PUBLIC UTILITIES COMMISSION AGENDA

City of Brainerd, Minnesota
BPU Service Center, 8027 Highland Scenic Rd, Commission Room
Thursday, March 13, 2025 @ 5:30 PM

The public is invited to attend these meetings in person

1. **Call To Order**

2. **Roll Call**

   Wastewater Management Board: ___M. Cross ___J. Czeczok ___Mike O'Day ___Z. Tabatt ___ M. Angland
   Commission ___M. Higgins ___D. Matten ___Mark O'Day

3. **Pledge of Allegiance**

4. **Approval Of Agenda - Voice Vote**

5. **Unfinished Business**

   A. **Approve Minutes of the April 11, 2024 Meeting**

   B. **Discuss Bolton & Menk Inc. proposal related to 20-year Wastewater Assessment**

6. **New Business**

   A. **Discuss Project Priority List Funding and Next Steps**

   B. **Schedule Quarterly Meetings**

7. **Adjourn**

Visit Brainerd Public Utilities website at www.bpu.org

MISSION

"The mission of Brainerd Public Utilities is to provide safe, reliable, environmentally friendly electric, water and sewer services to our customers at the lowest reasonable cost."

Public Utilities Commission
Agenda Request

MEETING DATE: March 13, 2025

TITLE OF ITEM: Approve Minutes of the April 11, 2024 Meeting

ACTION REQUESTED: Approve/Deny Motion **ESTIMATED TIME (MIN):**

SUBMITTED BY: **PRESENTER:**

SUMMARY OF ISSUE:

ALTERNATIVE, OPTIONS, EFFECTS ON OTHERS/COMMENTS:

RECOMMENDED ACTION/MOTION:

FINANCIAL IMPACT:

BRAINERD PUBLIC UTILITIES
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The meeting of the Joint Wastewater Management Board was held at 5:30 PM on April 11, 2024.

Brainerd Public Utilities (BPU) Commission Vice President Angland called the meeting to order.

Board Member Roll Call
Jeff Phillips (Baxter City Council) – Absent
Mark Cross (Baxter City Council) - Absent
Jeff Czeczok (Brainerd City Council) – Present
Mike O'Day (Brainerd City Council) – Present
Mike Angland (BPU Commission) – Present

Utility Staff Present

BPU Water/Wastewater Manager	Charlie Gammon
BPU Finance Manager	Danny Loch
Baxter Public Works Director/City Engineer	Trevor Walter
Brainerd City Engineer/Public Works Director	Jessie Dehn

Others in Attendance

Brainerd City Administrator	Nick Broyles
Baxter City Administrator	Brad Chapulis
Baxter Public Utilities Commission	Rock Yliniemi

Commissioner Angland presented on the projection study that occurred previously and the board discussed the purpose for the original creation of the board.

A discussion occurred on how often the board should meet and a determination was made to meet before the budget cycles of the following year with additional meetings to be called as needed when projects or need arise.

Charlie Gammon and Trevor Walters discussed how previous projections were not met by the growth of the two cities from the previous study and that within the next 5 years action items will have to now be taken to address the biosolids capacity and treatment delegation. Angland, Gammon and Walters discussed how with the upcoming projects in order for the, board and respective commissions and city councils, to make decisions and meet a bonding bill cycle it is necessary to take action and provide insight for budgeting, rate studies, and future improvement planning to meet the needs of both communicates and requirements for a discharge permit that it is recommended by the joint board to pursue quotes/request for proposal related to a 20-year projection of use and feasibility study as it relates to the Brainerd wastewater plant and future projects.

Walters explained how Baxter would prefer to pay with cash on hand and would like to not require bonding and would like to enable both cities to budget accurately by having the 20-year plan completed. As BPU has set aside $500,000 for the current year project this depreciation expense is not set aside for Baxter presently. Danny Loch explained that these capital costs are reflected in the City of Baxter's charges via depreciation expense that's allocated out by the useful life and then allocated by the percentage in the use agreement but would take with Finance Director Vacinek to consider changes in the annual billing.

Recommendation from the Board is to request quotes and begin the 20-year feasibility study for future planning purposes. Nick Broyles asked if the 20-year projection study is for design or flows. Gammon clarified that it would be for future of the plant. The purpose would be to assist in future design excluding biosolids. Walters explained that the projections have not been reached and therefore the size of the overall plant has the potential to make the next 30 years based on demand but will need to be addressed.

Adjournment

BPU Commissioner Angland adjourned the meeting at 6:43 PM.

Public Utilities Commission
Agenda Request

MEETING DATE: March 13, 2025

TITLE OF ITEM: Discuss Bolton & Menk Inc. proposal related to 20-year Wastewater Assessment

ACTION REQUESTED: Discussion Item

ESTIMATED TIME (MIN): 10

SUBMITTED BY: Danny Loch, Finance Manager

PRESENTER: Chris Evans, Public Utilities Director, Danny Loch, Finance Manager

SUMMARY OF ISSUE: Bolton and Menk Inc. was contracted to complete a 20-year Wastewater Use and Needs assessment as part of the Joint Wastewater Management Board discussion in July 2024. The attached report has been submitted for discussion by Bolton & Menk.

ALTERNATIVE, OPTIONS, EFFECTS ON OTHERS/COMMENTS:

RECOMMENDED ACTION/MOTION: Staff recommend accepting the final draft of the proposed 20-year wastewater use and needs assessment and to suggest discussion for applicable Council's and Utility Commission on next steps and recommendations.

FINANCIAL IMPACT:

20 Year Assessment

Wastewater Treatment Facility

Brainerd Public Utilities, MN

24X.136470.000
February 20, 2025

Real People. Real Solutions.

Submitted by:
Bolton & Menk, Inc.
7656 Design Road
Suite 200
Baxter, MN 56425
P: 218-825-0684

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I. EXECUTIVE SUMMARY

This wastewater treatment facility provides an assessment of existing conditions and recommendations for wastewater treatment facility (WWTF) improvements and what can be expected over the next 20 years. The intent of this report is to provide guidance and a framework for improvements that both entities can use to guide the decision-making process when it comes to capital improvements at the WWTF to maintain the existing facility and for improvements needed to meet future nutrient and emerging contaminant limits (total nitrogen removal and PFAS removal).

Projected populations, flows, and wastewater nutrient loadings were estimated based on planning documents provided by both Baxter and Brainerd and standard design parameters. These documents should continually be reviewed and updated by each city to ensure accuracy for growth projections. The cities should both review the populations estimated to verify accuracy for the 2045 population projections.

Below is a summary of estimated costs for recommended improvements for facility maintenance broken out over a 5-year, 10 year, and 20 year period. The costs for recommended improvements for meeting future nitrogen and PFAS limits are in the following tables.

Estimated Capital Costs for Recommended WWTF Improvements (2025 dollars)		
Item	**Preliminary Budget Range**	
Total Budget for 2025-2030	**$8,700,000**	**$16,400,000**
Total Budget for 2030-2035	**$7,500,000**	**$13,400,000**
Total Budget for 2035-2045	**$42,300,000**	**$75,400,000**
Note: costs do not include nitrogen or PFAS treatment		

The wastewater treatment facility is in good condition overall. General maintenance, equipment replacement, and rehabilitation are required to keep the facility in good condition. The liquid treatment processes have adequate capacity for current flows and loadings. If discharge limits change the liquid treatment processes should be re-evaluated, and capital improvements should be made to meet new limits.

The current biosolids processes are able to thicken biosolids produced at the treatment facility but the system has inadequate sludge storage capacity and processing capabilities. Biosolids processing is the limiting treatment for expansion or additional loadings at the current WWTF. To make sure the utility is prepared for the future and has a proper plan in place to handle biosolids, the utility should consider reviewing and design new biosolids processing system for cake production (up to 15% or more) and drying of the cake to reduce volume of sludge storage required. This would allow the utility to phase in PFAS treatment if and when PFAS limits are imposed on biosolids, or the utility cannot land apply biosolids due to PFAS concentrations. PFAS limits are not currently imposed, but if imposed, would drastically alter the required biosolids treatment.

The costs for the biosolids improvement options evaluated range from $60 million to over $100 million, depending on the improvements and technology selected. In order to meet future PFAS limits in biosolids, the utility will need to first dewater then dry the biosolids before a PFAS destruction/removal technology. The total estimated project cost range for the dewatering and drying facility is $57 million to $78 million without PFAS treatment of the biosolids. The utility should expect to add an additional $12 million to $19 million to the biosolids cost to add equipment and infrastructure to treat PFAS in the biosolids.

Biosolids Dewatering and Drying Capital Costs (2025 dollars)	
Convert Existing Facilities + Dewatering and Drying	
Item	**Budget**
Convert Digesters to Storage	$10,000,000
Remove GBT System	$1,000,000
Rehabilitate Existing Sludge Storage	$21,400,000
Rehabilitate WAS System	$750,000
Dewatering Equipment	$2,500,000
Drying Equipment	$4,500,000
Building	$3,000,000
Chemical Feed	$150,000
Piping and Valves	$2,000,000
Electrical, Instrumentation, and Control	$6,795,000.00
Subtotal	$52,100,000
Engineering, Legal, Contingencies (30%)	$15,600,000
Total Cost	$67,700,000
Cost Range (+/- 15%)	**$57M - $78M**

Additional Biosolids Treatment for PFAS Capital Cost (2025 dollars)	
Item	**Budget**
Pyrolysis unit	$5,000,000
Pyrolysis building	$1,500,000
Pumps, piping, valves, chemical feed	$1,500,000
Electrical, Instrumentation, and Controls	$2,400,000
Subtotal	$10,400,000
Engineering, Legal, Contingencies	$3,100,000
Total Cost	$13,500,000
Cost Range	$12M - $19M

Improvements to meet potential future nitrogen limits were also evaluated. If nitrogen limits are enacted, the utility should evaluate the following options for capital improvements and the utility plan accordingly for these improvements:

- Aeration Basin improvements including the addition of anoxic, anaerobic, aeration basin additions. The SBR tanks would be repurposed to specific tanks depending on the volume requirements needed to meet treatment and design goals.
- Secondary clarifier addition for chemical phosphorus removal.
- Chemical feed system for phosphorus removal.

- Chemical feed system for carbon addition to supplement denitrification processes (recommended even if there is sufficient influent BOD).
- Additional piping and pumping for recycle and wasting.
- New lift station for effluent pumping.
- Side stream treatment for nitrogen and phosphorus of the supernatant from the biosolids dewatering.

Below is a cost estimate for the capital improvements the facility could expect when a total nitrogen limit needs to be met:

Potential Nitrogen Limit Improvements (2025 dollars)		
Item	Preliminary Budget Range	
SBR tank modifications and aeration basins	$5,000,000	$8,000,000
EQ tank modifications	$1,500,000	$3,000,000
RAS and WAS Pumps and building	$1,995,000	$2,750,000
Process piping modifications	$1,000,000	$2,000,000
New secondary clarifiers and splitter structure	$10,000,000	$15,000,000
Chemical Feed	$250,000	$500,000
New effluent lift station	$1,500,000	$3,000,000
Site work and yard utility piping	$2,100,000	$3,400,000
Site process piping and valves	$1,490,000	$2,400,000
Plumbing/HVAC	$1,100,000	$1,700,000
Electrical, Instrumentation, and Control	$5,300,000	$8,600,000
Subtotal	**$31,200,000**	**$50,400,000**
Engineering, Legal, Contingencies (30%)	$9,400,000	$15,100,000
Total Cost	**$40,600,000**	**$65,500,000**

II. INTRODUCTION

A. Purpose

This report provides the City of Brainerd, Brainerd Public Utilities, and the City of Baxter with an assessment of existing conditions and recommendations for wastewater treatment facility (WWTF) improvements and what can be expected over the next 20 years. The intent of this report is to provide guidance and framework for improvements that both entities can use to guide the decision-making process when it comes to capital improvements at the WWTF. The recommendations in this report should not be considered final until a decision is made by both entities on the final direction for WWTF improvements. Ultimately, a Facility Plan that meets Minnesota Pollution Control Agency (MPCA) requirements is recommended to be written based on the findings of this report and submitted to MPCA for review at a later date.

Expected influent flow volume and quality were determined through the prescribed Minnesota Pollution Control Agency and Public Facilities Authority process based on documents provided by the cities of Brainerd and Baxter. Necessary effluent water quality is assumed based on current permit limits and needs to be confirmed with the MPCA. Visual inspection of existing infrastructure conditions, input from existing stakeholders, and an evaluation of facility requirements in accordance with current recommended practices serves as the background for this report. Recommendations are based on input from Brainerd Public Utilities staff and an evaluation of the facility requirements in accordance with the current recommended practices and regulatory agency requirements.

B. Background

Brainerd Public Utilities provides wastewater treatment services to the communities of Brainerd and Baxter through a Class A facility located in the City of Baxter, Minnesota in Crow Wing County. Lift stations are used to convey flow to the WWTF and are owned and operated separately by Brainerd and Baxter

The Brainerd WWTF is a Class A facility originally constructed in 1982. The original liquid treatment consisted of bar screening, two primary clarifiers, two rotating biological contactors, two secondary clarifiers, and chlorination and dichlorination. The original biosolids treatment consisted of two anaerobic digesters and sludge storage. In 2009 the facility underwent improvements which consisted of additional pretreatment and grit removal, converting the liquid phase to four sequencing batch reactors (SBR) followed by ultraviolet (UV) disinfection, the addition of sludge thickening, two additional anaerobic digesters, an additional sludge storage tank, and converting the secondary clarifiers to waste activated sludge (WAS) tanks.

The Brainerd WWTF is designed for a continuous discharge to the Mississippi river. The 100-year flood level of the Mississippi river at the discharge location is 1164.00 and the system is designed with a gravity discharge. The existing block flow diagram is shown in Figure 2.1.

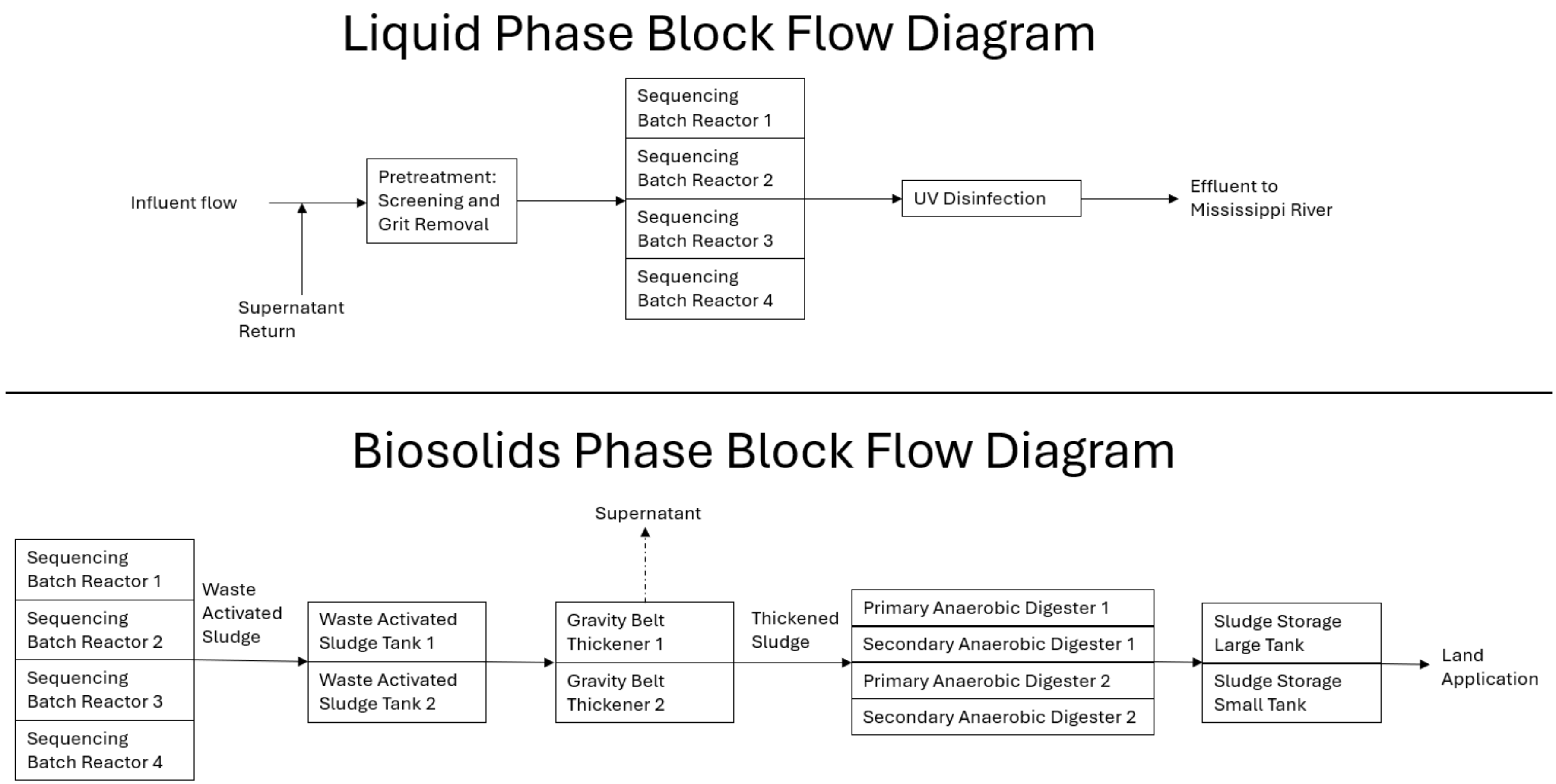


Figure 2.1: Liquid and Biosolids Block Flow Diagram

III. DESIGN CONDITIONS

A. Planning Period

Wastewater treatment facilities are typically designed based on a 20-year planning period as it is generally not feasible to make frequent changes in the capacity of a wastewater treatment facility. State and federal funding programs for wastewater infrastructure require at least a 20-year planning period and this report is to be used as the framework to develop the 20-year planning period. A facility plan should be written to finalize the planning to meet all funding requirements. Projected wastewater flows and loadings are developed from analyzing historical flows, loadings, and population along with future residential, commercial, and industrial growth projections from documents provided by both Brainerd and Baxter.

A design year of 2045 is used for this evaluation.

B. Development Projections

Wastewater is broken into four different categories: residential, commercial, institutional, and industrial. Each category is defined by what generates wastewater. Residential wastewater is from homes and apartments and has a predictable volume and strength associated with the contributing population. Commercial wastewater is from businesses and is similar to residential wastewater in strength and has an assigned volume based on square footage of the business community.

Institutional wastewater is from hospitals, schools, prisons, and similar facilities. The strength and volume can be predicted based on the number of beds or other factors associated with the specific institutions in the community.

Industrial wastewater is generated by businesses which discharge process water to make the products being produced or to clean the facilities. Industries range from metal plating facilities to food and beverage production. The discharge volume and strengths vary greatly. Industrial contributors are requested to project their anticipated needs. Pretreatment may be required to reduce the strength to near residential wastewater levels.

1. Population Projections

Several methods are used for predicting population trends for cities the size of Brainerd and Baxter. Historical city and county population trends are reviewed. Historical data from the Minnesota State Demographic Center (SDC) and the decennial census and documents provided by Brainerd and Baxter were used for population analysis. Future trends can be predicted using a variety of mathematical projections including arithmetic, geometric, and linear regression methods.

Table 3.1 and Figure 3.1 show the historical and projected populations for the Cities of Brainerd and Baxter as reported by the Minnesota State Demographic Center or provided by the Cities of Brainerd and Baxter. The population of Brainerd has remained relatively steady, slightly increasing from 13,671 in 2015 to 14,689 in 2024. Brainerd's growth is expected to decline, as projections by the Minnesota State Demographic Center indicate that the population of Brainerd will be 14,601 in 2045, a 0.6% decrease from 2024. Population projections are highly variable and may not always take into account local population trends, housing, and other factors that affect migration of peoples. Therefore, a more accurate depiction of population trends can be found in local planning documents provided by the city.

The City of Brainerd has provided population projections from comprehensive planning and housing documents. Those documents indicate a population increase for both Crow Wing County and the City of Brainerd. Estimates from these planning documents indicate a population served in the city of Brainerd of 15,200 by 2030, representing 11% growth from 2015 populations. Using the 2024 population estimate, 3.5% growth is expected through 2030 to match the planning documents. Assuming this trend remains consistent over the design period, a design population of 15,700 is used for City of Brainerd domestic flows and loadings.

The population of Baxter has been increasing, growing by 16% from 2015 to 2024. Populations from Baxter were provided through planning documents provided by the City. The projections indicate a slight increase over the 20-year design period. The design population for Baxter is 13,100 as indicated in planning documents provided by the City. The total population for Brainerd and Baxter in the 2045 design year is projected to be 28,800.

Prior to finalizing a facility plan for MPCA approval, it is recommended that each City, Brainerd and Baxter, review the population projections to ensure they are accurate and address all growth factors for both cities.

