	$0
OP Analyzer	$0	$29,000	15	$19,000	15	$0	$0
Energy Dissipating Inlets (Future)	$0	$72,000	10	$54,000	20	$36,000	$20,000
Chemical Pumps	$0	$29,000	15	$19,000	15	$19,000	$11,000
Subtotal	$408,000						
Piping/Mechanical (30%)	$122,000			$0	30	$41,000	$23,000
Electrical (30%)	$122,000			$0	25	$24,000	$14,000
HVAC (10%)	$41,000			$0	20	$0	$0
Sitework (5%)	$20,000			$0	20	$0	$0
Subtotal	$713,000						
Contractor's General Conditions (15%)	$107,000						
Supply Chain (15%)	$107,000						
Total Construction Costs	$927,000						
Contingencies, Legal & Engineering Services (40%)	$371,000						
Total Capital Costs	**$1,298,000**	$130,000		$92,000		$120,000	$68,000

Estimated Annual O&M Costs	
Labor	$0
Power	$1,000
Chemical	$224,000
Maintenance and Supplies	$0
Additional Sludge Disposal	$41,000
Total	$266,000
Present Worth of O&M	$4,004,000

Summary of Present Worth Costs	
Capital Cost	$1,298,000
Replacement	$92,000
O&M Cost	$4,004,000
Salvage Value	($68,000)
TOTAL PRESENT WORTH	**$5,326,000**
Annualized PW	$354,000

Notes:

All costs are fourth quarter 2022 dollars.

Present worth is calculated on a 20-year basis at discount rate shown.

Discount Rate (WDNR FFY 2022) 2.875%

Rib Mountain Metropolitan Sewerage District Facilities Plan

Alternative P2 - Cloth Disc Filtration

ITEM	Initial Capital Cost	Replacement Cost	Replacment Interval (Yr)	Replacement P.W.	Service Life	20 yr Salvage Value	Salvage Value (P.W.)
Disc Filter Equipment	$1,525,000	$0	20	$0	20	$0	$0
New Filter Building	$995,000	$0	20	$0	20	$0	$0
Effluent Pumps	$201,000	$0	20	$0	20	$0	$0
Chemical Yard Piping Replacement	$113,000				20	$0	$0
OP Analyzer	$0	$29,000	15	$19,000	15	$19,000	$11,000
Polymer Equipment	$39,000	$39,000	15	$25,000	15	$26,000	$15,000
Mixers	$78,000	$0	20	$0	20	$0	$0
Rapid Mix, Coagulation, and Flocculation Tanks	$236,000	$0	20	$0	20	$0	$0
Chemical Tank, Chemical Building Modifications	$295,000	$0	20	$0	20	$0	$0
Chemical Pumps	$0	$29,000	15	$19,000	15	$0	$0
Subtotal	$3,482,000						
Piping/Mechanical (30%)	$1,045,000			$0	30	$348,000	$197,000
Electrical (30%)	$1,045,000			$0	25	$209,000	$119,000
HVAC (10%)	$348,000			$0	20	$0	$0
Sitework (5%)	$174,000			$0	20	$0	$0
Subtotal	$6,094,000						
Contractor's General Conditions (15%)	$914,000						
Supply Chain (15%)	$914,000						
Total Construction Costs	$7,922,000						
Contingencies, Legal & Engineering Services (40%)	$3,169,000						
Total Capital Costs	**$11,091,000**	$97,000		$63,000		$602,000	$342,000

Estimated Annual O&M Costs	
Labor	$11,000
Power	$7,000
Chemical	$224,000
Maintenance and Supplies	$36,900
Additional Sludge Disposal	$51,000
Total	$329,900
Present Worth of O&M	$4,965,000

Summary of Present Worth Costs	
Capital Cost	$11,091,000
Replacement	$63,000
O&M Cost	$4,965,000
Salvage Value	($342,000)
TOTAL PRESENT WORTH	**$15,777,000**
Annualized PW	$1,048,000

Notes:

All costs are fourth quarter 2022 dollars.

Present worth is calculated on a 20-year basis at discount rate shown.