Table 3.1 – Population History and Projections

Year	Baxter	Brainerd	Total
2015	8,065	13,671	21,736
2016	8,318	13,679	21,997
2017	8,360	13,719	22,079
2018	8,478	13,732	22,210
2019	8,555	13,755	22,310
2020	8,612	14,395	23,007
2021	8,911	14,679	23,590
2022	9,030	14,895	23,925
2023	8,835	14,670	23,505
2024	9,341	14,689	24,030
2030	11,105	14,800	25,905
2035	11,721	15,200	26,921
2040	12,373	15,500	27,873
2045	13,100	15,700	28,800

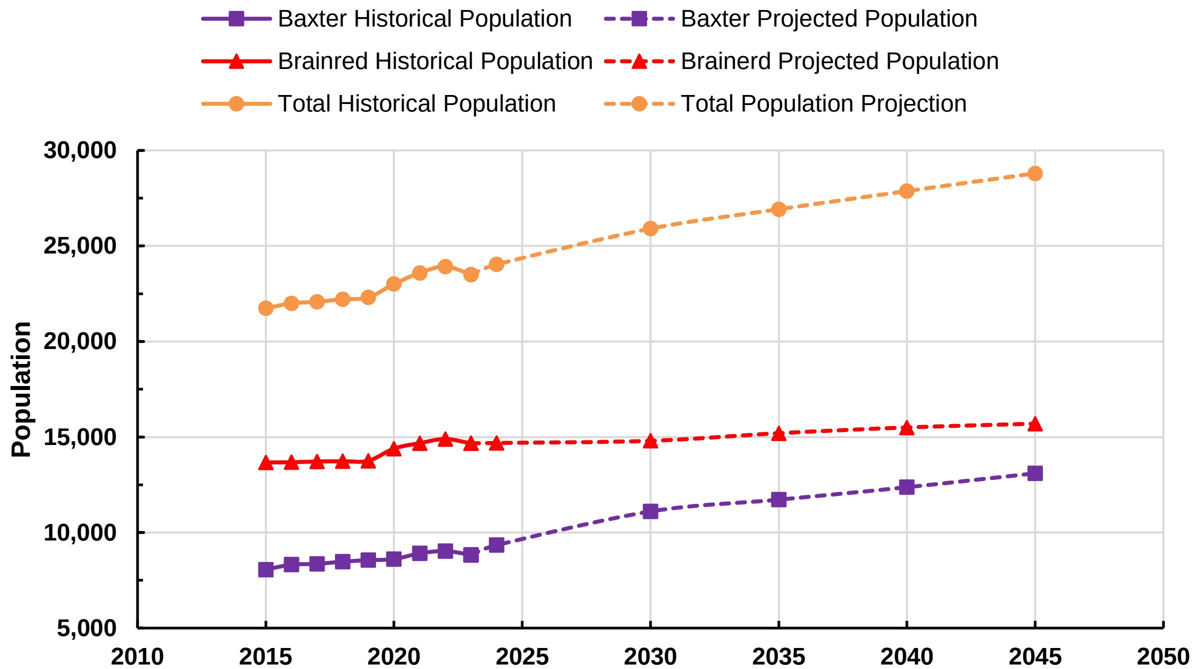


Figure 3.1: Population History and Projections

2. Commercial and Industrial Development

The Brainerd-Baxter area has seen a growing commercial and industrial base over the last 20 years. The majority of the projected commercial growth is associated with population growth and includes businesses such as restaurants and retail stores.

Brainerd and Baxter do not anticipate any new significant industrial development which would add significant flow to the WWTF. Significant industrial development includes food production facilities, bottling companies, and others that use a significant volume of water and end up discharging a significant volume of water or high strength waste. Based on planning documents provided, there are not any high-strength users planned in the next 20 years. If there are updated plans for high strength or high flow industries, it is recommended to revisit the flow analysis and update flows and loadings accordingly with the projected flows and loadings from those specific industries.

C. Wastewater Flows

1. Historical Monitoring Data

a) Influent Monitoring

The existing Brainerd WWTF is designed for a continuous discharge to the Mississippi River. The Mississippi River at the point of discharge is designated Class 2Bg, 3C, 4A, 5, 6 Water. The NPDES permit allows for an influent average wet weather (AWW) flow of 6.0MGD, 240 mg/L of carbonaceous biochemical oxygen demand (CBOD5), and 240 mg/L of total suspended solids (TSS).

A summary of the historical average, minimum, and maximum influent flows to the Brainerd WWTF are presented in Table 3.2. The historical flows to the WWTF are presented in Table 3.3 and Figure 3.2. The maximum day flow peaks occur between April and September. High flow days correspond to spring snowmelt and heavy rain events. The historic peaking factor (peak day to average day ratio) is 1.9 over the last 5 years.

Table 3.2 – Historical Influent Flow Data Summary (2019 – 2024)			
	Date	**Flow (MGD)**	**GPCD**
Average Daily Flow	January 2019- October 2024	2.00	85
Low Flow Month Average Flow	Nov-2023	1.63	69
Maximum Month Average Flow	Oct-2019	3.00	127
Maximum Day Flow	Sep-2019	3.80	161

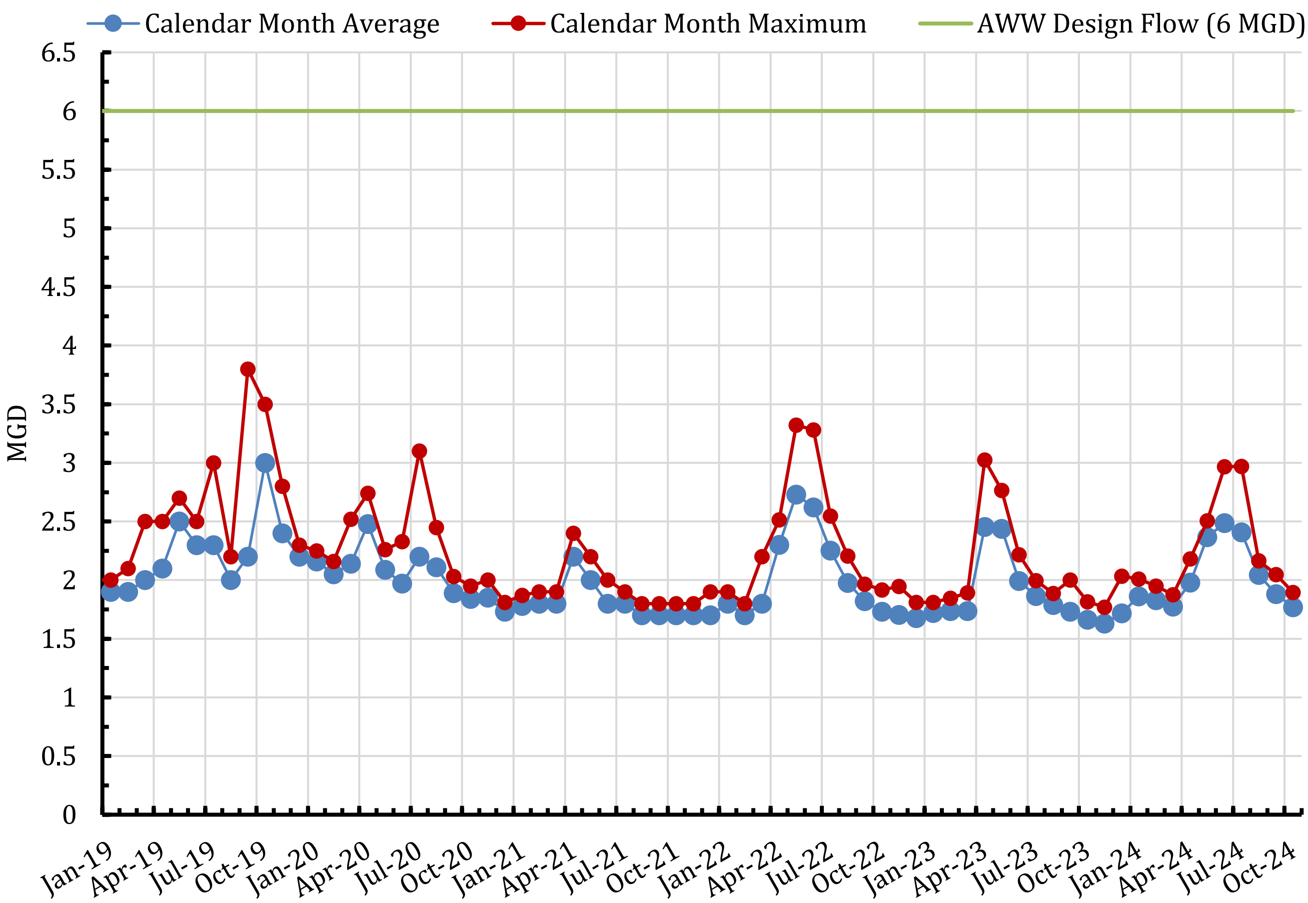


Figure 3.2: Brainerd WWTF Historical Influent Flow

b) Infiltration and Inflow Analysis

The Minnesota Pollution Control Agency (MPCA) has developed guidelines to provide a comprehensive and systematic approach to analyze Inflow and Infiltration (I&I). These guidelines were used to determine if I&I is considered excessive in the Cities of Brainerd and Baxter wastewater collection system. The following are definitions of inflow and infiltration as provided by the MPCA guidelines:

- Infiltration – is water other than wastewater which enters a sewer system, including service sewer connections and foundation drains, from the ground through broken or defective pipes, pipe joints, connections, manholes, and wet basements.
- Inflow – is water other than wastewater which enters a sewer system, including sewer service connections, through sources such as, but not limited to, roof leaders, foundation drains, yard drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, storm waters, surface runoff, street wash water, or other drainage structures.
- Excessive Infiltration – infiltration is excessive if the quantity of flow (domestic base flow and infiltration) is greater than 120 gallons per capita per day (gpcd). The quantity of flow was determined using the max average wet weather residential/commercial flow over the past six years and the 2022 population of 23,925.

  3,000,000 gpd / 23,925 people = 125 gpcd

  Investigation and correction of excessive infiltration to 120 gpcd reduces the maximum average wet weather flow by 119,000 gpd.

  (125 gpcd – 120 gpcd) * 23,925 = 119,000 gpd
- Excessive Inflow – inflow is excessive if the quantity of flow during storm events results in chronic operational problems related to the hydraulic overloading of the treatment system or that results in a total flow of more than 275 gpcd (domestic base flow plus infiltration and inflow). The flow during storm events was determined using the maximum residential/commercial flow over the past six years and the 2022 population of 23,925.

  3,800,000 gpd / 23,925 people = 159 gpcd

Table 3.3 – Historical Wastewater Flow, Brainerd Public Utilities WWTF, MN														
	2019		2020		2021		2022		2023		2024		6 Year	
Month	Monthly Average (MGD)	Daily Max (MGD)	Monthly Average (MGD)	Daily Max (MGD)	Monthly Average (MGD)	Daily Max (MGD)	Monthly Average (MGD)	Daily Max (MGD)	Monthly Average (MGD)	Daily Max (MGD)	Monthly Average (MGD)	Daily Max (MGD)	6-Year Monthly Average (MGD)	6-Year Daily Max (MGD)
January	1.90	2.00	2.16	2.25	1.78	1.87	1.80	1.90	1.72	1.81	1.86	2.01	1.87	2.25
February	1.90	2.10	2.05	2.16	1.80	1.90	1.70	1.80	1.74	1.85	1.83	1.95	1.84	2.16
March	2.00	2.50	2.14	2.52	1.80	1.90	1.80	2.20	1.74	1.89	1.77	1.88	1.88	2.52
April	2.10	2.50	2.48	2.74	2.20	2.40	2.30	2.51	2.46	3.02	1.98	2.18	2.25	3.02
May	2.50	2.70	2.09	2.26	2.00	2.20	2.73	3.32	2.44	2.76	2.37	2.51	2.35	3.32
June	2.30	2.50	1.97	2.33	1.80	2.00	2.62	3.28	1.99	2.22	2.49	2.97	2.20	3.28
July	2.30	3.00	2.20	3.10	1.80	1.90	2.25	2.55	1.87	2.00	2.41	2.97	2.14	3.10
August	2.00	2.20	2.11	2.45	1.70	1.80	1.98	2.21	1.79	1.89	2.05	2.17	1.94	2.45
September	2.20	3.80	1.89	2.03	1.70	1.80	1.82	1.97	1.73	2.00	1.88	2.05	1.87	3.80
October	3.00	3.50	1.84	1.95	1.70	1.80	1.73	1.92	1.66	1.82	1.77	1.90	1.95	3.50
November	2.40	2.80	1.85	2.00	1.70	1.80	1.70	1.95	1.63	1.77	N/A	N/A	1.86	2.80
December	2.20	2.30	1.73	1.81	1.70	1.90	1.68	1.81	1.72	2.03	N/A	N/A	1.80	2.30
Yearly Average/Max	2.23	3.80	2.04	3.10	1.81	2.40	2.01	3.32	1.87	3.02	2.04	2.97	2.00	3.80

According to MPCA criteria, inflow in the Brainerd and Baxter wastewater collection system is below the high threshold but the infiltration into the system is above the high threshold. The Cities of Brainerd and Baxter should invest in reducing the infiltration to below the described value by locating sources of inflow and infiltration and correcting them. Inflow and infiltration reduction will help extend the life of the plant by keeping systems operating within the design parameters of the equipment and facilities. Source identification can be achieved through several methods, including the following:

- Residential/Commercial sump pump and foundation drain inspections – involves inventorying residential and commercial sump pump and drain tile installations to verify discharge to storm water systems rather than to the sanitary sewer system.
- Smoke testing – identifies sources of inflow and infiltration by setting up a blower and pumping a non-toxic, pressurized smoke through sewer mains and residential lines. The smoke aids in identifying leaks or cross-connections in the sanitary sewer system.
- Dye testing – identifies sources of inflow by adding NSF-approved tracing dye to potential cross-connections (storm sewer, foundation drains, etc.) to verify if any specific drains flow to the sanitary sewer system.
- Sewer televising – identifies sources of inflow and infiltration by taking camera footage of the interior sanitary sewer piping. The camera footage helps identify broken or defective piping, offset joints, and potential cross-connections.
- Manhole inspections – involves taking an inventory of all sanitary manholes throughout the collections system to identify leaking joints, covers, and other installation or age-related issues.

2. Design Flow

a) MPCA Flow Conditions

The MPCA has guidelines to determine the design wastewater flows for new or expanded treatment facilities. Flow projections are developed for different climatic conditions as described below:

- Average Dry Weather (ADW) Flow – Measure of flow during which there is no inflow due to precipitation and/or snowmelt and no infiltration due to high groundwater. This flow typically occurs during winter months or very dry summers. It is also strongly correlated with drinking water usage.
- Average Wet Weather (AWW) Flow – Daily average flow for the wettest 30 consecutive days for mechanical treatment facilities. AWW flow is based on flow with infiltration due to high groundwater and typical inflow due to precipitation and/or snowmelt. This flow typically occurs during the spring and early summer.
- Peak Hourly Wet Weather (PHWW) Flow – Peak flow during the peak hour of the day at a time when the groundwater is high and a five-year one-hour storm event is occurring.
- Peak Instantaneous Wet Weather (PIWW) Flow – Peak instantaneous flow during the day at a time when the groundwater is high and a 25-year one-

hour storm event is occurring. This flow is used for sizing pumps and piping systems. The flow parameters described above are determined by following the procedures outlined in the MPCA document "*Design Flow and Loading Determination Guidelines for Wastewater Treatment Plants.*" Additional flow from population increase will be estimated based on historical per capita flow and loadings, as discussed in the following sections.

b) Residential, Commercial, Institutional Flow

Commercial flows include wastewater from businesses, small industries, restaurants, and city offices. These flows are typically similar in strength to residential flows and will be considered in future flow allocations. Institutional flows include wastewater from the School District buildings, healthcare facilities, and other educational buildings. Residential flows include household wastewater flows. These flows contribute to a significant portion of flow for the City of Brainerd.

c) Industrial Flow

There are several existing significant industrial users (SIU) located within Brainerd and Baxter. The SIU's have agreements for the quality and quantity of wastewater that can be discharged to the Brainerd WWTF.

No major additional SIU's are projected.

d) 20 Year WWTF Design Flow

Calculated design flows for 2045 have been projected utilizing the following criteria:

- 2045 Design Population of 28,800 capita.
- Flow from population increase will be estimated using historical per capita flow rates. The Recommended Standards for Wastewater Facilities (commonly Known as Ten States Standards) recommends a flow of 100 gal/cap/day for Wet Weather Flow projections and 75 gal/cap/day for Dry Weather Flow projections. The City's historical per capita flow rates are 78 gal/cap/day for dry weather flow and 100 gal/cap/day for wet weather flow. The historic per capita flow rates are very similar to the 10SS recommendations and, thus, will be used in projections.
  - The Brainerd water treatment plant (WTP) will be adding a backwash reclamation tank to the facility in the upcoming years. The water that is not reclaimed will be sent to the sanitary sewer. Based on current and estimated WTP operations once the reclaim tank is installed, the estimated sludge volume which will be discharge to the sanitary sewer is 150,000 gallons per week, typically pumped in a 1- or 2-day period. The additional flows from the reclaim tank will be added to residential flows for flow development.
- Commercial and Institutional flows will increase proportionally with residential flows and are accounted for by the population growth.
- Industrial Flows are not projected to increase since there are no new projected SIU's that will significantly increase flows to the WWTF. If SIU's are projected, then the design flows should be updated to reflect estimates by the industry for peak flows and loadings.

Table 3.4 presents a summary of the allocated calculated 2045 design flows, along with the existing facility design flows.

Table 3.4 – Summary of Allocated 2045 Design Flows

Parameter	2024 Existing Flows	2045 Calculated Design Flows	Facility Design Flows
Average Dry Weather Flow (MGD)	1.85	2.26	--
Average Wet Weather Flow (MGD)	2.35	3.32	6.00
Average Annual Flow (MGD)	2.00	2.54	4.78
Peak Hourly Wet Weather Flow (MGD)	4.77	5.40	10.36
Peak Instantaneous Wet Weather Flow (MGD)	5.45	6.17	10.88

D. Wastewater Loadings

1. Historical Monitoring Data

a) Influent Monitoring

The City of Brainerd monitors influent pollutant loadings per the requirements of their NPDES Discharge Permit. The City monitors the 5-day Carbonaceous Biochemical Oxygen Demand (CBOD5), Total Suspended Solids (TSS), and Total Phosphorus (TP). The City also monitors Total Kjeldahl Nitrogen (TKN) and Total Nitrogen (TN). The historical loadings for the City of Brainerd WWTF are shown in Table 3.5. The historic loading for CBOD5, TSS, TKN, and TP, are shown in Figures 3.3-3.6, respectively.

The average influent loadings for CBOD5, TSS, TKN, and TP have been consistent over the past six years.

Table 3.5 – Historical Influent Loading Summary								
Parameter	**Unit**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**6-Year Average**
Population Estimate		22,310	23,007	23,590	23,925	23,505	24,030	23,395
Average Flow	MGD	2.23	2.04	1.81	2.01	1.87	2.04	2.00
	gpcd	100	89	77	84	80	85	86
CBOD5	mg/L	169	214	218	190	189	197	196
	lb/d	3,149	3,641	3,283	3,190	2,959	3,357	3,263
	lb/cap/d	0.14	0.16	0.14	0.13	0.13	0.14	0.14
TSS	mg/L	246	252	301	301	308	298	284
	lb/d	4,574	4,297	4,530	5,036	4,811	5,073	4,720
	lb/cap/d	0.21	0.19	0.19	0.21	0.20	0.21	0.20
TKN (1)	mg/L				41	41	41	41
	lb/d				687	640	698	675
	lb/cap/d				0.03	0.03	0.03	0.028
TP	mg/L	4.58	5.84	6.30	5.93	6.13	5.64	5.74
	lb/d	85	99	95	99	96	96	95
	lb/cap/d	0.004	0.004	0.004	0.004	0.004	0.004	0.004
(1) TKN was not monitored until 2022								

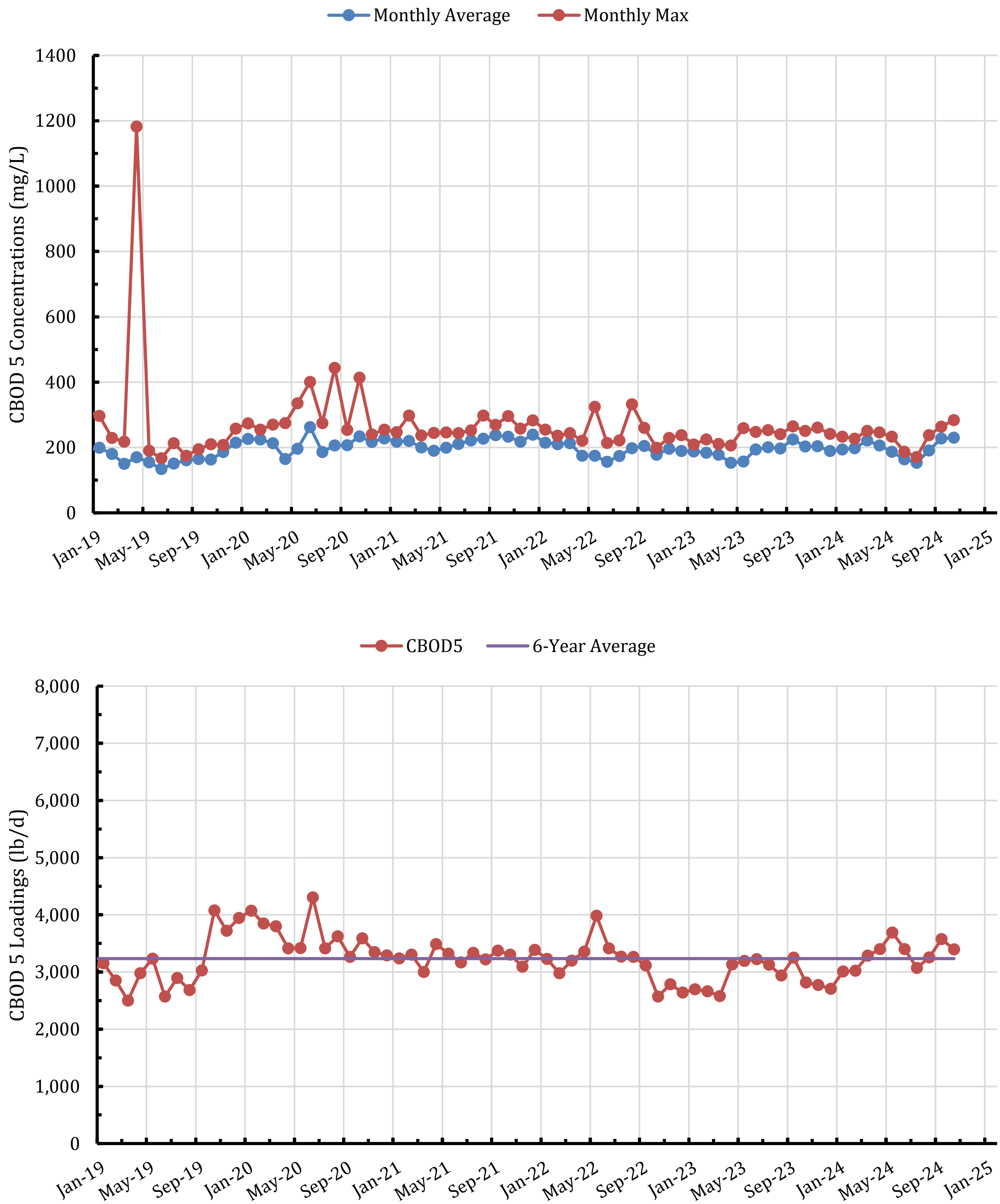
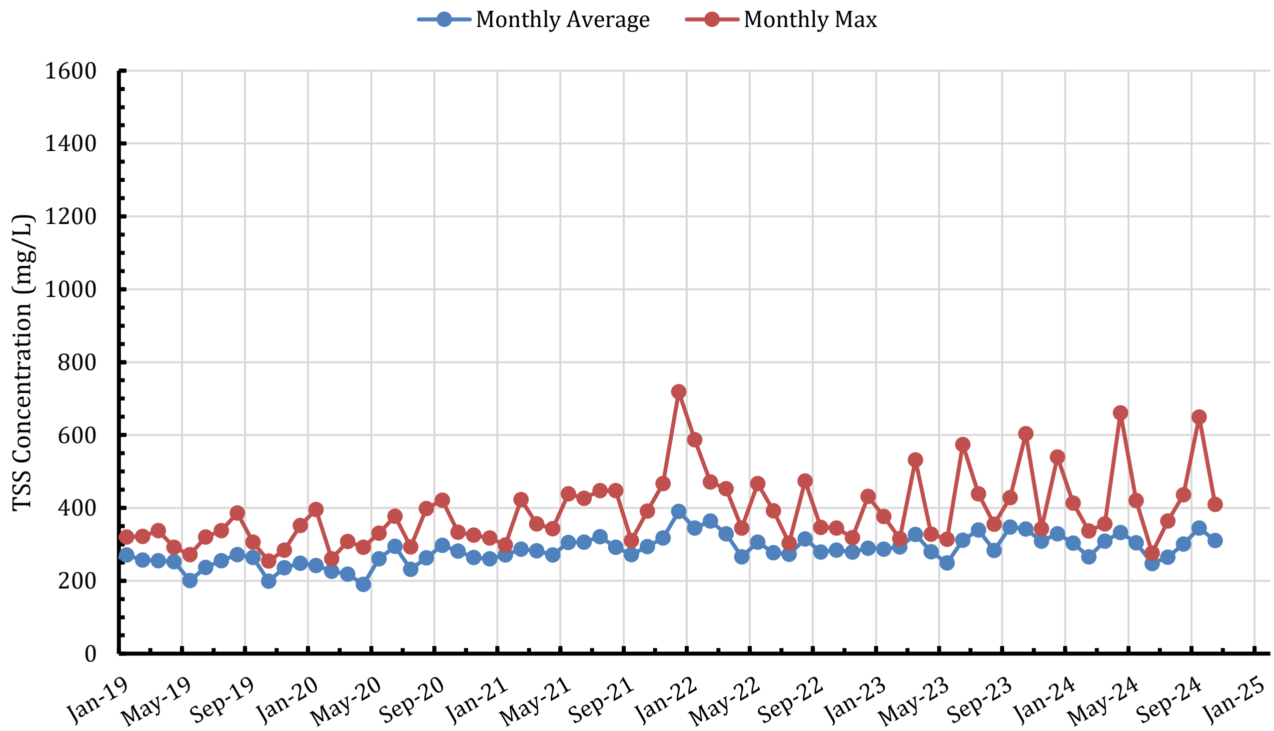


Figure 3.3: Historic CBOD5 Concentrations (top) and Mass loadings (bottom)



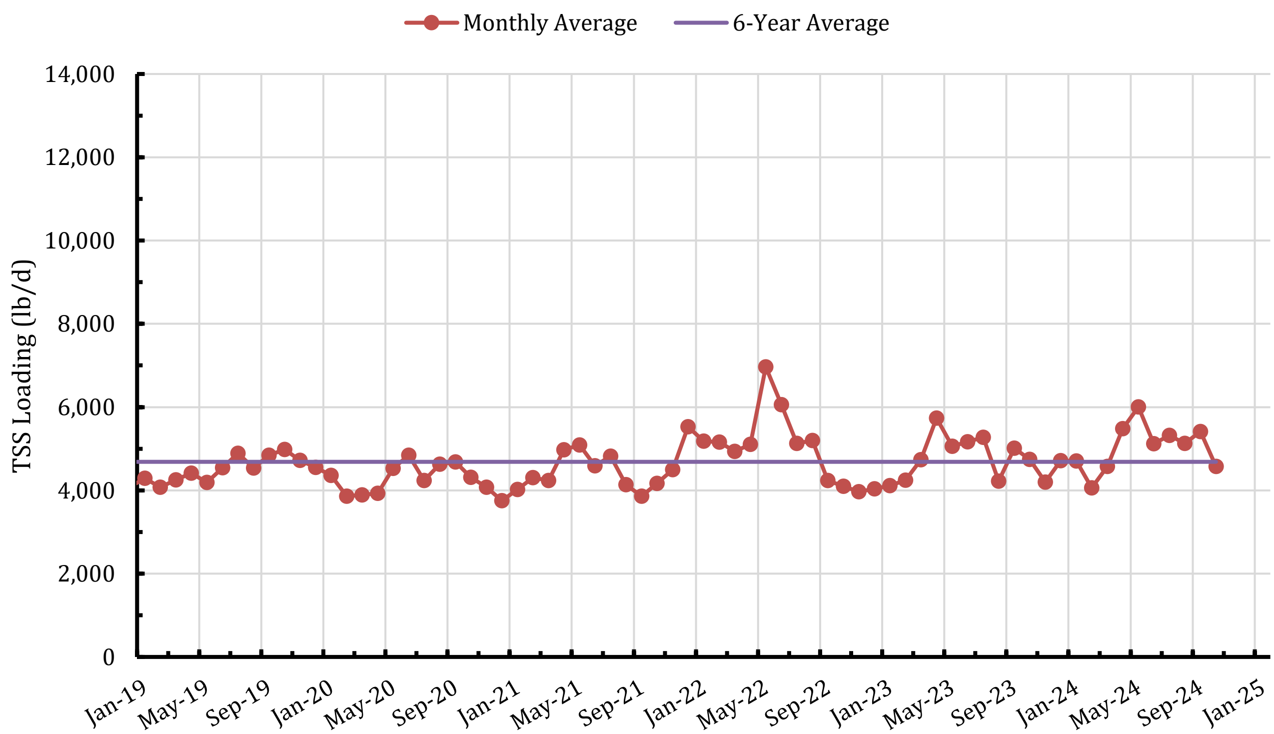
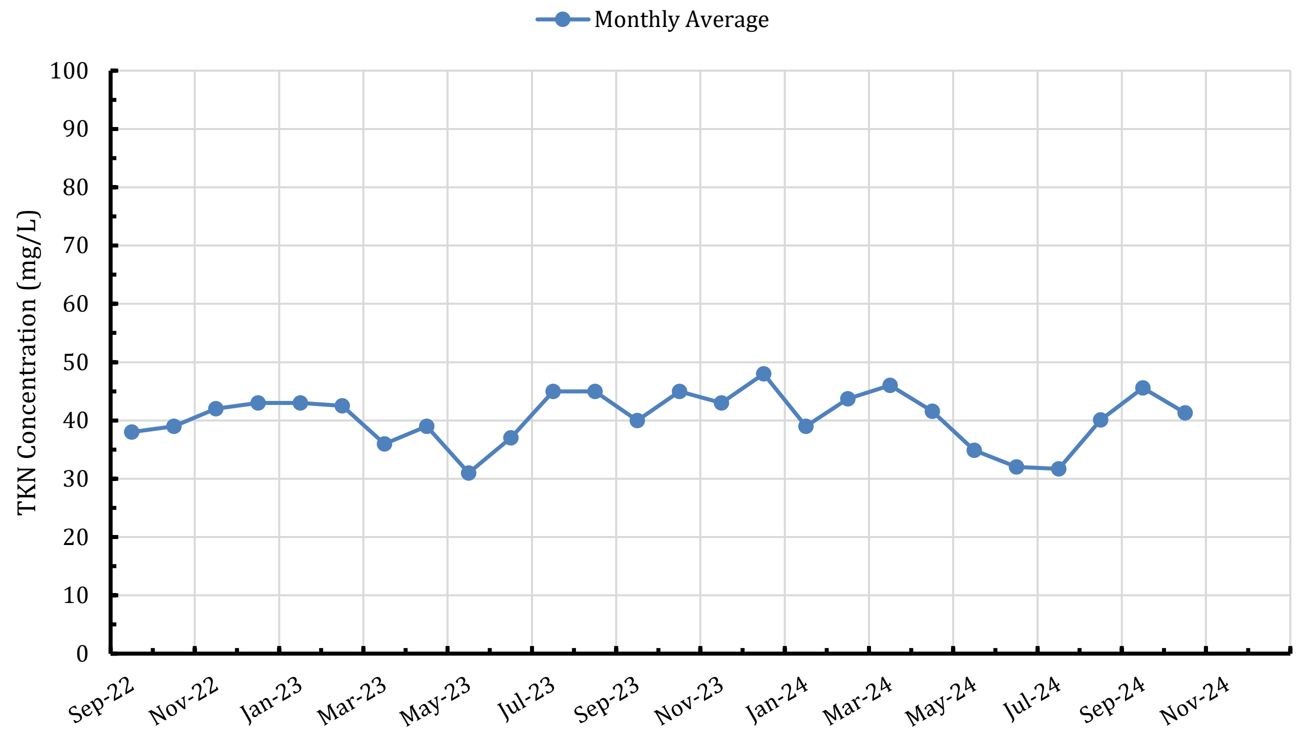


Figure 3.4: Historic TSS Concentration (top) and Mass Loading (bottom)



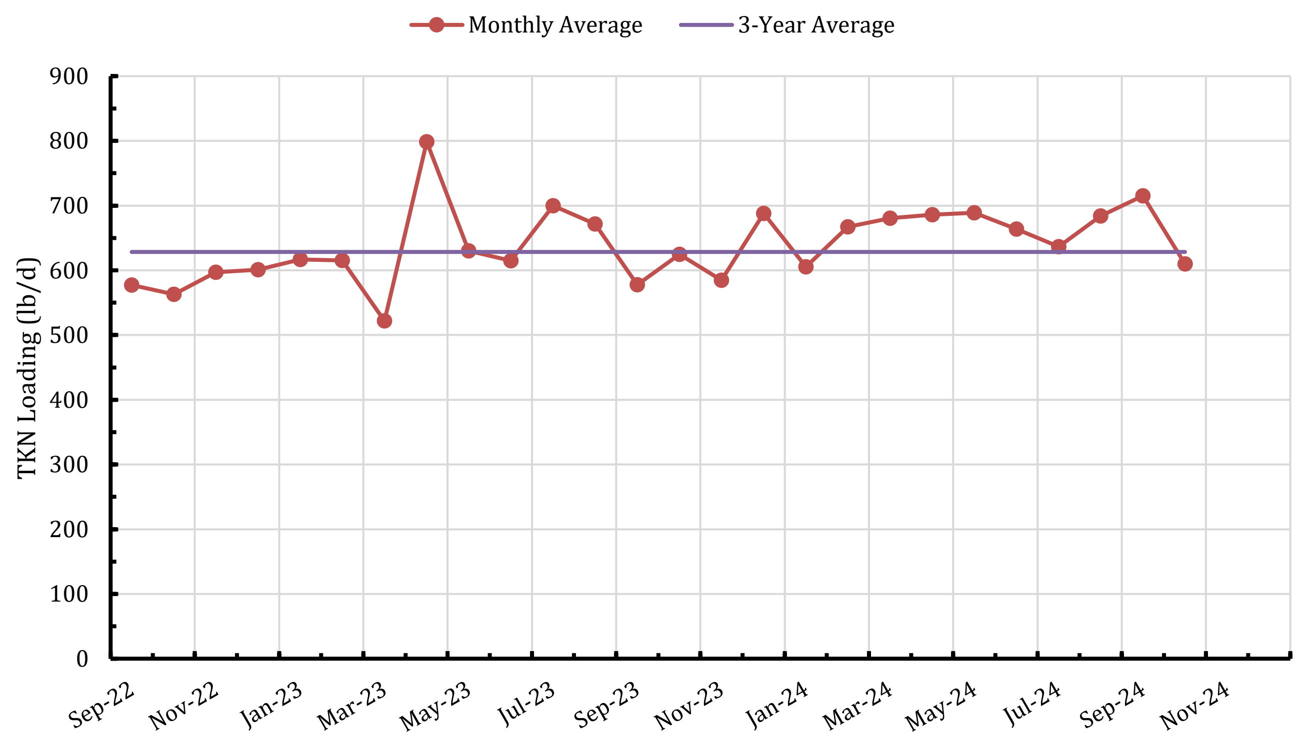


Figure 3.5: Historic Total Kjedahl Nitrogen Concentration (top) and Mass Loading (bottom)

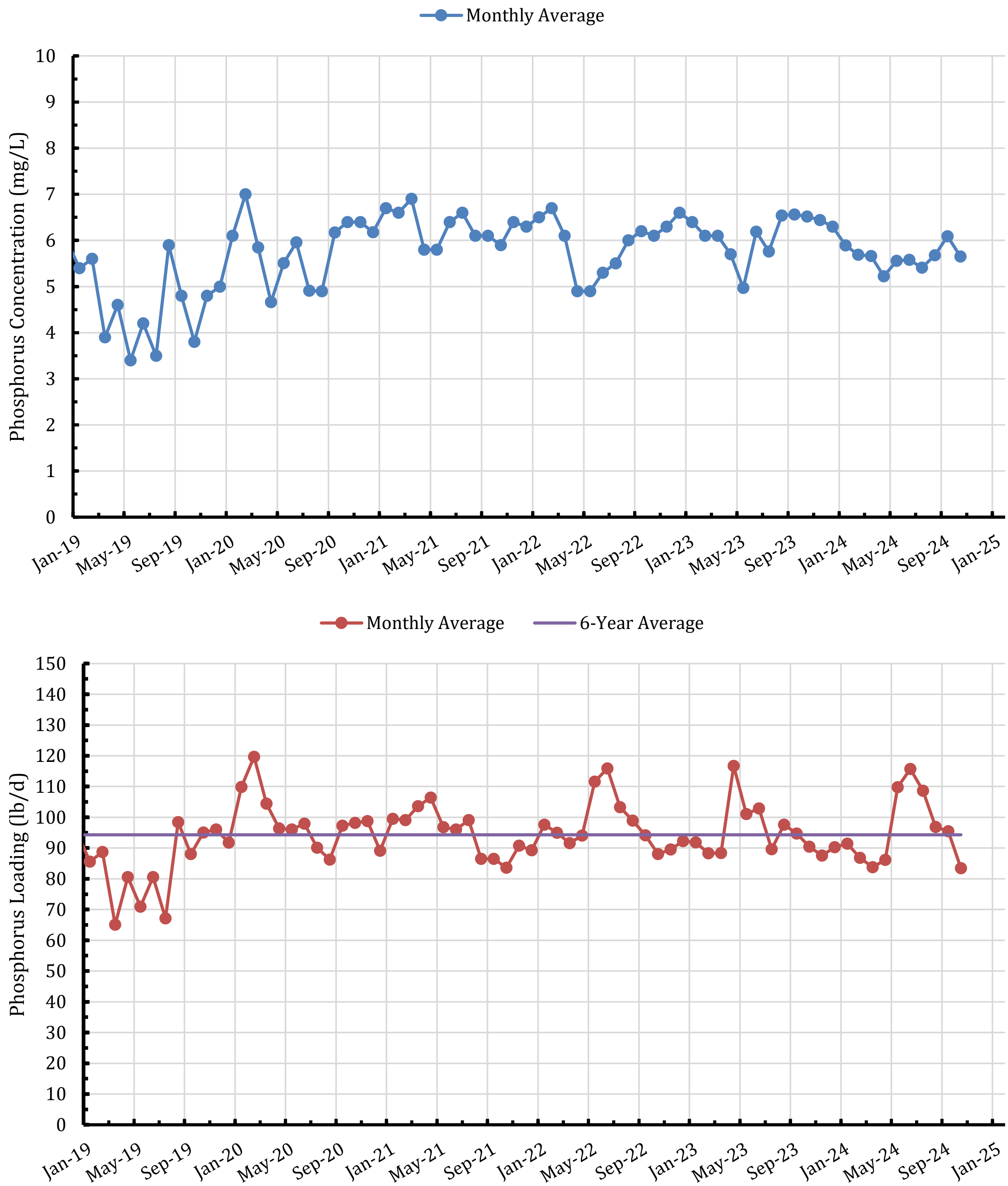


Figure 3.6: Historic Phosphorus Concentration (top) and Mass Loading (bottom)

2. Design Loadings

The City of Brainerd's WWTF receives pollutant-loading contributions from residential, commercial, institutional, and industrial users. The flows from each are discussed below.

a) Residential, Commercial, Institutional Loadings

Design loadings from residential/commercial/institutional users can be developed using either historical loading data or common recommended design loading values. Common per capita design loading rates for residential/commercial sources, as per the Ten States Standards, are 0.17-0.22 lbs. CBOD5/capita/day, 0.20-0.25 lbs. TSS/capita/day, and 0.036-0.048 lbs. TKN/capita/day. According to Metcalf & Eddy (2003), typical per capita Total Phosphorus loading is 0.008 lbs./capita/day. The historic per capita loading for the City of Brainerd WWTF is summarized in Table 3.6 along with the common recommended design loading values. The historic per capita loading values for Brainerd WWTF are slightly under the common design loadings. To be conservative, the Ten States Standards common design loading values are used for future load projections.

Table 3.6 – Per Capita Loading

Parameter	Per Capita Design Loading	Historical Per Capita Loading
CBOD5	0.200 lbs/capita-day (1)	0.14 lbs/capita-day
TSS	0.220 lbs/capita-day (1)	0.20 lbs/capita-day
TP	0.008 lbs/capita-day (2)	0.004 lbs/capita-day
TKN	0.036 lbs/capita-day (1)	0.028 lbs/capita-day

(1) Design loading from Ten States Standards

(2) Recommended design loading from Metcalf & Eddy (2003)

b) Industrial Loadings

There are no anticipated additional SIU loadings. If SIU's are projected, then the design flows should be updated to reflect estimates by the industry for peak flows and loadings. All existing loadings are accounted for in historical data.

c) 20 Year WWTF Calculated Design Loading

The calculated 2045 design loadings are shown in Table 3.7. The design loadings include the projected load increase due to population (residential/commercial/ institutional) growth and assumes no major additional SIU's.

Table 3.7 – 2045 Design Loads

Parameter	Existing Load	2045 Calculated Design Load	Facility Design Loads
CBOD5 (lbs/day)	3,263	4,238	9,568
TSS (lbs/day)	4,720	5,793	9,568
TP (lbs/day)	95	134	343
TKN (lbs/day)	675	851	2,392

E. Existing Effluent Limits

The existing effluent limits for the Brainerd Wastewater Treatment Facility are described in NPDES Permit No. MN0049328. A copy of the permit is included in Appendix A. A summary of the current effluent limits is presented in Table 3.8.

Table 3.8 – NPDES Discharge Limits

Parameter	Season	Limit Type	Limit
5-Day Carbonaceous BOD	Jan-Dec Jan-Dec	Calendar Month Average Maximum Calendar Week Average	25 mg/L (296 kg/d) 40 mg/L (473 kg/d)
Total Suspended Solids (TSS)	Jan-Dec Jan-Dec	Calendar Month Average Maximum Calendar Week Average	30 mg/L (355 kg/d) 45 mg/L (533 kg/d)
Total Phosphorus	Jan-Dec	12-Month Moving Average	1 mg/L average (8,278 kg total)
Total Ammonia Nitrogen (NH_3-N)	Oct-May	Calendar Month Average	Monitor Only
Total Kjeldahl Nitrogen	Jan-Dec	Calendar Month Average	Monitor Only
Total Nitrogen	Jan-Dec	Calendar Month Average	Monitor Only
Dissolved Oxygen (DO)	Jan-Dec	Calendar Month Average	Monitor Only
Fecal Coliform, MPN, or Membrane Filter 44.5C	Apr-Oct	Calendar Month Geometric Mean	200 organisms per 100 mL
pH	Jan-Dec	Min-Max	6.0 - 9.0
Perfluorooctane Sulfate	Mar, Jun, Sep, Dec	Calendar Month Average	287 ng/L
		Daily Maximum	497 ng/L
Mercury	Jan, Mar, May, Jul, Sep, Nov	Calendar Month Average Daily Maximum	6.9 ng/L 11.95 ng/L
Copper - Phase 1	Mar, Jun, Sep, Dec	Calendar Month Average Daily Maximum	802 ug/L 1,984 ug/L
Copper - Phase 2	Mar, Jun, Sep, Dec	Calendar Month Average Daily Maximum	235 ug/L 581 ug/L

F. Influent Design Criteria Summary

The existing and proposed design criteria are shown in Table 3.9.

Table 3.9 – Existing and Proposed Influent Design Criteria Summary

Parameter	2009 Design Criteria	Proposed Design Criteria
Design Flow (MGD)		
Average Dry Weather Flow (ADW)	--	--
Average Annual Flow (AA)	4.78	4.78
30-day Average Wet Weather Flow (AWW)	6.00	6.00
Maximum Day Flow	--	--
Peak Hourly Wet Weather Flow (PHWW)	10.36	10.36
Peak Instantaneous Wet Weather Flow (PIWW)	10.88	10.88
Design Load (lb/day)		
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	9,568	9,568
Total Suspended Solids (TSS)	9,568	9,568
Total Kjeldahl Nitrogen (TKN)	2,392	2,392
Total Phosphorus (TP)	343	343

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IV. EXISTING WASTEWATER FACILITIES

A. Overview

Construction of the WWTF was completed in 2009/2010. Since then, there have not been any major improvements to the facility with the exception of regular maintenance and anaerobic digester improvements. This section will give a high-level summary of the assessment of the major treatment components of the facility.