Discount Rate (WDNR FFY 2022) 2.875%

Rib Mountain Metropolitan Sewerage District Facilities Plan

Alternative B1 - Continued Liquid Land Application

ITEM	Initial Capital Cost	Replacement Cost	Replacment Interval (Yr)	Replacement P.W.	Service Life	20 yr Salvage Value	Salvage Value (P.W.)
Replacement of Mixers in the Biosolids Storage Tanks	$119,000				20	$0	$0
Replacement of decant pumps	$33,000				20	$0	$0
Replacement of Biosolids Transfer Pumps	$146,000				20	$0	$0
Tanker Truck 1	$0	$249,000	10	$188,000	10	$0	$0
Tanker Truck 2	$0	$249,000	10	$188,000	10	$0	$0
Tractor	$0	$231,000	15	$151,000	15	$154,000	$87,000
Tank with Injector	$0	$138,000	10	$104,000	10	$0	$0
Subtotal	$298,000						
Piping/Mechanical (30%)	$89,000			$0	30	$30,000	$17,000
Electrical (30%)	$89,000			$0	25	$18,000	$10,000
HVAC (10%)	$30,000			$0	20	$0	$0
Sitework (5%)	$15,000			$0	20	$0	$0
Subtotal	$521,000						
Contractor's General Conditions (15%)	$78,000						
Supply Chain (15%)	$78,000						
Total Construction Costs	$677,000						
Contingencies, Legal & Engineering Services (40%)	$271,000						
Total Capital Costs	**$948,000**	$867,000		$631,000		$202,000	$114,000

Estimated Annual O&M Costs	
Labor	$141,250
Power (Gasoline)	$3,500
Chemical	$0
Maintenance and Supplies	$75,500
Total	$220,300
Present Worth of O&M*	$5,237,000

Summary of Present Worth Costs	
Capital Cost	$948,000
Replacement	$631,000
O&M Cost	$5,237,000
Salvage Value	($114,000)
TOTAL PRESENT WORTH	**$6,702,000**
Annualized PW	$445,000

Notes:

All costs are fourth quarter 2022 dollars.

Present worth is calculated on a 20-year basis at discount rate shown.

Discount Rate (WDNR FFY 2022) 2.875%

*Assumed 5% increase in O&M costs each year due to increasing difficulty securing fields for biosolids disposal.

Rib Mountain Metropolitan Sewerage District Facilities Plan

Alternative B2 - Dewatering and Landfill

ITEM	Initial Capital Cost	Replacement Cost	Replacment Interval (Yr)	Replacement P.W.	Service Life	20 yr Salvage Value	Salvage Value (P.W.)
Dewatering Equipment (Centrifuge)	$388,000				20	$0	$0
Sludge Storage Cell 1 Metal Roof	$184,000				20	$0	$0
Centrifuge Feed Pump	$120,000				20	$0	$0
Conveyor	$320,000				20	$0	$0
Dump Truck	$100,000				20	$0	$0
Subtotal	$1,112,000						
Piping/Mechanical (30%)	$334,000			$0	30	$111,000	$63,000
Electrical (30%)	$334,000			$0	25	$67,000	$38,000
HVAC (10%)	$111,000			$0	20	$0	$0
Sitework (5%)	$56,000			$0	20	$0	$0
Subtotal	$1,947,000						
Contractor's General Conditions (10%)	$195,000						
Total Construction Costs	$2,142,000						
Contingencies, Legal & Engineering Services (40%)	$857,000						
Total Capital Costs	**$2,999,000**	$0		$0		$178,000	$101,000

Estimated Annual O&M Costs	
Labor	$40,000
Power	$19,600
Chemical	$0
Maintenance and Supplies	$8,000
Landfill Sludge Disposal	$273,750
Total	$341,400
Present Worth of O&M	$5,138,000

Summary of Present Worth Costs	
Capital Cost	$2,999,000
Replacement	$0
O&M Cost	$5,138,000
Salvage Value	($101,000)
TOTAL PRESENT WORTH	**$8,036,000**
Annualized PW	$534,000

Notes:

All costs are fourth quarter 2022 dollars.

Present worth is calculated on a 20-year basis at discount rate shown.