B. Headworks

1. Influent Channel

The influent channel is used to convey the flow from Brainerd and Baxter to the mechanical fine screens. Brainerd’s main lift station pumps across the Mississippi River where the flow joins with the sanitary sewer for the portion of Brainerd West of the Mississippi River. Brainerd’s wastewater then flows by gravity to the WWTF and enters the influent channel via gravity. Baxter’s final lift station in the collection system is at the entry gate to the WWTF. Baxter’s final lift station pumps wastewater into a metal box above the influent channel. The metal box aids in the flow split between the mechanical screens, but the channels still surge and receive uneven flow split when Baxter’s final lift station is pumping. The influent channel is in good condition and has adequate freeboard for current flows. However, the freeboard is fully consumed when Baxter’s final lift station is pumping. Flow equalization should be considered for Baxter’s flow after the final lift station.

2. Headworks Building

The headworks contain a number of components used for pretreatment and grit removal. The building was constructed in 2009 and is in good condition. There is minor settlement around the building which should be monitored over the next several years and repaired if it continues to get worse. The roof is in good condition and there have been no reported leaks in the building. Inside the building, the condition of the equipment is good due to the air scrubber that sits in the next room. The air scrubber helps to remove hydrogen sulfide and other gases from the room atmosphere which helps to prevent corrosion. Minimal corrosion was observed inside the building.

3. Mechanical Fine Bar Screens

Wastewater enters the plant from Brainerd and Baxter and both lines have a sampler which allows both sources to be sampled independently. The wastewater flows through one of two mechanical bar screens. The bar screens are mechanical fine screens. Screened material is disposed of in dumpsters. Mechanical components, such as the fine screens, grit collector and grit classifier, have a typical useful life of 15 to 20 years due to normal wear overtime. The mechanical traveling fine screens should be replaced in kind within the next 5 to 10 years to avoid a major equipment failure.

The screenings pipe currently has a hole in the side which allows material to spill onto the floor. This equipment and piping should be replaced with new equipment.

4. Grit Removal System

Once the water flows through the screens, it enters a channel where it flows through a vortex grit removal chamber. The equipment included is a Pista Grit paddle, grit pump, grit cyclone, and grit classifier. The grit removal equipment is in good condition, but it is recommended to replace the pump and classifier within the next 5 – 10 years.

5. Flow Measurement

After grit removal, the water flows through a Parshall flume for flow measurement and then is conveyed to the SBR building. The Parshall flume is in good condition and is not in need of replacement within the next 10 years.

6. Headworks HVAC equipment

The HVAC equipment in the headworks building is in poor condition and is adequately maintained given the current condition. The heaters are all original from 2009. A typical life expectancy of a heater in a headworks building is 10 – 15 years. It is recommended to replace the existing heaters with new explosion proof heaters. The ductwork in the building is in good condition and appears to be resisting corrosion. No repairs are needed on the ductwork in this room.

7. Headworks Electrical Equipment

The headworks building is made up of three rooms, the screening room, scrubber room, and electrical room. The screening room has exposed process in the space, which makes the area a hazardous location for electrical installations. The danger is the buildup of flammable gases which a spark or heat from electrical equipment could ignite. The electrical equipment installed in the screening room is rated for a hazardous location and is in visually good condition.

NFPA 820 is a nationally recognized standard which identifies and label's hazardous locations for wastewater collection and treatment system/facilities. Per this standard, any room which has shared openings with the screening room would be classified as a Class 1, Division 1 hazardous location and would require all electrical equipment in the shared space to be rated as explosion proof. However, both the scrubber room and electrical room have exterior access and do not share an opening with the classified space.

The motor control center (MCC), SCADA control panel (SCP), and panelboard and other electrical and HVAC equipment is in the electrical room. It appears the panelboard was installed in 2009 and the equipment in this space visually looks good. The existing programmable logic controller (PLC) cards are obsolete and should be replaced.

The lighting in the headworks spaces is halogen bulbs. Halogen bulbs take a significant amount of time to reach maximum luminary output. It is recommended to replace the lighting with LED luminaires to reduce energy consumption, produce better lighting and less maintenance.

A summary of various components in need of repair/replacement can be found in table 4.1 below.

Table 4.1 – Headworks Building Recommended Repairs & Replacements		
Item	**Replace/Repair**	**Other Notes**
Air Scrubber	Have manufacturers inspect media and replace media if recommended.	Calcium bridge forming in media. Will affect the performance of air scrubber.
	Replace the recirculation pump at bottom of scrubber.	
HVAC	Replace all the heating in building. Add/fix thermostat for Berko heater.	
Lighting	Replace halogen with LED.	
Grit Removal System	Requires maintenance. Paddles need to be inspected.	Sufficient capacity. Concrete is in good condition.
Sample Lines	Replace wall penetration foam with filler that is able to stop odors and gasses.	
MAUs	Replace MAU-2.	
Structure	Caulking should be re-done on exterior joints.	
Structure Septage Receiving Station	Membrane roofs should be replaced every 20 years (next replacement due in 2030).	
	Consider adding a new CIP septage receiving station to handle septage.	Existing septage receiving station for vac-trucks.
Mechanical Traveling Fine Screens	Replace in kind	
Screenings Compactor/Washer	Replace in-kind	Grit has worn a hole in the pipe.
Wemco Grit Pump	Replace the pump.	
Grit Classifier	Replace Classifier	
Electrical/Controls	Replace PLC cards with updated versions	
Piping	No major updates needed	Minor corrosion, mainly near flanges or bolts. No epoxy coating on piping at chemical injection locations.
Brainerd Influent Sampler	Move sample line to a location to accurately grab a sample of the influent	Sampling line is too close to dump station and sometimes results in erroneous readings.

C. Sequencing Batch Reactors (SBR) and SBR Building

1. SBR Building and Laboratory

The SBR building houses all of the equipment and tanks for the SBR's. There are four (4) 1.5-million-gallon SBR tanks. The main level of the building is comprised of a laboratory/classroom, garage, blower room, and electrical room. The overall structure is in good condition since its construction in 2009. There are no major improvements needed to the building or structure at this time.

Vibration testing has shown that the laboratory in the SBR building cannot be used as a certified lab due to excessive vibration. Additionally, modifications such as a fume hood and computer additions would be required to function as a fully operational lab even if the vibrations were below the allowable threshold. Therefore, BPU staff use the laboratory in the main control building for testing, and the SBR building laboratory/classroom is mostly used for conducting training classes and holding other events and tours.

2. SBR Tanks and EQ Tanks

The SBR tanks are the main biological treatment component at the facility. The existing concrete tanks are in good condition since construction in 2009. It is expected that the concrete in the SBR tanks and EQ tanks will have a life expectancy of at least 75 years. No major improvements have been required. Water is conveyed to the SBR tanks from the headworks facility through a large pipe. Once at the SBR building, water is split to the SBR tanks depending on the cycle of each tank. Each tank, when in operation, goes through a four-step treatment process: filling (both anoxic and aerobic fills), react, settling, and decanting (with sludge wasting). The operation and setpoints for the process are all controlled by the PLC and SBR equipment supplier controls. When a SBR goes into decant mode and the PLC signals for the wasting pumps to turn on, the waste activated sludge from the SBR is pumped to the WAS holding tanks prior to thickening and digestion.

Once an SBR tank decants in the final stage, the water flows to the EQ tank prior to flowing to the UV disinfection building. The EQ tanks sit between the SBR tanks. No major improvements are needed for the EQ tanks at this time.

On top of both the SBR and EQ tanks are access hatches. The safety grating/netting in the access hatches should be replaced with new grating to allow safe observation of the tank.

3. Pumps, Piping, and Blowers

When a tank is in the fill cycle, influent wastewater enters the tank and fills until it hits the "stop" setpoint. At that time, the cycle will switch into the aeration mode to supply oxygen to the wastewater. Blowers supply the air to the SBR. Blowers have an estimated useful life of 20-25 years. The blowers are all in good condition and no major improvements are needed at this time.

Jet motive pumps are used to provide mixing in the SBR tanks during the aeration cycle. Jet motive pumps are high capacity pumps that create significant turbulence in the piping. Due to the orientation and fittings around the pump, cavitation has caused significant degradation in the piping on the discharge side of the pump. One fitting has already been replaced and others need replacement due to the cavitation. It is recommended to replace all downstream fittings from the pump and monitor for cavitation.

Once a SBR goes into the settling/decant mode, waste activated sludge is pumped to the WAS storage tanks via the WAS pumps. The WAS pumps currently have sufficient capacity and do not require replacement within the next 5 – 10 years.

When an SBR enters decant mode, effluent pumps move water from the EQ tank and pump it to the UV building. The effluent pumps have an estimated useful life of 20 years. The effluent pumps currently have sufficient capacity and do not require improvements at this time.

4. Filter Pipe Gallery

The piping in the pipe gallery shows minor signs of corrosion. The utility has done an excellent job on maintenance on the pumps, piping, and equipment in the pipe gallery. Minor improvements such as touching up coatings on the piping should be made over the next few years. No major improvements are recommended for the filter pipe gallery.

5. HVAC and Plumbing Systems

The HVAC and plumbing systems in the SBR building are all in good condition. The split-case air condition units in the electrical room are not functioning as intended and should be replaced with properly sized units. This work should happen within the next couple of years to protect the electrical equipment from overheating. All other HVAC systems appear to be operating as intended and no other major improvements are needed other than regular maintenance.

a) Restrooms

The restrooms appear to be in good condition. No improvements are needed at this time.

6. Electrical and Controls

a) Electrical Room

The electrical room in the SBR building houses the MCC, switchgear, and electrical service for the facility. The electrical gear was installed in 2009 and is in good condition. No major improvements are needed on the electrical gear and there is adequate space for new electrical equipment in the existing room.

The existing control panel and PLC contain outdated PLC cards that are no longer in production. The utility currently has to shop online for PLC cards if one were to fail. This makes repairs extremely difficult and parts difficult to obtain in a timely manner. It is recommended to replace the PLCs with new PLC cards and to update the SCADA system.

It is also recommended to update the SBR controls as the system is outdated.

b) Lighting

There are several types of luminary structures in the SBR building. It is recommended to evaluate replacing all lighting fixtures with LED luminaries to reduce energy consumption and provide bright white light for working.

c) Generator Systems

A diesel standby generator is provided at this facility. The generator was installed in 2009. The generator is located outside on the North side of the SBR building in an outdoor enclosure on top of a sub-base fuel tank.

An automatic transfer switch is provided in the SBR building electrical room. This transfer switch connects to the utility source via the breaker at the switchgear. The load side of the transfer switch feeds the motor control center in the control building, which in turn feeds other processes at the facility.

The generator and Automatic transfer switch visually appear to be in good condition and staff did not report any present issues with the generator assembly.

A summary of various components in need of repair/replacement can be found in table 4.2 below.

Table 4.2 – SBR Building Recommended Repairs & Replacements

Item	Replace/Repair	Other Notes
Effluent Pumps 1-3	No work needed	
Sump Pumps 1-4	Replace in kind	
WAS Pumps 1-4	No work needed	
Laboratory	It cannot be used as a certified lab due to vibrations. If it is to be used as a training lab, consider adding a fume hood and eyewash station.	No improvements are needed if BPU does not move to the lab space in the SBR building.
Building Lighting	Add LED lighting in pump/pipe gallery on lower level.	Could replace the lighting in a sequence of room by room or as fixtures fail.
Electrical Panel/Controls	Replace existing PLC cards with new updated cards. Update SCADA and SBR controls to allow more operational flexibility.	Sufficient room to install new panels, MCCs, etc.
Jet Motive Pumps	Replace fittings downstream of pumps.	To assist with phosphorus reduction, consider adding a ferric or alum feed line to allow injection of chemical into the SBR tanks.
SBR Tanks	Replace all safety grating/netting on the SBR access hatches. Caulk control joints in buildings, tanks, and edges.	Consider adding MLSS probe into tanks to provide additional data for process control.
HVAC systems	Replace the AC in the electrical room.	Existing AC does not work as intended.
EQ Tanks	Add storm catch basin on west side of SBR's to collect stormwater and convey away from the tanks.	

D. UV Disinfection

Disinfection at the WWTF is accomplished with a Trojan UV 3000plus system. The system was installed in 2009. UV disinfection systems have a useful life of 15 – 20 years. The UV system at the time of inspection was operating as intended and operators have not noticed any disinfection issues to date. The system currently operates during the disinfection season (April through October) and is shut off in the winter. Regular maintenance has been conducted on the channel and the UV bulbs as well as bulb replacement as needed.

The current system is always run at 100% capacity with both banks of bulbs running. This can provide sufficient disinfection but also increases energy consumption. The Trojan UV systems are programmable and can be programmed to ramp bulb intensity up and down to maintain an adequate UV dose to meet design standards for UV dosing. It is recommended the utility evaluate updating the programming of the UV system to allow for flow paced UV dosing to increase the energy efficiency of the system.

Once the water passes through the UV bulbs, it flows over a finger weir to the outfall pipe which flows via gravity to the Mississippi River.

A summary of various components in need of repair/replacement can be found in table 4.3 below.

Table 4.3 – UV Disinfection Recommended Repairs & Replacements

Item	Replace/Repair	Other Notes
UV Module	No major improvements needed.	Consider updating programming to flow pace the UV dose.
UV Building	Replace lighting and add LED lights.	
Site Improvements	Add high flow hydrant in building to more easily wash down the channel and clean equipment.	

E. Outfall Structure and Perimeter Fence

After the water is disinfected in the UV channel, the water flows through an outlet structure to the river. From discussions with utility staff, the outfall structure is in okay condition. It is recommended that this structure be evaluated yearly and assessed for erosion to ensure proper function and to prevent damage to the structure.

During the site inspection it was observed that the perimeter fence was in good condition.

F. Control Building and Lab

The existing control building currently has the main SCADA PLC, office spaces, and the laboratory. The building also has a garage for truck and equipment storage and a room that houses the original generator that is still used. Above the garage space there is an old room that used to house centrifuges for dewatering biosolids, but the room is currently not in use.

The generator is original and is past its useful life and needs to be replaced. The electrical system for the west side of the WWTF, including the GBT's, anaerobic digesters, WAS tanks, and sludge storage are all powered from the original controls building. The electrical system for the controls building is original from 1982 and is in need of significant improvements. The MCC's should be replaced with electrical improvements.

The laboratory space in the original control building is used as the certified lab on site since the SBR laboratory has excessive vibration and cannot be used as discussed above. The laboratory is original from 1982 and needs capital improvements.

The roof is at its useful life and needs to be replaced on the control building. Additionally, window and door replacements should be considered for increased energy efficiency.

G. Biosolids Processes

1. Waste Activated Sludge (WAS) Tanks

Sludge from the SBR tanks is sent via the WAS pumps to the WAS storage tanks. The WAS storage tanks are the original secondary clarifiers from the original WWTF. The tanks are in need of concrete rehabilitation. The domes on the tanks are in adequate condition but likely should be replaced if these tanks are to remain in operation for more than 10 years. The diffusers in the tanks appear to be operating as intended and provide evenly dispersed aeration of the WAS across the diameter of the tank.

WAS is pumped from the storage tanks to the gravity belt thickeners prior to going to the digesters.

A summary of various components in need of repair/replacement can be found in table 4.4 below.

Table 4.4 – WAS Holding Tank Repairs & Replacements		
Item	**Replace/Repair**	**Other Notes**
Hoisting Crane	Hoisting cranes are in poor condition – remove and replace as needed.	
Coatings	Clean and coat tanks if tanks are to be used for more than 10 years.	
Concrete	Repair spalling concrete and repair door thresholds.	If tanks are to be used for more than 10 years, it is recommended to completely rehab the concrete to ensure proper function of the tanks.
HVAC		Review HVAC for building code compliance

2. Gravity Belt Thickeners (GBT)

Sludge from the WAS tanks is fed to the gravity belt thickeners via the GBT feed pumps. Polymer is fed to the influent sludge to aid in the thickening process. The polymer system has been modified by the utility to allow it to function more efficiently. It is recommended to review new polymer systems that will provide additional operational flexibility for the GBT's, if the GBT's will be used long-term.

The liquid supernatant from the GBT's is sent to the head of the facility to be treated while the thickened sludge from the gravity belt thickeners is then sent to the thickened sludge holding tank. The thickened sludge tank sends sludge to the primary/anaerobic digesters via the thickened sludge pumps. The filtrate holding tank sends filtrate to the headworks of the plant via the filtrate pumps.

The building that houses the GBT's is in good condition and no major building improvements are needed. The GBT's have been very well maintained and are operating as intended to produce a solids concentration of about 5% -7%. Typical GBT operations produce solids ranging from 4% - 10%. The utility has done a good job of thickening the WAS prior to digestion.

A summary of various components in need of repair/replacement can be found in table 4.5 below.

Table 4.5 – Gravity Belt Thickeners Repairs & Replacements		
Item	**Replace/Repair**	**Other Notes**
MAUs	Inspect MAUs and determine if they need to be upsized.	
Electrical/Controls	Add separate space for electricals outside of odor control building.	

3. Anaerobic Digesters

The anaerobic digestion process consists of two primary digesters and two secondary digesters. Two of the digesters, one primary and one secondary, are from the original facility while the other two digesters were constructed in 2009. Overall, the digester structures are in fair condition. The secondary digesters are being used as an overflow of the primary digesters and they are not currently functioning as secondary digesters. The primary digesters have fixed covers, so the condition of the covers is not known. The secondary digester covers are floating metal covers but the condition of them is unknown. To inspect the covers, the digesters would need to be taken offline, cleaned, and air tested to ensure a safe environment for inspection. However, in order to take the digesters offline, the utility would need to find alternative biosolids treatment for the duration of the inspection. That could lead to problems with biosolids treatment and there is not enough liquid sludge storage volume to hold the volume of sludge needed.

Methane production occurs in the primary digesters. Boilers provide supplemental heat to the digesters to assist in the biological activity to break down the waste. Methane produced is used to fire the boilers (supplemented with natural gas) and also flared off with a waste burner outside the digester building.

After digestion, the sludge from the anaerobic digesters is sent to the sludge storage tanks by the sludge transfer/mixing pumps. The mixing pumps are also used to recirculate sludge within the anaerobic digesters. All the digested sludge from the WWTF is loaded into tankers and land applied as liquid biosolids. The utility has over 1,000 acres of land available to apply biosolids to which meet MPCA requirements.

Anaerobic digestion requires a significant investment in repair and maintenance over the life span of the digesters. Discussed in the next section are alternatives to anaerobic digestion with estimated capital costs for the improvements. Ultimately, the decision to make a biosolids processing change should be dependent on future nitrogen limits, Per and polyfluoroalkyl substances (PFAS) limits, land application availability, landfill availability, and utility preference. Rehabbing anaerobic digesters may not be the most feasible option in the future when looking at potential emerging contaminant limits. The MPCA has released the biosolids management plan for land application of biosolids. Utilities like Brainerd may be significantly impacted if land application is no longer allowed with future restrictions or land application sites are no longer available. Discussion on future impacts and possible capital improvements for new limits are discussed later in this report.

4. Sludge Storage Tanks and Loadout

Sludge from the anaerobic digesters is sent via the sludge transfer pumps to the sludge storage tanks. The facility does not have adequate sludge storage. Between 2014 and 2020, the utility did not have adequate storage for biosolids to meet the 180-day storage requirements. From 2020 to now the facility has hovered right around the 180-day requirements, leaving little room for error. This limits operational flexibility and requires operators to maintain consistent sludge production. The sludge storage capacity is shown in Figure 4.1.

When the facility was designed in 2009, the sludge storage tanks were sized using 10SS recommended minimum sludge production value per population equivalent (P.E.) of 0.12 lb/P.E./day. However, historical facility loadings have resulted in a sludge loading of 0.16-0.24 lb/P.E./day, with an average loading of 0.20 lb/P.E./day.

Using existing sludge flow data, and assuming a digester feed of 5% solids and sludge storage at 3% solids, an additional 1.41-2.47 MG of sludge storage is required to meet the 180-day minimum requirement. The required volume of additional sludge storage depends on digester efficiency and other facility operational efficiencies. However, with future limits and emerging contaminants in mind, it is recommended to evaluate several biosolids treatment options to reduce the volume of biosolids and allow flexibility for biosolids disposal for both landfill and land applications. The biosolids and sludge storage options will be further discussed in the next section.

Supernatant from the sludge storage tanks is sent via the supernatant pumps to the filtrate holding tank. Sludge mixing pumps allow the sludge storage tanks to mix or send sludge to the sludge loadout area. It is recommended to consider adding dedicated mixing pumps to allow for mixing during loadout.

The sludge loadout area contains an overhead fill station to fill tankers when the utility hauls biosolids. The loadout station is in good condition and no improvements are needed at this time. If a new biosolids treatment system is installed, it is recommended to keep the existing sludge loadout system as a back-up system, so the utility has a way to remove liquid solids if the main processes are not operational. The utility is currently land applying biosolids as a Class B product. Anaerobic digesters achieve volatile solids reduction and therefore are able to meet requirements for land application.

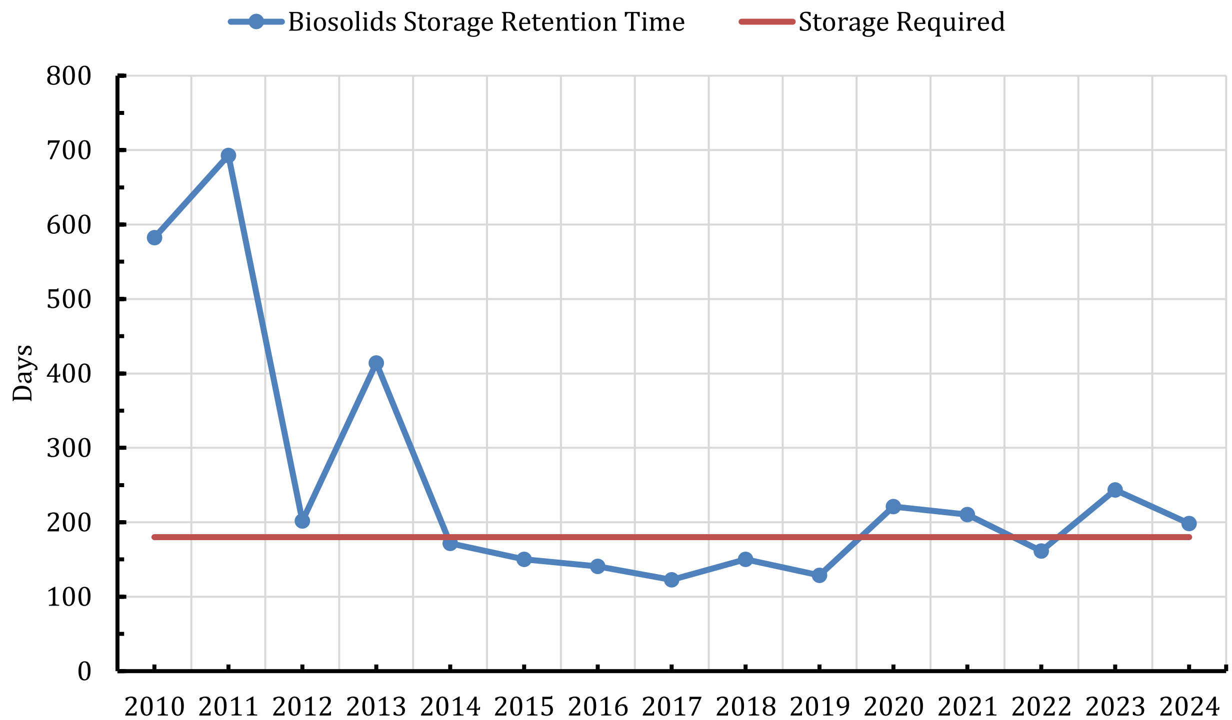
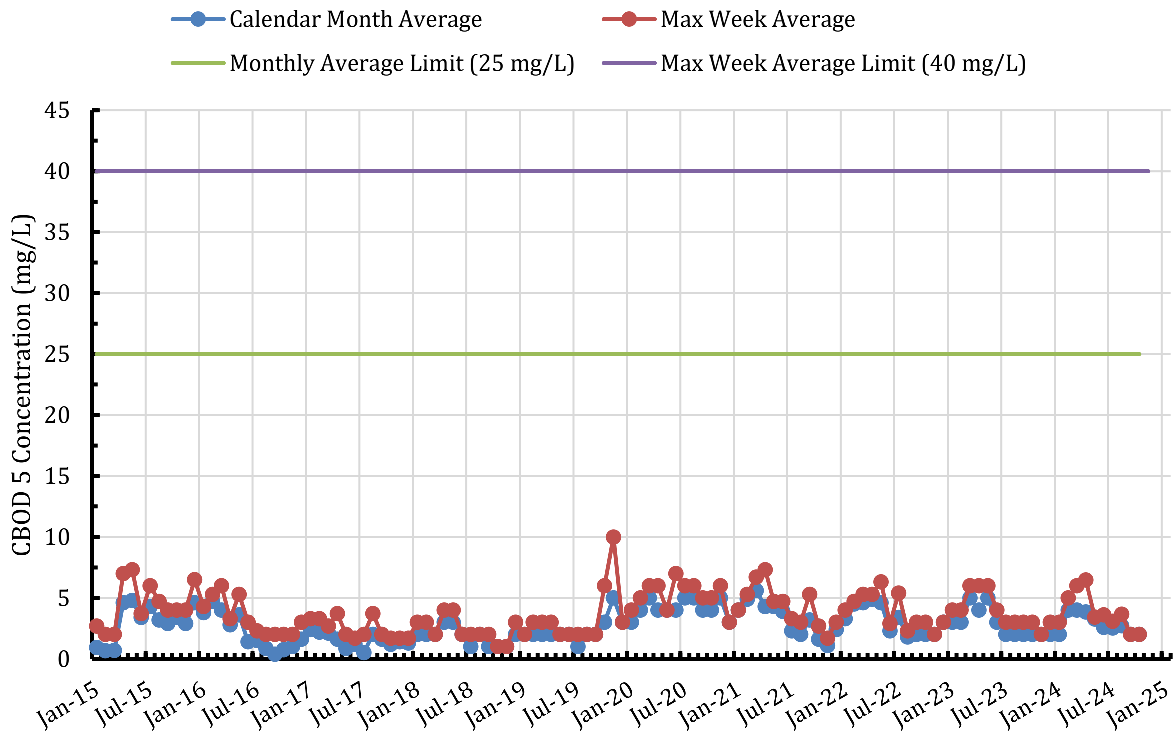


Figure 4.1: Biosolids Storage Retention Time

H. Treatment Performance

The reported effluent discharge values since 2019 for CBOD5, TSS, total phosphorus, and ammonia are shown in the figures below. During this period, the city did not have any discharge violations for these parameters.

Table 4.6 – Brainerd Public Utilities WWTF Historical Effluent Loads								
Parameter	**Unit**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Average**
CBOD5	mg/L	2.3	4.2	3.3	3.2	2.9	2.9	3.1
	lb/d	42	68	50	53	47	49	51
TSS	mg/L	3.8	4.8	4.9	5.0	5.7	5.9	5.0
	lb/d	67	77	73	83	92	99	82
TKN	mg/L	7.1	4.7	9.1	5.7	8.1	5.8	6.8
	lb/d	127	77	136	93	129	99	110
Total Nitrogen	mg/L				6	12	11	9.5
	lb/d				88	194	180	154
NH_3-N	mg/L	3.7	2.6	3.4	6.3	7.0	3.5	4.4
	lb/d	67	42	52	103	111	59	72
TP	mg/L	0.35	0.48	0.24	0.45	0.56	0.81	0.5
	lb/d	6.2	7.8	3.6	7.3	8.8	13.8	7.9
(1) Total Nitrogen (TN) was not monitored until 2022								



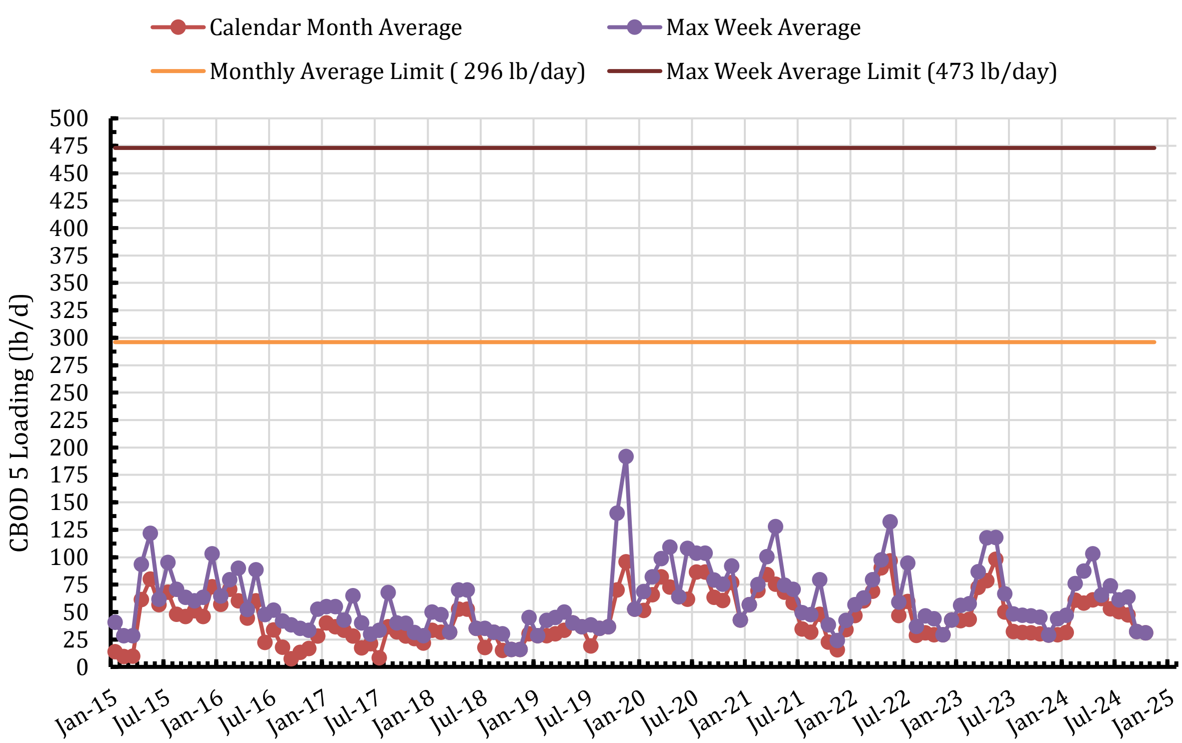
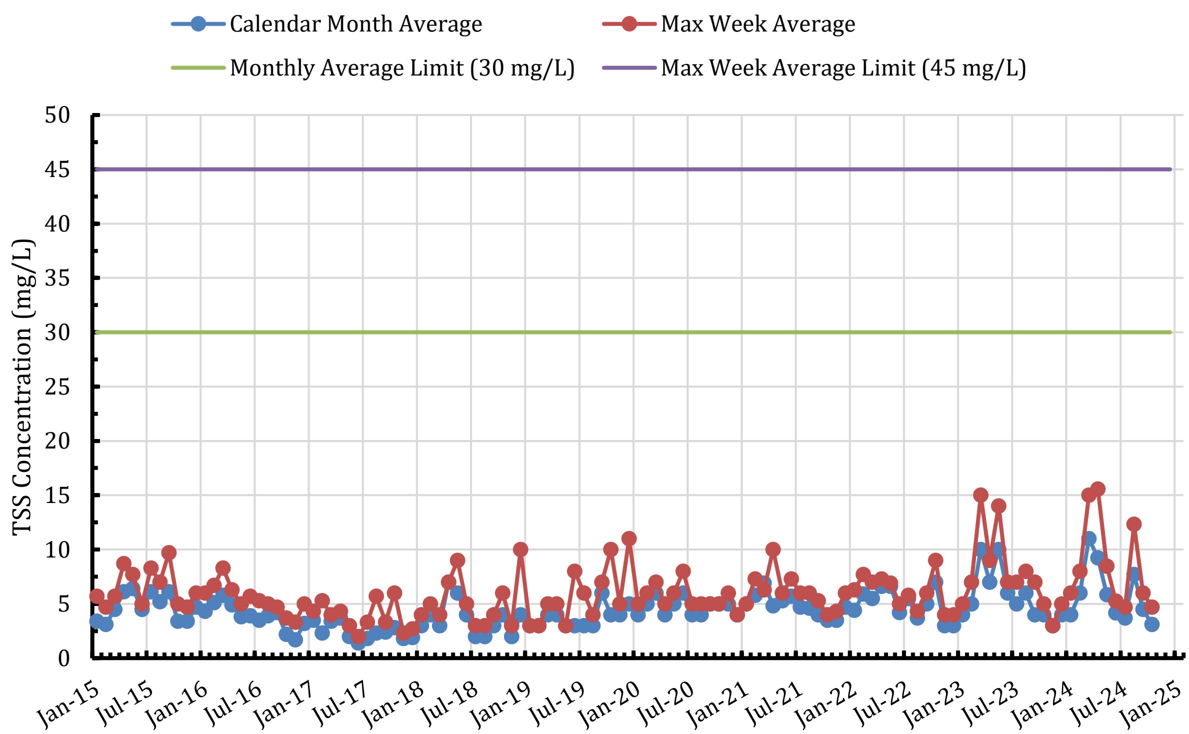


Figure 4.2: Historical Effluent CBOD Concentrations (Top) and Mass Loadings (Bottom)



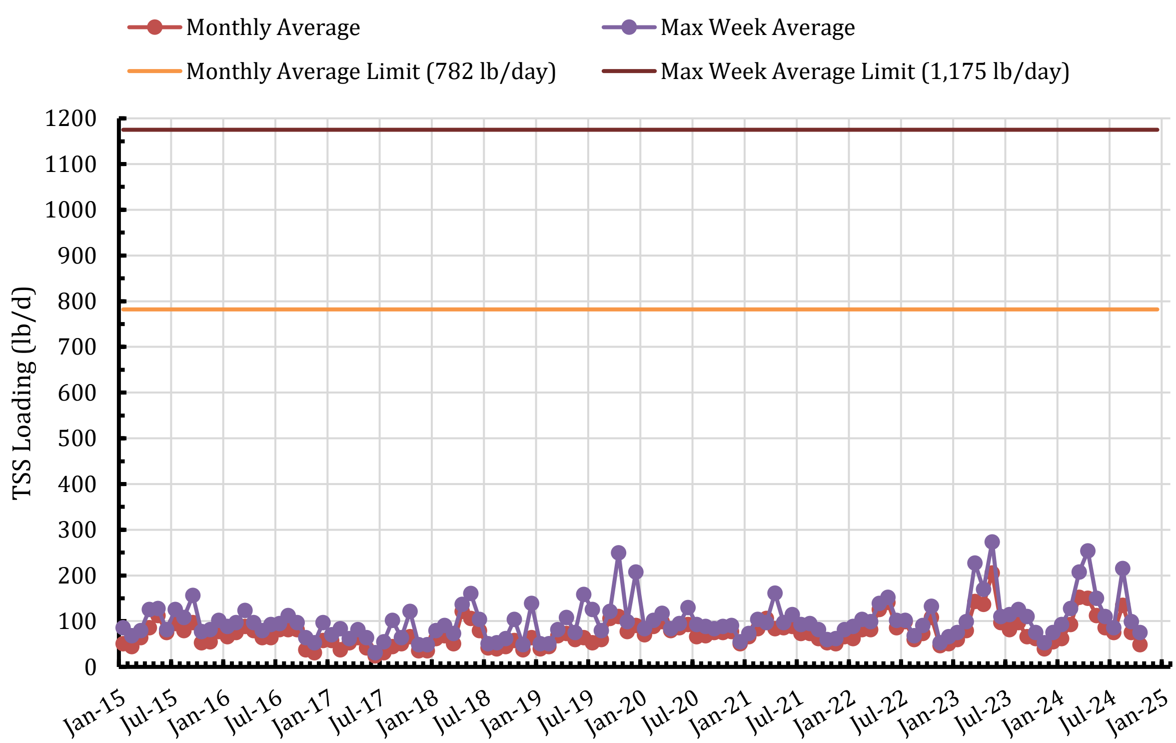
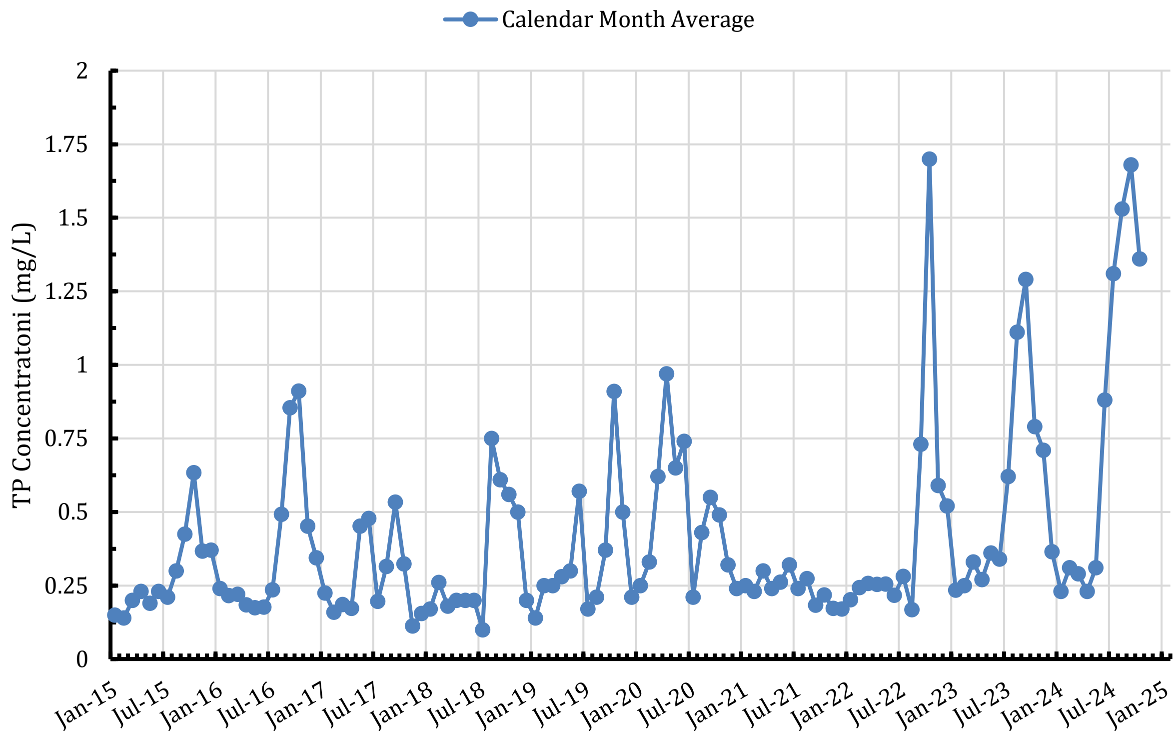


Figure 4.3: Historical Effluent TSS Concentrations (Top) and Mass Loadings (Bottom)



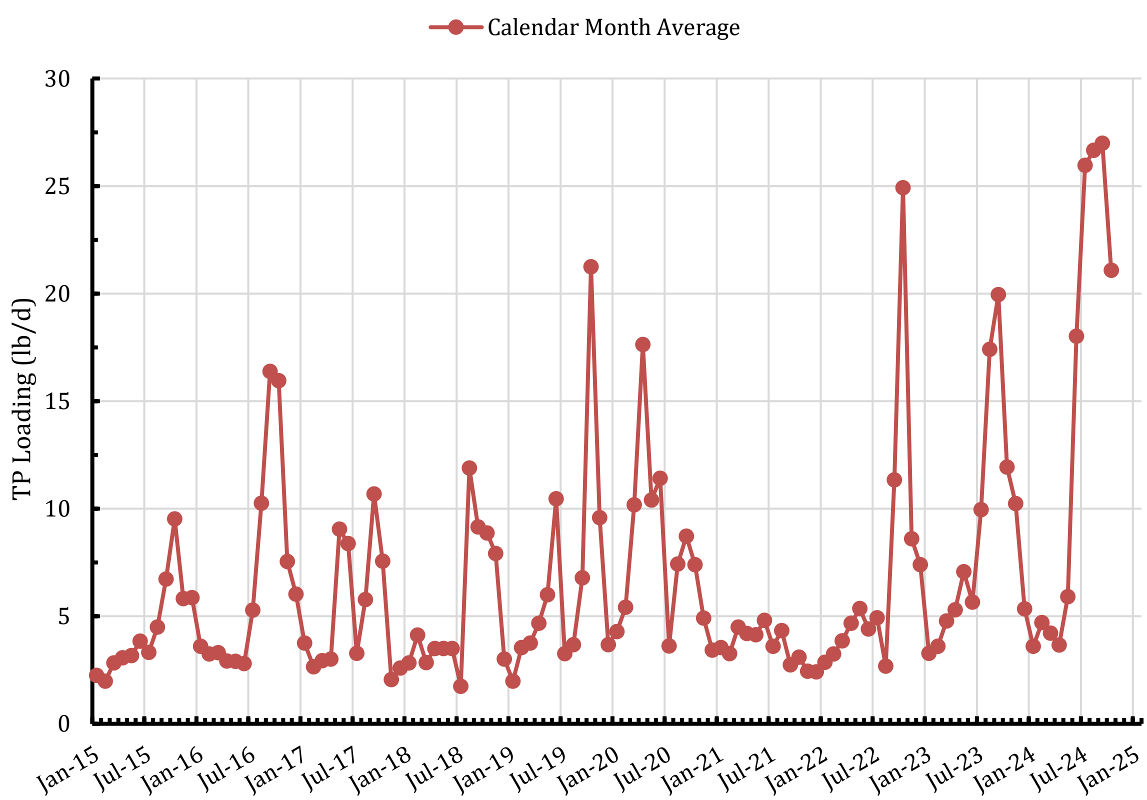
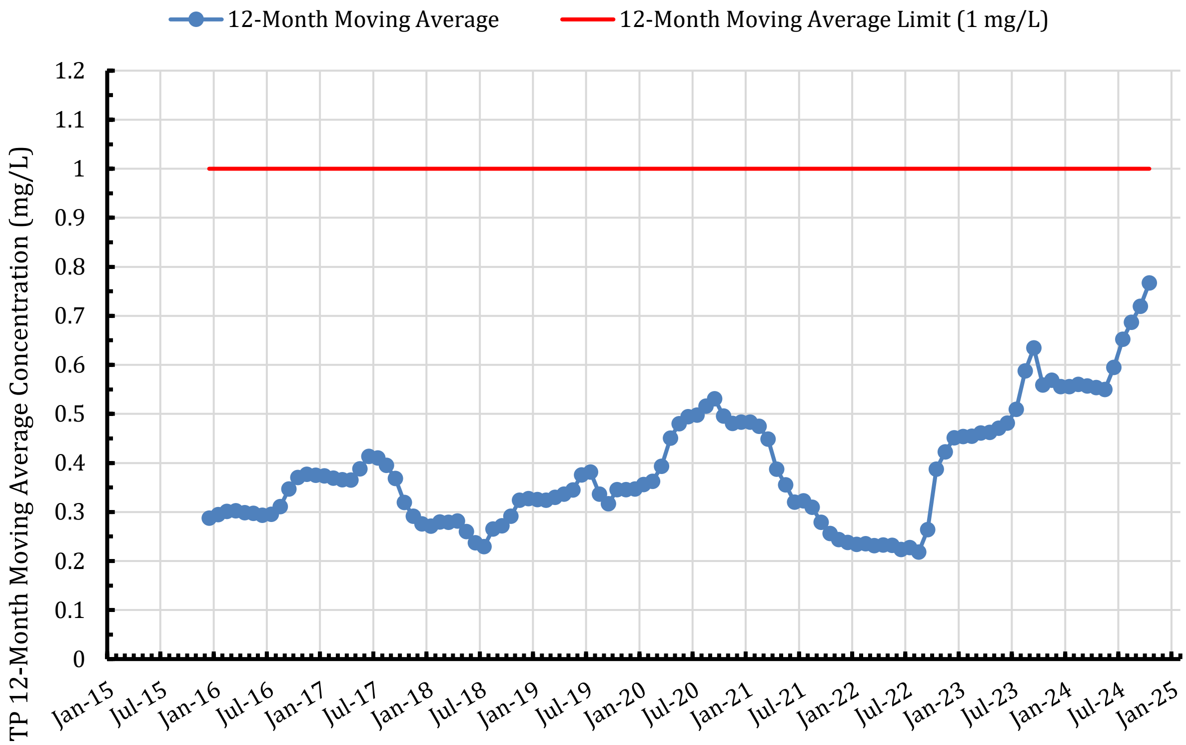