Discount Rate (WDNR FFY 2022) 2.875%

Rib Mountain Metropolitan Sewerage District Facilities Plan
Alternative B3 - Heat Drying

ITEM	Initial Capital Cost	Replacement Cost	Replacment Interval (Yr)	Replacement P.W.	Service Life	20 yr Salvage Value	Salvage Value (P.W.)
Dewatering Equipment (Centrifuge)	$388,000	$0	20	$0	20	$0	$0
Centrifuge Feed Pump	$120,000						
Drying Equipment (Paddle Dryer, Cake Hopper, Conveyor)	$4,441,000	$0	20	$0	20	$0	$0
Dried Biosolids Storage							
Enclose Dewatered Cake Storage Building	$238,000				30	$79,000	$45,000
Metal Roof for Storage Cell 1	$184,000				20	$0	$0
HVAC Ventilation	$80,000				20	$0	$0
Fire Protection	$100,000				20	$0	$0
Lighting	$60,000				20	$0	$0
Subtotal	$5,611,000						
Piping/Mechanical (15%)	$842,000			$0	30	$281,000	$159,000
Electrical (30%)	$1,683,000			$0	25	$337,000	$191,000
HVAC (10%)	$561,000			$0	20	$0	$0
Sitework (5%)	$281,000			$0	20	$0	$0
Subtotal	$8,978,000						
Contractor's General Conditions (15%)	$1,347,000						
Supply Chain (15%)	$1,347,000						
Total Construction Costs	$11,672,000						
Contingencies, Legal & Engineering Services (40%)	$4,669,000						
Total Capital Costs	**$16,341,000**	$0		$0		$697,000	$395,000

Estimated Annual O&M Costs	
Labor	$40,000
Power*	$66,000
Chemical	$54,000
Maintenance and Supplies	$99,000
Total	$259,000
Present Worth of O&M	$3,898,000

Summary of Present Worth Costs	
Capital Cost	$16,341,000
Replacement	$0
O&M Cost	$3,898,000
Salvage Value	($395,000)
TOTAL PRESENT WORTH	**$19,844,000**
Annualized PW	$1,318,000

Notes:
All costs are fourth quarter 2022 dollars.
Present worth is calculated on a 20-year basis at discount rate shown.
Discount Rate (WDNR FFY 2022) 2.875%
*Includes electric costs and natural gas costs.

Rib Mountain Metropolitan Sewerage District, WI
WWTP Facilities Plan
Opinion of Present Worth Cost

Alternative TN1 - MLE Process

Equipment	Electric Costs/Yr	Motor Size (hp)	Motor Efficiency	Hr Op/Yr	Elec. Cost ($/kw-h)
Anaerobic Digester Mixers	$ 700	5	0.85	2,190	0.07
Primary Clarifier Drives	$ 800	3	0.85	4,416	0.07
Aeration Blowers	$ 94,800	176.16	0.85	8,760	0.07
Anoxic Mixers	$ 4,300	8	0.85	8,760	0.07
Nitrate Recycle Pumps	$ 4,300	8	0.85	8,760	0.07
Anaerobic Digester Recirculation Pumps	$ 1,300	10	0.85	2,190	0.07
Primary Sludge Pumps	$ 2,700	20	0.85	2,190	0.07
Natural Gas for Digesters in Winter	$ 5,000				
Total Annual Electrical Energy Cost	**$ 114,000**				

Alternative TN2 - MLE Process without Primary Clarifiers and Anaerobic Digestion

Equipment	Electric Costs/Yr	Motor Size (hp)	Motor Efficiency	Hr Op/Yr	Elec. Cost ($/kw-h)
Aeration Blowers	$ 142,000	264	0.85	8,760	0.07
Anoxic Mixers	$ 8,600	16	0.85	8,760	0.07
Nitrate Recycle Pumps	$ 8,600	16	0.85	8,760	0.07
Aerobic Digester Blowers	$ 42,200	314.016	0.85	2,190	0.07
Total Annual Electrical Energy Cost	**$ 202,000**				

Alternative B2 - Drying

Equipment	Electric Costs/Yr	Motor Size (hp)	Motor Efficiency	Hr Op/Yr	Elec. Cost ($/kw-h)
Dryer	$ 44,600	110	0.85	6,570	0.07
Dewating Equipment	$ 16,100	40	0.85	6,570	0.07
Total Annual Electrical Energy Cost	**$ 61,000**				

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