Figure 4.4: Historical Effluent Total Phosphorus Concentrations (Top) and Mass Loadings (Bottom)



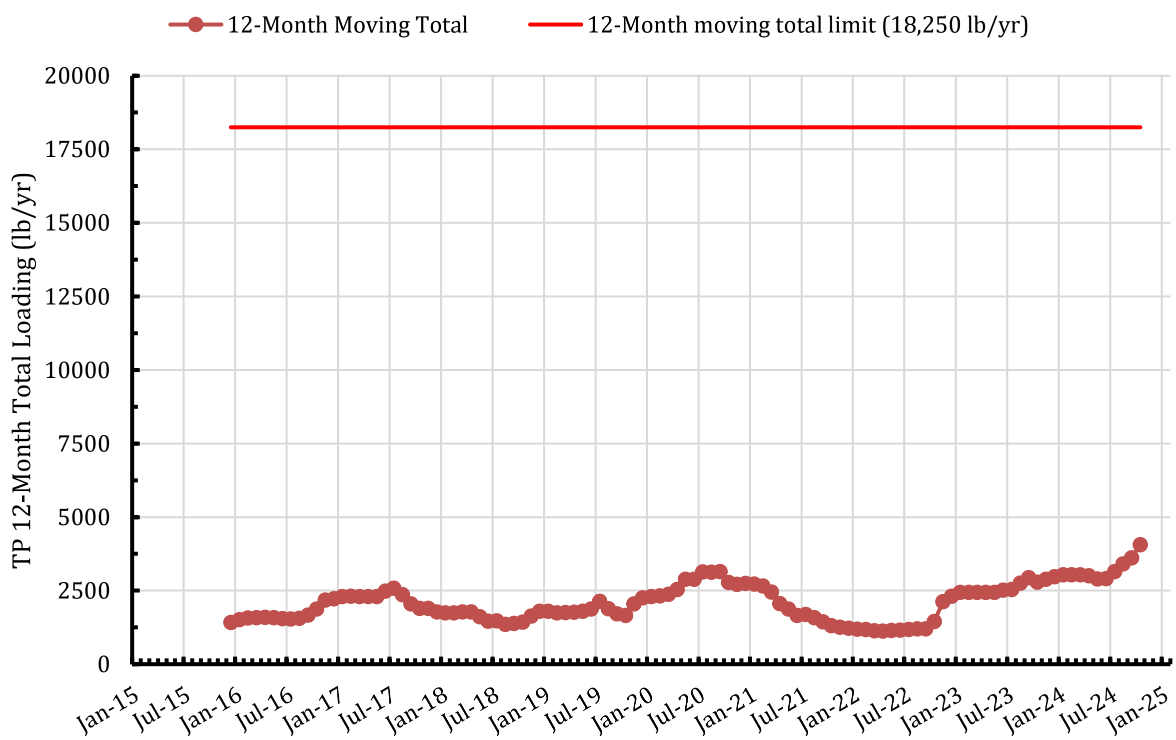
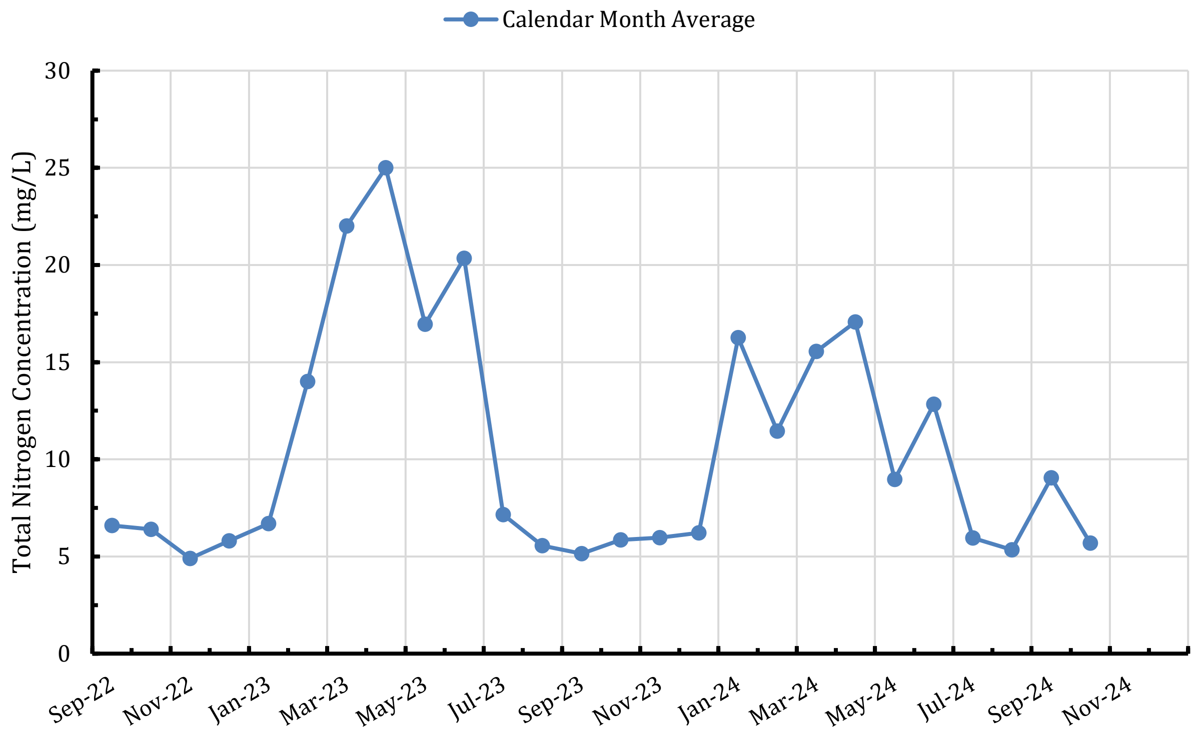


Figure 4.5: Historical Effluent Total Phosphorus Concentrations (Top) and Mass Loadings (Bottom)



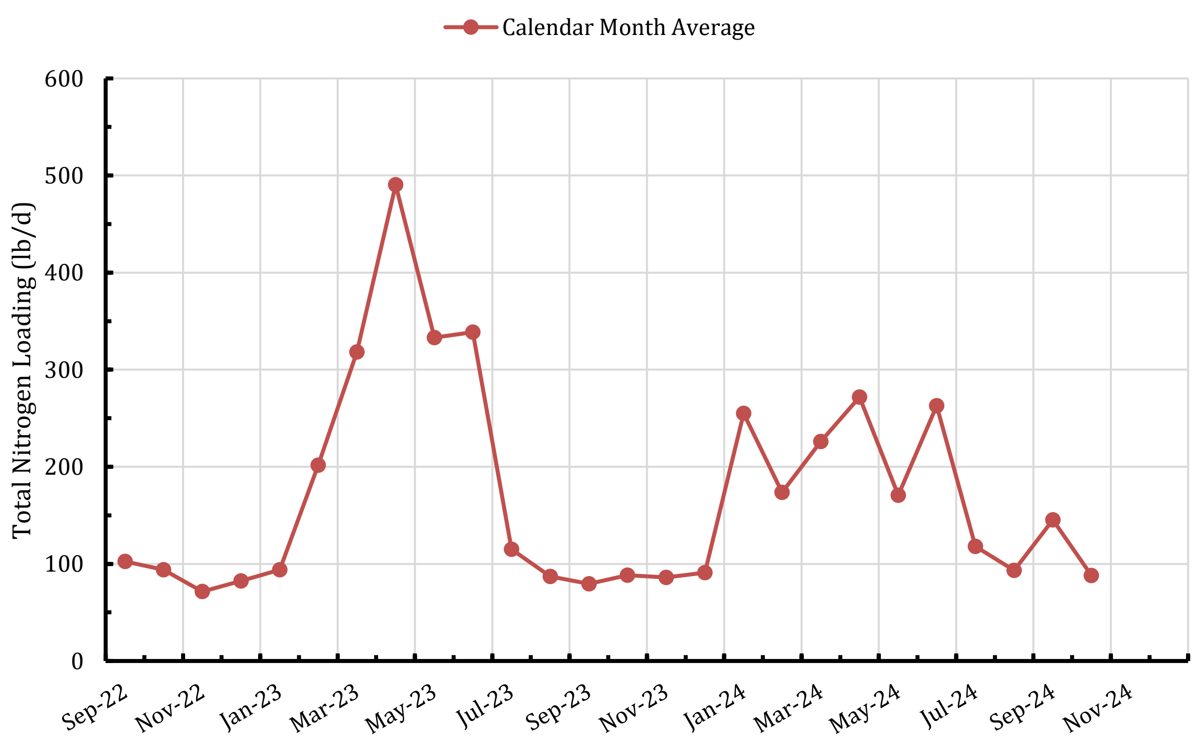


Figure 4.6: Historical Effluent Total Nitrogen Concentrations (Top) and Mass Loadings (Bottom)

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V. FUTURE LIMITS AND REGULATIONS

A. Nitrogen

Minnesota Pollution Control Agency (MPCA) has a 20% nitrate load reduction goal by 2025. This reduction is intended to aid not just Minnesota's rivers, lakes, and groundwater, but also downstream waterways such as the Gulf of Mexico. Phase 1 of the nitrogen reduction and implementation strategy went into effect in April 2024. As facilities are built or upgraded, they will need to keep these new limits in mind. Minnesota's Nutrient Reduction Strategy also plans to have 50% reduction by 2040. By phase 3, facilities that successfully optimized operations during phase 1 will have a limit of 10 mg/L TN SDR. If Brainerd WWTF is upgraded, MPCA will conduct preliminary effluent limit reviews at the beginning of the planning process. If MPCA identifies any Nitrogen concerns, they will develop a nitrogen limit for the NPDES permit.

It is likely that a nitrogen limit will come with a compliance schedule to allow the utility time to plan and construct new infrastructure to meet the nitrogen limit. At this time, it is difficult to predict what a compliance schedule would look like but limits for nitrogen are quickly moving into effect. The impact of nitrogen can have a serious negative effect on water quality and combined with phosphorus, there is a risk of impairing waters downstream of a treatment facility.

The existing SBR treatment system has done a good job at removing phosphorus to meet permit limits. However, due to the nature of biological activity and SBR sequencing there can be a slight inverse relationship between phosphorus and nitrogen removal. In a conventional activated sludge system, biological material is oxidized, and the organic material is converted into food for microorganisms and CO_2 gas is released. For nitrogen, the influent form is typically an ammonia species. Ammonia can be extremely toxic to aquatic animals and other species. Through biological processes and treatment, the ammonia nitrogen in the wastewater is nitrified by nitrifying bacteria to create nitrate-nitrogen (NO_3-N). Nitrate-nitrogen is less toxic to aquatic organisms but can have an adverse effect on human health in high concentrations.

The MPCA has set goals described above to reduce nitrogen and has identified a future limit of 10 mg/L for total nitrogen. Total nitrogen is the sum of all species of nitrogen (ammonia, nitrite, nitrate, and other forms of nitrogen). Conventional WWTF's convert the ammonia to nitrate-nitrogen which is discharged to the receiving stream. In order to denitrify, or convert the nitrate-nitrogen to nitrogen gas, additional processes at the Brainerd WWTF are required.

It is unlikely that the SBR's will be able to accomplish total nitrogen reduction along with total phosphorus reduction without significant capital improvements. The figure below shows the relationship between effluent total nitrogen and effluent total phosphorus. This trend indicates the wastewater is likely CBOD5 limited since the phosphorus decreases when nitrogen increases. Additionally, the influent ratio of BOD to Nitrogen to Total Phosphorus for the Brainerd WWTF is 100 : 21 : 3. The recommended BOD : N : P ratio for activated sludge is between 100 : 10 : 1 – 100: 5 : 1. The Brainerd WWTF needs to more than double the BOD loading, or reduce influent nitrogen and phosphorus, to achieve the recommended limits, all of which require large capital expenditures.

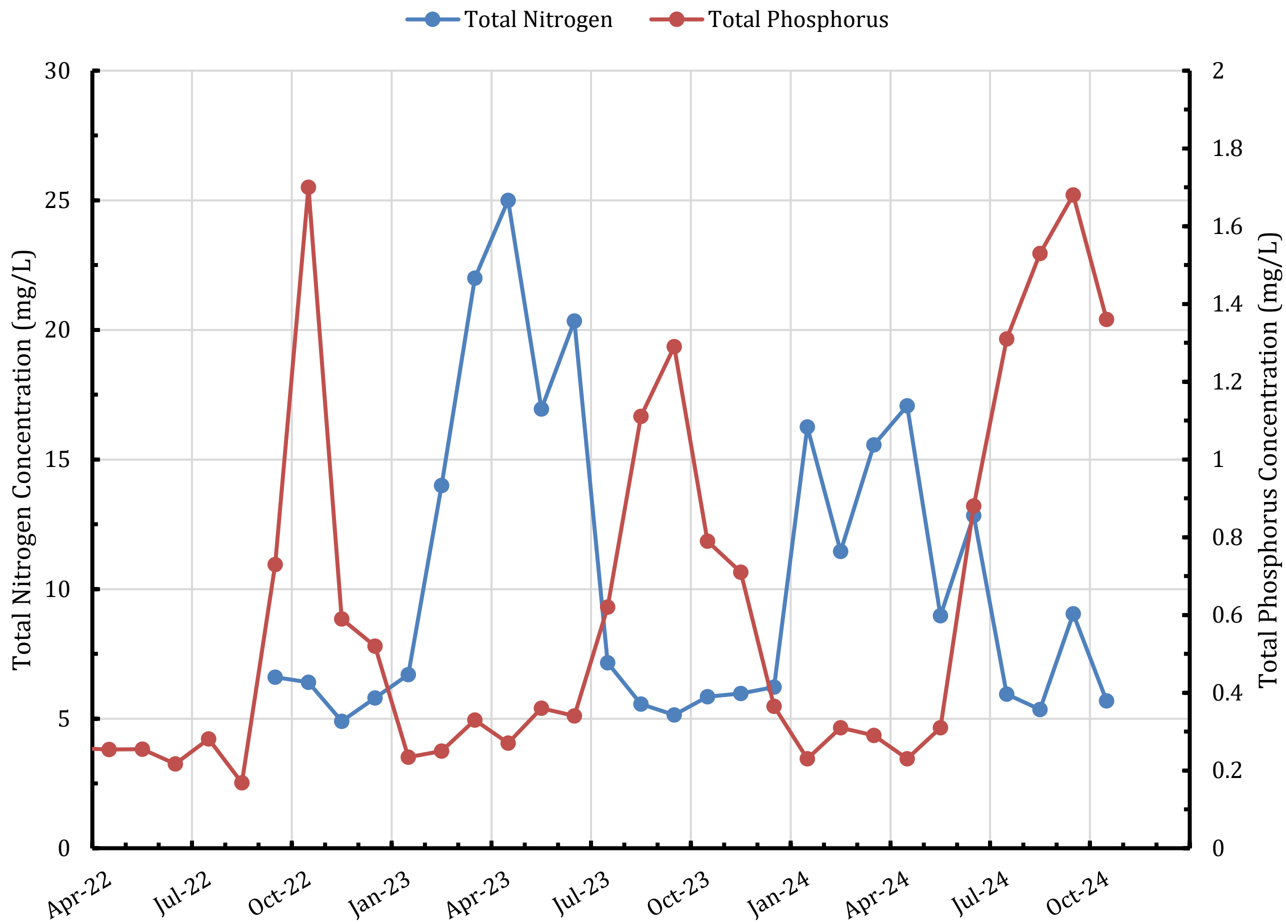

Figure 5.1: Historical Effluent TN and TP relationship

Nitrogen limits will also affect the biosolids processes implemented at the treatment facility. Depending on the biosolids treatment selected, side stream treatment may be necessary to reduce nitrogen loading for the liquid treatment processes. Supernatant from dewatering or digestion can be highly concentrated with nitrogen which can impact treatment and potentially lead to high effluent nitrogen concentrations, above potential limits which can lead to violations and fines.

In order to meet future nitrogen limits, it is recommended to evaluate the following options for capital improvements and the utility plan accordingly for these improvements:

- Aeration Basin improvements including the addition of anoxic, anaerobic, aeration basin additions. The SBR tanks would be repurposed to specific tanks depending on the volume requirements needed to meet treatment and design goals.
- Secondary clarifier addition for chemical phosphorus removal.
- Chemical feed system for phosphorus removal.
- Chemical feed system for carbon addition to supplement denitrification processes (recommended even if there is sufficient influent BOD).
- Additional piping and pumping for recycle and wasting.
- New lift station for effluent pumping.

- Side stream treatment for nitrogen and phosphorus of the supernatant from the biosolids dewatering.

Below is a cost estimate for the capital improvements the facility could expect when a total nitrogen limit needs to be met:

Table 5.1 – Potential Nitrogen Limit Improvements (2025 dollars)		
Item	Preliminary Budget Range	
SBR tank modifications and aeration basins	$5,000,000	$8,000,000
EQ tank modifications	$1,500,000	$3,000,000
RAS and WAS Pumps and building	$1,995,000	$2,750,000
Process piping modifications	$1,000,000	$2,000,000
New secondary clarifiers and splitter structure	$10,000,000	$15,000,000
Chemical Feed	$250,000	$500,000
New effluent lift station	$1,500,000	$3,000,000
Site work and yard utility piping	$2,100,000	$3,400,000
Site process piping and valves	$1,490,000	$2,400,000
Plumbing/HVAC	$1,100,000	$1,700,000
Electrical, Instrumentation, and Control	$5,300,000	$8,600,000
Subtotal	**$31,200,000**	**$50,400,000**
Engineering, Legal, Contingencies	$9,400,000	$15,100,000
Total Cost	**$40,600,000**	**$65,500,000**

B. Polyfluoroalkyl and Perfluoroalkyl Substances (PFAS)

1. Liquid PFAS Treatment

By 2026 PFAS water quality standards will be regulated for Class 1 waters. Thus, NPDES permits that discharge to Class 1 waters will have more strict PFAS effluent limits. In addition, MPCA will broaden PFAS regulations on NPDES permits in the future. The MPCA expects NPDES permitting to be implemented in 2025 or later. There are multiple treatment methods that could be used for liquid stream PFAS removal including Granular Activated Carbon (GAC), Ion Exchange (IX), supercritical water oxidation (no full scale facilities exist at this time for this technology), and Reverse Osmosis (RO) membrane filtration. RO is effective against many different PFAS compounds and can also remove other contaminants such as chlorides or hardness. However, RO can be costly and cannot be tailored to only remove PFAS. With RO treatment, utilities are also left with the question of what to do with a concentrated stream of PFAS in the RO reject stream. This can have unintended consequences for side stream treatment and will likely require advanced treatment of the liquid waste stream to remove or destroy PFAS compounds.

Brainerd currently has a PFAS limit for Perfluorooctane Sulfate in the NPDES permit for the liquid discharge and has so since the early 2000's. It is recommended that Brainerd and Baxter continue monitoring the influent and effluent for PFAS and continue to follow the PFAS management plan approved by the utility. Eliminating PFAS at the source (in the distribution system) can be highly effective and more cost efficient than building new treatment technologies. If high concentrations are found in the influent, the city should follow the steps in the PFAS management plant to identify the source and evaluate solutions to reduce or eliminate the source of PFAS into the system. If additional liquid stream PFA limits are imposed, additional treatment technologies would likely be required to meet the discharge limits. It is difficult to predict the exact treatment needed or the cost because it is highly variable depending on the constituent of concern or the PFAS chain needing to be removed.

2. Biosolids PFAS Treatment

For biosolids, PFAS limits and regulations are highly anticipated. The MPCA has officially released the biosolids management strategy that has a tiered system for biosolids land application for utilities and cities. The purpose of this section is to discuss options for biosolids treatment systems where PFAS destruction technologies can be phased into the process train for future PFAS destruction or reduction.

Brainerd currently has biosolids that meet the MPCA Tier 2 criteria which still allows for land application, but at any time landowners can reject accepting solids which can have a significant impact on the amount of land available for biosolids disposal. More recently, the EPA released guidance for land application of biosolids related to PFAS which could have the potential to limit more land availability.

To date, there are limited full-scale treatment technologies available for PFAS destruction or reduction for biosolids produced at wastewater treatment facilities. High temperature thermal oxidation shows promising potential for biosolids PFAS destruction but there are very limited installations in the US. Pyrolysis, or high temp burning without oxygen, is the most promising treatment technique and has been tested with large scale pilots. Pyrolysis pilots have also been testing PFAs in the smokestack exhaust to verify complete destruction of the PFAs in all process streams, since PFAs have been found in the smokestack exhaust for high temp thermal oxidation and other potential treatment techniques. A treatment technique that completely destroys PFAs in all process streams will likely be required when limits are imposed.

The cost tables below are intended to be used for planning purposes to evaluate biosolids dewatering, drying, and also PFAS destruction. Table 5.2 shows biosolids improvement options to meet facility needs and does not include costs for treatment of PFAS. These costs are estimates for rehab and treatment improvements to meet current biosolids needs at the facility.

- Option one (1) consists of rehabilitating the current processes and adding the required additional sludge storage.
- Option two (2) consists of rehabilitating the existing processes and adding dewatering and drying.
- Option three (3) consists of converting the existing anaerobic digesters to additional sludge storge, removing the gravity belt thickeners (GBTs) and replacing the GBTs with dewatering and drying. Dewatering and drying the biosolids greatly reduces the volume of biosolids and allows for operational flexibility for biosolids disposal.

Table 5.3 shows the capital cost required, in addition to the cost from option 2 or 3 in Table 5.2, for PFAs treatment and destruction in biosolids.

Table 5.4 shows additional O&M costs for landfilling biosolids.

Table 5.2 – Biosolids Improvements Capital Budgets					
Option 1 - Rehabilitate Existing Facilities		**Option 2 - Rehabilitate Existing Facilities + Dewatering and Drying**		**Option 3 - Convert Existing Facilities + Dewatering and Drying**	
Item	**Budget**	**Item**	**Budget**	**Item**	**Budget**
Rehabilitate Digesters	$27,000,000	Rehabilitate Digesters	$27,000,000	Convert Digesters to Storage	$10,000,000
Rehabilitate GBT System	$3,900,000	Rehabilitate GBT System	$3,900,000	Remove GBT System	$1,000,000
Rehabilitate Existing Sludge Storage	$21,400,000	Rehabilitate Existing Sludge Storage	$21,440,000	Rehabilitate Existing Sludge Storage	$21,400,000
Rehabilitate WAS System	$750,000	Rehabilitate WAS System	$750,000	Rehabilitate WAS System	$750,000
Additional Sludge Storage	$10,000,000	Dewatering Equipment	$2,500,000	Dewatering Equipment	$2,500,000
Subtotal	$63,050,000	Drying Equipment	$4,500,000	Drying Equipment	$4,500,000
Engineering, Legal, Contingencies (30%)	$18,900,000	Building	$3,000,000	Building	$3,000,000
Total Cost	$81,950,000	Chemical Feed	$150,000	Chemical Feed	$150,000
Cost Range (+/- 15%)	**$70M - $94M**	Piping and Valves	$1,000,000	Piping and Valves	$2,000,000
		Electrical, Instrumentation, and Control	$9,630,000.00	Electrical, Instrumentation, and Control	$6,795,000.00
		Subtotal	$73,800,000	**Subtotal**	$52,100,000
		Engineering, Legal, Contingencies (30%)	$22,100,000	Engineering, Legal, Contingencies (30%)	$15,600,000
		Total Cost	$95,900,000	**Total Cost**	$67,700,000
		Cost Range (+/- 15%)	**$82M - $110M**	**Cost Range (+/- 15%)**	**$57M - $78M**

Table 5.3 – Additional Biosolids Treatment for PFAS Capital Cost	
Item	**Budget**
Pyrolysis unit	$5,000,000
Additional Building Space	$1,000,000
Pumps, piping, valves, chemical feed	$1,500,000
Electrical, Instrumentation, and Controls	$2,250,000
Subtotal	$9,750,000
Engineering, Legal, Contingencies (30%)	$2,900,000
Total Cost	$12,650,000
Cost Range (+/- 15%)	$12M - $19M

Table 5.4 – Additional Biosolids Landfilling O&M Annual Costs	
Item	**Budget**
Landfill Tipping Fees	$200,000
Fuel, Equipment, and Staff	$5,000
Total Annual Additional Cost	$205,000
Cost Range (estimated)	$200,000-$400,000

The costs in Table 5.4 are additive to what the utility spends now on O&M costs for biosolids disposal. The above costs assume tipping fees based on 2025 dollars and does not factor inflation into the costs or new fees from landfills. This also assumes the utility will be less than a 60 minute drive, one-way, to a landfill who will accept the biosolids. This also assumes that the utility will haul solids out twice a year as they do now.

VI. WASTEWATER TREATMENT FACILITY IMPROVEMENT NEEDS

The wastewater treatment facility is in good condition overall. General maintenance, equipment replacement, and rehabilitation are required to keep the facility in good condition. The liquid treatment processes have adequate capacity for current flows and loadings. If limits change, as discussed above, the liquid treatment processes should be re-evaluated and capital improvements made to meet new limits.

The biosolids processes are able to thicken biosolids produced at the treatment facility but the system has inadequate sludge storage capacity and processing capabilities. Since 2020, the utility has been making adjustments to maintain the minimum storage of biosolids at 180 days which has impacted operations and does not allow operational flexibility if there is a change in the treatment process or upset that requires more storage or biosolids processing. If there is a change or upset, the utility would be left with renting equipment or disposing of biosolids at a different treatment facility that can handle the additional solids. This would require agreements and add cost to the operations budget as the solids would need to be trucked long distances for disposal. There is also no guarantee that a different facility would take the solids which could leave the utility in a difficult position of how to dispose of the solids generated.

To make sure the utility is prepared for the future and has a proper plan in place to handle biosolids, the utility should consider review and design new biosolids processing system for cake production (up to 15% or more) and drying of the cake to reduce volume and achieve a class B or Class A solid for land application. This would allow the utility to phase in PFAS treatment if and when PFAS limits are imposed on biosolids or the utility cannot land apply biosolids due to PFAS concentrations. PFAS limits are not currently imposed, but if imposed would drastically alter the required biosolids treatment as discussed above.

The following table are capital expenditure improvements to maintain the facility assuming no new limits are imposed. If limits are imposed, reference the tables in Section 5.

Table 6.1 – 2025-2030 Capital Improvements		
Item	**Preliminary Budget Range**	
Headworks		
Replace seals, brushes, and ancillary components on the two fine screens	$60,000	$120,000
Replace Screenings Compacter	$100,000	$200,000
Replace Grit Pump	$35,000	$60,000
Replace Grit Classifier	$150,000	$300,000
Replace Sump Pumps and Piping	$30,000	$50,000
SBR Building		
Replace existing control panels and add SBR data to SCADA	$50,000	$85,000
Replace Safety Netting on all 3 hatches on all 4 tanks (12 total)	$7,200	$9,600
Caulk building and tank corners and edges	$10,000	$20,000
Replace Exhaust Fans	$45,000	$65,000
Replace Air Conditioning Units in electrical room	$10,000	$30,000
WAS*		
Replace Hoisting Crane in each tank	$50,000	$75,000

Table 6.1 Continued - 2025-2030 Capital Improvements		
Repair concrete spalling	$20,000	$50,000
Replace Middle (third) GBT feed pump with Borger rotary lobe	$25,000	$50,000
Sludge Thickening*		
Replace Chemical Feed Systems for GBT	$50,000	$100,000
Replace Makeup Air Unit 3 and 4	$250,000	$500,000
Anaerobic Digesters*		
Replace Sludge Mixing Pumps 1-4	$200,000	$340,000
Replace air handling unit	$50,000	$100,000
Replace sump pumps 1-4	$30,000	$50,000
Replace waste gas burner	$20,000	$30,000
Sludge Storage*		
Add mixing pumps to allow mixing during loadout	$230,000	$370,000
Replace Sump Pumps	$30,000	$50,000
UV Disinfection		
Replace lights with LED lighting	$25,000	$50,000
Chemical Feed		
Replace roofing	$35,000	$85,000
Controls/Office Building		
Replace roofing	$600,000	$800,000
Replace generator	$300,000	$600,000
Electrical Systems Improvements	$4,000,000	$8,000,000
Subtotal	**$6,700,000**	**$12,600,000**
Engineering, Legal, Contingencies (30%)	$2,000,000	$3,800,000
Total Budget for 2025-2030	**$8,700,000**	**$16,400,000**
* Note: recommended capital improvements for biosolids are greatly dependent on potential PFAS limits.		

Table 6.2 – 2030-2035 Capital Improvements		
Item	**Preliminary Budget Range**	
Headworks		
Replace Pista-Grit	$150,000	$300,000
Repaint Process Piping and Interior	$250,000	$400,000
Add a Parshall Flume for Brainerd flow or Flow meter at main lift	$60,000	$150,000
Replace Make-Up air units	$75,000	$150,000
Replace piping and water recirculation pump for odor control unit	$35,000	$65,000
Replace Roofing	$215,000	$350,000
Replace Control Panels	$25,000	$50,000
Improve Receiving Station	$100,000	$200,000
Replace heaters	$35,000	$65,000
SBR Building		
Replace 4 sump pumps	$40,000	$100,000
Replace all 4 WAS pumps	$180,000	$280,000
Replace lighting with LED	$65,000	$125,000
Repaint Process Piping	$125,000	$300,000
Add Storm Catch Basin on West side of SBR	$750,000	$1,250,000
Replace roofing	$500,000	$750,000
WAS*		
Replace air diffusers	$50,000	$75,000
Sludge Thickening*		
Replace filtrate pump 1 and 2	$45,000	$70,000
Relocate electrical and controls to new separate building	$1,000,000	$2,000,000
Replace roofing	$180,000	$300,000
Anaerobic Digesters*		
Replace Heat Exchanger 1 and 2	$250,000	$350,000
Replace Backup electric boiler	$80,000	$120,000
Replace roofing	$300,000	$500,000
Sludge Storage*		
Replace mixing diffuser nozzle system	$300,000	$500,000
Replace sludge loadout/mixing pumps 1 and 2	$140,000	$220,000
Replace supernatant pumps 1 and 2	$70,000	$100,000
Replace roofing	$100,000	$200,000

Table 6.2 Continued - 2030-2035 Capital Improvements		
UV Disinfection		
Replace effluent sampler	$10,000	$20,000
Replace roofing	$100,000	$200,000
Chemical Feed		
Replace Chemical feed systems	$80,000	$150,000
Controls/Office Building		
Lab rehabilitation and improvement	$500,000	$1,000,000
Subtotal	**$5,800,000**	**$10,300,000**
Engineering, Legal, Contingencies (30%)	$1,700,000	$3,100,000
Total Budget for 2030-2035	**$7,500,000**	**$13,400,000**

* Note: recommended capital improvements for biosolids are greatly dependent on potential PFAS limits.

Table 6.3 – 2035-2045 Capital Improvements		
Item	**Preliminary Budget Range**	
Headworks		
Replace Odor Control Unit	$250,000	$500,000
Replace Lighting with LED	$50,000	$100,000
SBR Building		
Replace WAS Blower 1 & 2	$360,000	$400,000
Replace Effluent Pumps 1, 2, & 3	$195,000	$270,000
Replace Second Air Compressor	$20,000	$40,000
Replace Heat Recover Pump 1 and 2	$100,000	$150,000
Replace Heat Recovery Pump 3 and 4	$70,000	$120,000
Replace 5 SBR Blowers	$900,000	$1,000,000
Replace 4 Jet Motive Pumps	$300,000	$600,000
Replace SBR Diffusers	$75,000	$125,000
Replace Engine Generator by SBR/EQ tanks	$300,000	$500,000
WAS*		
Replace and update electrical and controls	$300,000	$500,000
Sludge Thickening*		
Replace GBT 1 and 2	$350,000	$600,000
Replace Thickened Sludge Pump 1 and 2	$65,000	$120,000
Replace GBT Belt Wash Pump 1 and 2	$65,000	$120,000
Replace Filtrate and Thickened sludge mixers	$50,000	$100,000
Anaerobic Digesters*		
Digester cover repair and structure rehabilitation	$15,000,000	$25,000,000
Replace all 4 sludge recirculation pumps	$240,000	$340,000
Replace Sludge Transfer Pumps 1 and 2	$120,000	$170,000
Sludge Storage*		
Rehabilitate Sludge Storage Tanks	$10,000,000	$20,000,000
UV Disinfection		
Replace electrical and controls	$250,000	$500,000

Table 6.3 Continued- 2035-2045 Capital Improvements		
Chemical Feed		
Replace electrical and mechanical systems	$400,000	$750,000
Controls/Office Building		
Replace electrical systems	$3,000,000	$6,000,000
Subtotal	**$32,500,000**	**$58,000,000**
Engineering, Legal, Contingencies (30%)	$9,800,000	$17,400,000
Total Budget for 2035-2045	**$42,300,000**	**$75,400,000**
* Note: recommended capital improvements for biosolids are greatly dependent on potential PFAS limits.		

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VII. PROJECT FUNDING

There are several alternatives that the City can consider for project funding when moving forward with facility improvements. The funding sources are described below.

The first step for public funding sources is to write and submit a Facility Plan for approval. A facility plan details alternatives for improvements and lays out the selected project and is required to be eligible for funding. Additionally, many of the grant sources also require a new NPDES limit to be accepted to be eligible for the grant. It is recommended to write and submit a facility plan by March of 2026 or March 2027 to get placed on eligible funding lists.

A. Bonding

The cities could sell general obligation, local improvement, or revenue bonds in order to raise the capital costs to improve the treatment facility. The proceeds of the bonds would need to be repaid, either through property taxes, assessments, or user charges to the system.

B. Assessment

A portion of the capital costs of the project can be assessed to local property owners under Minnesota Statute 429. Using this method, a one-time assessment could be levied and repaid over a period of 10 to 20 years. This cost could help offset some monthly increases in user fees and permit use of general obligation bonding.

C. State Revolving Fund Loan (through the PFA)

The loan program was created under the State Revolving Fund (SRF) provisions in the Federal Clean Water Act to provide financial assistance for water pollution control projects. Minnesota's revolving loan program provides loans to municipalities for planning, design and construction of wastewater treatment projects. The loans are typically for a 20-year period at an interest rate of two to four percent. The loan monies are administered through the Public Facilities Authority. To be eligible for PFA funding, the City must submit a Facilities Plan for review and approval by the Minnesota Pollution Control Agency. Revenue for loan repayment is typically generated by user rates, availability charges or assessment.

D. Wastewater Infrastructure Funding Program

Supplemental assistance to municipalities is currently available through the wastewater infrastructure (WIF) program. The Public Facilities Authority (PFA) administers the WIF program to those communities who are applying for funding under the Clean Water Revolving Fund Loan program. Assistance is in the form of grants with a maximum value of 80% of the project and a maximum grant of $5 Million.

This program is income and debt based. The debt service for the city must result in the average residential user's monthly rate, which is determined by the rates required to pay back the debt service, to exceed the affordability threshold of 1.4% of the Median household income (MHI). WIF should be investigated when a project is completed.

E. Point Source Implementation Grant (PSIG)

In addition to the CWRF program, the MPCA and PFA jointly administer Point Source Implementation Grant programs funded by the Clean Water Legacy money. The grant program provides 80% grant on eligible portions of the project for up to $7,000,000 for TMDLs and new limit compliance. If new limits are necessary at Brainerd WWTF, Point Source Implement Grant eligibility should be investigated. A facility plan is required to be eligible for PSIG monies.

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Appendix A: Wastewater Asset Inventory

Brainerd WWTF
Asset Inventory-BPU **February 2025**

Item Name	Location	Redundancy % Backup	Year Installed	Condition	General Notes	Equipment Information and Operating Notes
River Crossing	Buried-under river	50	1978	No access		2-20" FM's. Pipe thickness was tested. Slightly below average DIP wall thickness. No reading on bottom of pipe thickness. Minimum velocity in FM=2 fps, Max = 8-10 fps. Inverted Siphons should be minimum of 3 fps (10SS)
Valve MH 2 (East Crossover)	East side of River. Pre crossing	0	1978			
Valve MH 1 (West Crossover)	West Side of River. Post Crossing	0	1978			
Plant Scada/Controls	WWTF	0	2010			New Computers/Electrical controls/fiber, etc being installed in phases starting this year
SBR Building						
WAS Blower 1 (30B6)	Blower Room	50	2010			60 HP Motor. Sutorbilt Legend Model 8M Blower- rotary lobe. 1800 rpm
WAS Blower 2 (30B7)	Blower Room	50	2010			60 HP Motor. Sutorbilt Legend Model 8M Blower- rotary lobe 1800 rpm
Effluent Pump 1 (30P9)	SBR Building Pump/Piping Gallery (Lower Level)	100	2010	Good	Pump uses seal water.	Fairbanks Morse 12" Model B5741CT. 40 HP. 3500 gpm @ 22' TDH n=885
Effluent Pump 2 (30P10)	SBR Building Pump/Piping Gallery (Lower Level)	100	2010	Good	Pump uses seal water.	Fairbanks Morse 12" Model B5741CT. 40 HP. 3500 gpm @ 22' TDH n=886
Effluent Pump 3 (30P11)	SBR Building Pump/Piping Gallery (Lower Level)	100	2010	Good	Pump uses seal water.	Fairbanks Morse 12" Model B5741CT. 40 HP. 3500 gpm @ 22' TDH n=887
Kaiser Air Compressors	Blower Room	0	2024	Good	Had troubles in past with alternator issues. Replaced one of two generators in 2024	Model SX 5. 21 cfm @ 125 psig. 5 HP n=3520.
Sump Pump 1,2 (SPU5)	SBR Building Pump/Piping Gallery (Lower Level)	0	2010		Recommended to replace.	
Sump Pump 3,4 (SPU6)	SBR Building Pump/Piping Gallery (Lower Level)	0	2010		Recommened to replace.	
Heat Recovery Pump 1 (Heat pump 10)	SBR Building Pump/Piping Gallery (Lower Level)	50	2010	Good		US motors 20 HP n-17565 motor. 5 x 3 -10.25" impeller pump
Heat Recovery Pump 2 (heat pump 9)	SBR Building Pump/Piping Gallery (Lower Level)	50	2010	Good		US motors 20 HP n-17565 motor. 5 x 3 -10.25" impeller pump
Heat Recovery Pump 3 (heat pump 7)	SBR Building Pump/Piping Gallery (Lower Level)	50	2010	Good		Nema Premium 5 HP n=1755 motor. Armstrong 5 HP n=1800 pump, 106 gpm @ 61' TDH
Heat Recovery Pump 4 (heat pump 6)	SBR Building Pump/Piping Gallery (Lower Level)	50	2010	Good		Nema Premium 5 HP n=1755 motor. Armstrong 5 HP n=1800 pump, 106 gpm @ 61' TDH
Energy Recovery Ventilator (2)	Mechanical Room	0	2010	Good		
WAS Pump 1	SBR Building Pump/Piping Gallery (Lower Level)	50	2010	good	Pump uses seal water.	7.5 HP n=885 Emerson U.S electric Motor. Fairbanks Morse 6" Model B5423 pump, 900 gpm @ 20.8 ' TDH n=885
WAS Pump 2	SBR Building Pump/Piping Gallery (Lower Level)	50	2010	Good	Pump uses seal water.	7.5 HP n=885 Emerson U.S electric Motor. Fairbanks Morse 6" Model B5423 pump, 900 gpm @ 20.8 ' TDH n=886
WAS Pump 3	SBR Building Pump/Piping Gallery (Lower Level)	50	2010	Good	Pump uses seal water.	7.5 HP n=885 Emerson U.S electric Motor. Fairbanks Morse 6" Model B5423 pump, 900 gpm @ 20.8 ' TDH n=887
WAS Pump 4	SBR Building Pump/Piping Gallery (Lower Level)	50	2010	Good	Pump uses seal water.	7.5 HP n=885 Emerson U.S electric Motor. Fairbanks Morse 6" Model B5423 pump, 900 gpm @ 20.8 ' TDH n=888
Boiler	Mechanical Room	0	2010			
Heat Pump 1	Mechanical Room	50	2010			
Heat Pump 2	Mechanical Room	50	2010			
SBR Blower 1	Blower Room	20	2010	good	Blowers were inspected in 2023.	250 HP n=3575 motors. Continental centrifugal blowers model 51A.07 n=3600.
SBR Blower 2	Blower Room	20	2010	good	Blowers were inspected in 2023.	
SBR Blower 3	Blower Room	20	2010	good	Blowers were inspected in 2023.	
SBR Blower 4	Blower Room	20	2010	good	Blowers were inspected in 2023.	
SBR Blower 5	Blower Room	20	2010	good	Blowers were inspected in 2023.	
Aeration Diffusers	SBR tanks	0	2010?	No access		
Builidng Structure	SBR Building	0	2010	Excellent	Replace lighting with LED lighting. Add eyewash on lower level.	
HVAC (general)	SBR Building	0	2010	Good		
Electrical Panel/Controls	Electrical Room	0	2010	good	Plenty of room to install new panels, MCCs, etc. Recommened to replace existing panels and to put SBR data to SCADA and to hard drive instead of the printer.	
Electrical					Replace lighting in pipe gallery with LEDs.	
Air Handlling Unit (AHU-2)	Mechanical Room	0	2010	good		

Energy Rrecovery Ventilator (5)	Mechanical Room	0	2010	good		
Water Heater	Mechanical Room	0	2010			
SBR Jet Motive Pump 1	SBR Building Pump/Piping Gallery (Lower Level)	0	2010	Fair-Good	Pump uses seal water. Pump impeller and fittings after the jet pumps are cavitating and need replacement. BPU is starting to replace these in 2024. Ferric feed is on the second 90. However, the cavitation causes the chemical tube to shake and crack at the pipe connection.	US Motors 150 HP n=1785 motor. Goulds Jet Motive Model AF pump: 13,542 gpm @ 25.5' TDH n=827 20x20-20' impeller. Cast iron
SBR jet Motive Pump 2	SBR Building Pump/Piping Gallery (Lower Level)	0	2010	Fair-Good	Pump uses seal water. Pump impeller and fittings after the jet pumps are cavitating and need replacement. BPU is starting to replace these in 2024. Ferric feed is on the second 90. However, the cavitation causes the chemical tube to shake and crack at the pipe connection.	US Motors 150 HP n=1785 motor. Goulds Jet Motive Model AF pump: 13,542 gpm @ 25.5' TDH n=827 20x20-20' impeller. Cast iron.
SBR Jet Motive Pump 3	SBR Building Pump/Piping Gallery (Lower Level)	0	2010	Fair-Good	Pump uses seal water. Pump impeller and fittings after the jet pumps are cavitating and need replacement. BPU is starting to replace these in 2024. Ferric feed is on the second 90. However, the cavitation causes the chemical tube to shake and crack at the pipe connection.	US Motors 150 HP n=1785 motor. Goulds Jet Motive Model AF pump: 13,542 gpm @ 25.5' TDH n=827 20x20-20' impeller. Cast iron
SBR Jet Motive Pump 4	SBR Building Pump/Piping Gallery (Lower Level)	0	2010	Fair-Good	Pump uses seal water. Pump impeller and fittings after the jet pumps are cavitating and need replacement. BPU is starting to replace these in 2024. Ferric feed is on the second 90. However, the cavitation causes the chemical tube to shake and crack at the pipe connection.	US Motors 150 HP n=1785 motor. Goulds Jet Motive Model AF pump: 13,542 gpm @ 25.5' TDH n=827 20x20-20' impeller. Cast iron
Piping/Valves/Painting	SBR Building Pump/Piping Gallery (Lower Level)	0	2010	Mostly Good		Most piping/painting in good shape. Some paint starting to flake & pipes show rust. WAS line are the worst, could use new paint job
Spare Jet motive motor	Blower Room					
spare jet motive pump	Blower Room					
SBR 1 Tank	SBR 1 Cell	25	2010	No View	Recommended to replace all safety netting on the 3 access hatches.	Plant Currently runs 3 Cells. Have SBR 2 off-backup cell if needed. Average SRT of 9 days, MLSS of 1,100 mg/L, WAS of 4,500 mg/L (0.45 %)
SBR 2 Tank	SBR 2 Cell	25	2010	No View	Recommended to replace all safety netting on the 3 access hatches.	
SBR 3 Tank	SBR 3 Cell	25	2010	No View	Recommended to replace all safety netting on the 3 access hatches.	
SBR 4 Tank	SBR 4 Cell	25	2010	No View	Recommended to replace all safety netting on the 3 access hatches.	
SBR Tanks and building	Exterior		2010		Add caulking in builidng and tanks and edges.	
crane 1	blower room					
crane 2	Blower Room					
crane 3	downstairs					
crane 4	downstairs					
Air conditioning unit	Mechanical Room					
Engine Generator	Just West of SBR 1	0	2010			Runs SBR, headworks, chemical, and other upper bulding
Exhuast Fan 1	roof					
Exhuast Fan 2	roof					
Exhuast Fan 3	roof					
Exhuast Fan 4	roof					
Exhuast Fan 5	roof					
Portable Generator 1						25 kW
A/C units					Replace AC in electrical room.	
Portable Generator 2						150 kW
eq tank 1					Reommendated to add storm catch basin west side of SBRs.	Located between 2 sbrs. Takes flow from SBR to equalize flow to the uv
eq tank 2					Reommendated to add storm catch basin west side of SBRs.	Located between 2 sbrs. Takes flow from SBR to equalize flow to uv
Utility Transformer	Just West of EQ tank 1, S of engine generator					
SBR Lab					No fume hood, fume hood is necessary for VS testing with anaerobic digesters. Admin building has fume hood in lab. No eyewash station.	
Headworks						

Influent Trough	headworks, top floor	0	2010	good	Concrete in ok condition.	brainerd influent pipe-gravity line- comes in at bottom of trough.
Mechanical Traveling Fine Screen 1	Pretreatment building (top floor)	50	2010	Good	Replace seals, brushes, and ancillary components. General maintenance required.	Monster Fine Screens: Model (MFS) Traveling mechanical fine screens. 7.5 MGD rated Capacity. 2.5' x 6.5' channel, 70 degree's from horizontal-standard 1/4" perforations.
Mechanical Traveling Fine Screen 2	Pretreatment building (top floor)	50	2010	Good	Replace seals, brushes, and ancillary components. General maintenance required.	Operators happy with screen performacne. No Issues with rags/clogging down plant
Manual Bar Screen	Pretreatment building (top floor)	0	2010	Good		
Screenings Compactor/Washer (Screenings Washer Monster)	Pretreatment building (top floor)	0	2010	Good	Grit has worn a hole in the pipe after the compactor. Brainerd has 2 lift stations with screening. Evaluate Baxter pretreatment for their growth projections to reduce grit in baxter influent. BPU currenlty has bids out to suppliers to replace the Screenings Washer Monster (compactor).	Model SWM4018. 3hp
Wemco Grit Pump	Pretreatment building (basement)	0	2010	Fair-Good	Recommended to replace pump.	10 HP motor. Model C 3x3 torque flow pump. 220 GPM @ 23' TDH n=850 rpm
Pista Grit	Exterior East side of pretreatment building	0	2010	Good	Only needs general maintenece; check paddles. Has sufficient capacity. Concrete in good condition.	Smitth and Loveless Type concrete 270-Model 20.0 Rated for peak flow of 20 MGD. Operators have had no issues. Plenty of size. 2hp
Wemco Hydrogritter Separator	Pretreatment building (top floor)	0	2010	Good	Needs full replacement. BPU has bids open currently. BPU looking at replacing as is (painted steel) vs SS.	1-12" full flared hydrogritter with 1- 100C Wemclone. 0.5 hp
Grit Dumspters	Pretreat building	0	2010	good		
System Piping	Pretreatment Building	0	2010	good		Piping and paint mostly in good condition. Grit piping could use a recoating in near future
Baxter FE 1	Pretreatment Building (main floor)	50	2010	good		
Baxter FE 2	Pretreatment Building (main floor)	50	2010	good		
Parshall Flume	Pretreatment building (top floor)	0	2010	good	Consider adding a parshall flume manhole to measure brainerd flow ahead of headworks	Brainerd currently has no Flow Meter off main lift station. Only way to determine brainerd flow is from Parshall flume minus baxter Flow meter.
Filtrate FE	Pretreatment Building (main floor)	0	2010	good		
Makeup Air Unit (MAU-5)	Exterior on west side of odor control	0	2010	good		
Energy Recovery Ventilator	Exterior on west side of odor control	0	2010	good		
Makeup Air Unit (MAU-2)	Exterior on North side of pretreat	0	2010	good	Reommended to replace MAU-2.	Need air unit for pretreat for gas/hydrogen sulfide control
Odor Control Unit	Odor control room (west of pretreat room)	0	2010	Good		biorem. 11.5 hp. 460v. Serial no. 1936F
Water Recirculation Pump for Odor Control Unit	Odor control room (west of pretreat room)	0	2010	good		30.36 gpm @ 136 ft tdh. 1.5 hp. Lines clog with calcium from brainerd water hardness. Uses lots of water. Flow meter in the panel next to pump. Design flow normally 23.4 gpm. lines are so clogged with calcium bpu gets 10 gpm
Building structure	Headworks (both pretreate and odor control)	0	2010	Good	Ballasted membrane roof is still original, should be replaced every 20 years (2030). Caulking touchups needed. Concrete walls are in good condition. No coating but no pitting or loose aggregate either. Wall penetrations for sample lines only has foam to stop air flow. Odors seep through foam. Settling in pavement around front of building.	
Electrical/Controls	Eletrical Room-East side of building	0	2010	Good	Panel replacent is recommended, replace the 5/05 cpu's.	20-mmcc-1 has spare buckets. Add thermostat to electrical room
Lighting					Replace lighting in electrical room. Replace lighting in air scrubbing room with LEDs.	
Piping					Minor corrosion, mainly near flanges or bolts. No epoxy coating on piping at chemical injection locations.	
Sump Pump	Pretreat-basement/grit pump floor	0			Reommended to replace discharge piping and brackets. Existing piping shakes and has disconnected in past.	
Brainerd Influent Sampler	Electrical room	0			Sampling line is too close to receiving station. Sometimes results in errounous reading. Recommended to relocate sample line.	
Baxter Influent Sampler	Electrical room	0				New pump was installed in 2023. BPU has spare parts and keeps up on maintenance.
CombinedMixed Influent Sampler	Electrical room	0				
Exhuast Fan	Roof	0				
Exhuast Fan	roof	0				
Receiving Station	truck receiving station	0			Always full of debris. Recommended to make improvements to the dump station to make an updated septage receiving station.	Receive from Baxter and Brainerd. No leachate is accepted.
HVAC (general)	Pretreatment building	0	2010	good	Replace all heating in headworks building.	No thermostat on Berko heater except for on the unit which is difficult to adjust.
WAS						
WAS Storage Tank - West	WAS structure	50	1982	fair-good	Hoisting cranes are in poor condition, remove and replace. Needs to be cleaned and painted.	WAS tanks have bad mixing. GBT feed pumps airlock/cant pump soldis when draining tank to bottom. Plant looking at installing mixers and a thicker solids pump in third spot for this
WAS Storage Tank - East	WAS structure	50	1982	fair-good	Hoisting cranes are in poor condition, remove and replace. Needs to be cleaned and painted. Concrete repair needed to correct spalling.	

GBT feed pump 1	WAS building (lower level)	50	2022	good		New Borger Rotary Lobe (PD) pump in 2022. Original Design Point: 375 gpm @ 33' TDH.
GBT feed pump 2	WAS building (lower level)	0	2010	good		Pump is backup pump. Possible Rotary lobe pump installed here instead for better pump at end of cycle with thicker solids
GBT feed pump 3	WAS building (lower level)	50	2022	good		New Borger Rotary Lobe (PD) pump in 2022. Original Design Point: 375 gpm @ 33' TDH.
electrical/controls	Building-upper level		2010			
HVAC/Plumbing	Building					
Odor Control	Building				Calcium buildup on media due to use of city water.	
Air Diffusers	WAS tanks	0		fair		
Air Handling Unit		0	2010			
Thickening						
Gravity Belt Thickener 1	Thickening Building	50	2010	Fair-Good		Komline-Sanderson Model GSC-2 Series III Gravabelt. 3HP Baldor drive motor. Machines are in mostly good condition. Belts replaced as needed from wear. Plant has been running both GBT's to reduce time of operation
Gravity Belt Thickener 2	Thickening Building	50	2010	Fair-Good		
Thickened Sludge Holding Tank	Below Thickening Building	0	1982	No access		Tank is previous primary settling tanks, with one end filled with sand. Storage depth has been roughly 5.5-6.5 Ft. Stays relatively level as digesters are fed approx the same each day as thickened storage feed. Currently at the design storage depth of 5 ft. Storage has depth of 11 ft until HWL/emergency
Filtrate Holding Tank	Below Thickening Building	0	1982	No access		Tank is previous primary settling tanks, with one end filled with sand. Depth goes from approx 1.5 FT to 7-8.5 FT during GBT use. Provided storage depth of 11 ft at HWL. Filtrate pumps run during GBT use to keep tank at capacity. Estimated fill rate of 500-600 gpm
Filtrate Pump 1	Electrical/Control Building- Lower Floor	50	2010			Fairbanks Morse 4" Model B5441K - 400 gpm @ 20 ft TDH. 5 HP Motor
Filtrate Pump 2	Electrical/Control Building- Lower Floor	50	2010			Plant is currently running 1 pump constantly and another turns on for 15-20 min as needed to keep up with pumping while both GBT's are being used. Average filtrate flow is mid 500's gpm. Pumps currently fine. Charlie does want to upgrade eventually as plant flow increases: roughly 600-650 gpm pumps to only have to run 1, then have firm/redundant capacity
Thickened Sludge Pump 1	Electrical/Control Building- Lower Floor	50	2024			Borger rotary lobe installed in 2024. Original Design Point: 100-150 gpm @ 30 Ft TDH.
Thickened Sludge Pump 2	Electrical/Control Building- Lower Floor	50	2024			Borger rotary lobe installed in 2024. Original Design Point: 100-150 gpm @ 30 Ft TDH.
Chemical/Polymer Feed Pump 1	Thickening Building	50	2010			
Chemical/Polymer Feed Pump 2	Thickening Building	50	2010			
Polymer Storage Tank	Thickening Building	50				
Polymer Storage Tank	Thickening Building	50				
Belt Wash Pump 1	Thickening Building	50	2010			G & L Goulds Model SSh frame mounted. 7.5 HP 3500 rpm, 40 gpm @ 127' TDH
Belt Wash Pump 2	Thickening Building	50	2010			G & L Goulds Model SSh frame mounted. 7.5 HP 3500 rpm, 40 gpm @ 127' TDH
Biofilter Odor System	Thickening Building-South Room	0	2010	good		
Electrical/Controls	Thickening Building	0	2010			
Makeup air unit MAU-4	south side of bioodor room	0	2010		MAU has a hard time keeping up.	
Energy recovery ventilator	south side of bioodor room	0	2010			
Makeup air unit MAU-3	t exterior of thickening building	0	2010		MAU has a hard time keeping up.	
HVAC/Plumbing	Thickening Builidng	0	2010	good		
Air compressor	Electrical/Control Building- Upper Floor	0	2010			
Air compressor	Electrical/Control Building- Upper Floor	0	2020			
Mixer-thickening	North exterior of thickening building, on well portion of storage tank	0	2020	good		Added in 2020
Mixer-Filtrate	North exterior of thickening building, on well portion of storage tank	0	2020	good		Added in 2020
Spare GBT Motor	SBR blower room					
Exhuast Fan	Biorem room roof					

Electrical/Controls	Electrical/Control Building- Upper Floor	0			Electricals for GPT is technically separate but practically not, would be good to have separate space for electrical outside of odor control building.	
Digestors						
Boiler/Heat Exchanger 1	Boiler Room-Upper floor or digester building	50	2010	Fair		
Boiler/Heat Exchanger 2	Boiler Room-Upper floor or digester building	50	2010	Fair		
Electric Backup Boiler	Boiler Room-Upper floor or digester building	0	2010	Fair-Good		
Primary 1	Primary Digester #1	50	1982			
Primary 2	Primary Digester #2	50	2010			Digestors have gas piping problem. Plant also having trouble with transfering contents from primaries to secondaries. Lines/pumps airlock and primaries cant fully drain. Struvite found in biosolids: could possibly be an issue in digestors? Possible feed of ferric chloride if needed to minimize chances of struvite?
Secondary 1	Secondary Digester #1	50	1982			
Secondary 2	Secondary Digester #2	50	2010			
Chemical feed						
Mix piping					Remove air actuated valves.	
Secondary 1 Floating Cover	Secondary Digester #1	0	2010			
Secondary 2 Foatring Cover	Secondary Digester #2	0	2010			
Primary 1 Fixed Cover	Primary Digestor #1	0	2010			
Primaery 2 Fixed Cover	Primary Digester #2	0	2010			
Sludge Recirculaition Pump 1A	Digester Building-Lower Floor	100	2020	Good		Boerger Rotary Lobe Pump-Model Classic PL 300 170 gpm @ 10.8 psi at discharge
Sludge Recirculation Pump 1B	Digester Building-Lower Floor	100	2020	Good		Boerger Rotary Lobe Pump-Model Classic PL 300 170 gpm @ 10.8 psi at discharge
Sludge Recirculation Pump 2A	Digester Building-Lower Floor	100	2020	Good		Boerger Rotary Lobe Pump-Model Classic PL 300 170 gpm @ 10.8 psi at discharge
Sludge Recirculation Pump 2B	Digester Building-Lower Floor	100	2020	Good		Boerger Rotary Lobe Pump-Model Classic PL 300 170 gpm @ 10.8 psi at discharge
Sludge Transfer Pump 1A	Digester Building-Lower Floor	100	2020	Good		Boerger Rotary Lobe Pump-Model Classic PL 300 170 gpm @ 10.8 psi at discharge
Sludge Transfer/Mixing Pump 1B	Digester Building-Lower Floor	100	2010	Fair		Vaughan 1600 gpm @ 37' TDH
Sludge Transfer/Mixing Pump 1C	Digester Building-Lower Floor	100	2010	Fair		Vaughan 1600 gpm @ 37' TDH
Sludge Transfer Pump 2A	Digester Building-Lower Floor	100	2020	Good		Boerger Rotary Lobe Pump-Model Classic PL 300 170 gpm @ 10.8 psi at discharge
Sludge Transfer/Miixng Pump 2B	Digester Building-Lower Floor	100	2010	Fair		Vaughan 1600 gpm @ 37' TDH
Sludge Transfer/Mxing Pump 2C	Digester Building-Lower Floor	100	2010	Poor-Fair		Vaughan 1600 gpm @ 37' TDH. Seal out-pump still runs, but seal needs replacement. Pump at end of 10 year solids/sludge pump life
Air Handling Unit	Building Roof	0	2010			
Air Compressor					Remove air compressor.	
Gas Meter	Digester Gas lines	0				
Gas Burner	Digester Gas lines	0				
Sump Pump	Digestor Building					
Sump Pump	Digestor Building					
Sump Pump	Digestor Building	0	2010	Good		
HVAC/Plumbing	Digester Building	0	2010	Good	Some HVAC issues, glycol in system.	
Electrical/Controls	Digester Building	0	2010	Good		
Waste Gas Burner	Exterior	0		Poor	Replace waste gas burner.	
Sludge Storage						
Large Tank	Sludge Storge Tank	0	2010	Good		Tanks have bad mixing. Seem to be dead spots between air headers where sludge doesn't mix. 11-17% solids when tested last time towards end of loadout. Struvite found in solids-could lead to pipe/pump issues. Possible feed of ferric chloride to minimize struvite?

Small Tank	Sludge Storage-Underground Tank	0	1997	Good		pipe/pump issues. Possible feed of ferric chloride to minimize struvite?
Sludge Mixing/Loadout Pump 1	Sludge Building-Lower Floor	50	2010		Consider adding mixing with transfer pump for more consistent solids loadout.	Vaughan Model HE8N10CSB n=925 rpm. 3000 gpm @ 38 TDH
Sludge Mixing/Loadout Pump 2	Sludge Building-Lower Floor	50	2010		Consider adding mixing with transfer pump for more consistent solids loadout.	Vaughan Model HE10R12CSB 16" impeller n=885 rpm. 3000 gpm @ 38 TDH
Supernatant Pump 1	Supernatant Building-Lower Floor	50	2010			3 HP 1175 rpm motor. 100 gpm @ 10 Ft TDH Fairbanks Morse Pumps- 3" model B5421K
Supernatant Pump 2	Supernatant Building-Lower Floor	50	2010			3 HP 1175 rpm motor. 100 gpm @ 10 Ft TDH Fairbanks Morse Pumps- 3" model B5421K
Electrical/Controls						
HVAC/Plumbing						
Alumidone cover						
Sump Pump						
A/C Unit						
Exhuast Fan						
Mixing/air header piping						
UV Disinfection						
UV module	UV building	0	2010	good	Could save energy by flow pacing and changing the dose with the change in flow.	new bulbs every 2 years. 3000plus. No ramp down. UV does doesn't change as the system is set for 100% (maximum dose).
Serpentine Weir	UV building	0	2010	good		
Parshall Flume	UV building	0	2010	good		
UV Building	UV building	0	2010	good	Add LED lights. Add hydrant in building for washing out.	
Electrical/Controls	Electrical room-UV Building	0	2010	good		
HVAC/Plumbing	UV building	0	2010	good		some corrosion on the copper plumbing
Effluent Sampler	UV building	0	2010	good		
lighting	UV building	0	2010	good		Could replace lighting with LED to conserve energy.
Chemical						**77860-from pumps**
Chemical Pump 1	Chemical Building	100	2019	Good	No room for future skids.	Flex-Pro Model M-424-MNL Peristaltic pump 100 GPH at 50 Psi max
Chemical Pump 2	Chemical Building	100	2019	Good		Flex-Pro Model M-424-MNL Peristaltic pump 100 GPH at 50 Psi max
Storage Tank 1	Chemical Building	0		Good		500 Gallon Hawkins tank-35% ferric
Storage Tank 2	Chemical Building	0		Good		500 Gallon Hawkins tank-35% ferric
Storage Tank 3	Chemical Building	0	2010	Good		1900 Gallon double tank
Chemical Manhole	South of chemical building	0	2020			
Water Heater				Fair-Good		
Sump Pump						
Emergency Eyewash/Shower				Good		
Storage Building						
Control Building						
Generator	Inside	0	origininal-1982	Poor	Replace genset.	head replaced in 2019. runs all "old" stuff-digestors, sludge storge, control, uv, thickening
Diesel Tank	exterior east side	0	2020	Good		275 gallon
Decant Blower						Sutborbilt Model GAFMDPA
Decant Pump 1						Goulds Model 12B2-B Pump. 2 HP motor
Decant Pump 2						Goulds Model 12B2-B Pump. 2 HP motor
Overhead Crane						

Overhead Crane						
Portable Godwin Pump						
Electrical				Poor	Repair/replace electrical.	
Lab Space				Good		
General					Possible to install temp. centrifuge upstairs.	
General Site						
Influent Manhole	Just North of Headworks bldg		2010			
Effluent Manholes 1-4	N, NW, W, and SW of UV bldg		Varyi ng			1 & 3 with 2010 project, Manholes Just N and Just W of UV
Sludge Control Manhole	South of digesters, by loadout structure					
Sludge Yard Hydrant	Just East of old tank					
Yard Hydrant-W of Digester Boiler Room						
YH- East of digester boiler room						
YH- W side off thickening building						
YH- W of thickenign builidng in yard						
YH-W of control buidling on conc.						
Hydrant-NE of chemical , NW of pretreat						
Hydrant- north of decant tank						
generator-has disel tank in it						feeds sbr-headworks-chemical-uooer
Biosolids Disposal						
Load out Semi						
Loadout Semi 2						
Tractor						
Applicator Apparatus						
Other items-find where they go						
Plunger pumps	no longer in use		2010			Carter plunger pumps. Model 800D (duplex) 150 gpm @ 50 TDH, 50 rpm. 7.5 HP 1750 rpm motor
Chopper Pump ISP-1	??		2010			Vaughan Model SE3G2 5HP 170 rom chopper pump. 80 gpm @ 32 TDH
Chopper Pump ESP-1	??		2010			Vaughan Model SE3F2 5HP 170 rom chopper pump. 80 gpm @ 32 TDH
decant pumps						

Public Utilities Commission
Agenda Request

MEETING DATE: March 13, 2025

TITLE OF ITEM: Discuss Project Priority List Funding and Next Steps

ACTION REQUESTED: Discussion Item

ESTIMATED TIME (MIN): 10

SUBMITTED BY: Danny Loch, Finance Manager

PRESENTER: Morgan Salo, Paul Saffert

SUMMARY OF ISSUE: Bolton & Menk Inc to discuss funding steps as we move forward.

ALTERNATIVE, OPTIONS, EFFECTS ON OTHERS/COMMENTS:

RECOMMENDED ACTION/MOTION:

FINANCIAL IMPACT:

Public Utilities Commission
Agenda Request

MEETING DATE: March 13, 2025

TITLE OF ITEM: Schedule Quarterly Meetings

ACTION REQUESTED: Approve/Deny Motion

ESTIMATED TIME (MIN): 2

SUBMITTED BY: Danny Loch, Finance Manager

PRESENTER: Danny Loch, Finance Manager

SUMMARY OF ISSUE: Proposed Dates and Times Based on Current Schedule:
Thursday, June 12, 2025 5:30PM
Thursday, September 11, 2025, 5:30PM
Thursday, December 11, 2025, 5:30PM

ALTERNATIVE, OPTIONS, EFFECTS ON OTHERS/COMMENTS:

RECOMMENDED ACTION/MOTION: Staff recommend adjourning to a future date.

FINANCIAL IMPACT: