Facility Plan

Winona Wastewater Treatment Facility

WINON 160394

Winona, Minnesota | February 23, 2022

SEH

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February 23, 2022

RE: Winona Wastewater Treatment Facility
Facility Plan
Winona, Minnesota
SEH No. WINON 160394 4.00

Mr. Paul Drazkowski
City of Winona
1400 Shives Road
Winona, MN 55987

Dear Mr. Drazkowski:

Enclosed is the Facilities Plan for the Winona Wastewater Treatment Facility (WWTF). This Plan recommends a high-level approach to move forward towards meeting the Facility's new effluent phosphorus limit and provides estimates of costs that can be used to begin planning for funding. These recommendations provide concepts, and further refinement is required through pilot testing.

We look forward to working with you and the City to further advance the future plans for your facility.

Sincerely,

Susan Doyle

(Lic. CA, CO, MN, VA)

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Facility Plan

Winona Wastewater Treatment Facility
Winona, Minnesota

SEH No. WINON 160394

February 23, 2022

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Susan Danzl, PE

Date: February 21, 2022 License No.: 48528

Reviewed By: Celina Tragessor Date: February 21, 2022

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1	Corey Hower MPCA 7381 Airport View Drive SW Rochester, MN 55902

Executive Summary

Background

The City of Winona's wastewater treatment facility has undergone improvements over the years, with some components of the facility over 50 years old with newer components completed more recently in 2015. The evaluation of flows to the facility indicate that the current facility capacity of 9.6 MGD average wet weather is sufficient for the 20-year planning period, given that population projections for the area show declining population.

The Facilities Plan identified the 20-year design flow and loading conditions and develops a plan for facility improvements to address the needs of the facility into the future.

Treatment Objectives

In July 2021, the City received a reissued National Pollutant Discharge Elimination System (NPDES) permit. The reissued permit includes a compliance schedule to meet a water-quality based Phosphorus effluent limit (WQBEL) of 27 kg/d, equating to an effluent limit of 0.74 mg/L at the design average wet weather flow condition. Into the future, the improvements should also consider a total nitrogen and/or nitrate limit.

Treatment Alternatives

This Facilities Plan focuses on treatment alternatives to address the new phosphorus limit (Phase 1) and future potential nitrogen requirements (Phase 2). The following three secondary treatment options were evaluated in this Facilities Plan:

Alternative	Phase 1 (Meet TP limit of 0.7 mg/L)	Phase 2 (Meet TP limit of 0.7 mg/L AND TN limit of 10 mg/L)
Alternative 1	- Chemical Phosphorous Removal - Rehab existing Trickling Filters	- Denitrification Filter - Supplemental Carbon for denitrification
Alternative 2	- Biological-P via Integrated Fixed-Film Activated Sludge - Chem-P for Polishing	- Add additional IFAS Media
Alternative 3	- Biological Phosphorous Removal via anaerobic treatment followed by aerobic treatment (A/O) - Chem-P for Polishing	- Biological Nitrogen Removal Via Anaerobic, Anoxic, and Aerobic treatment (A2/O) - Supplemental Carbon for denitrification

Additional alternatives were previously analyzed as part of a Solids Preliminary Design Report, which is included as an attachment and the recommendations listed are included in this Facilities Plan.

Recommendations

Recent advancements in wastewater treatment leverage existing tankage to provide more treatment. The recommended alternative, Alternative 2, is an intensification process that does just that – provides more capacity in a given footprint. The process is similar to integrated-fixed film activated sludge (IFAS), except that it uses organic sludge granules rather than plastic support media. As a newer technology, it is recommended that the City pilot this type of system prior to proceeding.

In addition to the improvements required to address the current and future nutrient limits, the facility has other needs, which are described below and are included in the following tables.

- Pretreatment Building Modifications – Replace electrical, mechanical, and select process equipment and modify building to separate building areas in accordance with current National Fire Protection code. Due to the poor condition of the electrical equipment, this project is scheduled to move forward in 2022/23.
- Primary Clarifiers and Grit Removal – Replace primary clarifier equipment due to age and condition. Provide new vortex grit removal system.
- Final Clarifiers – Rehab existing final clarifiers. Some components
- Thickening - New dissolved air flotation thickener is recommended to improve thickening performance.
- Dewatering: Add a second belt filter press. Also, the existing building should be brought up to current fire protection codes, with a new electrical room and back-up generator.
- Biosolids Storage: Increase biosolids storage.

Table ES 1 – Proposed Recommended Improvements and Implementation Schedule

Project	Estimated Cost[1]	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Pretreatment Building Modifications	$1,984,000	X									
Pretreatment Building Equipment Replacement	$1,932,000		X								
Phosphorus Removal (Recommended Alternative)	$5,039,000					X					
Nitrogen Removal (Recommended Alternative)	$412,000										X
Primary Clarifier Improvements and Vortex Grit	$2,594,000					X					
Final Clarifier Improvements	$550,000					X					
Thickening	$2,826,000					X					
Dewatering	$6,557,000					X					
Biosolids Storage	$1,755,000					X					
Gas Storage and Microturbine	$2,867,000									X	
TOTAL	$26,516,000	$1,984,000	$1,932,000			$19,321,000				$2,867,000	$412,000

1- Costs include equipment, engineering, and construction in 2021 dollars. Projects are shown in the estimated year of completion. Note that costs will be distributed throughout the design and construction phase as costs are occurred.

Executive Summary (continued)

Table ES 2 – Proposed Phosphorous Improvements Project Timeline

Action	Tentative Date[1]
Submit Facilities Plan to MPCA	March 1, 2022
Public Hearing	March 7, 2022
Request placement on IUP	May 2022
Piloting	January 2022 – June 2022
Authorize preparation of design documents	July 2022
Submit Plans and specifications to MPCA	December 2023
Receive MPCA approval of plans and specifications	March 2024
Advertise project for bids	April 2024
Receive bids and award contract	May 2024
Begin construction	June 2024
Improvements operational	March 2026
Final Completion	June 2026

[1] Tentative dates are subject to change

Contents

Contents (continued)

List of Tables

Contents (continued)

List of Figures

List of Appendices

Facility Plan

Winona Wastewater Treatment Facility

Prepared for

1 Introduction

The City of Winona (City) is located in southeastern Minnesota in Winona County. The City's wastewater treatment facility is in the southeast corner of the City and discharges to the Mississippi River. The facility treats wastewater from the City's residential, commercial, and industrial customers, and also the customer community of the City of Goodview.

In July 2021, the City received a new NPDES permit. As part of this reissuance, the permit includes a compliance schedule to meet a new phosphorus limit. As part of this compliance schedule, the City must submit a Wastewater Treatment Plant Facilities Plan. Further a Facilities Plan is a requirement of the Clean Water State Revolving Fund (SRF), a funding program administered by the Public Facilities Authority (PFA).

1.1 Purpose

This Facilities Plan has been prepared for the City to aid the community in providing adequate wastewater treatment that meets current and future needs. The facilities plan addresses the operational limitations and condition issues identified in previous studies, including:

- In 2014 the City of Winona completed a Condition Evaluation Study of the City's wastewater treatment facility (WWTF) and lift stations (2014). This study recommended investigation of options for improvements to the solids handling treatment process at the facility.
- Solids Preliminary Design report (2018) was developed in response to the recommendations of the 2014 report and included an updated evaluation of the existing conditions of other equipment at the WWTF.

This plan also evaluates the ability of the existing wastewater treatment facility to meet the projected flows and loads as part of a 20-year planning period and addresses the condition of aging equipment and structures. Multiple alternatives to improve the existing facility are presented, along with their cost implications. The facilities plan also includes evaluation of several lift stations servicing the sewershed for the treatment facility.

1.2 Report Organization

This report is organized into the following sections:

Section 2: Regulatory Requirements. This section summarizes the regulatory requirements the facility is designed to meet in accordance with the facility's National Pollutant Discharge Elimination System (NPDES) permit requirements.

Section 3: Design Conditions. This section evaluates the current flow and loads to the WWTF and provides recommended future projection of flows and loads for the facility at the 20-year design condition.

Section 4: Existing Facilities. This section describes the existing facilities, equipment, and treatment process at the WWTF. The section also evaluates the performance and capacity of existing processes at current and future projected flows and loads.

Section 5: Alternative Evaluation. This section provides an overview of the alternatives proposed to address condition or capacity concerns identified during review of the existing treatment facilities. This section also identifies recommended alternatives for each improvement identified.

Section 6: Opinion of Capital Costs for Recommendations. This section summarizes the identified recommended improvements and the preliminary Engineer's opinion of probable costs associated with each recommendation. Opinion of probable cost is evaluated to include the total project costs as estimated for bid. The financial impact of each alternative was estimated by combining the total projected capital cost of each project with the estimated annual operation and maintenance cost in a present worth analysis. This section also provides a recommendation for implementation of the Facilities Plan, bidding process, and construction.

Section 7: Wastewater User Rate Impact Evaluation. This section provides a preliminary evaluation for the user rate impact because of capital improvements associated with the recommended alternatives.

Section 8: Public Hearing. This section includes comments and discussion of the recommended improvements as described in Section 6 and Wastewater User Rate Impact Evaluation as described in Section 7.

Other information required by MPCA and state statutes to supplement the facilities plan document are included as appendices and are identified below. The list below is a copy of the list on MPCA's Facilities Plan Submittal Checklist:

- A completed Cost and Effectiveness Certification Form, completed cost and effectiveness certification checklist, and completed B3 2030 Exemption form all provided by MPCA. These documents are included in Appendix E.
- A summary of the public hearing held on March 1, 2022, including comments received during the hearing period has been included in Appendix F.
- A complete list of addresses used for public notice purposes on a form provided by MPCA has been included in Appendix F.
- A copy of the resolution of the municipality's governing body adopting the Facilities Plan has been included in Appendix G.
- A list of ordinances or intermunicipal agreements required for the implementation and administration of the project. The City's existing Sewer Use Ordinance is included in Appendix H.
- Signed agreements with each significant industrial user (SIU) are included in Appendix I.
- A copy of the current NPDES permit provided by MPCA is included in Appendix B.
- A completed Environmental Information Worksheet is included in Appendix A.

- Copies of all notifications, certifications, and comments received from review agencies such as Native American Tribes, MN DNR, and the State Historic Preservation Office are included in Appendix C, which contains the EIW.
- A copy of the previously submitted Project Priority List (PPL) Application and Scoring Worksheet for this project are included in this report as Appendix J.

1.3 Historical, Archeological, Cultural, and Environmental Elements

An Environmental Information Worksheet (EIW) is required by the MPCA as part of a facilities plan. The completed EIW can be found in Appendix A. As part of this planning step, the State requires information related to the presence of rare, endangered, or historic resources and/or landmarks.

The National Register for Historic Places was searched for the planning area. The results of the search can be found in Appendix A. There are no historical, archeological, or cultural areas within the project boundaries. Adjacent properties are not anticipated to be adversely affected.

The Minnesota Department of Natural Resources was also contacted to determine if rare plant or animal species or other significant natural features exist near the project area. The National Heritage and Nongame Research Program database was also searched and the results can be found in Appendix A. Any potential project at the wastewater treatment facility should have no impact on any natural features.

Local tribal governments were also contacted in accordance with Federal rules applicable to Section 106 of the National Historic Preservation Act (NHPA) and in 36 CFR Part 800. Section 106 of the NHPA requires federal agencies and their applicants to consider the effects of the proposed project on historic properties listed in or eligible for listing in the National Register of Historic Places. If adverse effects are identified, Section 106 requires the federal agencies and their applicants to avoid, minimize or mitigate the adverse effects on historic properties. the results can be found in Appendix A. Any potential project at the wastewater treatment facility should have no impact on any cultural or historical properties.

2 Regulatory Requirements

The Minnesota Pollution Control Agency (MPCA) has responsibility for determining the best uses of the State's waters and quality of effluent necessary to meet these uses. In accordance with this responsibility, they have defined seven water use "classes" and grouped all the State's waters into one or more of these classes. Each contains a list of substances or characteristics that must be met before the water is suitable for its designated use. This list of substances and their permissible concentrations are referred to as "water quality standards". These standards have been established after appropriate public hearings and have been approved by the U.S. Environmental Protection Agency (EPA).

Treated wastewater from the City of Winona's WWTF is discharged into the Mississippi River. The Mississippi River is classified as a Class 2Bg, 3C, 4A, 4B, 5, and 6 waterway. The definitions of these classifications follow:

- Class 2Bg: The quality of Class 2B waters of the state shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. These waters shall also be suitable for recreational use, including bathing. All requirements for class 2B warm or cool water stream and river habitats continue to apply in addition to requirements for class 2Bg. "General cool and warm water aquatic life and habitat" or "class 2Bg" is a beneficial use that means waters capable of supporting and maintaining a balanced, integrated, adaptive community of warm or cool water aquatic organisms having a species composition, diversity, and functional organization comparable to the median of biological condition gradient level 4 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

- Class 3C: The quality of Class 3C waters of the state shall be such as to permit their use for industrial cooling and materials transport without a high degree of treatment being necessary to avoid severe fouling, corrosion, scaling, or their unsatisfactory conditions.
- Class 4A: The quality of Class 4A waters of the state shall be such as to permit their use for irrigation without significant damage or adverse effects upon any crops or vegetation usually grown in the waters or area, including truck garden crops.
- Class 4B: The quality of Class 4B waters of the state shall be such as to permit their use by livestock and wildlife without inhibition or injurious effects.
- Class 5: The quality of Class 5 waters of the state shall be such as to be suitable for aesthetic enjoyment of scenery, to avoid any interference with navigation or damaging effects on property.
- Class 6: The uses to be protected in Class 6 waters may be under other jurisdictions and in other areas to which the waters of the state are tributary and may include any or all of the uses listed in Minnesota Rules parts 7050.0221 to 7050.0225, plus any other possible beneficial uses.

2.1 Effluent Standards

The Winona WWTF discharges effluent in accordance with Minnesota National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit no. MN 0030147. A copy of the current permit is included in Appendix B. The current permit became effective July 1, 2021 and will expire June 30, 2026. As the MPCA just completed an effluent limit review for the 2021 permit reissuance, the MPCA indicated that a preliminary effluent limit request was not necessary for this Facilities Plan.

Table 1 summarizes the water quality parameters with discharge limits for the facility's main discharge SD-001.

Table 1 – Effluent Water Quality Requirements

Parameter	2021 Permit Limit	2021 Permit Units	Limit Type	Effective Period
cBOD5	907	kg/day	Calendar month average	Jan-Dec
	1452	kg/day	Maximum calendar week average	Jan-Dec
	25	mg/L	Calendar month average	Jan-Dec
	40	mg/L	Maximum calendar week average	Jan-Dec
	85	%	Minimum calendar month average for removal	Jan-Dec
Chlorine, Total Residual	0.038	mg/L	Daily maximum	Jan-Dec
Fecal Coliform, MPN or Membrane Filter 44.5C	200	org/100ml	Geometric Mean	Apr-Oct
pH	6.0	SU	Calendar month minimum	Jan-Dec
	9.0	SU	Calendar month maximum	Jan-Dec
Phosphorus, Total (as P)	27	kg/day	Calendar month average	Jun-Sep
TSS	1089	kg/day	Calendar month average	Jan-Dec
	1633	kg/day	Maximum calendar week average	Jan-Dec
	30	mg/L	Calendar month average	Jan-Dec
	45	mg/L	Maximum calendar week average	Jan-Dec
	85	%	Minimum calendar month average for removal	Jan-Dec

1. Carbonac7eous 5-Day Biochemical Oxygen Demand
2. Total Suspended Solids

A significant change in the reissued permit is a seasonal mass limit for total phosphorus of 27 kg/day for the months of June through September. At the average wet weather design flow, this mass limit equates to a concentration of 0.74 mg/L. The MPCA's approach with phosphorus water-quality based effluent limits (WQBELs) is to assume that the facility will overachieve. That is, the MPCA projects that by complying with the 27-kg/d monthly limit, the Winona WWTF will actually average 13 kg/d, June – September over a longer-term, 5-year period. The waste load allocation (WLA) for the WWTF is 13 kg/d for the Mississippi to meet the water quality standard. After each 5-year permit cycle, the MPCA will evaluate the facility's discharge and the downstream water quality and adjust the limit down, if necessary, to meet the long-term average waste load allocation of 13 kg/day.

While the 13 kg/d WLA is not a design condition, there is the potential that the NPDES effluent could eventually be that low. Table 2 summarizes the effluent phosphorus concentrations that result from the two mass loading conditions – the current WQBEL and the long-term average WLA.

Table 2 – Concentration-Equivalent Mass Loading Limits

Mass Load Threshold	Flow Condition	Concentration
27 kg/d (current WQBEL)	Design AWW: 9.6 MGD	0.74 mg/L
27 kg/d (current WQBEL)	2020 AWW: 6.61 MGD	1.08 mg/L
13 kg/d (long-term average WLA)	Design AWW: 9.6 MGD	0.36 mg/L
13 kg/d (long-term average WLA)	2020 AWW: 6.61 MGD	0.52 mg/L

While the effluent limit could become more stringent if the discharge does not meet the long-term targeted average WLA, it is unlikely that the limit would ever become an annual, year-round limit. MPCA has indicated that annual limits are generally applied when there is a lake downstream or if there is a hydraulic expansion, neither of which are the case for Winona.

The existing $cBOD_5$, TSS, fecal coliform, chlorine residual, and pH effluent limits remained unchanged between the 2010 permit and draft permit.

In addition to limits, the NPDES permits outline constituents of concern for monthly monitoring as part of the compliance reporting. Table 3 summarize the water quality parameters which the facility must monitor for the facility's main discharge SD-001. The 2021 reissued NPDES permit included additional monitoring for salty parameters beyond those already indicated in the 2010 discharge permit. The parameters include bicarbonates, total calcium, hardness, calcium and magnesium, total magnesium, specific conductance, and total sulfate. There were also minor modifications to the mercury sampling requirements.

Table 3 – Effluent Monitoring Parameters

Parameter	2021 Permit Limit	2021 Permit Units	Limit Type	Effective Period
Bicarbonates (HCO_3)	Monitor	mg/L	Calendar month maximum	Jan-Dec
Calcium, Total	Monitor	mg/L	Calendar month maximum	Jan-Dec
Chloride, Total	Monitor	mg/L	Calendar month maximum	Jan-Dec
Flow	Monitor	MG	Calendar month maximum	Jan-Dec
	Monitor	MG	Calendar month average	Jan-Dec
	Monitor	MG	Calendar month total	Jan-Dec
Hardness, Calcium and Magnesium, (as $CaCO_3$)	Monitor	mg/L	Calendar month maximum	Jan-Dec
Magnesium, Total (as Mg)	Monitor	mg/L	Calendar month maximum	Jan-Dec
Mercury, Dissolved (as Hg)	Monitor	ng/L	Calendar month maximum	May, Sep
Mercury, Total (as Hg)	Monitor	ng/L	Calendar month maximum	May, Sep
Nitrite plus Nitrate, Total (as N)	Monitor	mg/L	Calendar month average	Jan-Dec
Nitrogen, Ammonia Total (as N)	Monitor	mg/L	Calendar month average	Jan-Dec
Nitrogen, Kjeldahl Total	Monitor	mg/L	Calendar month average	Jan-Dec
Nitrogen, Total (as N)	Monitor	mg/L	Calendar month average	Jan-Dec
Oxygen, Dissolved	Monitor	mg/L	Calendar month minimum	Jan-Dec
Phosphorus, Total (as P)	Monitor	kg/day	Calendar month average	Oct-May
Phosphorus, Total (as P)	Monitor	mg/L	Calendar month average	Jan-Dec
Potassium (as K)	Monitor	mg/L	Calendar month maximum	Jan-Dec
Sodium, Total (as Na)	Monitor	mg/L	Calendar month maximum	Jan-Dec
Solids, Total Dissolved (TDS)	Monitor	mg/L	Calendar month maximum	Jan-Dec
Solids, Total Suspended (TSS), grab (Mercury)	Monitor	mg/L	Calendar month maximum	May-Sep
Specific Conductance	Monitor	µΩ/cm	Calendar month maximum	Jan-Dec
Sulfate, Total (as SO_4)	Monitor	mg/L	Calendar month maximum	Jan-Dec
Zinc, Total (as Zn)	Monitor	µg/L	Calendar month maximum	May, Sep

2.2 Future Limits

As the MPCA just completed an effluent limit review for the 2021 permit reissuance, the MPCA indicated that a preliminary effluent limit request was not necessary for this Facilities Plan. However, there are potential future limits that merit discussion, which the MPCA does not currently address in preliminary effluent limits. These include nitrate/total nitrogen, sulfate, chloride and salty parameters, and Per/Poly-fluoroalkyl Substances (PFAS).

2.2.1 Nitrate or Total Nitrogen

The MPCA anticipates in the next 5 years that they will complete a nitrate aquatic life water quality standard. According to a discussion with the MPCA on 5/21/2021, the MPCA expects the water quality criterion of a chronic value of 7 to 10 mg/L. Because the Mississippi River offers a significant dilution volume, the limit could potentially be greater than 10 mg/L. However, the MPCA has not been clear if the limit will be for nitrate or total nitrogen (nitrate, nitrite, ammonia, and organic nitrogen) or if it will be driven by toxicity or eutrophication. It is anticipated that more definition regarding this will become available over the next 2 years. Section 5 discusses improvements that could be considered to address a future total nitrogen or nitrate limit.

2.2.2 Sulfate

In 1973, Minnesota adopted a sulfate standard to protect wild rice. Though the standard has not been enforced, in 2017 the MPCA attempted to revise the sulfate water quality standard applicable to Wild Rice Waters, but ultimately withdrew the rule from review in 2018. More recently, in 2021, the EPA reviewed the MPCA's 2020 impaired waters list and added 30 new wild rice waters impaired for excess sulfate, including two reaches of the Mississippi River downstream of the Winona WWTF. The MPCA was preparing comments back to the EPA on the added waters at the time of this Facilities Plan and it is uncertain what the outcome will be.

Sulfate cannot easily be addressed at wastewater treatment facilities. The state of Minnesota commissioned a study evaluating treatment options. This study concluded:

- Reverse osmosis and nanofiltration are the most developed and effective alternatives today, but these treatment systems are challenged with a concentrated brine that requires disposal.
- Chemical precipitation and ion exchange are also treatment options, though may not treat down to levels required.
- Source control may be an option depending on specific site characteristics. Sources of sulfate include the drinking water supply, industrial discharges, and domestic wastewater.

Aside from treatment, a variance may also be an option. Due to the uncertainty of the sulfate regulations and the lack of cost-effective treatment options, alternatives to address sulfate were not considered in this Facilities Plan.

2.2.3 Chloride and Salty Parameters

Minnesota has water quality standards in place to protect lakes, wetlands and streams from chlorides or other salty parameters.

- Class 2B waters, waters protected for cool and warm water sport fish, have a chronic standard for chloride of 230 mg/L with a maximum standard of 860 mg/L.
- Class 3C waters, waters protected for industrial consumption, have a chloride standard of 250 mg/L
- Class 4A and 4B waters, waters protected for irrigation and livestock, have numerical limits for salty parameters and total salinity.

In 2021, MPCA amended the rules for Class 3, Class 4A, and Class 4B waters from numeric standards to narrative standards. MPCA's position is that the original standards date back to the 1960's and there is not much science behind the numerical standards. The narrative standards allow for a more localized approach. However, this rule making results in no changes to Class 2B waters.

Due to the very high dilution flow of the Mississippi River, the Winona WWTF is unlikely to have reasonable potential to cause a water quality violation for chlorides and, therefore there are no alternatives that address chlorides. Similar to sulfate, chlorides are often best addressed at the source – drinking water or industries, as there are not cost-effective treatment systems for chlorides at wastewater treatment facilities.

2.2.4 PFAS

Perfluoroalkyl Substances (PFAS) are a family of over 5,000 manmade chemicals that have been manufactured since the 1940s. These chemicals are used in industry because of their resistance to heat, oil and water; however, they are also resistant to breakdown and persist in the environment. MPCA started monitoring PFAS in drinking water near 3M in Cottage Grove in 2002, and at wastewater treatment plants in 2007.

Today, PFAS is an area of concern. Testing methods have advanced to detect to parts per trillion (ppt) levels, though official testing methods are not yet EPA-approved for wastewater. There will continue to be discussion about PFAS. MPCA is working to develop a baseline level and will be requesting wastewater influent and biosolids testing (either voluntary or mandated) to better understand the presence of PFAS throughout our systems (stormwater, drinking water, wastewater, biosolids) in the future.

PFAS, similar to other emerging contaminants, are better handled with source reduction. Treatment options are granular activated carbon and reverse osmosis, neither are cost-effective for wastewater treatment facilities. No treatment alternatives for PFAS are evaluated in this Facilities Plan.

3 Design Conditions

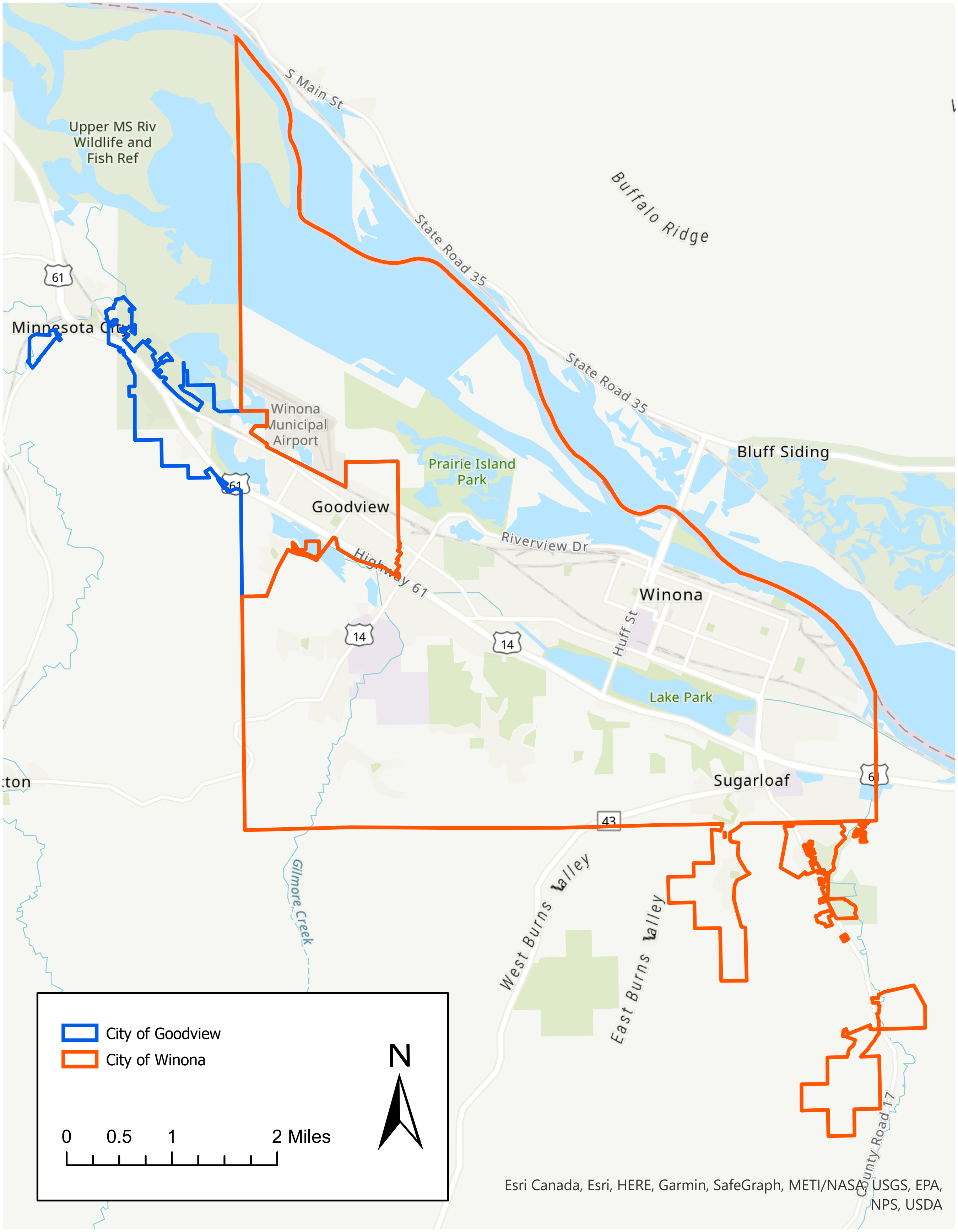
To assist in determining the wastewater demand and facility capacity, a review of the current flows and loads to the facility is conducted and compared to reference values and recommended minimum design criteria provided by the MPCA and 10 States Standards Recommended Standards for Wastewater Facilities.

Processes must be designed to handle the current flows and loads received by the WWTF and be scalable to handle potential increases in flows and loads over the planning period and comply with potential future phosphorus limits. Development of design conditions for Winona involved:

- Evaluating historical flows and loads to establish the current conditions.
- Determining a future service population and associated future flows and loads considering input from significant industrial dischargers.
- Estimating future solids production from either biological or chemical phosphorus removal.

3.1 Planning Area

The Winona wastewater treatment facility provides sanitary sewer treatment service to the communities of Winona and Goodview, Minnesota. The City operates a number of collection system lift stations which convey wastewater from each community to the WWTF. Figure 1 shows the city boundaries of Winona and Goodview which contribute flow to the WWTF.



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Project: WINON 160394
Print Date: 11/19/2021

Map by: ctragesser
Projection:
Source:

Winona WWTF Service Area

Winona, MN

Figure
1

The City of Winona encompasses 24.13 square miles with a 2020 Census estimated service population of 25,948 residents. To the north of Winona, Goodview covers 2.49 square miles with a 2020 Census estimated service population of 4,158 residents.

3.2 Service Population

The facility's service area includes the community of Goodview. The most recent population estimates for Winona and Goodview reported 2020 populations of 25948 and 4158, respectively.

Winona is home to both Winona State University and Saint Mary's University of Minnesota, which enroll approximately 7,602 and 1,467 undergraduates respectively. Adding the student population, the total service population for 2020 is 39,418 persons.

3.3 Current Flows and Loads

The City provided SEH with historical influent and effluent data from discharge monitoring reports (DMRs) for the Winona WWTF for January 2016 through December 2020.

3.3.1 Flow Determination

3.3.1.1 Definitions

The following terms are used to characterize the flows experienced by the WWTF.

- Average Dry Weather Flow (ADF) – The daily average flow when the groundwater is at or near normal and runoff is not occurring.
- Average Wet Weather (AWW) – The daily average flow for the wettest 30 consecutive days.
- Peak Hourly Wet Weather Flow (PHWW) – The 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) – Peak flow during a day when the groundwater is high and a twenty-five year one-hour storm event is occurring.
- Infiltration – Water other than sanitary wastewater that enters the collection system through deficiencies in the collection system (pipes, joints, manholes)
- Inflow – Water that enters the collection system from sources other than the collection system

Historical data showed that the Winona WWTF flows were significantly influenced by sustained high river flows and flooding in 2019. This unique circumstance and the resulting current and future design flows are documented in a August 3, 2021 memo to the MPCA. This memo is included in Appendix D. Table 4 presents the average influent flow from 2016 to 2020, highlighting the impacts of the 2019 flood event.

Table 4 – Average Influent Flow from 2016 to 2020

Year	Avg Annual Flow (MGD)	Avg Dry Weather Flow (MGD)	Avg Wet Weather Flow (MGD)	Max Daily Flow (MGD)
2016	3.39	3.12	4.14	4.95
2017	3.76	3.08	5.97	6.74
2018	4.46	3.36	6.81	7.35
2019	**6.228**	**3.683**	**12.01**	**13.05**
2020	4.01	3.88	6.61	7.82
2021 (Jan-Mar)	3.027	2.955	3.16	3.44
Permitted Design Capacity		6.74	9.60	

Although the 2019 AWW flow was significantly higher than the permitted design capacity of the facility, the AWW flow of the preceding and following years are significantly lower than the capacity. As the high flows experienced in 2019 are due to a specific flood event, which is not considered to be normal, the current capacity of the plant is considered adequate for the 20-year planning period.

Inflow and infiltration were determined following MPCA guidelines. A detailed determination is provided in Appendix D. A summary of the inflow/infiltration and peak hour flows is presented in Table 5.

Table 5 – Inflow/Infiltration and Peak Hour Flows

Flow Type	Units	2019	2020
Peak Hour Dry Weather Flow	MGD	5.0	4.0
Peak Hour Wet Weather Flow	MGD	11.2	4.5
Infiltration	MGD	6.2	0.5
Inflow	MGD	2.0	3.0

The City has worked to decrease I/I and will continue their reduction efforts in the future.

3.3.2 Load Determination

In addition to flow data, Table 6 shows the organic, solids, and phosphorus loading from January 1, 2016 through December 31, 2019 coming to the plant. These values include industrial and residential loading. Data from 2020 was excluded due to implications from COVID-19 as typical water usage from industry and the two college campuses was disrupted and did not follow typical water use patterns.

Table 6 – Average Annual Daily Flows and Loadings (Residential, Commercial, Industrial)

Year	Facility Influent					Facility Effluent			
	Total Flow (MGD)	cBOD5 (ppd)	TSS (ppd)	Ammonia (as N, mg/L)[1]	Total P, (as P) (ppd)	cBOD5 (ppd)	TSS (ppd)	Ammonia (as N, mg/L)[1]	Total P, (as P) (ppd)
2016	3.4	6761.5	5938.0	-	222.7	222.5	146.8	-	128.1
2017	3.8	6567.8	5143.7	-	220.0	367.3	211.2	-	160.9
2018	4.5	8560.1	8024.3	-	308.8	447.3	231.3	-	199.7
2019	5.2	6299.7	9466.1	20.1	315.7	319.5	276.9	5.2	176.2
Average	4.2	7047.3	7143.0	20.1	266.8	339.2	216.5	5.2	166.2
Minimum	3.4	6299.7	5143.7	7.0	220.0	222.5	146.8	0.3	128.1
Maximum	5.2	8560.1	9466.1	27.2	315.7	447.3	276.9	14.7	199.7

1. Ammonia (as N) is not an influent parameter that historically has been tested. The new 2021 permit now requires monthly monitoring. Data is based upon one monthly sample throughout 2019.

Monthly organics loading, analyzed as 5-day carbonaceous biochemical oxygen demand ($cBOD_5$), averaged 7,047.3 pounds per day (lb/d) over the period, with a maximum average month load of 9,678.9 lb/d in June 2018.

Monthly solids loading, analyzed as total suspended solids (TSS), averaged 7,143 lb/d over the review period. The greatest maximum average monthly TSS load was 11,426 lb/d in May 2018.

Phosphorus loadings analyzed as total phosphorus (as P), averaged 266.8 lb/day over the review period. The greatest maximum phosphorus load was 628 lb/day in June 2018.

Table 7 breaks down the flow, BOD, and TSS contribution from Industry based upon 2019 and 2020 data. It also accounts for BOD and TSS loading that has been allocated to industry in user agreements, but are not currently being used by industry. These loadings do not currently impact the plant, but must be considered and reserved should industry choose to use the full loadings allocated.

Table 7 – Flows and Loads Residential and Commercial Versus Industry Breakdown

Discharge	AWW Flow MGD	cBOD lb/day	TSS lb/day
Current Allocations			
Commercial/Residential Estimate[1]	2.24	4,054	6,579
Inflow/Infiltration	3.50		
Current SIU Discharge[2]	0.71	2,993	564
Unused SIU Allocation	1.67	2,480	4,347
CURRENT TOTAL	8.12	9,527	11,491
Current Permitted Capacity	9.6	14,605	13,936

1. Calculated from 2016-2019 average influent flows/loadings less industry annual average flows/loadings.
2. Assumes average annual values

It is also important to understand the per-capita loading. This is determined by removing the industrial contribution to the influent flows and loads. Table 8 shows the per capita loading based on flows and loads from residential, commercial, and I/I sources only.

Table 8 – Per Capita Flows and Loads[1]

Year	Facility Influent			
	Total Flow Gal/Day/Capita	BOD5 (ppd/capita)	TSS (ppd/capita)	Total P, (as P) (ppd/capita)
2018	162.2	0.151	0.294	0.005
2019	124.5	0.122	0.274	0.006
Average	143.3	0.136	0.284	0.006
1 - Based on combined population of 30,308 for the City of Winona and Goodview.				

The calculated per capita BOD_5 load was observed to be 0.136 pounds per capita per day (ppcd). According to the Recommended Standards for Wastewater Facilities (Ten States Standards), the design of domestic waste treatment shall be based upon 0.17 ppcd BOD, or 0.22 ppcd where garbage comminutors are commonly used. The observed per capita load of 0.136 ppcd BOD_5 was used for design as the population is predicted to decrease and no increase in residential or commercial loading is predicted.

The calculated per capita TSS load was observed to be 0.28 ppcd. According to Ten States Standards, the design of domestic waste treatment shall be based upon at least 0.20 ppcd TSS, or 0.25 ppcd where garbage disposals are commonly used. The observed per capita load of 0.28 ppcd TSS was used for design.

The calculated per capita total phosphorus (as P) load was observed 0.006 ppcd. Metcalf and Eddy (2003) Wastewater Engineering suggest a typical design range for total phosphorus of 0.006-0.010 ppcd. The observed per capita load of 0.006 ppcd total phosphorus was used for design.

3.4 Design Values

The typical planning period for wastewater treatment facilities is 20 years due to the useful service life of process equipment. For Facilities Plans, the MPCA prescribes specific design parameters. Specifically, the four flow conditions, defined in Section 3.3.1, must be established for the planning period. These flow conditions are used to quantify the range of flows observed and provide a basis for future planning. Population projections are also important to assess the requirements of new or existing treatment processes. The flow conditions, described below, account for future population growth and industrial expansion.

3.4.1 Design Population

The Minnesota State Demographic Center provides population estimates for Counties in the State of Minnesota. The Demographic Center predicts an 11.7% reduction in population for Winona County between 2020 and 2045. As the population of the City of Winona comprises of over half of the county population, it is also projected that the City population will decline.

Therefore, the Future Flow and Loads are not projected to increase during the design period due to residential growth.

3.4.2 Industrial Projections

The Winona WWTF receives flow from three categorical and four non-categorical significant industrial users (SIUs). The WWTF also receives periodic tankage flow from six users. As many industries in general experienced lower flows during 2020, using 2020 flow data may underrepresent the normal flows of each industry. However, some industries increased their flows significantly from 2019 and 2020. Therefore, the average flow for each industry for 2019 and 2020 were compared, and the year with the highest average flow was selected as the actual flow from each industry. The total average flow from all seven SIUs based on 2019 and 2020 flows is 377,487 gallons per day (gpd). Two SIUs notified the City of Winona that their flows are projected to increase in the coming year. Midwest Co-pack estimated that their flows would double, and Peerless Chain estimated an increase of 20,000 gpd. Including those increases, the new estimated flow from all seven SIUs is 426,275 gpd. It is assumed that no other increases in flow will occur between 2021 and 2045 from these industrial users.

Assuming a BOD concentration of 210 mg/L and TSS concentration of 180 mg/L, the increase in Industrial loadings associated with this increased flow is predicted to be 84.01 ppd BOD and 72.01 ppd TSS.

3.4.3 Flow and Load Projections

Design flows and loads are typically determined by scaling the current flows and loads by the projected population and industry increase. As the population is predicted to decrease and industry only slightly increase, the design flow and loadings were selected based on the current demands and the current facility's permitted design. Table 9 summarizes the historical flows and recommended design flows.

Design Exception: While the peak month flow was 12.01 MGD in 2019, sizing the wastewater treatment plant for this as an average wet weather capacity would be grossly oversizing the facility, particularly given the average annual flow is only 4.46 MGD (if excluding 2019, refer to Appendix M).

The current peak hour design capacity of the facility is 10,500 gpm (15 MGD) and hydraulically the facility was able to pass the sustained high flows in 2019 while providing effective treatment. Therefore, the recommended design PHWW and PIWW flow is 15 MGD.

Table 9 – Recommended Design Flow Conditions

Year	Unit	Avg Annual Flow	Avg Dry Weather Flow	Average Wet Weather Flow	Max Daily Flow	Peak Hour/Peak Instantaneous Flow[1]
2016	MGD	3.39	3.12	4.14	4.95	
2017	MGD	3.76	3.08	5.97	6.74	
2018	MGD	4.46	3.36	6.81	7.35	
2019	MGD	6.23	3.68	12.01	13.05	11.2
2020	MGD	4.01	3.88	6.61	7.82	4.5
Estimated Future	MGD	4.51[2]		6.86[2]		
Recommended Design Conditions	**MGD**		**6.74**	**9.60**		**15.0**

[1] Peak Hour Wet Weather Flow from Table 5

[2] Based on the highest average annual flow from 2016 to 2020 (excluding 2019) plus the estimated industry increase of 0.048 MGD and no increase in residential flows.

The current facility capacity is adequate to treat the current and expected future flows assuming:

- Future I/I reduction measures are effective at reducing I/I entering the system
- The flows experienced in 2019 due to flooding were a rare occurrence and are not expected to contribute regularly to the plant influent
- No significant increase in population or water usage from industry.

The Design Loadings to the plant are based on current conditions, current unused SIU loading allocations, and predicted increase in loadings from SIUs. The calculated future loadings are less than the current design capacity. This decrease in load capacity at the plant will reduce the overall costs of all alternatives considered and will offer better treatment for the current conditions than an oversized plant would offer. A summary of the current, future, and recommended design loadings is presented in Table 10.

Table 10 – Recommended Design Loadings

Discharge	AWW Flow MGD	cBOD lb/day	TSS lb/day	Phosphorus lb/day[2]
Current Allocations				
Commercial/Residential Estimate	2.24	4,054	6,579	
Inflow/Infiltration	3.50			
Current SIU Discharge[1]	0.71	2,993	564	
Unused SIU Allocation	1.67	2,480	4,347	
Current Total	**8.12**	**9,527**	**11,491**	**166.2**
Future Increases				
Future Population Increase	0	0	0	0
Future Industrial	0.048	84.01	72.01	
Future Projected Total	**8.16**	**9,611**	**11,563**	
Current Permitted Capacity	9.6	14,605	13,936	
Recommended Design Capacity	**9.6**	**9,611**	**11,563**	**166.2**
1 Assumes average annual values 2. Limited data exists of the industry contributions of phosphorus.				

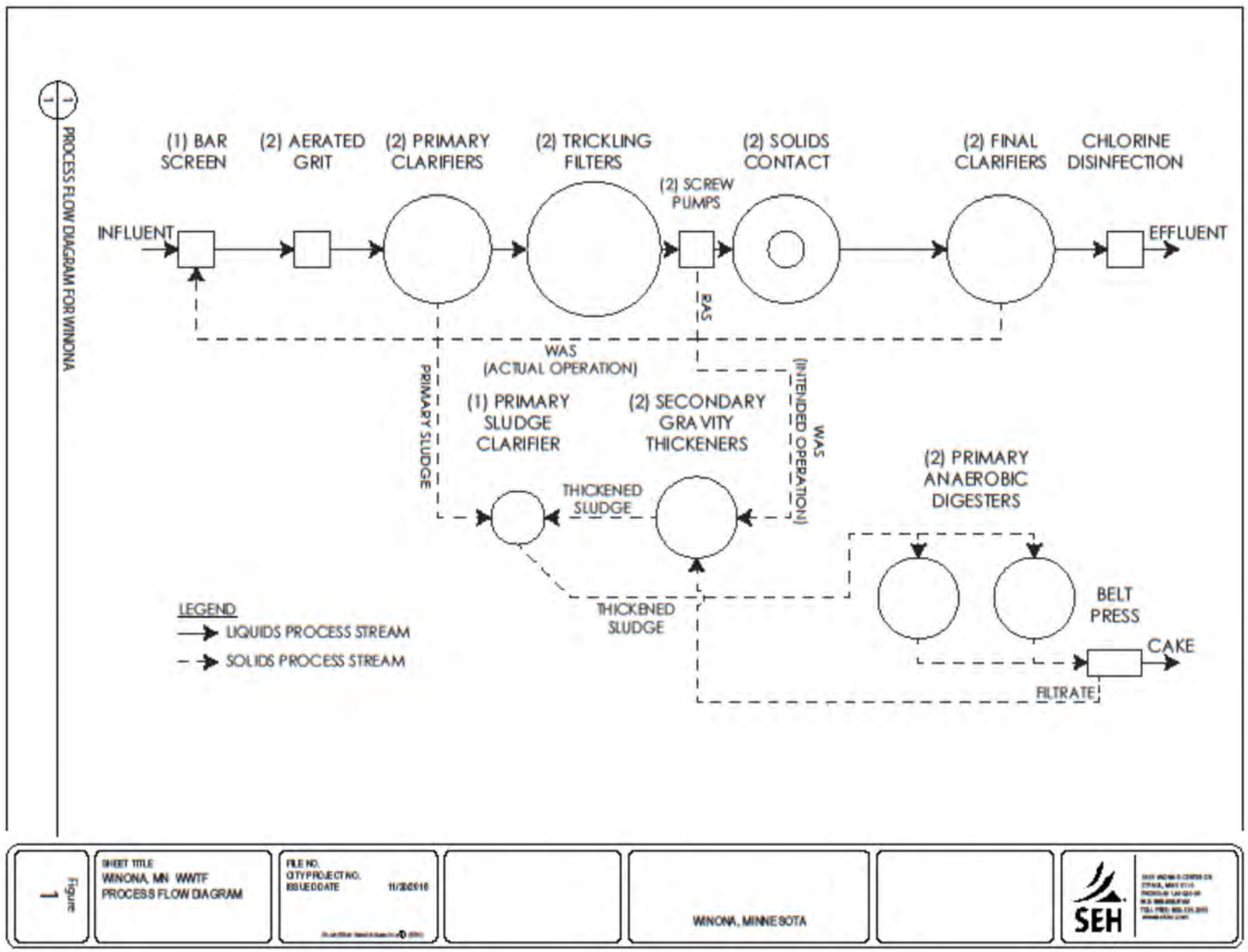
4 Existing Facilities

The WWTF was originally constructed as a trickling filter plant in 1970. In 1985, the current dewatering belt press and outside sludge storage were installed. In 1996, two final clarifiers were converted to solids contact aeration basins and two new clarifiers were constructed to increase organic capacity. The secondary digester was converted to the Primary Digester No. 2 and the gas floating cover was replaced. In 2011, mixers were added to the digesters and the cover was replaced on Primary Digester No. 2. A microturbine was added to the facility in 2011 to utilize biogas from the digestion process at the plant. The most recent plant upgrade was in 2017 and consisted of rehabbing Primary Digester No. 1 with new mixers, cover, and a deeper skirt.

Figure 2 includes a flow diagram of the facility today. More detailed process flow diagrams are included in Appendix K.

The City maintains the WWTF. Annual capital improvement planning is used to track and plan for equipment replacement and repair.

Figure 2 – Process Flow Diagram for Winona WWTF

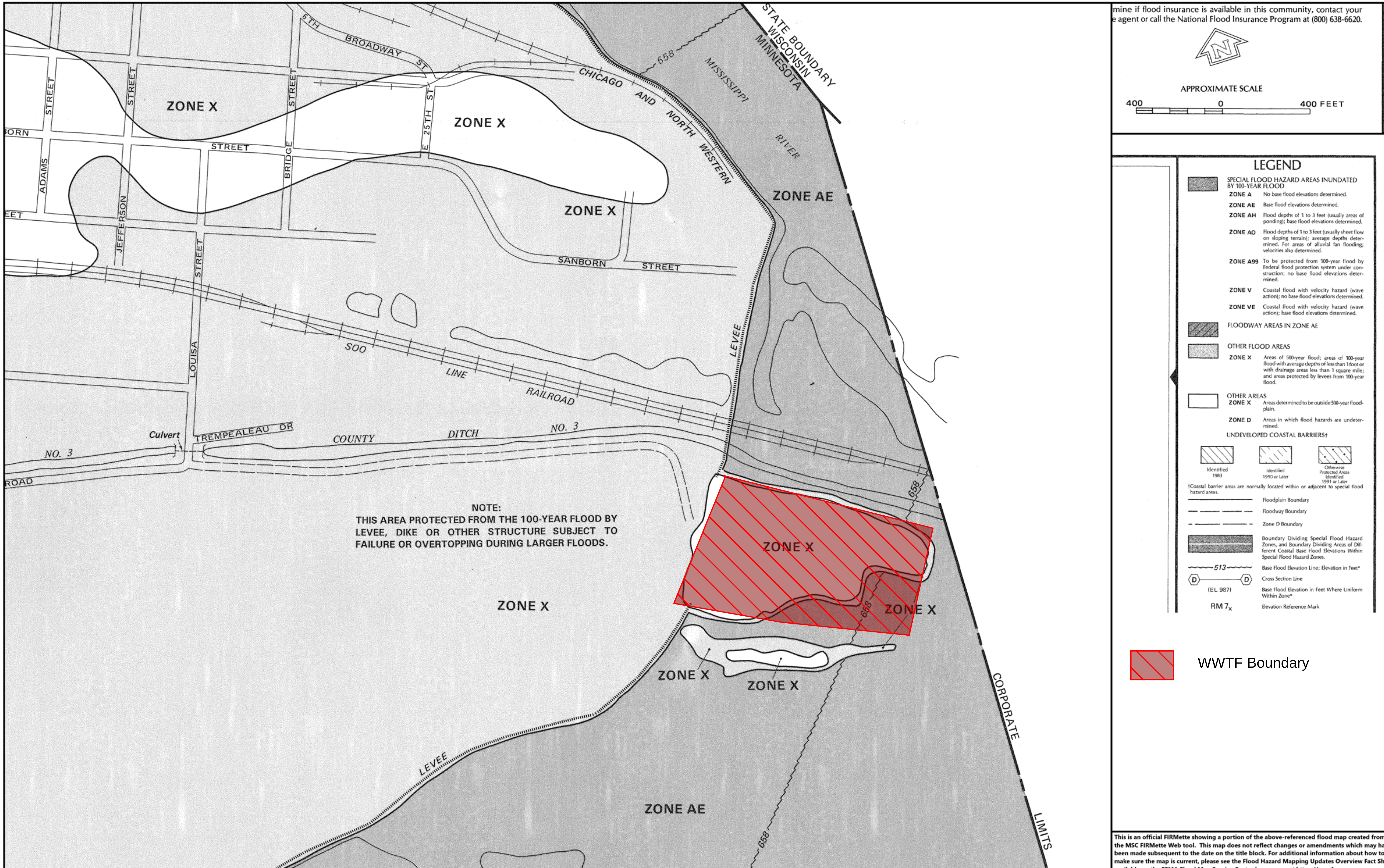


4.1 100-Year Flood Elevation

Several state agencies govern activities in the flood plain:

- Under the Minnesota statewide floodplain management standards, local communities cannot allow development in the floodway that would cumulatively cause more than six inches increase in the height of the 100-year flood (MN DNR). Development is normally allowed in the flood fringe provided that the buildings are placed on fill so that the lowest floor, including the basement, is above the 100-year flood level.
- Minnesota Building Code § 6120.5800 requires public utility facilities within the floodplain to be designed to minimize increases in flood elevations and be compatible with existing local comprehensive floodplain development plans. Where failure or interruption of the public facility results in danger to the public health or safety, protection to the flood protection elevation shall be provided. The flood protection elevation is defined as an elevation one foot above the 100-year flood. The elevation of the lowest floor of a dwelling must be at or above the flood protection level. Local regulations will also require the access road elevation to be within two feet of the flood protection elevation.
- MPCA design guidelines for wastewater treatment facilities require treatment plant structures and electrical and mechanical equipment to be protected from physical damage by the 100-year flood. Additionally, treatment plants should remain fully operational and accessible during the 25-year flood. These requirements apply to new construction and to existing facilities undergoing major modification.

If new facilities are constructed in the floodplain, hydraulic modeling and coordination with the DNR are required to confirm that the new facilities do not result in a flood elevation change more than six inches. To avoid this, it is recommended that any new facilities be located outside the 100-year flood elevation. Due to the location of the 100-year floodplain on the southern end of the site, construction in the 100-year flood plain is not likely to be an issue with structure placement, but needs to be considered during site grading, and may limit expansion of some facilities. A FEMA Map is included in Figure 3.


mine if flood insurance is available in this community, contact your
e agent or call the National Flood Insurance Program at (800) 638-6620.
N
APPROXIMATE SCALE
400 0 400 FEET
LEGEND
SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
ZONE A No base flood elevations determined.
ZONE AE Base flood elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding; velocities also determined.
ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.
FLOODWAY AREAS IN ZONE AE
OTHER FLOOD AREAS
ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.
OTHER AREAS
ZONE X Areas determined to be outside 500-year floodplain.
ZONE D Areas in which flood hazards are undetermined.
UNDEVELOPED COASTAL BARRIERS†
Identified 1983
Identified 1990 or Later
Otherwise Protected Areas Identified 1991 or Later
†Coastal barrier areas are normally located within or adjacent to special flood hazard areas.
Floodplain Boundary
Floodway Boundary
Zone D Boundary
Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
513 Base Flood Elevation Line; Elevation in Feet*
D D Cross Section Line
(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone*
RM 7x Elevation Reference Mark
WWTF Boundary
ZONE X
ZONE X
ZONE X
ZONE AE
ZONE X
ZONE X
ZONE X
ZONE X
ZONE X
ZONE AE
STATE BOUNDARY
WISCONSIN
MINNESOTA
MISSISSIPPI RIVER
CHICAGO AND NORTH WESTERN
BROADWAY ST
5TH
E 25TH ST
SANBORN STREET
SOO LINE RAILROAD
TREMPEALEAU DR
COUNTY DITCH NO. 3
NO. 3
Culvert
LEVEE
LEVEE
CORPORATE LIMITS
ADAMS
JEFFERSON
LOUISA
BRIDGE
STREET
658
NOTE:
THIS AREA PROTECTED FROM THE 100-YEAR FLOOD BY LEVEE, DIKE OR OTHER STRUCTURE SUBJECT TO FAILURE OR OVERTOPPING DURING LARGER FLOODS.
This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.

4.2 Wastewater Treatment Facility

The WWTF is described in the following sections. Photos of the existing equipment are referenced throughout and are included in Appendix L.

4.3 Liquid Treatment System

The liquid treatment system consists of screening, grit removal, primary clarifiers, trickling filters, screw pumps, solid contact tanks, final clarifiers and disinfection. The major components of the liquid treatment system are summarized in the following sections.

4.3.1 Preliminary Treatment

The Preliminary Treatment Building was originally constructed in 1970. Several pieces of equipment were replaced since 1970 due to age, including a rehab of the grit pumps, sludge pumps, and in-plant waste pumps. The primary role of this building is to provide influent metering and screening. The aerated grit tanks are connected to the north side of the building, following screening. The grit pumps, aeration blower, classifier, and primary sludge pumps are all located inside the preliminary treatment building. The lower level has garage space and a dumpster loading area. The majority of the process equipment is in satisfactory condition; however the bar screen and grit blowers are in poor condition and are at the end of their useful life.

The electrical room for this building is physically attached to the screenings room. Hydrogen sulfide from the screening room has caused deterioration of the electrical equipment. As noted in the Solids Preliminary Design Report, improvements to the Preliminary Treatment Building are required to bring the space up to National Fire Protection Association (NFPA) code. The following sections detail the capacity and condition of the individual process units.

4.3.1.1 Mechanical Screening and Dewatering

Flow enters the plant below-grade through a 30-inch forcemain at el. 659.5 ft, is metered, and then enters a small basin to allow for Waste Activated Sludge (WAS) to combine with plant influent to provide co-thickening. The combined flow enters one of three channels, all 4 ft wide by 5 ft 8 in deep. The primary channel directs flow through a ¼” mechanical bar screen, upgraded in 1995 and refurbished in 2011 with a new element belt, which also includes a dewatering unit (See Figure L-1). The second channel has a ½” manual bar screen bypass, for use when the mechanical bar screen is being serviced. There is also one bypass channel, which is reserved for emergency situations.

The water level and velocity through the screening channels is set by the outlet weirs in the grit chambers. The depth upstream of the mechanical bar screen is 0.99 ft, and the depth through the other two channels is 1.66 ft. Flow through the channel meets the recommended design range at average wet weather flow and is slightly above the recommended velocity at peak hourly flow.

The mechanical bar screen is currently rated to 8,500 gpm (12.24 MGD). The mechanical bar screen is in poor condition and is approaching the end of its design life and should be replaced in the near future.

4.3.1.2 Aerated Grit Removal

Two aerated grit chambers are located on the north side of the screening and dewatering building and were constructed with the building in 1970. Each tank has a capacity of 16,250 gallons and sets the high-water level of 672.0 ft. Ten State Standards recommends a detention time of 3 to 5 minutes at design peak hourly flows. At the design PIWW of 15.1 MGD, the detention time is 3.1 minutes. Two grit pumps are located inside the Preliminary Treatment Building (Figure L-2).

The facility operators report issues with the grit removal efficiency of the existing aerated grit system. The facility operators have observed a buildup of grit in the primary digesters, requiring the digester to be taken out of service for cleaning. Alternatives to the aerated grit chambers were evaluated as part of the 2017 Solids Preliminary Design Report.

4.3.1.3 In-Plant Waste Lift Station

The plant has one in-plant lift station, which can hold approximately 3,000 gallons, located in the Preliminary Treatment Building. Two pumps service the lift station (Figure L-3).

4.3.1.4 Primary Sludge Pumps

Two (2) 150 gpm sludge pumps are located on the northeast corner of the preliminary treatment building (Figure L-4) and were installed in 2016. The pumps receive sludge from two (2) 6-inch sludge lines and two (2) 6-inch scum lines from the primary clarifiers. The pumps send sludge to the digesters.

4.3.1.5 Influent Flow Measurement and Sampling

One (1) influent magnetic flow meter is located in the lower level of the Preliminary Treatment Building on the 24-inch plant influent pipe (Figure L-5). A new meter was installed in 2018 as the previous meter, a radar sensor, did not accurately measure flow during periods of high inflow and infiltration, as the water was significantly clearer during those periods.

4.3.2 Primary Clarifiers

Two (2) primary clarifiers are located on either side of the grit tanks (Figures L-6 and L-7) and are original to the plant (1970). Both tanks are 95-ft diameter with 7-ft side water depth. Ten States Standards suggests an AWW Surface Overflow Rate of 700 gpd/sf and a PHWW Surface Overflow Rate of 1200 gpd/sf. Assuming both tanks are in service at full capacity, approximately 14,200,000 GPD at AWW and 17,00,000 GPD at PHWW can be treated through the clarifiers. Ten States Standards also recommends a weir loading rate at peak hour flows less than 30,000 gpd/linear feet. Both clarifiers use two-sided circular weirs, which provide ample weir length. The current weirs can meet the recommended weir loading rate up to over 30,000,000 gpd of flow.

The detention time in the primary clarifiers varies based on plant flow. At the AWW flow of 9.5 MGD, the detention time is 2.1 hours. Design standards state that the typical detention time is 1.5 to 2.5 hours at design flow. The clarifiers are considered appropriately sized for the current flow. It is estimated that 30 to 50 percent of the BOD and 50 to 70 percent of the TSS is removed through the clarifiers, depending on the flow.

At an age of 51 years, the primary clarifier internal components require replacement as they are at the end of their useful life. The structures appear to be in good condition, though were not inspected below the water level.

4.3.3 Trickling Filters

Two (2) Trickling Filters follow the primary clarifiers (Figures L-8 and L-9). Each filter is original to the plant and has an inner diameter of 135 feet and an average rock depth of 7 feet. The US EPA states that the Total Organic Load (TOL) of trickling filters should be between 25- and 100-pound BOD/day/1000 cubic feet. A TOL of 100 pounds BOD/day/1000 cu. ft. allows for a load of up to 12,825 pounds per day at the peak hourly flow of 15 MGD. The maximum daily level of BOD from 2016 to 2020 was 11,010 pounds per day (ppd) in the influent (not accounting for primary clarifier reduction). The tricking filters have the required capacity with one in service.

The BOD coming into the trickling filters is dependent on the removal rate of BOD in the primary clarifiers. Typically, primary clarifiers are assumed to have a 30% BOD removal rate, however these clarifiers were designed with the assumption of providing up to 46% BOD removal. The design BOD loading rate with both units in service is 39.36 ppd BOD/1000 cubic feet at 46% removal in the primary clarifiers and 51.02 ppd BOD/1000 cubic feet at 30% removal in the primary clarifiers.

4.3.3.1 Splitter MH No. 1

Splitter Manhole (MH) No. 1 is located just south of the trickling filters. Effluent from the primary clarifiers combine at MHP-1, along with a grit tank bypass line, and flow to Splitter MH No. 1. The splitter can hold approximately 9,350 gallons and has two gate operators to control the flow to each Trickling Filter. A 24-inch recirculation pump discharge pipe enters the manhole approximately 12 feet above the finished floor elevation. A separate chamber on the east side of the manhole receives treated water from the trickling filters and directs to Splitter MH No. 2. The 10-inch In-plant Waste pipe from screening also enters the east side of the manhole, joining with the flow to Splitter MH No. 2.

4.3.3.2 Recirculation Pumping Station

The recirculation pumping station is located in between the solids contact tanks and was constructed in 1970. The building houses two (2) WAS pumps. The WAS pumps draw from the sludge wetwell, which receives WAS from the final clarifiers, and discharges to the secondary thickeners. The building previously housed two (2) recirculation pumps, which recirculated flow back to the trickling filter splitter box. Effluent is circulated through a sump in the lower level of the building to monitor for dechlorination dosage.

4.3.4 Screw Pumps

The trickling filters are followed by three (3) 8,050 gpm screw pumps, added to the plant in 1996 (Figure L-10). They provide 15 feet of head. The screw pumps are in good condition.

4.3.4.1 Waste Pump Wetwell

The waste pump wetwell was constructed as part of the 1996 renovation. The wetwell receives waste from the final clarifier scum and belt press filtrate. The effluent flows to the WAS pumps located in the recirculation pump station.

4.3.4.2 Screw Pump Wetwell

The screw pump wetwell was added to the plant in 1996. Flow enters from Splitter MH No. 2 and is lifted by the screw pumps. It is attached to the north end of the screw pump structure and is approximately 17 ft long by 9.75 ft wide by 17 ft deep.

4.3.5 Solids Contact

The plant has two (2) aerated solids contact tanks in the original plant's final clarifiers (Figure L-11). The basins were originally constructed as 85-ft diameter final clarifiers. These clarifiers were converted to solids contact tanks in 1996. The resulting basins have a 16.5-ft operation depth, 1.5 feet of freeboard, a 32-ft diameter center wall, and two (2) dividing walls. The tanks have 160,500 cubic feet of capacity.

Four (4) blowers provide air to the solids contact tanks. Two (2) blowers are original to the 1996 improvements project and two (2) were replaced in 2015 with smaller blowers to provide a larger range of turndown to control dissolved oxygen in the solids contact tanks. All four blowers are located in a building east of the tanks.

4.3.5.1 Splitter MH No. P-5

Splitter MH P-5 is a bypass manhole between the Screw Pump effluent channel and the solids contact tank. It is the only bypass provided for the solids contact tanks. In order to bypass Solids Contact Tank No. 1, all flow must be diverted towards Solids Contact Tank No. 2 to MH P-5, where the flow is then redirected to the effluent pipe leaving Solids Contact Tank No. 2, and returns back to Splitter MH 3.

4.3.6 Blower Building No. 2

Blower Building No. 2 was constructed as part of the 1995 Improvement Project and houses four (4) 1,500 SCFM blowers. The facility and all equipment are in good condition.

4.3.7 Final Clarifiers

Two (2) final circular clarifiers (Figure L-12) were added to the plant as part of the 1995 Improvements Project. The clarifiers have a 120-ft diameter and a 16-ft side water depth. A splitter box distributes flows from the solids contact tanks to the clarifiers.

At design AWW, the overflow rate is 462 GPD/ft2 and the detention time is 6.22 hours. Each tank has a vacuum sludge collection with a return sludge rate of 5,600 GPM. Return sludge flows by gravity to the screw pumps. Waste sludge is pumped by the WAS pumps.

The final clarifier mechanisms, at 25 years old, are approaching the end of their typical useful life. Photos of the clarifier from 2015 and 2020 show that some components are in serviceable condition, while others, like the suction tube, warrant replacement.

4.3.7.1 Effluent and Scum Boxes

Each clarifier has an effluent and scum box. Effluent and Scum from Final Clarifier No.1 flows to the Final Clarifier No. 2 effluent and scum boxes, respectively. The combined effluent continues to Manhole P-2. The combined scum line combines with flow from the WAS splitter and flows to the sludge wetwell.

4.3.8 Disinfection

Final clarifier effluent flows to the chlorination manhole where it is dosed with chlorine gas, then flows to the dechlorination manhole. The outfall line is designed to provide 16.79 minutes of disinfection at the design peak instantaneous wet weather flow.

4.4 Solids Handling System

The WWTF was originally constructed as a trickling filter plant in 1970. In 1985, the current dewatering belt press and outside sludge storage were installed. The organic capacity of the plant was expanded in 1996 through several major renovations including the conversion of, the secondary anaerobic digester to a second primary anaerobic digester. A microturbine was also installed to utilize the biogas from the digestion process. The solids system is also described in Appendix M.

The solids handling system consists of:

- Primary solids are routed to a sludge clarifier, where they are thickened (along with secondary sludge) to 1.75-2.5% solids prior to digestion.
- Waste activated sludge (WAS) at about 0.5% solids from the two final clarifiers flows back to the head of the plant where it is co-settled in the primary clarifiers and then in the sludge clarifier. There are two gravity thickeners to thicken the WAS, but challenges with these units and lack of performance, resulted in co-settling WAS with primary sludge.
- The thickened solids are fed to two anaerobic digesters. The digesters are both mixed and heated, and have floating covers.
- Digested solids are dewatered with a belt filter press (BFP). The BFP produces cake that is 13% solids on average. The City has tested newer equipment, without significant improvements to percent solids.

Biogas generated from the anaerobic digesters is used to fuel a 65kW microturbine.

4.4.1 Primary Sludge Thickener

Primary sludge is removed to 5% or 1.5%, corresponding to 16,870 GPD and 56,236 GPD respectively, by the two (2) 300 gpm sludge pumps in the Preliminary Treatment Building. The primary sludge is transferred to the gravity sludge thickener that is 30-ft diameter with a 12-ft side-water depth.

4.4.1.1 Scum Wetwell

The scum wetwell is located on the northeast portion of the primary sludge thickener. It is 4-ft wide by 4-ft long by 5.5-ft deep. It has a sloped bottom to drain the accumulate scum from the clarifier to the 6'' scum pipe to the sludge pump.

4.4.1.2 Supernatant Wetwell

The supernatant wetwell is attached to the east side of the Primary Sludge Thickener and is 6-ft wide by 5-ft long by 5.5-ft deep. The wetwell receives flow from the thickener launder and distributes to two supernatant lines, one to Splitter MH1 and to MH P-5.

4.4.2 Aerated Secondary Sludge Thickeners

Secondary clarifier underflow is pumped by two (2) 812 gpm WAS pumps into two aerated holding tanks for thickening. Each tank is 50 ft in diameter and has a 14-ft side water depth. Each tank is fitted with a coarse-bubble diffuser system powered by three (3) 700 SCFM rotary blowers. Currently, these secondary gravity thickeners are not used.

4.4.2.1 Supernatant Wetwell

Each secondary sludge thickener has a 5-ft wide by 8-ft long by 10.5-ft deep supernatant wetwell. The wetwell has four outlet valves that discharge flow from the thickener to the wetwell at several elevations. The bottom of the wetwell is sloped to allow for drainage to the 10-inch supernatant outlet pipe.

4.4.3 Blower Building No. 1

Blower building No. 1 is located north-west of the thickeners and was constructed as part of the 1996 improvements project. There are three (3) blowers that supply air to the aerated secondary sludge thickeners via a 6-inch pipe. There are two (2) sludge pumps that receive sludge from the thickeners and discharge to the primary thickener and digester via 6-inch pipes.

4.4.4 Anaerobic Digester Complex

The digester complex (Figures L-13 and L-14) was constructed with the original plant and houses two (2) digester tanks, biogas conditioning equipment, boilers, a heat exchanger, sludge recirculation, a polymer feed system, and a belt filter press.

The two 60-ft diameter digesters are attached to the south end of the Digester Complex. Together, approximately 50,000 gpd of primary and secondary sludge can be digested within the minimum 15-day detention time, providing ample capacity.

The belt filter press is a 2.0-m press. A 1.5-ft wide conveyor with a positive slope of 1:4 conveys the solids approximately 38 feet to the solids loadout bay.

The Anaerobic Digester Complex is described in the Solids Preliminary Design Report (Appendix M). The building does not comply with NFPA codes and additional dewatering capacity is recommended. With the improvements to the digesters in 2011 and 2017, it is assumed that no improvements are necessary to the digester units, however operators expressed a desire for additional gas storage.

4.4.5 Sludge Storage Beds

Four (4) sludge storage (Figure L-22 and L-23) beds were constructed as part of the 1985 improvements projects. Each bed is approximately 36 feet by 96 feet. A separate sludge storage area to the east of the beds is approximately 120 feet by 110 feet.

4.4.6 Cake Storage Building

A separate cake storage building was constructed in 1996 and is approximately 105 feet by 120 feet. It is located northeast of the sludge beds and east of the thickeners. This is the primary storage location for sludge at the facility.

4.4.7 Garage

The garage was constructed sometime between 1985 and 1996. The garage is approximately 40 feet by 80 feet. The garage is directly east of the digester complex.

4.4.8 Administration Building

The administration building (Figure L-24) is original to the plant and was renovated in 2019 to include additional space for a kitchen and meeting room. The initial layout provided approximately 1,600 square feet, and with the addition the current area is approximately 3,000 square feet.

4.5 Collection System

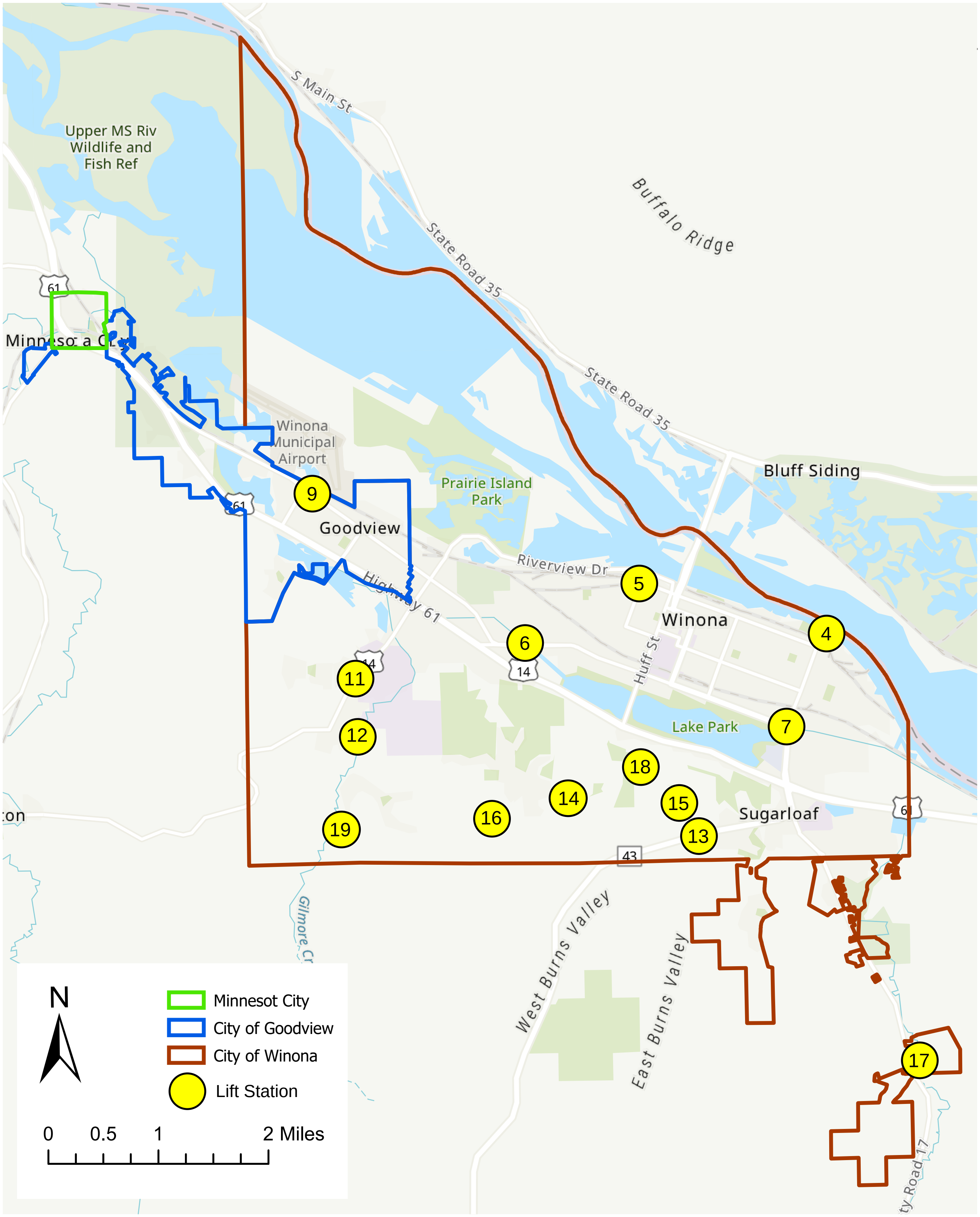
The City of Winona operates a total of 14 lift stations. Table 11 summarizes the pumping capacity and age of each station.

Table 11 – Lift Station Summary

Lift Station No.	Forcemain	Number of pumps	Power (hp)	Pump Capacity (gpm), per pump	Year Established	Last Updated
4	24" CIP	3	140	5600	1946	2017
5	12" CIP	3	30	2500	1925	2019 (2022)[1]
6	12" DIP	2	20	1000	1948	2019
7	24" DIP	4	(2) at 70 (2) at 125	(2) at 2300 (2) at 4000	1948	2015
9	8" CIP	2	20	450	1968	2019
11	6" PVC	2	7.5	350	1998	2021
12	6" PVC	2	7.5	350	1998	2019
13	4" PVC	2	7.5	200	2002	2014
14	8" PVC	2	30	350	2003	2021
15	4" PVC	2	10	200	2003	-
16	4" PVC	2	5	100	2007	-
17	8" HDPE	2	10	200	2005	-
18	4" PVC	2	10	200	2006	-
19	6" HDPE	2	5	200	2019	-

[1] Planned rehabilitation

A map of the lift stations operated by the City of Winona is shown in Figure 4 below.



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Project: WINON 160394
Print Date: 11/19/2021

Map by: ctragesser
Projection:
Source:

Lift Station Map
Winona, MN

Figure
4

The lift stations are in all in good condition and are on a maintenance and pump replacement schedule. Lift stations should be continuously monitored and upgraded as equipment reaches the end of its useful life.

5 Alternative Evaluation

5.1 Overview

The Winona WWTF requires improvements to continue current operation, improve performance, meet new effluent limits, and be prepared for future limits. These improvements are recommended to be addressed as multiple separate phases:

- Phase 0 – Immediate Upgrades – Address previously identified or scheduled improvements, including the preliminary treatment building.
- Phase 1 – Total Phosphorous – Upgrade the liquid process train to meet current Total Phosphorous limit, upgrade the biosolids components as required, and other facility improvements.
- Phase 2 – Total Nitrogen – Upgrade the liquid process train to meet predicted Total Nitrogen Limit. Timing driven by regulations.
- Phase 3 – Useful Life – Other long-term improvements as required.

As the population is predicted to decline between 2021 and 2045, the capacity of the plant will reflect current flow conditions for all phases.

Phases 1 and 2 have several alternatives that are capable of meeting the specific goal. The Alternatives addressed in this Facility Plan relate to secondary treatment options – how to address new and potential future nutrient regulations. Each Alternative is explored further in the following sections. Other Alternatives, considered for the solids processes, are described in detail in the Solids Preliminary Design Report, attached as Appendix M.

Table 12 – Effluent Water Quality Targets per Phase

	Average TP limit (mg/L)	Average TN limit	Comments
Phase 0	-	-	Upgrades do not address nutrient removal or limits
Phase 1	0.7 mg/L	-	Updates focused on phosphorous removal
Please 2	0.7 mg/L	10 mg/L	Updates focused on nitrogen removal in addition to existing phosphorous removal
Phase 3	-	-	Upgrades increase reliability but do not specifically address proposed or potential future limits

Three alternatives were developed to achieve the treatment goals of Phases 1 and 2, as shown below in Table 13. Two additional alternatives were initially considered and deemed as not feasible for the project: a do-nothing approach and a full plant replacement.

A do-nothing approach is not feasible as the plant is not meeting the required new total phosphorous limit and has some equipment which is beyond its usefully life and needs to be upgraded.

A full-plant replacement would bring the plant to full compliance with permit requirements. However, as much of the equipment of the plant has remaining useful life as-is or with minor improvements, a full-plant replacement would decommission working and effective equipment and is cost prohibitive.

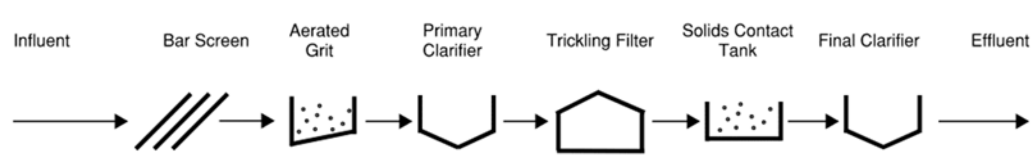
The following alternatives propose modifications to the existing WWTF. The alternatives reuse as much of the existing equipment as possible while maximizing long term operation and maintenance cost savings and plant performance.

Table 13 – Comparison of Phases and Alternates

Alternative	Phase 1 (Meet TP limit of 0.7 mg/L)	Phase 2 (Meet TP limit of 0.7 mg/L AND TN limit of 10 mg/L)
Alternative 1	- Chemical Phosphorous Removal - Rehab existing Trickling Filters	- Denitrification Filter - Supplemental carbon for denitrification
Alternative 2	- Biological-P via Integrated Fixed-Film Activated Sludge - Chem-P for Polishing	- Add additional IFAS Media
Alternative 3	- Biological Phosphorous Removal via anaerobic treatment followed by aerobic treatment (A/O) - Chem-P for Polishing	- Biological Nitrogen Removal Via Anaerobic, Anoxic, and Aerobic treatment (A2/O) - Supplemental carbon for denitrification

Figure 5 shows the existing liquid treatment schematic, for comparison between alternatives.

Figure 1 – Current Treatment Schematic



All cost estimates provided in this report are preliminary and are based on the following assumptions:

1. A 30% contingency is applied to all estimates for the preliminary planning phase.
2. The costs include a 20% mark-up for engineering design and construction administration.
3. All costs are based on 2021 equipment costs for similarly sized projects. As market conditions are volatile, these costs may not be accurate or valid at the time of design or construction.

5.2 Phase 0 – Immediate Upgrades – Improve Existing Equipment

The Solids Study (Appendix M) identified several improvements that should be performed to be in compliance with National Fire Protection code. Due to the timing of the new NPDES permit, some of the improvements identified in the Solids Study are included in Phase 1. Phase 0 will include Pretreatment building improvements to replace aging equipment and address NFPA codes.

For additional details, see Section 11 of Appendix M. The updated cost for this phase adjusted to 2021 dollars is $1,984,000.

5.3 Phase 1 – Phosphorous and Phase 2 – Nitrogen Removal

Three alternatives were developed to address phosphorous and nitrogen removal. Each alternative has two phases: Phase 1 targets phosphorous removal, and Phase 2 targets nitrogen removal. Because the direction planned to address phosphorus (Phase 1) impacts the cost to implement nitrogen removal (Phase 2), these two phases are looked at together for a holistic, long-term approach.

5.3.1 Phosphorus Removal

Phosphorus removal is the driver for Phase 1 of the three alternatives. Phosphorus can be addressed chemically, using chemicals such as alum, ferric chloride, ferric sulfate, and others, or biologically by creating conditions for microorganisms to uptake phosphorus. As phosphorus limits drop below 0.5 mg/L, the effectiveness of treatment becomes a function of solids removal, requiring some facilities to install filters or even membranes to meet low concentration levels.

As noted in Table 2, the target effluent total phosphorus concentration varies from 0.36 to 1.08 mg/L, depending on the WLA assumed and the wastewater volume. Target effluent concentrations with current flow conditions should be easily achieved without a tertiary filtration step. The scenario with the worst-case effluent concentration of 0.36 mg/L (assuming the long-term average WLA and future design flows) will be challenging without filtration. However, particulate phosphorus typically comprises 5% of the effluent TSS at a facility treating for phosphorus. If the effluent TSS concentration is 7 mg/L or less, the effluent phosphorus would be approximately 0.36 mg/L or less. Other facilities in Minnesota have achieved effluent total phosphorus levels of 0.3 mg/L without filtration. Given the small likelihood of the flows reaching the design conditions and that the WLA of this worst-case scenario is not a requirement, implementing a tertiary filtration step today is not warranted.

5.3.2 Nitrogen Removal

Total nitrogen removal requires the conversion of ammonia to nitrogen gas. The MPCA is currently planning for water quality standards for either nitrate or total nitrogen. The specific effluent limit(s) have not been defined but are expected to be phased into permits starting in 2024. For the basis of planning, SEH has assumed that in Phase 2 the facility would be required to target an effluent total nitrogen (TN) limit of 10 mg/L.

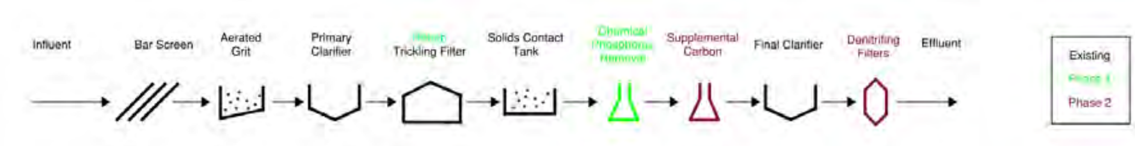
5.4 Alternatives

The three identified alternatives address the need to meet the new phosphorous limit through modifications to the secondary treatment process. All alternatives do not propose changes to the preliminary treatment building, primary clarification, final clarification, or disinfection processes. These improvements, though required, are consistent across the three alternatives and are not included in the comparison of alternatives but are addressed in Section 6.

5.4.1 Alternative 1 – Chemical Nutrient Removal

This alternative maximizes reuse of existing equipment and processes at the WWTF. Figure 6 proposes the treatment train for this alternative:

Figure 1 – Alternative 1 Treatment Train



5.4.1.1 Phase 1

Phase 1 continues to keep all existing processes in operation. Most of the equipment in the liquid treatment train is in good condition and can continue to operate with minimum upgrades. However, the trickling filters require complete media replacement to continue to be operable. While the trickling filters are not required for the success of Phase 1, they are required for nitrification in Phase 2. Therefore, improvements to the trickling filters are included in Phase 1 so that they can be operated in both phases. Rehabilitating the trickling filters does offer additional BOD loading capacity and helps reduce the impact of peak loading events from industry.

The most significant aspect of Phase 1 is the addition of a chemical phosphorous removal system. Ferric chloride or alum are commonly used for chemical phosphorous removal. The chemical feed system would require a new building to house the chemicals.

The following improvements are required to achieve the above treatment desired in this alternative:

5.4.1.1.1 Trickling Filters

The trickling filter media has reached the end of its useful life and requires complete replacement. The recirculation pumps also require complete replacement.

5.4.1.1.2 Solids Contact Tanks

The existing aeration equipment and laterals have reached the end of their useful life and need to be completely replaced. The blowers feeding the aeration equipment also need to be replaced. The blower building, housing these blowers, needs to be modified to be brought up to code.

5.4.1.1.3 Chemical Feed

New chemical feed equipment and piping is required for this alternative to achieve chemical phosphorous removal. This includes the construction of a new chemical feed building and piping to convey chemical to the treatment process.

5.4.1.1.4 Site Piping

Additional site piping is required to accommodate the new chemical feed system.

5.4.1.2 Phase 2

Phase 2 requires both supplemental carbon addition and denitrification filters to meet the required effluent limit. Both of these items require a new structure. A 75-ft by 75-ft building is the minimum footprint required. In addition, a pumping structure is needed to move final clarifier effluent to the filters, which will likely be above ground.

5.4.1.3 Preliminary Cost Estimate

A preliminary cost estimate is provided in Table 14. This cost estimate only includes upgrades relating to the liquid train associated with phosphorous and nitrogen nutrient removal.

Table 14 – Alternative 1 Preliminary Cost Estimate

Alternative 1			
Cost Element	**Phase 1**	**Phase 2**	**Total**
Construction Cost Estimate[1]	$10,798,000	$24,237,000	$35,035,000
Present Worth of Annual O&M[2]	$3,181,000	$7,938,000	$11,119,000
Salvage Value[2]	$1,946,000	$5,505,000	$7,451,000
20-Year Net Present Value	$12,033,000	$26,670,000	$38,703,000

1. Includes contingency (30%), permitting (1%), Mobilization/bonding/insurance/testing (6%). Engineering Design and Construction (20%)
2. Assumes 3% inflation rate. Phase 1 OM applied for years 1-10, Phase 2 OM applied years 10-20.

The above Construction Cost Estimate includes the following items:

- Phase 1:
  - Rehab trickling filters (media, dome panel, underdrain system, concrete repair)
  - New blowers for solids contact tanks
  - Modifications to Blower Building 2
  - New laterals and diffusers for solids contact tanks
  - Chemical feed piping
  - Modifications to recirculation pump station
  - New recirculation pumps to tricking filters
  - New chemical feed building and feed system
  - Site piping modifications
- Phase 2:
  - New chemical feed building and feed system
  - New filter building with filters
  - Site piping modifications
  - Pumping from Final Clarifiers to Filters

The Operation and Maintenance estimate includes electricity usage, chemical usage, aeration demand, thickening costs, and operator/maintenance labor costs.

5.4.2 Alternative 2 – Biological Nutrient Removal via IFAS

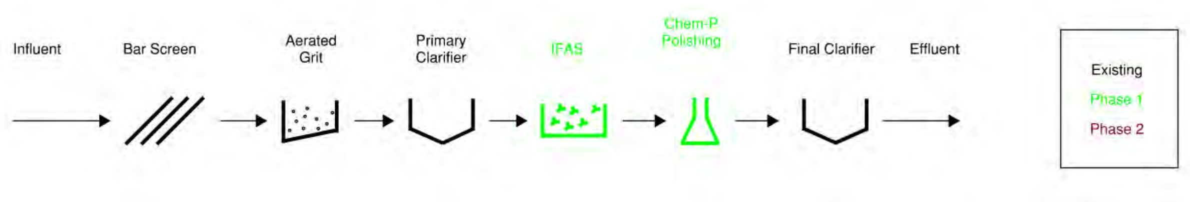
Alterative 2 utilizes the Integrated Fixed-Film Activated Sludge (IFAS) system for secondary treatment. IFAS is typically used for retrofit projects and offers BOD, phosphorous, and nitrogen removal in a small footprint. IFAS can be implemented using either fixed or free media designed for attached growth, placed in the existing solids contact basins. The media and bacteria are selected to maximize COD removal, phosphorous removal, nitrification and denitrification.

Phosphorous reducing chemicals are also added between the aeration basin and final clarifier to provide chemical polishing redundancy as required by the MPCA but are not relied on for the success of the process.

The IFAS system relies upon the carbon contained in the BOD loading and, therefore, the reduction of BOD by the trickling filters would hinder the efficiency of the system. The trickling filters would be decommissioned.

Figure 7 proposes the treatment train for this alternative:

Figure 1 – Alternative 2 Treatment Train



5.4.2.1 Phase 1

Phase 1 consists of removing the trickling filters, modifications to the splitter box and existing solids contact basins, and the addition of media collection screen(s) after the WAS pumps in the recirculation pump station. This alternative also provides the capabilities for chemical polishing to provide redundancy.

There are several variations of the traditional IFAS system. The most common and traditional systems utilize plastic media for attached biological growth. A newer hybrid IFAS and organic biofilm system, Nuvoda, is able to achieve similar or better effluent quality to traditional IFAS systems in a smaller footprint, reducing both initial and long-term costs. Section 6 - Recommendations further discusses this technology and other similar technologies. The cost estimates for Alternative 2 for both Phase 1 and Phase 2 assume the use of the Nuvoda IFAS technology rather than the traditional IFAS technology. Based on preliminary calculations, traditional IFAS systems would require additional basin capacity, introducing additional costs than shown below.

5.4.2.2 Phase 2

Phase 1, while focused on phosphorous removal, simultaneously provides high nitrogen removal. Depending on the nitrogen limit, Phase 2 may not be necessary. In the event of a lower nitrogen limit than achievable by the Phase 1 system, additional media can be added to further reduce the effluent nitrogen concentrations down to an estimated 10 mg/L.

5.4.2.3 Preliminary Cost Estimate

A preliminary cost estimate is provided in Table 15. This cost estimate only includes upgrades relating to the liquid train associated with phosphorous and nitrogen nutrient removal.

Table 15 – Alternative 2 Preliminary Cost Estimate

Alternative 2			
Cost Element	**Phase 1**	**Phase 2**	**Total**
Construction Cost Estimate[1]	$5,039,000	$412,000	$5,451,000
Present Worth of Annual O&M	$2,165,000	$1,611,000	$3,776,000
Salvage Value[2]	$335,000	$0	$335,000
20-Year Net Present Value	$6,869,000	$2,023,000	$8,892,000

1. Includes contingency (30%), permitting (1%), Mobilization/bonding/insurance/testing (6%). Engineering Design and Construction (20%)
2. Assumes 3% inflation rate. Phase 1 OM applied for years 1-10, Phase 2 OM applied years 10-20.

The above cost estimate includes the following items:

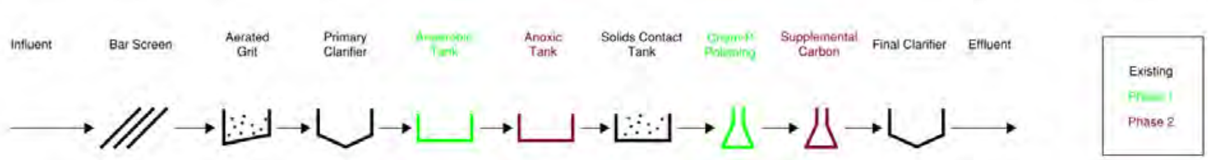
- Phase 1:
  - Remove trickling filters
  - New blowers for solids contact tanks
  - Modifications to Blower Building
  - New laterals and diffusers for solids contact tanks
  - Modify walls in solids contact tanks
  - Modifications to recirculation pump station
  - New chemical feed building, feed system, and site piping
  - New media retention screen after WAS pumps in Recirculation Pump Building.
  - Nuvoda media
- Phase 2:
  - Additional media for solids contact tanks

5.4.3 Alternative 3 – Biological Nutrient Removal Via A/O and A2/O

Another method of phosphorous reduction is via biology through a traditional suspended-growth anaerobic/oxic (A/O) configuration, which consists of an anaerobic (and anoxic) basin followed by an aeration basin. Phosphorous removal is achieved biologically. Phosphorous reducing chemicals are added between the aeration basin and final clarifier to provide redundancy and operational flexibility.

Figure 8 proposes the treatment train for this alternative:

Figure 1 – Alternative 3 Treatment Train



5.4.3.1 Phase 1

As the plant already has two aeration basins, only anaerobic basins are required for the A/O. This basin is sized to provide adequate hydraulic residence time (HRT) and solids residence time (SRT) for phosphorous accumulating bacteria to activate. Adequate BOD is required for this process, and therefore the trickling filters, which lower the BOD loading to the solid contact tanks, are decommissioned as part of this alternative.

5.4.3.2 Phase 2

The A2/O process (Anaerobic/Anoxic/Oxic) removes nitrogen biologically through anaerobic, anoxic and oxic basins. As Phase 1 provides the anaerobic and oxic basins, only an anoxic basin would be added in Phase 2 to achieve denitrification. As much of the BOD required for denitrification is consumed in the nitrification process, supplemental carbon, such as glycerin or glycol, would likely be required.

5.4.3.3 Preliminary Cost Estimate

A preliminary cost estimate is provided in Table 16. This cost estimate only includes upgrades relating to the liquid train associated with phosphorous and nitrogen nutrient removal. Costs for other elements are provided in Section 6.

Table 16 – Alternative 3 Preliminary Cost Estimate

Alternative 3			
Cost Element	**Phase 1**	**Phase 2**	**Total**
Construction Cost Estimate[1]	$14,137,000	$3,921,000	$18,058,000
Present Worth of Annual O&M	$2,235,000	$8,238,000	$10,473,000
Salvage Value[2]	$2,074,000	$692,000	$2,766,000
20-Year Net Present Value	$14,298,000	$11,467,000	$25,765,000

1. Includes contingency (30%), permitting (1%), Mobilization/bonding/insurance/testing (6%). Engineering Design and Construction (20%)
2. Assumes 3% inflation rate. Phase 1 OM applied for years 1-10, Phase 2 OM applied years 10-20.

The above cost estimate includes the following items:

- Phase 1:
  - Remove trickling filters
  - New blowers for solids contact tanks
  - Modifications to Blower Building 2
  - New laterals and diffusers for solids contact tanks
  - Modifications to recirculation pump station
  - New phosphorous chemical feed building, feed system, and site piping
  - New anerobic basins
  - Site piping modifications
  - New RAS lift station
  - Modifications to control structures between primary clarifiers and trickling filter splitter box
- Phase 2:

- New anoxic tanks
- Site piping modifications
- Supplemental Carbon chemical feed system, building, and site piping

5.5 Summary of Alternatives

All three alternatives are able to achieve the new phosphorous limit and estimated future nitrogen limit while reusing existing infrastructure. However, Alternative 2 can treat to the new limits without adding significant operational complexity and at a significantly lower capital and operational cost than Alternatives 1 and 3. Table 17 summarizes the capital costs, average operation and maintenance, salvage value, and 20-year net present value for each alternative.

Table 17 – Comparison of Alternatives

Cost Element	Alternative 1	Alternative 2	Alternative 3
Phase 1 Capital Cost	$10,798,000	$5,039,000	$14,137,000
Phase 2 Capital Cost	$24,237,000	$412,000	$3,921,000
Operation and Maintenance PV	$11,119,000	$3,776,000	$10,473,000
Salvage Value	$7,451,000	$335,000	$2,766,000
20-Year Net Present Value[2]	$38,703,000	$8,892,000	$25,765,000

1.Assume operating at full scale
2.Assume Phase 2 completed at year 10

The amount of solids generated for each alternative was estimated to ensure that the solids processes have capacity. Alternative 1 is projected to have the greatest solids production because it relies upon chemical phosphorus removal, while there are variations in the volumes projected, the variation was not significant to impact the comparison of alternatives.

While the cost comparison strongly favors Alternative 2, other non-monetary factors should be considered when selecting the treatment process. Below are some of the non-monetary factors considered:

- Complexity of Operation: As Alternative 2 has the least amount of major process units, it is the lease complex.
- Flexibility: Alternative 1 provides the greatest organic capacity, and as such, offers a great amount of flexibility for future loadings. Alternative 2 also offers flexibility with varying media volumes to achieve different levels of treatment.
- Sustainability: A primary difference impacting sustainability is reliance on chemicals. Alternative 2 has the least reliance on chemicals.
- Power Usage: Alternative 1, with continued use of the trickling filters, has lower aeration demand than the other 2 alternatives. Alternative 3 is expected to have the greatest power demand due to the mixers added for the anaerobic and anoxic zones.
- Odor: The existing trickling filters produce some odor. Less odor is anticipated with Alternatives 2 and 3.
- Lifetime of Processes/Basins: When planning for the next 20-years, it is important to invest wisely and consider the remaining life of existing structures. Alternative 3 involves the greatest amount of new structures, and therefore has the best useful life.

- Process stability: Alternative 1 offers stability to handle greatly varying load fluctuations with the trickling filters. However, the system still experiences instability. Alternative 2 is believed to have the greatest process stability, in fact, some wastewater treatment plants bring in the Nuvoda media as a way to recover from a process upset.
- Maintenance: With the least individual processes, Alternative 2 is easier to maintain than the other two alternatives.

Given the significant cost savings and operational benefits of Alternative 2, it is recommended that the City of Winona pursue this alternative further. The next section provides additional detail on Alternative 2 and presents recommended next steps.

5.6 Phase 3 – Future Needs

As the improvements identified in Phases 0-2 do not address every component of the plant, the City should still plan for replacements in the long-term future. These replacements include:

- Influent Pumps
- Screw Pumps
- Anaerobic Digester Covers
- Primary Thickener Internals
- Microturbine and gas conditioning maintenance, replacement, and addition
- Continued collection system work
- Lift Station rehabilitation
- Final Clarifier rehabilitation

5.7 Resource Recovery

Wastewater treatment facilities offer the potential to produce recycled water, generate energy from biogas, and harvest nutrients from wastewater. These opportunities come with costs. The following sections describe these opportunities.

5.7.1 Water Reuse/Conservation

As part of the Cost & Effectiveness criteria, water reuse and conservation must be considered. The following are some of the water reuse/conservation opportunities.

- Industrial Reuse. There are a few industries within Winona that use a significant volume of water. One industry is in close proximity to the wastewater plant where supply of effluent may be viable.
- City Uses. City uses, such as irrigation, would require the addition of a filtration step to comply with Title 22 Reuse requirements. This would be cost-prohibitive given the amount of water used.
- In-Plant Uses. Effluent can be reused throughout the wastewater facility for wash water and spray water for screens, grit washers, and thickening and dewatering. This would require installing a non-potable water loop through the site and a booster pump skid, which is estimated to cost approximately $800,000. The City spends approximately $8,000 per year on potable water at the wastewater plant. Given this, an effluent reuse system is not economical.

- Water Efficient Devices.
  - The City does not currently require water efficient plumbing or devices, however does send educational newsletters to residents related to water conservation.
  - The City supports partner organizations, including energy companies, which offer rebates for retrofitting residential water usage devices (such as shower heads and faucets).
  - The City notifies users that experience significant increases in water usage to help identify leaks or other abnormalities.
  - The City offers select high-water users an option to use a phone application to view real-time water usage at residential locations to track water usage. The goal of this is to help residential users pinpoint high-usage activities in order to lower water consumption.
- Use or Replacement of Water Meters. The Cost & Effectiveness guidance suggests that more accurate water metering can make users more aware of the volume and cost of the water. The City has 90-95% of the meters changed to new Electronic Encode Register (ECR) type meters. These meters allow for more accurate measurements.
- Water Audits and Conservation Plans.
  - The following items were implemented based on the previous 10-year conservation plan:
    - Water supply system improvements (leak repairs, valve replacements, etc.) as part of ongoing preventative maintenance or immediate repair of leaks.
    - Midwest Leak Detection performs annual water leak surveys for the City of Winona.
  - The Water Conservation Report achieves the following items:
    - Estimates water loss based on water bills and usage.
    - Tracks residential water usage
    - Keeps accurate accounting of water treatment, distribution, and residential versus commercial/industrial water usage.
    - Maintains records of water conservation outreach efforts, including city ordinances, education and outreach activities, and seasonal water rates.

5.7.2 Energy Generation

The City's WWTF currently uses biogas from the anaerobic digesters for co-generation, using a microturbine to generate electricity and the waste heat from the microturbine to heat the digesters. In the 2019 Solids Preliminary Design Report, SEH evaluated opportunities to increase biogas generation, including high-strength waste co-digestion, and produce more electricity. Given the other capital investments at the facility, infrastructure to take hauled wastes is a lower priority.

5.7.3 Energy Conservation

The facility has made great strides over the years to replace pumps, blowers, and other equipment with VFDs and instrumentation to optimize performance. The recommended improvements are not going to have a significant impact on energy use.

5.7.4 Byproduct Recovery

Currently, the biosolids from the treatment process are land applied on farm fields. This practice puts to beneficial use the biosolids. There are other technologies, such as struvite harvesting, that form a saleable fertilizer product. Some larger facilities have implemented these types of technologies, but without facing maintenance costs associated with unintended struvite formation, struvite recovery is not economical at this scale.

6 Recommended Alternative

The recommended alternative, Alternative 2, is a hybrid IFAS and biofilm system producing granular sludge to improve settling and simultaneous phosphorous removal, nitrification, and denitrification. This alternative is specific to the Mobile Organic Biofilm (MOB) process by Nuvoda, Inc. As this technology is relatively new, a pilot study is highly recommended to demonstrate the applicability at this facility.

A similar technology also fits well within this retrofit alternative and is expected to have similar costs and operational impacts to the Nuvoda system. The InDENSE system by World Water Works also produces granular sludge and is aimed to improve settleability. Upon further vetting, this technology may also be piloted along with the Nuvoda technology to compare performance and select the technology that provides the best value to the facility.

The following sections assume the selection of the Nuvoda MOB system.

6.1 Description of Technology

The Nuvoda MOB process utilizes plant-based media to produce attached biological growth. The process produces fine granular sludge during the aeration treatment stage, providing the mechanism for phosphorous removal, nitrification, and denitrification. The system retains all granules through use of a rotary drum screen located at the WAS pumps. The entire system consists of ballast media pellets (which break away into small pieces to produce granules) and a rotary drum screen. Additional mixers in the RAS/WAS and final clarifier splitter basins (Splitter MH No. 3) are recommended to keep granules well-mixed and suspended.

The rotary drum screen provides extremely high granular retention by separating the granules from the sludge to be wasted. The retained granules are returned to the solids contact tanks.

It is recommended that plants budget for 2% media replacement annually, however some plants have gone several years without needing to add additional media to achieve effluent treatment goals. Media can be easily purchased as needed and can be added to the aeration tanks directly. The cost of 2% media replenishment is included in the operation and maintenance cost estimate.

6.2 Plant Modifications

As the media provides significant surface area, this process is able to utilize the existing basins without need for an increase in hydraulic volume. Only a few modifications are associated with this alternative.

6.2.1 Removal of Trickling Filters

The trickling filters are used today as roughing filters to reduce the BOD loading to solids contact tanks. This additional BOD is necessary to achieve the biological nutrient removal the Nuvoda system is capable of. Therefore, the trickling filters are decommissioned as part of this alternative.

6.2.2 Convert Solids Contact Tanks to Aeration Tanks

The existing solids contact tanks, which were originally constructed as final clarifiers, will be retrofitted to provide both anaerobic and aerobic treatment. Approximately 25% of each basin will be converted to anaerobic selectors, with the remaining 75% providing aeration. Screw pump effluent, containing both primary effluent and granules produced from the Nuvoda media, will first go through the anerobic zone, and then will flow through the aeration zone.

The existing diffusers have performance issues. New diffusers and air risers will be provided as part of the tank modifications.

The center portion of each tank was filled as part of the 1995 Improvements Project. This portion will remain filled.

6.2.3 Rotary Drum Screen for Granule Capture

Settled granules from the final clarifiers are recovered through a rotary drum screen located just after the WAS pumps.

6.2.4 Mixers in Splitter MH No. 3

Without proper mixing, granules will settle in the intermediate basins. Therefore, mixers will be added to the following splitter chambers in Splitter MH No. 3

- Final Clarifier Influent Splitters (2 mixers)
- Final Clarifier Combined Effluent (1 mixer)
- WAS/RAS Splitters (3 mixers)

6.2.5 Chemical Building

The proposed alternative is capable of achieving the required phosphorous and estimated future nitrogen limits without chemical use. However, this is dependent on proper ratios of phosphorus to available carbon and with the industry loadings, may not always be achievable. Further, the MPCA requires chemical redundancy for biological phosphorous removal. Chemical for chemical phosphorus removal will be provided to supplement the secondary treatment system.

6.3 Operation and Maintenance Changes

The operation of the plant will remain similar to the existing plant. The operations will be simpler with respect to the removal of the trickling filters. The new rotary drum screens introduce an additional maintenance item; however, this is a relatively small added power and maintenance cost.

Media replacement is limited to adding a large bag of media to each basin annually and does not require any additional equipment or staffing.

6.4 Opinion of Capital Costs for Recommendation

The following cost estimate is specific to the proposed Nuvoda system. This estimate includes both improvements required for this alternative in addition to improvements that were recommended to the secondary process across all alternatives, including to the blower building, screw pumps, and Recirculation Pump Station.

Table 18 – Summary of Recommended Alternatives

Treatment Process		Phase 1	Phase 2
1	Demolition (Trickling filters and splitter box)	$469,200	-
2	Solids Contact Rehabilitation	$184,500	-
3	Nuvoda Media and Screening	$1,200,000	$250,000
4	Blower Building 2 Rehabilitation	$389,300	-
5	Screw Pump Structure Rehabilitation	$13,200	-
6	Recirculation Pump Station Rehabilitation	$294,600	-
7	Chemical Building Improvements	$483,700	-
8	Site Piping	$30,000	-
	Subtotal	$3,064,500	$250,000
	Contingency (30%)	$919,400	$75,000
	Permitting (1%)	$30,700	$2,500
	Mobilization, Bonding, Insurance (5%)	$153,300	$12,500
	Material Testing (1%)	$30,700	$2,500
	Subtotal	$4,198,600	$342,500
	Engineering – Design (10%)	$419,900	$34,300
	Engineering – Construction (10%)	$419,900	$34,300
	Total Capital Cost	$5,039,000	$412,000
	Annual O&M Cost	$2,165,000	$412,000
	Salvage Value	$355,000	-
	20 Year Present Value of O&M and Capital Cost	$7,559,000	$2,023,000

[1] Engineering fees include services for design, construction administration, and full-time construction observation.

6.5 Other Recommended Improvements

Several other improvements to the facility are recommended in addition to the improvements necessary to implement the selected alternative for nutrient removal. The 2017 Solids Preliminary Design Report recommended improvements to the thickening, dewatering, and biosolids storage systems. Alternatives, where appropriate, were evaluated. The following summarizes these items. The costs recommended in that report are adjusted to 2021 values as follows in Table 19.

- Grit Removal: As described in the Solids Preliminary Design Report, the staff noted large volumes of grit making its way to the anaerobic digesters. While the system has the appropriate capacity, aerated grit removal systems do not always remove fine grit as well as other types of systems. SEH has recommended influent grit testing to determine the size distribution. The estimated costs below assume installation of a vortex grit removal system.

- Primary Clarifiers: Given the age of these structures and their exposer to raw wastewater, replacement of the primary clarifier drives, and mechanisms has been planned.
- Thickening. Reviewed at length in the Solids Preliminary Design Report (Appendix M), the existing secondary sludge thickener has not performed, and the secondary sludge is co-settled with primary sludge. To improve digestion performance and reduce costs, a new dissolved air flotation thickener is planned.
- Dewatering: Reviewed at length in the Solids Preliminary Design Report (Appendix M), SEH recommends adding a second belt filter press. Also, the existing building should be brought up to current fire protection codes, with a new electrical room and back-up generator.
- Biosolids Storage: The Solids Preliminary Design Report laid out multiple options for improved biosolids storage. The improvements are assumed to include one of those options presented.

Table 19 – Updated Improvements Cost Estimates

Process	Updated Cost (2021 Value)
Primary Clarifiers and Grit Removal	$2,594,000
Secondary Thickening w/DAFT	$2,826,000
New Dewatering Equipment and Building Improvements	$6,557,000
Additional Biosolids Storage	$1,755,000

It is recommended that these improvements be implemented in phases and coordinated with the CIP with the phosphorus removal project.

6.6 Green Infrastructure

The improvements recommended include very little new structures. Much of the work is rehabilitating existing structures, as such, there is little opportunity to incorporate green infrastructure into the project.

6.7 Proposed Project Schedule

Several projects have been identified in the 2017 Solids Study, the CIP, and this report. These projects are proposed to be implemented in a phased schedule over the next ten years. Table 20 proposes a timeline for these projects.

Table 20 – Proposed Project Schedule

Project	Estimated Cost[1]	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Pretreatment Building Modifications	$1,984,000	X									
Pretreatment Building Equipment Replacement	$1,932,000		X								
Phosphorus Removal (Recommended Alternative)	$5,039,000					X					
Nitrogen Removal (Recommended Alternative)	$412,000										X
Primary Clarifier Improvements and Vortex Grit	$2,594,000					X					
Final Clarifier Improvements	$550,000					X					
Thickening	$2,826,000					X					
Dewatering	$6,557,000					X					
Biosolids Storage	$1,755,000					X					
Gas Storage and Microturbine	$2,867,000									X	
TOTAL	$26,516,000	$1,984,000	$1,932,000			$19,321,000				$2,867,000	$412,000

1. Costs include equipment, engineering, and construction in 2021 dollars. Projects are shown in the estimated year of completion. Note that costs will be distributed throughout the design and construction phase as costs are occurred.

6.8 Financial Assistance

The most likely source of loan funds, based on availability, is from Public Facilities Authority (PFA). The PFA administers the **Clean Water Revolving Fund**, which provides below-market-rate financing for upgrading and constructing wastewater treatment facilities. Interest rates are determined by a set formula based on demographic characteristics of the borrower and other established rules.

The PFA is responsible for reviewing each city's financial capability and determining the amounts, terms, and conditions of the loans. Key features of the PFA loan program are the requirements to:

- Pay Federal and State mandated wage rates during construction.
- Complete wage compliance including inspections and interviews.

PFA also administers the **Point Source Implementation Grant (PSIG)**. This grant provides assistance to communities to meet phosphorus limits below 1 mg/L, a total nitrogen limit less than 10 mg/L, and load reductions for other TMDL requirements. The PSIG grant funds 80% of related costs up to $7 million. Project elements reviewed in the Solids Preliminary Design Report in 2019 were intentionally delayed to be able to capture funding available through the PSIG program once the City received a phosphorus limit in the NPDES permit.

- Phosphorus: The City would be likely to obtain some grant dollars from the PSIG program associated with the phosphorus treatment. A fraction of the costs for the solids-related components could be funded with connection to phosphorus, including thickening, dewatering, and sludge storage. Additionally, the funding would cover 80% of the costs associated with the Nuvoda system, and the chemical feed system. Preliminarily, this could be a grant of $6 million for phosphorus.
- Total Nitrogen. The PSIG grant could be potentially maximized by pursuing Regulatory Certainty and accepting a Total Nitrogen limit along with the phosphorus limit. This would require adding the remaining media to the system. The MPCA states that "Regulatory certainty is an incentive for municipalities that will employ biological nutrient removal in their wastewater treatment technology, and that are willing to accept a nitrogen limits in advance of a nitrogen standard. It affords up to 20 years of no more-restrictive phosphorous and nitrogen effluent limits allowing greater certainty in future fiscal planning and economic development." With the MPCA developing nitrogen regulations today, it is unclear at which point the MPCA will no longer allow communities to pursue Regulatory Certainty. This can be further explored after completing pilot testing to determine the effectiveness of the recommended alternative for total nitrogen removal.

Another program coordinated by PFA is the **Wastewater Infrastructure Fund (WIF)**. WIF grants may be available if the average per household costs exceed 1.4% of median household income. The maximum WIF grant is $5 million. For Winona, the average household sewer bill would need to be $57/month for WIF grants to be applicable. Currently, a household using an average of 1,600 cf per quarter would pay $47.12 per quarter, or $15.70 per month, a cost that is well below 1.4% of the median household income. With the rate increase identified in Section 7, the projected residential rates will still be well below this threshold.

Other funding sources for wastewater treatment improvement projects are also available.

- **Rural Development**. Loan funding is also available through Rural Development. These loans tend to have higher interest rates compared with PFA loans, but they can be paid back over longer periods, up to forty years, to keep the payments lower.
- **Green Project Reserve (GPR) grants**. For projects that use green infrastructure, water or energy efficiency, or other environmental innovations, the GPR may forgive up to 25% of loan principal up to $1 million. The City could likely obtain some GPR funds associated with blower sizing.
- **State bonding bill appropriations**. The 2020 Bonding Bill had over $144M specially allocated to cities for water and wastewater projects as PFA grants. Communication with the City's legislative representatives would be key to try to obtain funding this way. Success may be limited due to the low sewer rates, which makes a weaker case for special funding when compared to the need of other communities.
- **Federal EDA Program.** These funds can be applied to projects that are necessary for a business to expand, create jobs and sustain the jobs in the region.

- **Federal Infrastructure Bill.** On November 15, 2021, H.R. 3684, the Infrastructure Investment and Jobs Act, was signed. The details of this are not defined yet, but Minnesota is expected to receive up to $680 million over 5 years to improve water infrastructure across the state. As information becomes available about this bill, the City will want to consider applicability to the wastewater treatment facility.

6.9 Recommendations and Implementation Schedule

A tentative schedule for the secondary treatment improvements to address the new Phosphorus Limit is proposed in Table 21 – Proposed Project Schedule, that follows the compliance schedule agreed upon between the City and the MPCA.

Table 21 – Proposed Project Schedule

Action	Tentative Date[1]
Submit Facilities Plan to MPCA	March 1, 2022
Public Hearing	March 7, 2022
Request placement on IUP	May 2022
Piloting	January 2022 – June 2022
Authorize preparation of design documents	July 2022
Submit Plans and specifications to MPCA	December 2023
Receive MPCA approval of plans and specifications	March 2024
Advertise project for bids	April 2024
Receive bids and award contract	May 2024
Begin construction	June 2024
Improvements operational	March 2026
Final Completion	June 2026
[1] Tentative dates are subject to change	

Wastewater must still be treated in accordance with the current NPDES permit during construction. In order to meet this requirement, the existing structures and facilities must remain in operation during the construction of the new facilities and temporary shutdowns during periods of low flows may be required for connection of the new facilities with the existing facilities. Fortunately, with the trickling filters, there is more than enough organic treatment capacity to facilitate one Contact Basin offline.

7 Wastewater User Rate Impact Evaluation

Understanding the impact the new capital projects will have on the existing rates requires knowledge of the existing annual operations and maintenance costs and an understanding of how those annual costs will change with the capital projects in place. The impact of the proposed project on the wastewater user rates was evaluated as part of the 2021 Rate Study Report.

The report found that cover the anticipated $22M in capital expenditure over the next 5 years, including financing the upgrade project with repayment starting in 2026, the rates need to increase between 20 and 40%, depending on water use and meter size.

8 Public Hearing

A public hearing to present the contents of this report is scheduled for March 7, 2022. The public hearing documents will be included in Appendix F.

dmk

Appendix A

Environmental Information Worksheet (EIW)

A-1 – Completed Environmental Information Worksheet
A-2 – National Register for Historic Places survey Response

A-1 – Completed Environmental Information Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

520 Lafayette Road North
St. Paul, MN 55155-4194

Environmental Information Worksheet (EIW) form

Clean Water State Revolving Fund Program

Minnesota Rule Chapter 7077.0272, subp. 2.a.F.
Minnesota Rule Chapter 7077.0277, subp. 3.E.

Doc Type: Wastewater Point Source

Eligible applicants seeking funds for clean water (stormwater and wastewater) projects through the Clean Water State Revolving Fund (commonly referred to as the CWSRF Program) are required by Minn. R. ch. 7077.0272, subp. 2.a. F. and Minn. R. ch. 7077.0277, subp. 3.E., to complete an Environmental Information Worksheet (EIW). This information will be used to assess environmental impacts, if any, caused by the project.

Questions: Contact Review Engineer or Bill Dunn at 651-757-2324 or bill.dunn@state.mn.us.

1. **Project title:** Winona WWTF Upgrade and Phosphorus Removal

2. **Proposer:** City of Winona

   Contact person: Paul Drazkowski

   Title: Wastewater Superintendent

   Address: 1801 Shives Road

   Winona, MN 55987

   Phone: 507-457-8207

   Fax:

3. **Project location:** County: Winona City/Twp: Winona

   NE 1/4 NE 1/4 Section: 36 Township: 107 Range: 007

Tables, Figures, and Appendices attached to the EIW:

- County map showing the general location of the project;
- United States Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable);
- Site plan showing all significant project and natural features.

4. **Description:**

a. Provide a project summary of 50 words or less.

The MPCA issued new limits on concentration of phosphorous in plant effluent in July, 2021. The Winona WWTF requires upgrades to meet this new limit. Project consists of converting existing solids contact tanks to aeration and adding media to produce granular sludge.

b. Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.

The WWTF Upgrade Project is broken up tin five parts: Phosphorous Removal, Digester Building and Dewatering Improvements, Primary Clarifier Rehabilitation, Waste Activated Sludge Thickening, and Biosolids Storage Expansion.

Phosphorous Removal:

The proposed project consists of modifying the existing treatment plant within the existng property area.

The two (2) existing trickling filters and effluent boxes will be removed as part of this project. The filters are at the end of their *useful life and will not be used as part of the new treatment train. The existing splitter structure that directs flow from the primary clarifiers to the trickling filters can remain in place and primary effluent can flow through the structure to the screw pumps.*

The two (2) existing solids contact tanks will be converted to aeration basins. Each tank currently has two internal walls that were constructed in 1996 as part of a past improvements project. One wall in each basin will be removed, and a new wall constructed to split the basin into two parts, 75% will be aerated and 25% will be anoxic. The basins will also require a new diffuser grid and blowers.

The recirculation pump station is old and is not up to code. The following section describes the addition of new equipment in the building, which will require the structure to be brought up to code. This will entail several improvements to the HVAC and electrical system.

As the aeration basins require new aeration equipment, the blowers in Blower Building 2 will need replacement. As this building is also old and not up to code, it will require electrical and HVAC improvements to bring to current code.

New mixers are required in the solids contact combined effluent boxes, WAS, and RAS splitter boxes.

A new drum screen will be installed in the recirculation pump station following the WAS pumps to retain granules produced in the aeration basin. These granules will be pumped back into each aeration basin.

A new chemical feed building is required to provide chemical phosphorous removal redundancy. The proposed footprint is 18 feet by 36 feet. The building will contain chemical feed pumps, a 500-gallon chemical tank, chemical transfer pump, HVAC, electrical, and controls.

Although limited, there will be some modifications to site piping as a result of the removal of the trickling filters and the addition of the rotary drum screen.

Site piping for the new chemical phosphorous removal system will also be required. Piping will be provided from the new structure to the aeration basins.

Digester Building and Dewatering Improvements:

This project includes improvements to the existing digester building. New equipment includes a belt press, control panel, polymer feed system, sludge feed pumps, booster pumps, screw conveyor, comminutor, recirculation pumps, sludge transfer pumps, and heat exchanger. Minor structural, electrical, and HVAC improvements are required to accommodate the new equipment.

Primary Clarifier Rehabilitation:

The mechanisms of the primary clarifiers are approaching the end of their useful lives and need to be replaced. Both primary clarifiers will receive new mechanisms and a walkway above the weirs to allow for operators to properly maintain weirs.

Waste Activated Sludge Thickening:

A DAF thickener is proposed to provide additional thickening for Waste Activated Sludge (WAS). This DAF thickener will be a 17-foot diameter circular tank with 8 feet of water depth. A new control building will need to be constructed to house electrical equipment, air compressor, chemical feed system, and pumps.

Biosolids Storage Expansion:

Additional storage for biosolids is required. A new 125-foot by 245-foot storage pad will be constructed. A membrane cover will also be provided.

c. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The purpose of this project is to address the new phosphorous limit set by the MPCA in July 2021. As the existing plant is not capable of meeting the new limit under current operations, it requires a major improvements project. This project will be completed by the City of Winona through consulting engineers and construction to be competed by a construction company under direct involvement of the City of Winona and the design engineers. The project benefits those living in the City of Winona, City of Goodview, Minnesota City, and all those who benefit from the water quality of the Mississippi River which receives the treated effluent.

d. Are future stages of this development including development on any outlots planned or likely to happen? ☐ Yes ☒ No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

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e. Is this project a subsequent stage of an earlier project? ☐ Yes ☒ No
If yes, briefly describe the past development, timeline and any past environmental review.

5. **Project magnitude data**

Total Project Area (acres) 5 or Length (miles) ______
Number of Residential Units: Unattached 0 Attached 0 maximum units per building 0
Commercial/Industrial/Institutional Building Area (gross floor space): total square feet 3000
Indicate area of specific uses (in square feet): ______

Office		Manufacturing	
Retail		Other Industrial	
Warehouse		Institutional	
Light Industrial		Agricultural	
Other Commercial (specify)			

Building height ______ If over 2 stories, compare to heights of nearby buildings ______

6. **Permits and approvals required.** List all known local, state and federal permits, approvals and financial assistance for the project. Include modifications of any existing permits, governmental review of plans, and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure.

Unit of government	Type of application	Status

7. **Land use.** Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines.

All land has been owned by the WWTF since the original construction in 1970. No environmental conflicts are anticipated. No hazardous liquid or gas pipelines have been identified.

8. **Cover types.** Estimate the acreage of the site with each of the following cover types before and after development:

	Before	After		Before	After
Types 1-8 wetlands	0	0	Lawn/landscaping	3.96	3.97
Wooded/forest	0	0	Impervious Surfaces	8.04	8.03
Brush/grassland	0	0	Other (describe)		
Cropland	0	0			
			Total	12	12

9. **Fish, wildlife, and ecologically sensitive resources.**

a. Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts.

The Mississippi River runs along the north side of the plant, however is outside of the plant property. No direct environmental impacts are expected as a result of the construction of this project. This project will result in lower phosphorus concentrations entering the Mississippi river, which will benefit the existing fish and wildlife resources and habitats long term.

b. Are any state (endangered or threatened) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial waterbird nesting colonies or regionally rare plant communities on or near the site?
☐ Yes ☒ No
If yes, describe the resource and how it would be affected by the project. Indicate if a site survey of the resources has been conducted and describe the results. If the Minnesota Department of Natural Resources (DNR) Natural Heritage and Nongame Research program has been contacted give the correspondence reference number: ______

Describe measures to minimize or avoid adverse impacts.

10. **Physical impacts on water resources.** Will the project involve the physical or hydrologic alteration (dredging, filling, stream diversion, outfall structure, diking, and impoundment) of any surface waters such as a lake, pond, wetland, stream or drainage ditch? ☐ Yes ☒ No
If yes, identify water resource affected. Describe alternatives considered and proposed mitigation measures to minimize impacts. Give the DNR Protected Waters Inventory (PWI) number(s) if the water resources affected are on the PWI.

11. **Water use.** Will the project involve installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface water (including dewatering)? ☐ Yes ☒ No
If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made, and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriation permit numbers, if known. Identify any existing and new wells on the site map. If there are no wells known on site, explain methodology used to determine.

12. **Water-related land use management districts.** Does any part of the project involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district? ☐ Yes ☒ No
If yes, identify the district and discuss project compatibility with district land use restrictions.

13. **Water surface use.** Will the project change the number or type of watercraft on any water body? ☐ Yes ☒ No
If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

14. **Erosion and sedimentation.** Give the acreage to be graded or excavated and the cubic yards of soil to be moved: **0.04** Acres: **6500** cubic yards. Describe any steep slopes or highly erodible soils and identify them on the site map. Describe any erosion and sedimentation control measures to be used during and after project construction.

Soil to be moved is entirely due to the demolition or addition of structures. No changes to site grading are anticipated as part of this project. The existing fence line will contain soil and limit erosion outside of the project area.

15. **Water quality – surface-water runoff.**

a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any storm water pollution prevention plans.

This project decreases the impervious area at the WWTF and therefore will reduce site runoff.

b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters.

Runoff from the site flows to the Mississippi River. As this project reduces the impervious surface area on the property, runoff is anticipated to decrease.

16. **Water quality – wastewater.**

a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.

Wastewater treated at this site consists of residential, commercial, and industrial wastewater. The facility currently treats an average flow of 4.2 MGD, however is rated for up to 9.6 MGD Average Flow and 15.0 MGD Peak Hourly Flow.

b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies, and estimate the discharge impact on the quality of receiving waters. If the project involves on-site sewage systems, discuss the suitability of site conditions for such systems.

The proposed project does not produce additional waste; thus no additional waste treatment methods or pollution prevention efforts are required.

c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility's ability to handle the volume and composition of wastes, identifying any improvements necessary.

Not applicable.

d. If the project requires disposal of liquid animal manure, describe disposal technique and location and discuss capacity to handle the volume and composition of manure. Identify any improvements necessary. Describe any required setbacks for land disposal systems.

Not applicable.

17. Geologic hazards and soil conditions.

a. Approximate depth (in feet) to

Groundwater	> 80 inches	minimum;	______	average.
Bedrock:	*> 80 inches*	minimum;	______	average.

Describe any of the following geologic site hazards to groundwater and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

No geologic hazards are known on site.

b. Describe the soils on the site, giving U.S. Soil Conservation Service (SCS) classifications, if known. Discuss soil granularity and potential for groundwater contamination from wastes or chemicals spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

The soil is categorized as Psamments, fill (Source: USDA Web Soil Survey). This is a very sandy soil with good drainage. This project only introduces one new chemical to the site (Alum or Ferric Chloride), which will be delivered in a typical delivery truck and transferred directly to an indoor tank with proper containment. Risk of chemical spills onto soils is similar to current operations and is very low.

18. Solid wastes, hazardous wastes, storage tanks.

a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating municipal solid waste, indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

No additional hazardous wastes will be produced as part of this project.

b. Identify any toxic or hazardous materials to be used or present at the site and identify measures to be used to prevent them from contaminating groundwater. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

No toxic or hazardous materials will be used as part of this project.

c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

No tanks store petroleum on site. There are basins treating municipal wastewater throughout the site, however all are partially above ground and visible.

19. Traffic. Parking spaces added: *0* Existing spaces (if project involves expansion): ______ Estimated total average daily traffic generated: *10* Estimated maximum peak hour traffic generated (if known) and its timing: ______ Provide an estimate of the impact on traffic congestion affected roads and describe any traffic improvements necessary. If the project is within the Twin Cities metropolitan area, discuss its impact on the regional transportation system.

No significant impacts are predicted due to this project.

20. Vehicle-related air emissions. Estimate the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts. Note: If the project involves 500 or more parking spaces, consult *Environmental Assessment Worksheet (EAW) Guidelines* about whether a detailed air quality analysis is needed.

No significant traffic is expected, and therefore increased vehicle-related air emissions will be minimal.

21. **Stationary source air emissions.** Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult *EAW Guidelines* for a listing), any greenhouse gases (such as carbon dioxide, methane, and nitrous oxides), and ozone-depleting chemicals (chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

    No additional stationary source air emissions are planned for this project.

22. **Odors, noise, and dust.** Will the project generate odors, noise or dust during construction or during operation? ☒ Yes ☐ No

    If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them. Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

    This project includes demolition of two trickling filters and modifications to other existing structures on site. This work will likely produce noise and dust. The site is far from residential areas that this project should not have a significant impact on sensitive receptors or any negative human health risks..

23a. **Nearby resources.** Are any of the following resources on or in proximity to the site? Projects should search the Minnesota State Historic Preservation Office's (SHPO) National Register of Historic Places database.

***Note:** Project proposers must contact the SHPO at datarequestshpo@mnhs.org to request a database review to obtain information on any known historical or archaeological sites in the project area.
Include a copy of correspondence with SHPO with the submittal of this EIW form.

a. Archaeological, historical, or architectural resources? ☐ Yes ☒ No
b. Prime or unique farmlands or land within an agricultural preserve? ☐ Yes ☒ No
c. Designated parks, recreation areas, or trails? ☐ Yes ☒ No
d. Scenic views and vistas? ☐ Yes ☒ No
e. Other unique resources? ☐ Yes ☒ No

If yes, describe the resource and identify any project-related impacts on the resources. Describe any measures to minimize or avoid adverse impacts.

23b. **Section 106 Review** (36 CFR 800) is required for all CWRF projects. The following forms can be found on the MPCA Wastewater and Stormwater Financial Assistance website at https://www.pca.state.mn.us/ppl. Select Clean Water Revolving Fund tab; then scroll to Facilities Plan and Facilities Plan Supplement for Wastewater Treatment Systems heading.

a. Project is exempt from review (attach completed *Exemption Checklist*) ☐ Yes ☒ No
b. Project is required to complete further Section 106 Review: ☒ Yes ☐ No
    a. SHPO
    b. Tribal consultation
    c. Other Consulting parties

24. **Visual impacts**. Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks? ☐ Yes ☒ No

    If yes, explain.

25. **Compatibility with plans and land use regulations.** Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable land use, water, or resource management plan of a local, regional, state or federal agency? ☐ Yes ☒ No

    If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

26. **Impact on infrastructure and public services.** Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project? ☐ Yes ☒ No

    If yes, describe the new or additional infrastructure or services needed. (Note: any infrastructure that is a connected action with respect to the project must be assessed in the EAW; see *EAW Guidelines* for details.)

27. **Cumulative impacts.** Minn. R. 4410.1700, subp. 7, item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Identify any past, present or reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative impacts. Describe the nature of the cumulative impacts and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to cumulative impacts (or discuss each cumulative impact under appropriate item(s) elsewhere on this form).

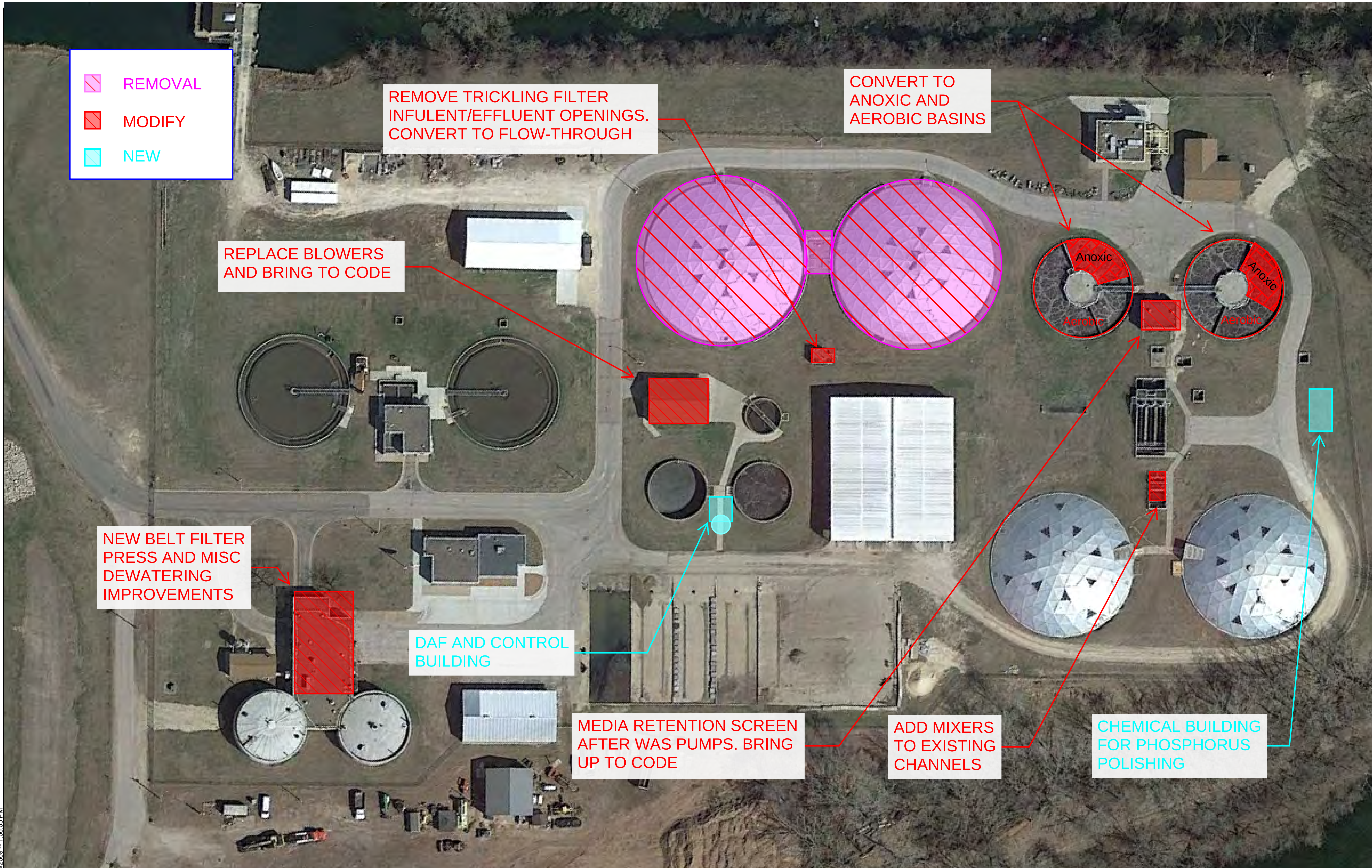
No other projects have recently occurred or are planned to occur outside of the projects proposed in this application that would present cumulative potential effects.

28. **Other potential environmental impacts.** If the project may cause any adverse environmental impacts not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.

No other environmental impacts are anticipated.

29. **Summary of issues.** List any impacts and issues identified above that may require further investigation before the project is begun. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

No issues are anticipated as a result of the proposed projects. Work is limited to existing structures and a few small new structures with limited changes to site grading.



Map Document: (L:\Resources\Cartographic\Templates\EmptyLayouts\B_ANSI_11x17\11x17L_Std1.mxd)
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SEH

3535 VADNAIS CENTER DR.
ST. PAUL, MN 55110
PHONE: (651) 490-2000
FAX: (651) 490-2150
WATTS: 800-325-2055
www.sehinc.com

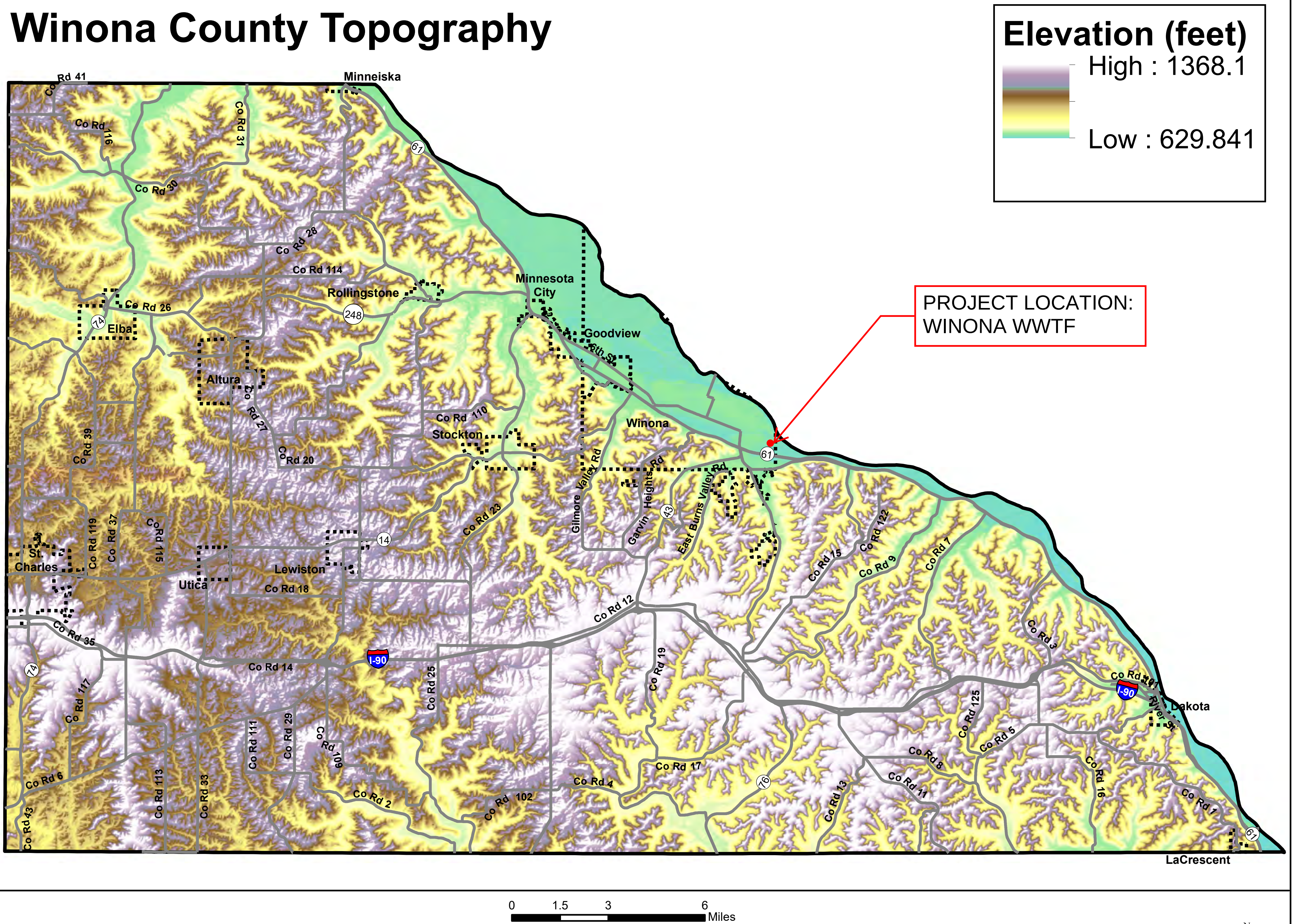
Project: XXXXX 000000
Print Date: 00/00/0000

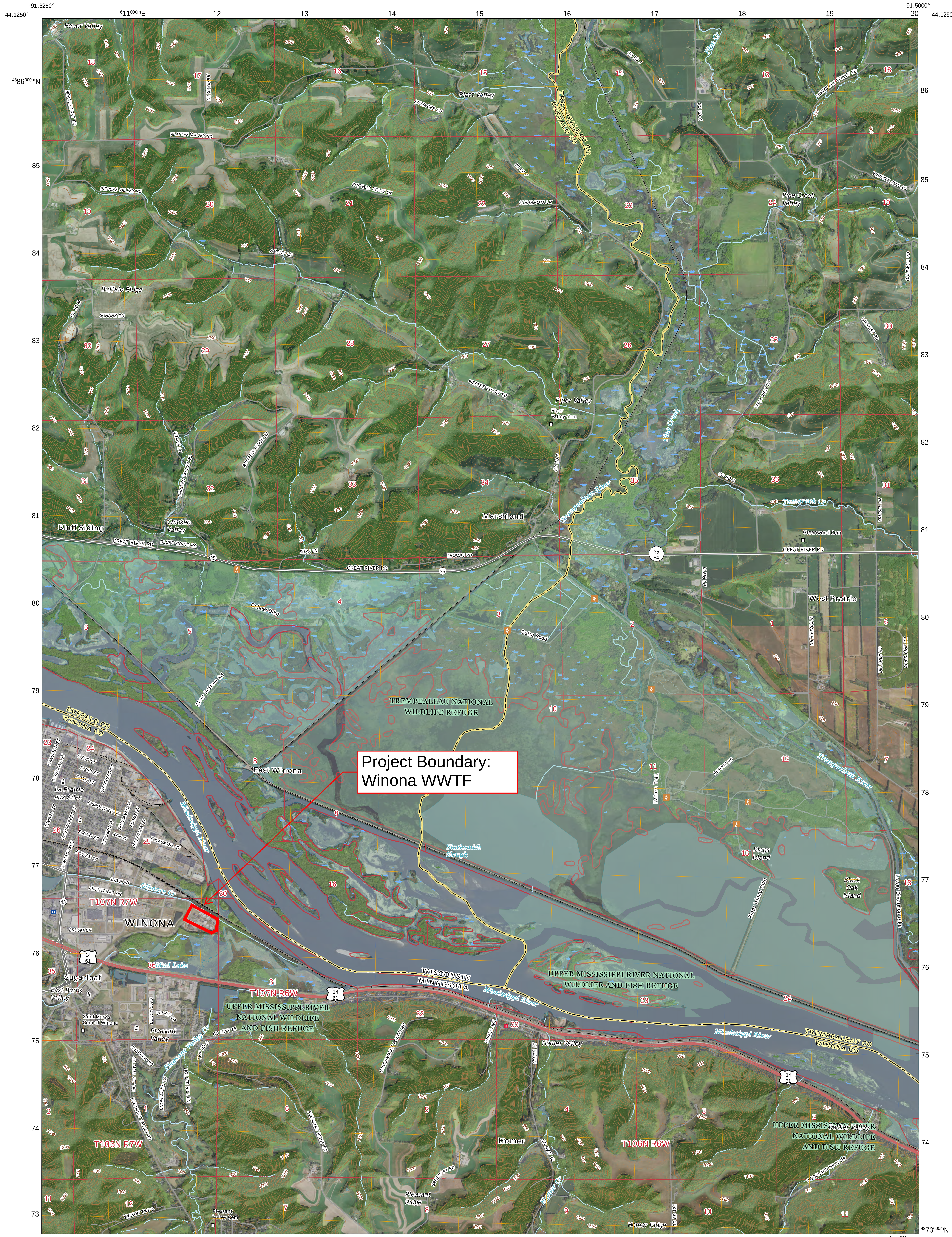
Map by:
Projection:
Source:

FIGURE TITLE
PROJECT NAME
Project Location

Figure
X

Winona County Topography





Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 15T

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery....NAIP, July 2017 - November 2017
Roads.... U.S. Census Bureau, 2016 - 2018
Names....GNIS, 1980 - 2018
Hydrography....National Hydrography Dataset, 1899 - 2018
Contours....National Elevation Dataset, 1998
Boundaries....Multiple sources; see metadata file 2017 - 2018
Public Land Survey System....BLM, 2017 - 2018
Wetlands....FWS National Wetlands Inventory 2001 - 2011

UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011. A metadata file associated with this product is draft version 0.6.18

QUADRANGLE LOCATION

ADJOINING QUADRANGLES
1 Fountain City
2 Dodge
3 Tamarack
4 Winona West
5 Trempealeau
6 Wilson
7 Witoka
8 Pickwick

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

WINONA EAST, MN, WI
2019

A-2 – National Register for Historic Places Survey Response

DEPARTMENT OF ADMINISTRATION
STATE HISTORIC PRESERVATION OFFICE

January 10, 2022

Susan Danzl
Short Elliot Hendrickson Inc.
3535 Vadnais Center Dr
St. Paul, MN 55110-3507

RE: SEH No WINON 160394 14.00
Winona WWTF Improvements Project
T107 R7 S35, Winona, Winona County
SHPO Number: 2022-0554

Dear Susan Danzl:

Thank you for the opportunity to comment on the above referenced project. Information received on December 27, 2021 has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and implementing federal regulations at 36 CFR 800, pursuant to the provisions of the Memorandum of Understanding among the Minnesota Public Facilities Authority, the Minnesota Pollution Control Agency, and the Minnesota State Historic Preservation Office, and pursuant to the responsibilities given the State Historic Preservation Office by the Minnesota Historic Sites Act (Minn. Stat. 138.665-666) and the Minnesota Field Archaeology Act (Minn. Stat. 138.40).

We have reviewed the documentation included with your submission and based on information that is available to us at this time, we have determined that **no historic properties will be affected** by the project as it is currently proposed.

Implementation of the undertaking in accordance with this finding, as documented, fulfills the agency's responsibilities under Section 106. If the project is not constructed as proposed, including, but not limited to, a situation where design changes to the currently proposed project diverts substantially from what was presented at the time of this review, then the agency will need to reopen Section 106 consultation with our office pursuant to 36 CFR 800.5(d)(1).

If you have any questions regarding our review of this project, please contact Kelly Gragg-Johnson, Environmental Review Program Specialist, at kelly.graggjohnson@state.mn.us.

Sincerely,

Sarah J. Beimers

Sarah J. Beimers
Environmental Review Program Manager

cc: Bill Dunn, MN Pollution Control Agency

Appendix B

Minnesota National Pollutant Discharge Elimination System (NPDES) Permit

MINNESOTA POLLUTION CONTROL AGENCY

Rochester Office | 7381 Airport View Drive SW | Rochester, MN 55902 | 507-285-7343

800-657-3864 | Use your preferred relay service | info.pca@state.mn.us | Equal Opportunity Employer

July 1, 2021

The Honorable Scott Sherman
Mayor, City of Winona
207 Lafayette Street
Winona, MN 55987-3533

RE: Final NPDES/SDS Permit Winona Wastewater Treatment Facility
Permit No. MN0030147
T107N, R7W, Sec 36, Winona, Winona County, Minnesota

Dear Mayor Sherman:

Enclosed is the final permit for the facility identified above. The Minnesota Pollution Control Agency (MPCA) has prepared this permit in accordance with Minn. Stat. chs. 115, 115A, and 116, and Minn. R. chs. 7000 and 7001.

No written comments were received during the 60-day public comment period.

A request was not made for a public informational meeting or contested case hearing during the 60-day public comment period.

If you have any questions regarding any of the terms and conditions of the final permit, please contact Melanie Miland at 507-206-2647 or by email at melanie.miland@state.mn.us.

Sincerely,

Paul Kimman

This document has been electronically signed.
Paul Kimman
Supervisor
Southeast/Southwest Regional Unit
Municipal Division

PK:MM/jw

Enclosure: Final Permit

cc: Stephen Sarvi, City Manager (w/enclosures)
Brian DeFrang, Director of Public Works (w/enclosures)
Paul Drazkowski, Plant Superintendent (w/enclosures)
Eden Willcox, Industrial Pretreatment Coordinator (w/enclosures)
Susan Danzl, Short Elliott Hendrickson Inc. (w/enclosures)
Region 5 NPDES, EPA (w/enclosures)
Andrea Schaller, EPA (w/enclosures)
Heather Quigley, EPA (w/enclosures)

MINNESOTA POLLUTION CONTROL AGENCY

National Pollutant Discharge Elimination System/State Disposal System

MN0030147

Permittee:	City of Winona
Facility name:	Winona Wastewater Treatment Plant
Receiving water:	Mississippi River - Class 2Bg, 3C, 4A, 4B, 5, 6 water
City:	Winona **County:** Winona
Issuance date:	July 1, 2021
Expiration date:	June 30, 2026

The state of Minnesota, on behalf of its citizens through the Minnesota Pollution Control Agency (MPCA), authorizes the Permittee to operate a disposal system at the facility named above and to discharge from this facility to the receiving water named above, in accordance with the requirements of this permit.

The goal of this permit is to reduce pollutant levels in point source discharges and protect water quality in accordance with the U.S. Clean Water Act, Minnesota statutes and rules, and federal laws and regulations.

This permit is effective on the issuance date identified above. This permit expires at midnight on the expiration date identified above.

Signature: Paul Kimman

This document has been electronically signed.

Paul Kimman
Supervisor
Southeast/Southwest Regional Unit
Municipal Division

for the Minnesota Pollution Control Agency

Submit eDMRs
Submit via the MPCA e-Services at
https://rsp.pca.state.mn.us/TEMPO_RSP/Orchestrate.do?initiate=true

Submit WQ reports to:

Electronically: wq.submittals.mpca@state.mn.us
Include *Water quality submittals form*:
https://www.pca.state.mn.us/sites/default/files/wq-wwprm7-71.docx

Or, by mail:
Attention: WQ Submittals Center
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Whole Effluent Testing (WET) and Pretreatment Annual Reports must be mailed to the WQ Submittals Center

Questions on this permit?
For eDMR and other permit reporting issues, use the directory listed at the bottom of the DMR page:
https://www.pca.state.mn.us/water/discharge-monitoring-reports

For specific permit requirements, contact your compliance staff: https://www.pca.state.mn.us/water/wastewater-compliance-and-enforcement-staff-contacts

Wastewater Permit Program general questions, contact:
MPCA, 651-282-6143 or 800-657-3938.

Table of Contents

Page

1. Permitted facility description

The Winona Wastewater Treatment Facility (Facility) is located at the NE 1/4 of the NE 1/4 of Section 36, Township 107 North, Range 7 West, Winona, Winona County, Minnesota. The Facility serves the communities of Winona and Goodview. This is a Class A facility.

The existing Facility consists of two main lift stations, approximately 8,300 feet of 24-inch and 30-inch force main, a bar screen, grit removal, two primary clarifiers, and two trickling filters. The wastewater is then lifted by screw pumps to two aerated-solids contact basins. The contact stabilization is followed by treatment in two final clarifiers, chlorine disinfection, and dechlorination by sulfur dioxide. The effluent is discharged through 1,246 feet of 48-inch and 60-inch outfall sewer.

Biosolids treatment consists of sludge dewatering, two anaerobic sludge digesters, and a belt press for biosolids thickening. Biosolids are stored in a roofed, open-sided, storage shed until land applied. The biosolids drying beds are used to dewater biosolids when the belt press is off line or when there is some other problem. The drying beds can be used for dewatered biosolids storage, if needed.

A bypass redirecting wastewater from the trickling filters to the chlorination tanks was constructed in the year 2003. Secondary treatment via the solids-contact aeration tanks and the final clarifiers is bypassed. The bypass is constructed to protect the Facility from damage during major flood events on the Mississippi River. The bypass is locked and manually controlled at all times.

The Facility has a continuous discharge (SD001) to the Mississippi River (Class 2Bg, 3C ,4A ,4B ,5, 6 water) and is designed to treat an average wet weather (AWW) flow of 9.6 million gallons per day (mgd) and an average dry weather flow of 6.74 mgd. The Facility has a five-day carbonaceous biochemical oxygen demand strength of 182 milligrams per liter, based on the AWW design flow.

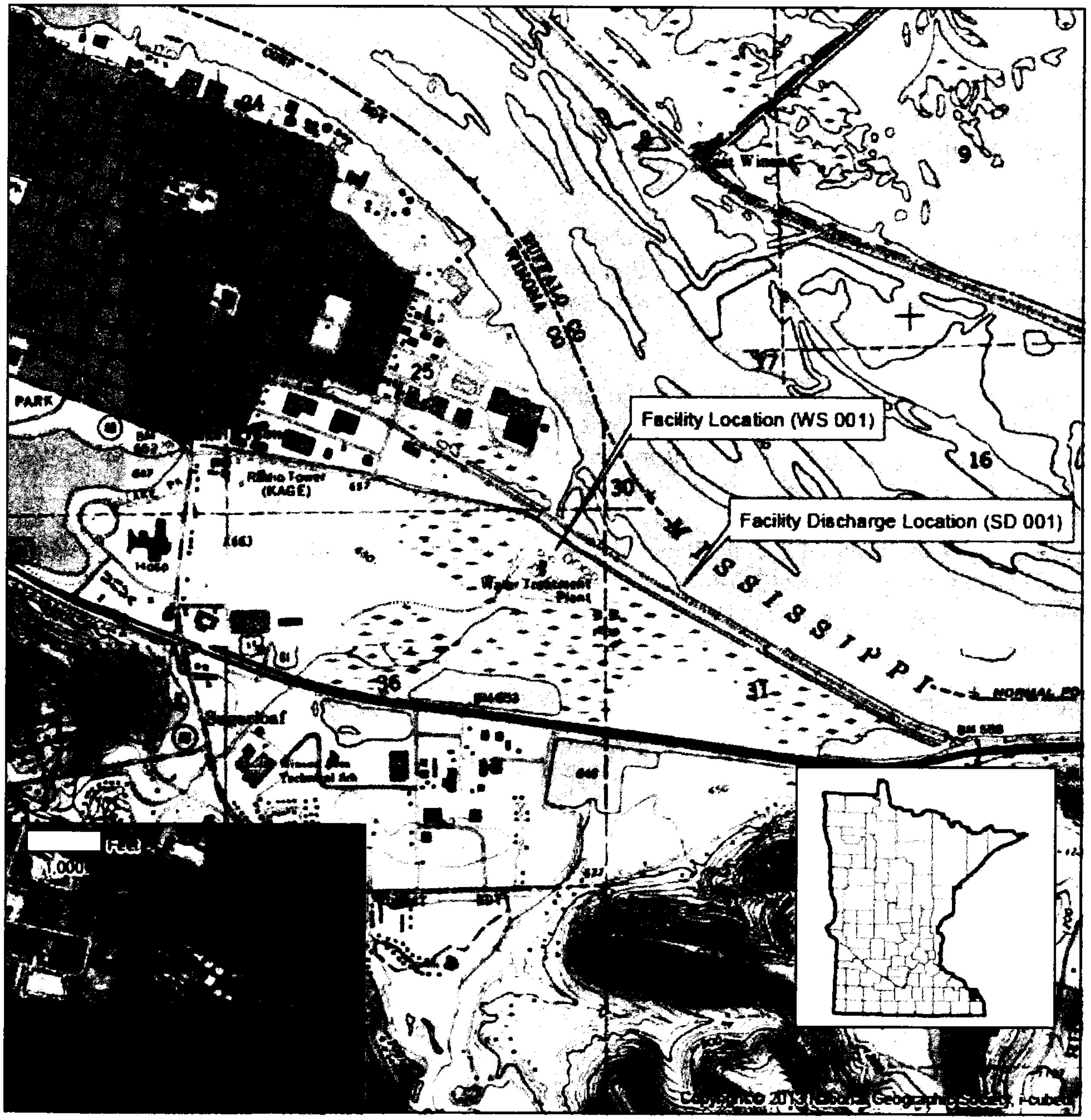
Changes to the facility may result in an increase in pollutant loading to surface waters or other causes of degradation to surface waters. If a change to the facility will result in a net increase in pollutant loading or other causes of degradation that exceed the maximum loading authorized through conditions specified in the existing permit, the changes to the facility are subject to antidegradation requirements found in Minn. R. 7050.0250 to 7050.0335.

This Permit also complies with Minn. R. 7053.0275 regarding anti-backsliding.

Any point source discharger of sewage, industrial, or other wastes for which a NPDES permit has been issued by the MPCA that contains effluent limits more stringent than those that would be established by Minn. R. 7053.0215 to 7053.0265 shall continue to meet the effluent limits established by the permit, unless the permittee establishes that less stringent effluent limits are allowable pursuant to federal law, under section 402(o) of the Clean Water Act, United States Code, title 33, section 1342.

2. Location map of permitted facility

MN0030147: Winona Wastewater Treatment Facility
T107N, R7W, Section 36
City of Winona, Winona County, Minnesota

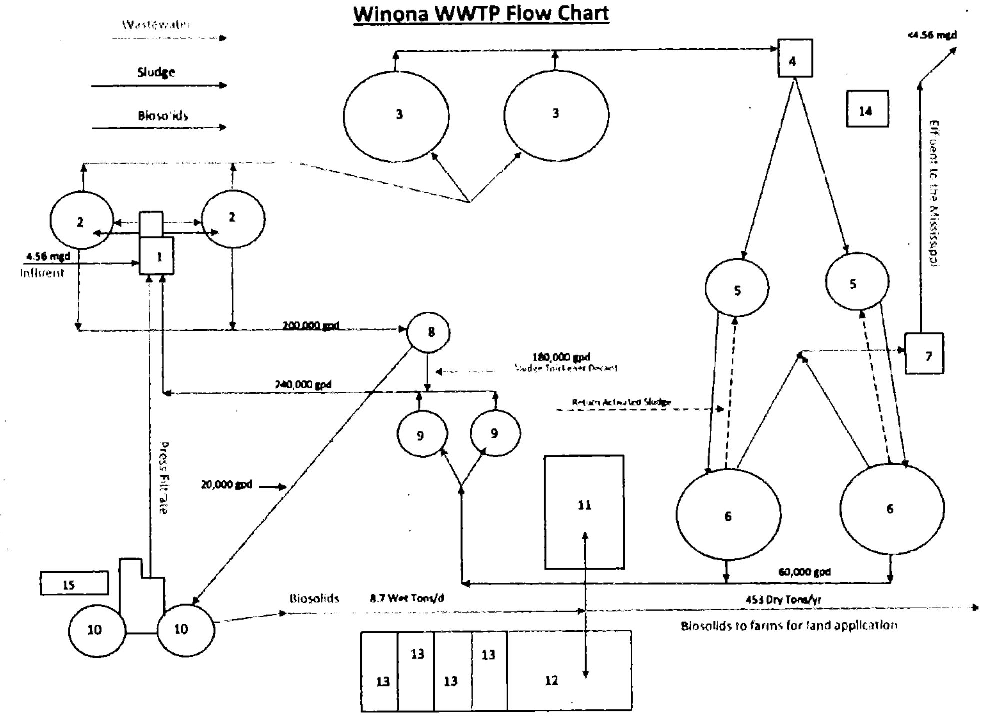


Map produced by: MPCA Staff, 2/19/2021
Scale: 1:24,000

0 0.25 0.5 1 Miles

3. Flow diagram

Winona WWTP Flow Chart



KEY TO WINONA WWTP FLOW CHART

1. The wastewater (ww) is lifted to the WWTP by Lift Stations #4 and #7 via force mains. The ww enters the (1) **bar screen building** where it passes through an automatic bar screen and also through the grit chambers north of the building. The bar screenings and the washed grit from the grit chambers is landfilled along with the rubbish generated at the WWTP. In 2013 an average of 4.56 mgd entered the WWTP.

2. After leaving the grit chambers the ww enters the (2) **primary clarifiers**. The sludge that settles on the bottom is pumped to the (8) **sludge clarifier**. The thickened sludge from the sludge clarifier is pumped to the (10) **anaerobic digesters.**

3. The ww leaves the primary clarifiers and enters the (3) **trickling filters** for biological treatment.

. The ww is then lifted by the (4) **screw pumps**.

5. The lift station moves it to (5) **the solids contact tanks** for additional biological treatment.

6. From the solids contact tanks the ww goes to (6) **the final clarifiers**. Most of the sludge from the final clarifiers goes to the (9) **sludge thickening units**. Some of the sludge is returned to the solids contact tanks to maintain the level of mixed liquor suspended solids necessary for optimum treatment, which varies somewhat according to the nutrient load entering the WWTP.

7. From the final clarifiers the ww goes to the (7) **chlorine diffuser chamber**. In this chamber, from April 1st through October 31st, chlorine is added to the ww to disinfect the ww. 1200 feet downstream is a chamber into which sulfur dioxide is diffused into the ww to remove any residual chlorine. About 500 feet downstream from the sulfur dioxide diffuser chamber the ww enter the Mississippi River.

8. Most of the sludge that settles on the bottom of the final clarifiers goes to the (9) **gravity thickeners**. The sludge is aerated in the thickeners and then goes to the primary clarifiers where it settles out and is pumped to the sludge clarifier.

10. About 20,000 gpd of sludge enters the (10) **anaerobic digesters** every day. The detention time of the sludge in the digesters is about 35 days. The digested sludge is dewatered on a belt press using a charged polymer. The dewatered digested sludge or biosolids is stored in the (11+12) **sludge storage areas**. The press filtrate is returned to the head of the plant for full treatment.

Number (11) is the **roofed biosolids storage area** and number (12) is **an unroofed slab**. Biosolids are land applied on area farms in Spring and Fall. In between those periods it is stored in these areas.

13. (13) **Sludge drying beds** are used to dewater sludge when the belt press is off line or there is some other problem that needs to be dealt with. Filtrate from the drying beds is returned to the head of the plant for full treatment. The drying beds can be used for dewatered biosolids storage if areas (11+12) are filled.

14. A (14) **diesel powered generator** is on standby to power critical treatment units in the WWTP in case of power outage.

15. (15) **The Turbine Building** is where we clean our biogas and burn it in a turbine to generate electricity to meet part of the demand for the WWTP.

4. Summary of stations and station locations

Station	Type of station	Local name	PLS location
SD 001	Effluent To Surface Water	Total Facility Discharge	T107N, R6W, S31, NW Quarter of the NW Quarter
WS 001	Influent Waste	Influent Waste Stream	T107N, R7W, S36, NE Quarter of the NE Quarter

5. Permit requirements

SD 001	Effluent To Surface Water	
		Surface Discharge: Class A Major Facility Effluent Requirements
	5.1.1	The Permittee shall submit a monthly DMR: Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
	5.1.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.1.3	Samples for Station SD 001 shall be taken at a point representative of the discharge to the Mississippi River. [Minn. R. 7001.0150, Subp. 2(B)]
	5.1.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Acute Toxicity Requirements
	5.2.5	**Definitions**. [Minn. R. 7001]
	5.2.6	"Acute Whole Effluent Toxicity (WET) Test" is a static renewal test conducted on an exponentially diluted series of effluent. The purpose is to calculate the proportion of effluent that causes 50% mortality/immobility of aquatic organisms at 48 hours for Daphnia magna and Ceriodaphnia dubia or 96 hours for fathead minnows. An LC50/EC50 (lethal/immobile concentration) less than or equal to 100% effluent constitutes a positive for toxicity. [State Definitions]
	5.2.7	"Acute toxic unit (TUa)" is the reciprocal of the effluent dilution that causes the acute effect by the end of the acute exposure period. For example, a TUa equals (100% effluent)/(48 hour LC50/EC50 for Daphnia magna and Ceriodaphnia dubia or 96 hour LC50/EC50 for fathead minnows in %). [State Definitions]
	5.2.8	"Test" refers to an individual species. [State Definitions]
	5.2.9	"Test Battery" consists of WET testing of each species associated with each specified acute test. For acute WET testing, all test species includes fathead minnows, Daphnia magna, and Ceriodaphnia dubia. [State Definitions]
	5.2.10	**General Requirements.** [Minn. R. 7001]
	5.2.11	This permit includes an acute WET limit of 0.9999 TUa, to be met at outfall Surface Discharge Station SD001. A violation of the 0.9999 TUa limit constitutes a violation of the permit. [Minn. R. 7052, Minn. R. 7053]
	5.2.12	The Permittee shall submit semi-annual toxicity test battery results : Due 180 calendar days after Permit Issuance Date every 6 months thereafter. [Minn. R. 7001]
	5.2.13	Additional WET tests are required for each year that exceeds the five-year permit cycle if the permit is not immediately reissued after permit expiration. The WET testing results are due on the same date as the original requirement, annually, until the permit is reissued. [Minn. R. 7001]
	5.2.14	Any test that exceeds 0.9999 TUa shall be re-tested according to the Positive Toxicity Results requirement(s) that follow to determine if toxicity is still present above 0.9999 TUa. [Minn. R. 7001]
	5.2.15	**Species and Procedural Requirements**. [Minn. R. 7001]
	5.2.16	Tests shall be conducted in accordance with procedures outlined in EPA-821-R-02-012 Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms - Fifth Edition (Acute Manual) and any revisions to the Acute Manual. [Minn. R. 7001]
	5.2.17	Any test that begins with an effluent sample that is equal to or exceeds a total

		ammonia concentration of 5.0 mg/L may use the carbon dioxide-controlled atmosphere technique to control pH drift. [Minn. R. 7001]
	5.2.18	Test organisms for each test battery shall include the fathead minnow (Pimephales promelas)-Method 2000.0, Ceriodaphnia dubia-Method 2002.0, and Daphnia magna-Method 2021.0 or any updates to these methods. [Minn. R. 7001]
	5.2.19	Static renewal acute serial dilution tests of the effluent shall consist of a control, 12, 25, 50, 75 and 100% effluent. [Minn. R. 7001]
	5.2.20	All effluent samples shall be flow proportioned, 24-hour composite samples. Test solutions shall be renewed daily. Testing of the effluent shall begin within 36 hours of sample collection. Receiving water collected outside of the influence of discharge shall be used for dilution and controls. [Minn. R. 7001]
	5.2.21	Any other circumstances not addressed in the previous requirements or that require deviation from that specified in the previous requirements shall first be approved by the MPCA. [Minn. R. 7001]
	5.2.22	**Quality Control (QC) and Report Submittals**. [Minn. R. 7001]
	5.2.23	Any test that does not meet quality control measures or results which the Permittee believes reflect an artifact of testing (i.e. poor control results) shall be repeated within two weeks of notification from the lab regarding the test sample results. The acute WET report and QC reports shall contain information consistent with the report preparation section of the Acute Manual. The MPCA shall make the final determination regarding test validity. [Minn. R. 7001]
	5.2.24	**Positive Toxicity Result for WET**. [Minn. R. 7001]
	5.2.25	Should a test exceed 0.9999 TUa for WET based on results from the most sensitive test species, the Permittee shall conduct two repeat test batteries on all species. The repeat tests are to be completed within 45 days after completion of the positive test. These tests are used to determine if toxicity exceeding 0.9999 TUa remains present for any test species. [Minn. R. 7001]
	5.2.26	**Repeat Testing Results**. [Minn. R. 7001]
	5.2.27	**Negative Retests.** If no toxicity is present above 0.9999 TUa for any test species in both repeat tests, the Permittee shall return to the test frequency specified by the permit. [Minn. R. 7001]
	5.2.28	**Positive Retests.** If toxicity is present above 0.9999 TUa for any test species in either of the repeat tests, the Permittee shall submit a plan for conducting a Toxicity Reduction Evaluation (TRE) for MPCA review and approval. [Minn. R. 7001]
	5.2.29	**TRE Requirements**. [Minn. R. 7001]
	5.2.30	The TRE shall be submitted within 60 days after the toxicity discovery date and include a Facility Performance Review. Upon approval of the TRE, the Permittee shall implement the TRE or subsequent amendments in its entirety. Any violations of the TRE are violations of this permit. In addition, quarterly reports starting from the date of the TRE submittal are required. The quarterly reports shall include, but are not limited to, a complete description of all progress made towards the identification of the source(s) of toxicity and the Permittee's plans for the removal of the toxicity. The TRE shall be consistent with the Acute Manual or subsequent procedures approved by the MPCA in attempting to identify and remove the source of the toxicity. Routinely schedule acute toxicity test batteries required in this permit shall remain in effect throughout the permit cycle. The Permittee must submit a request to discontinue the TRE for MPCA review upon conclusion of the TRE. If the MPCA discontinues the TRE, the permit may be modified to set conditions to be met by the Permittee based on the TRE results. If the MPCA continues the TRE, the Permittee shall continue to implement the approved conditions of the TRE. [Minn. R. 7001]

	5.2.31	Following successful completion of the TRE, the Permittee shall conduct semi-annual testing for the next five-year permit cycle. [Minn. R. 7001]
	5.2.32	**WET Data and Test Acceptability Criteria (TAC) Submittal**. [Minn. R. 7001]
	5.2.33	All WET test data and TAC shall be submitted to the MPCA by the dates required by this section of the permit using the MPCA Acute Whole Effluent Toxicity Test Report found on the MPCA website at https://www.pca.state.mn.us/water/wastewater-additional-guidance-and-information. Data not submitted on the correct form(s), or submitted incomplete, will be returned to the Permittee and deemed incomplete until adequately submitted on the designated form(s). These are legal forms and must be signed and dated by the Permittee. The data and form(s) shall be mailed to the MPCA, WQ Submittals Center. [Minn. R. 7001]
	5.2.34	**Potential Permit Modifications**. [Minn. R. 7001]
	5.2.35	The permit may be modified during a permit cycle to include additional toxicity testing and/or a WET limit based on the WET testing results. [Minn. R. 7001]
		Priority Pollutant Requirements
	5.3.36	**Monitoring Frequency**. [Minn. R. 7001]
	5.3.37	The Permittee shall monitor the effluent three times in the life of the permit for the following specified priority pollutants. Sampling events shall occur before the second, third, and fourth year following permit issuance and shall not be less than one year apart. [Minn. R. 7001]
	5.3.38	The Permittee shall submit the first priority pollutant monitoring report: Due 1095 calendar days before Permit Expiration Date. (By two years after permit issuance date). [Minn. R. 7001]
	5.3.39	The Permittee shall submit the second priority pollutant monitoring report: Due 730 calendar days before Permit Expiration Date. (By three years after permit issuance date). [Minn. R. 7001]
	5.3.40	The Permittee shall submit the third priority pollutant monitoring report: Due 365 calendar days before Permit Expiration Date. (By four years after permit issuance date). [Minn. R. 7001]
	5.3.41	**Sample Type**. [Minn. R. 7001]
	5.3.42	All samples should be collected using a 24-hour flow proportional composite; except for the 624 volatiles, cyanide, and 1631E mercury samples, which must be collected using the grab method. [Minn. R. 7050.0222]
	5.3.43	**Reporting Specifics**. [Minn. R. 7001]
	5.3.44	Reporting limits for all Priority Pollutant analyses shall be as close as analytically possible to the Class 2 chronic water quality standards. [Minn. R. 7050.0222]
	5.3.45	**Monitoring Specifics**. [Minn. R. 7001]
	5.3.46	Monitoring shall be for the organic priority pollutants identified under the volatile, acid, base/neutral, and pesticide fractions using EPA methods 624, 625, and 608 (40 CFR pt. 136) as listed in Table II of 40 CFR pt. 122, Appendix D or any updates to those methods. The following priority pollutant total metals shall also be monitored using EPA approved methods found in Table IB of the current version of 40 CFR pt. 136: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, and zinc. In addition, the Permittee shall monitor for total cyanide, total phenolic compounds, and hardness (total as $CaCO_3$) using methods approved in the most recent update of 40 CFR pt. 136.

		Total mercury shall be monitored by EPA method 1631E or the most recent update to this method, if not already required by the permit. Total cyanide shall be monitored to the free cyanide water quality standard. The chromium reporting limit shall meet the chromium +6 water quality standard. [Minn. R. 7001]
	5.3.47	The QA/QC associated with each priority pollutant scan shall also be submitted to the MPCA. [Minn. R. 7001]
		Facility Specific Requirements
	5.4.48	**Salty Discharge Monitoring Requirements**. [Minn. R. 7001]
	5.4.49	The Permittee may request a reduction in monitoring if, after two years with a minimum of 10 sets of data, the monitoring does not indicate a reasonable potential to exceed a water quality standard limit. [Minn. R. 7001]
	5.4.50	If monitoring results indicate a reasonable potential for any of the parameters, the Permittee will be required to submit an application for a permit modification. If necessary, a compliance schedule will be added to the permit to ensure progress towards meeting the water quality standards. [Minn. R. 7001]
	5.4.51	**Final Total Phosphorus Limit Requirement**. [Minn. R. 7001]
	5.4.52	The permit includes a proposed monthly total phosphorus WQBEL of 27 kilograms per day (kg/day), Calendar Month Average, June-September effective period, to protect for eutrophication impairments in the Mississippi River and is consistent with river eutrophication standards (RES). The WQBEL of 27 kg/day is based off a five-year long-term average waste load allocation (WLA) of 13 kg/day, June-September effective period. The long-term average WLA of 13 kg/day is based on achieving the RES criterion of 100 micrograms per liter (ug/L) in the Mississippi River. The MPCA projects that by complying with the 27 kg/day monthly limit, the Winona WWTF will have to average 13 kg/day, June-September effective period, over a five year/long-term period. After the five year permit cycle, the MPCA will evaluate the facility's discharge and the downstream water quality. If necessary, the MPCA will adjust the facility's 27 kg/day monthly average limit down to ensure that the long-term average WLA of 13 kg/day is achieved during the June-September effective period. [Minn. R. 7001]
	5.4.53	**Phases for Limits and Monitoring Requirements**. [Minn. R. 7001]
	5.4.54	Phase 1 Limits and Monitoring Requirements for total phosphorus are effective upon permit issuance. Phase 2 Limits and Monitoring Requirements for total phosphorus are effective 90 days after initiation of operation. Final compliance shall be attained as soon as possible, but no later than January 1, 2028. [Minn. R. 7001]
WS 001	Influent Waste	
		Waste Stream: Class A Major Facility Influent Requirements
	5.5.1	The Permittee shall submit a monthly DMR: Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
	5.5.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.5.3	Samples for Station WS 001 shall be taken at a point representative of total influent flow to the system. [Minn. R. 7001.0150, Subp. 2(B)]
	5.5.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge

		Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
MN0030147	Winona WWTP	
		Surface Discharge Station General Requirements
	5.6.1	Analysis Requirements. [Minn. R. 7001]
	5.6.2	Dissolved Oxygen, pH, Specific Conductance, Temperature and Total Residual Chlorine analyses shall be conducted within 15 minutes of Sample collection. [Minn. R. 7053]
	5.6.3	Representative Samples. [Minn. R. 7001]
	5.6.4	Samples and measurements required by this permit shall be representative of the monitored activity. [Minn. R. 7001]
	5.6.5	Surface Discharge Prohibitions. [Minn. R. 7001]
	5.6.6	Floating solids or visible foam shall not be discharged in other than trace amounts. [Minn. R. 7001]
	5.6.7	Oil or other substances shall not be discharged in amounts that create a visible color film. [Minn. R. 7001]
	5.6.8	The Permittee shall install and maintain outlet protection measures at the discharge stations to prevent erosion. [Minn. R. 7001]
	5.6.9	Winter Sampling Conditions. [Minn. R. 7001]
	5.6.10	The Permittee shall sample flows at the designated monitoring stations including when this requires removing ice to sample the water. If the station is completely frozen throughout a designated sampling month, the Permittee shall check the "No Discharge" box on the Discharge Monitoring Report (DMR) and note the ice conditions in Comments on the DMR. [Minn. R. 7001]
	5.6.11	Chlorine Addition Requirements. [Minn. R. 7001]
	5.6.12	If chlorine is added for any purpose, the Permittee shall monitor the discharge for Total Residual Chlorine once per day during chlorine usage. The Permittee shall report the monitoring data as a comment on the next submitted Discharge Monitoring Report for the affected station. The discharge shall not exceed a 0.038 mg/L Total Residual Chlorine limit. [Minn. R. 7001]
	5.6.13	Mercury Limits and Monitoring Requirements. [Minn. R. 7001]
	5.6.14	Permittees are required to sample for TSS (grab sample) at the same time that Total/Dissolved Mercury samples are taken. Total Mercury, Dissolved Mercury, and TSS (grab sample) samples shall be collected via grab samples. All results shall be recorded on DMRs. [Minn. R. 7001]
	5.6.15	Total and Dissolved Mercury samples shall be analyzed using the most current versions of EPA Method 1631 with clean techniques method 1669. Should another mercury analytical method that has a reportable quantitation level of <0.5 ng/L that allows for low-level sample characterization be approved by the EPA and certified by an MPCA recognized accreditation body, the method may be used in place of 1631/1669. [Minn. R. 7001]
	5.6.16	Mercury monitoring with a frequency of once per month and an effective period of May, Sep are to be taken once during the month of May and once during the month of September for a total of two samples per year. [Minn. R. 7001]
	5.6.17	Nitrogen Limits and Monitoring Requirements. [Minn. R. 7001]
	5.6.18	"Total Nitrogen" is to be reported as the summation of the Total Kjeldahl Nitrogen and Total Nitrite plus Nitrate Nitrogen values. [Minn. R. 7001]
		Waste Stream Station General Requirements
	5.7.19	Analysis Requirements. [Minn. R. 7001]

	5.7.20	Dissolved Oxygen, pH, Specific Conductance, Temperature and Total Residual Chlorine analyses shall be conducted within 15 minutes of Sample collection. [Minn. R. 7053]
	5.7.21	Representative Samples. [Minn. R. 7001]
	5.7.22	Grab and composite samples shall be collected at a point representative of total influent flow to the system. [Minn. R. 7001]
	5.7.23	Nitrogen Limits and Monitoring Requirements. [Minn. R. 7001]
	5.7.24	"Total Nitrogen" is to be reported as the summation of the Total Kjeldahl Nitrogen and Total Nitrite plus Nitrate Nitrogen values. [Minn. R. 7001]
		Compliance Construction Schedule
	5.8.25	Definitions. [Minn. R. 7001]
	5.8.26	"Initiation of operation" means the date that MPCA determines all components of the wastewater treatment system are complete and functioning and the project begins operating for the purposes for which it was planned, designed, and built. [State Definitions]
	5.8.27	"Completion of construction" means all the construction is complete except for minor weather-related components and conforms to the approved plans and specifications and change orders. [State Definitions]
	5.8.28	"Notice to proceed" means a written notice given by the Permittee to the contractor that affixes the contract effective date and the date that the contractor begins performing the work specified in the contract documents. [State Definitions]
	5.8.29	Schedule. [Minn. R. 7001]
	5.8.30	**Final Total Phosphorous Water Quality Based Effluent Limit (WQBEL)**. [Minn. R. 7001]
	5.8.31	The Permittee shall meet the final total phosphorus effluent limit of 27 kg/day, June-September effective period, as soon as possible, but no later than January 1, 2028. If at any time prior to January 1, 2028 the Permittee determines that they have attained compliance with the final limit, they shall notify the MPCA in writing within 14 days of the attainment. [Minn. R. 7001]
	5.8.32	The Permittee shall submit a facility plan : Due before 03/01/2022 The Permittee shall submit an approvable facility plan due by March 1, 2022. [Minn. R. 7001]
	5.8.33	The Permittee shall submit annual progress reports : Due 03/01/2023 annually in March The Permittee shall submit annual project progress reports due by March 1, 2023 and annually by March 1st thereafter. The annual report shall provide a project update and describe all of the design, funding, and construction activities completed during the calendar year to meet the final total phosphorus effluent limit. [Minn. R. 7001]
	5.8.34	The Permittee shall submit a NPDES Permit Application, as required, for permit modification by December 1, 2023. [Minn. R. 7001]
	5.8.35	The Permittee shall submit plans and specifications : Due before 12/01/2023 The Permittee shall submit plans and specifications due by December 1, 2023. Plans and specifications shall be at least 90% complete. [Minn. R. 7001]
	5.8.36	The Permittee shall initiate operation initiate operation : Due before 09/30/2027 The Permittee shall initiate operation due by September 30, 2027. [Minn. R. 7001]

	5.8.37	The Permittee shall attain compliance with final effluent limits : Due by 90 days after the initiation of operation date The Facility shall attain compliance with the final total phosphorus effluent limit of 27 kg/day within 90 days after the initiation of operation date. Final compliance shall be attained as soon as possible, but no later than January 1, 2028. [Minn. R. 7001]
		Mercury Minimization Plan
	5.9.38	The Permittee is required to complete and submit a Mercury Pollutant Minimization Plan (MMP) to the MPCA as detailed in this section. If the Permittee has previously submitted a MMP, it shall update its MMP and submit the updated MMP to the MPCA. The purpose of the MMP is to evaluate collection and treatment systems to determine possible sources of mercury as well as potential mercury reduction options. Guidelines for developing a MMP are detailed in this section. [Minn. R. 7001]
	5.9.39	The specific mercury monitoring requirements are detailed in the limits and monitoring section of this permit. Information gained through the MMP process can be used to reduce mercury concentrations. As part of its mercury control strategy, the Permittee should consider selecting activities based on the potential of those activities to reduce mercury loadings to the wastewater treatment facility. [Minn. R. 7001]
	5.9.40	The Permittee shall submit a mercury pollutant minimization plan: Due by 180 days after permit issuance. [Minn. R. 7001]
	5.9.41	At a minimum, the MMP shall include the following: a. A summary of mercury influent and effluent concentrations and biosolids monitoring data using the most recent five years of monitoring data, if available. b. Identification of existing and potential sources of mercury concentrations and/or loading to the facility. As appropriate for your facility, you should consider residential, institutional, municipal, and commercial sources (such as dental clinics, hospitals, medical clinics, nursing homes, schools, laundries, and industries with potential for mercury contributions). You should also consider other influent mercury sources, such as stormwater inputs, ground water (inflow & infiltration) inputs, lift station components, and waste streams or sewer tributaries to the wastewater treatment facility. c. An evaluation of past and present WWTF operations to determine those operating procedures that maximize mercury removal. d. A summary of any mercury reduction activities implemented during the last five years. e. A plan to implement mercury management and reduction measures during the next five years. [Minn. R. 7001]
		Phosphorus Management Plan
	5.10.42	The Permittee shall submit a phosphorus management plan: Due by 180 days after permit issuance. [Minn. R. 7001]
	5.10.43	Within 180 days of permit issuance the Permittee shall prepare and submit to the MPCA, a Streamlined Phosphorus Management Plan (PMP). The intent of the Streamlined PMP is to help maintain previous improvements and conduct ongoing evaluations to determine possible source reduction measures, operational improvements, and minor WWTP modifications that will reduce phosphorus loadings to the WWTP at a reasonable cost.

		Immediately upon submittal to the MPCA, the Permittee shall implement the PMP for the remainder of the permit. The Streamlined PMP should include, but not necessarily be limited to, an evaluation of the following and a plan to implement the necessary phosphorus management and reduction measures over the permit term: 1. WWTP influent reduction measures: a. Re-evaluation of the phosphorus reduction potential of users; b. Determine which sources have the opportunity for further reduction of phosphorus (e.g., industrial, commercial, institutional, municipal, and others); c. Determine whether known sources (e.g., restaurant and food preparation) have adopted or can adopt phosphorus minimization and water conservation plans; and d. Re-evaluation of whether or not local limits on influent sources of excessive phosphorus are needed. This includes an evaluation of whether any existing local limits are appropriate. 2. WWTP effluent reduction measures: a. Continued optimization of existing treatment processes; and b. An assessment of side stream loading and reductions options. PMP guidance can be found on the MPCA internet at http://www.pca.state.mn.us/enzq8fa or by contacting the compliance staff listed on the cover page of this permit. [Minn. R. 7001]
		Mechanical System
	5.11.44	**Bypass Structures**. [Minn. R. 7001]
	5.11.45	All structures capable of bypassing the treatment system shall be manually controlled and kept locked at all times. [Minn. R. 7001.0030]
	5.11.46	**Sanitary Sewer Extension Permit**. [Minn. R. 7001]
	5.11.47	The Permittee may be required to obtain a sanitary sewer extension permit from the MPCA for any addition, extension, or replacement to the sanitary sewer. If a sanitary sewer extension permit is required, construction may not begin until plans and specifications have been submitted and a written permit is granted except as allowed in Minn. Stat. 115.07, subd. 3b. [Minn. R. 7001.0020]
	5.11.48	**Operator Certification**. [Minn. R. 7001]
	5.11.49	The Permittee shall provide a Class A state certified operator who maintains direct responsibility of the operation, maintenance, and testing functions required to ensure compliance with the terms and conditions of this permit. [Minn. R. 9400]
	5.11.50	The Permittee shall provide the appropriate number of operators with a Type IV certification to be responsible for the land application of biosolids or semisolids from commercial or industrial operations. [Minn. R. 7048]
	5.11.51	If the Permittee chooses to meet operator certification requirements through a contractual agreement, the Permittee shall provide a copy of the contract to the MPCA, WQ Submittals Center. The contract shall include: A. The certified operator's name, certificate number, company name (if appropriate), and the period covered by the contract and provisions for renewal; B. The duties and responsibilities of the certified operator; C. The duties and responsibilities of the Permittee; and D. Provisions for notifying the MPCA 30 days in advance of termination if the contract

		is terminated prior to the expiration date. [Minn. R. 9400]
	5.11.52	The Permittee shall notify the MPCA within 30 days of a change in operator certification or contract status. [Minn. R. 9400]
		Pretreatment: Delegated Requirements
	5.12.53	Pretreatment - Definitions. [Minn. R. 7049]
	5.12.54	For the purposes of these pretreatment requirements, "Significant Industrial User" (SIU) shall mean any industrial user (IU) which: a. is subject to Categorical Pretreatment Standards, as defined in Minnesota Rules 7049.0120, subpart 5; b. discharges 25,000 gallons per day or more of process wastewater, excluding sanitary, noncontact cooling or boiler blowdown wastewater, to the POTW; c. contributes a process wastewater containing five percent or more of the flow or load of any pollutant of concern to the POTW treatment plant; or d. is designated as significant by the Permittee on the basis that the Industrial User has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement. [Minn. R. 7049]
	5.12.55	Exemption. [Minn. R. 7049]
	5.12.56	Industrial users qualifying as significant solely on the basis of criteria b. or c. above may be exempted from consideration as a SIU if the Permittee finds that they have no reasonable potential to adversely affect the POTW's operation or to violate pretreatment standards or requirements. [Minn. R. 7049]
	5.12.57	The Permittee shall notify the MPCA in writing of any Industrial User so exempted and provide justification for their exemption. [Minn. R. 7049]
	5.12.58	Pretreatment - Delegated Authority. [Minn. R. 7049]
	5.12.59	Under the authority of the General Pretreatment Regulations (40 CFR 403), the Permittee's pretreatment program was approved on July 3, 1984 and the last modification was approved on January 1, 2001. The Permittee has been delegated authority to operate as the Publicly Owned Treatment Works (POTW) control authority under the General Pretreatment Regulations. The Permittee shall fully and effectively implement and operate the approved pretreatment program according to the legal authorities contained therein and the General Pretreatment Regulations. [Minn. R. 7049]
	5.12.60	In addition to the Prohibitions contained in the General Pretreatment Regulations and the approved program, the Permittee shall prohibit new discharges of non-contact cooling waters to the POTW unless there are no cost-effective alternatives. [Minn. R. 7049]
	5.12.61	Existing discharges of non-contact cooling water to the wastewater treatment facility shall be eliminated where elimination is cost effective, or where an infiltration/inflow analysis and sewer system evaluation survey indicate the need for such removal. [Minn. R. 7049]
	5.12.62	Pollutants of concern in the administration of the Permittee's pretreatment program shall be considered in the determination of the Significance of Industrial Users, monitoring of Significant Industrial Users, establishment of limitations on users, and communications with users. A pollutant of concern is a pollutant that is discharged, or may be discharged by an industrial user to the permittees treatment works and that is, or should be, of concern on the basis that it may cause interference or pass through as defined in Minnesota Rules 7049.0120, subparts 10 and 12. [Minn. R. 7049]
	5.12.63	Legal Authority. [Minn. R. 7049]
	5.12.64	The Permittee shall maintain the legal authority that allows it to fully implement its approved pretreatment program in conformance with the requirements of the

		General Pretreatment Regulation. [Minn. R. 7049]
	5.12.65	Industrial Users Inventory. [Minn. R. 7049]
	5.12.66	The Permittee shall update its inventory of Industrial Users at least annually and as needed to ensure that all SIUs are properly identified, characterized and categorized. The Permittee shall: a. identify Industrial Users which may be subject to the POTW pretreatment program; b. characterize the discharge of pollutants to the POTW by the Industrial User; and c. determine the applicable categories for industrial users subject to National Categorical Pretreatment Standards. [Minn. R. 7049]
	5.12.67	Within 30 days of the designation of an Industrial User as significant, the Permittee shall notify the SIU of all applicable pretreatment standards and requirements. The Permittee shall also notify all Industrial Users of all applicable pretreatment standards and requirements, and the Industrial Users' obligation to comply with applicable requirements under Subtitles C and D of the Resource Conservation and Recovery Act (RCRA). [Minn. R. 7049]
	5.12.68	Local Limits. [Minn. R. 7049]
	5.12.69	The Permittee shall develop, maintain and enforce specific local limits to implement the prohibitions listed in Minnesota Rules 7049.0140. [Minn. R. 7049]
	5.12.70	The Permittee shall evaluate the need to revise local limits to effectively implement these prohibitions at least once during the term of this permit. Prior to the expiration date of this permit, the permittee shall submit, for approval, a report on the evaluation. If the evaluation determines that a more restrictive local limit is needed, the permittee shall submit for approval a suggested schedule for amending the permittee's local limits. [Minn. R. 7049]
	5.12.71	The evaluation shall include a pollutant mass balance for all pollutants of concern. The mass balance shall attempt to balance the source of the pollutants (Industrial Users and other sources), the measured headwork's loading of the pollutants and the fates of the pollutants (discharge, biosolids and others). The mass balance shall make use of all available and appropriate monitoring data. The permittee shall, for all pollutants of concern, obtain sufficient data to allow the permittee to evaluate the need for local limits and to set local limits if they are needed. Monitoring shall be done at a sensitivity adequate to evaluate the need for local limits and set local limits if needed. [Minn. R. 7049]
	5.12.72	Permit Significant Industrial Users. [Minn. R. 7049]
	5.12.73	The Permittee shall issue and reissue permits to all existing SIUs within 180 days of expiration of the existing SIU permit for existing SIUs, or identification of a new SIU. The permit shall contain at least the following: a. a statement of duration (no longer than five (5) years); b. a statement of nontransferability without prior approval by the POTW, and provision of a copy of the existing permit to the new owner or operator; c. discharge limits based on applicable prohibited discharges in Minnesota Wastewater Pretreatment Rules (Minn. R. 7049.0140), National Categorical Pretreatment Standards, and local limits and local discharge prohibitions; d. self-monitoring, sampling, reporting, notification and record keeping requirements, including an identification of the pollutants to be monitored, sampling location, sampling frequency and sample type; and e. a statement of applicable civil and criminal penalties for violation of pretreatment standards and requirements, and any applicable compliance schedule. [Minn. R. 7049]
	5.12.74	The Permittee may not extend the compliance date beyond applicable federal deadlines in any compliance schedule. [Minn. R. 7049]

	5.12.75	Compliance Monitoring and Inspections. [Minn. R. 7049]
	5.12.76	The Permittee shall randomly sample and analyze the discharge from Industrial Users and conduct surveillance activities to identify, independent of information supplied by Industrial Users, noncompliance with pretreatment standards. The Permittee shall inspect and sample the discharge from each SIU at least once a year. [Minn. R. 7049]
	5.12.77	The Permittee shall evaluate whether each SIU needs a plan to control spill and slug discharges as provided in Minnesota Rules 7049.0830 G. Where a control plan is determined to be needed, the Permittee shall require, in the permit issued to the industrial user, that the industrial user develop and implement such a plan. [Minn. R. 7049]
	5.12.78	Industrial User Reports. [Minn. R. 7049]
	5.12.79	The Permittee shall receive and analyze self-monitoring reports and other reports and notices submitted by Industrial Users in accordance with requirements contained in permits issued by the Permittee and in accordance with the General Pretreatment Regulation. [Minn. R. 7049]
	5.12.80	Enforcement Actions. [Minn. R. 7049]
	5.12.81	The Permittee shall investigate instances of noncompliance with pretreatment standards and requirements as indicated by reports submitted by Industrial Users, by information collected by the Permittee or by other means. [Minn. R. 7049]
	5.12.82	The Permittee shall collect samples, analyze data and compile information in a manner to ensure accuracy and admissibility in enforcement proceedings and judicial actions. [Minn. R. 7049]
	5.12.83	In instances of noncompliance, the Permittee shall take effective enforcement action in accordance with the approved enforcement response plan. [Minn. R. 7049]
	5.12.84	Data Management and Record Keeping. [Minn. R. 7049]
	5.12.85	The Permittee shall maintain records documenting pretreatment activities. These records shall contain an inventory of industrial users, characterization of discharges, compliance status, permit status, and records of enforcement actions. [Minn. R. 7049]
	5.12.86	The Permittee shall retain all records of monitoring activities and results for at least three (3) years and shall make the records available to EPA and the MPCA upon request. [Minn. R. 7049]
	5.12.87	Public Participation. [Minn. R. 7049]
	5.12.88	The Permittee shall comply with public participation requirements of 40 CFR 25 in the enforcement of national pretreatment standards. [Minn. R. 7049]
	5.12.89	The Permittee shall, once a year, publish the names of Industrial Users that were in significant noncompliance with pretreatment requirements, as defined in Minnesota Rules 7049.0120, subpart 25, any time during the previous twelve (12) months. [Minn. R. 7049]
	5.12.90	All industrial discharge data shall be made available to the public upon request. [Minn. R. 7049]
	5.12.91	Program Resources. [Minn. R. 7049]
	5.12.92	The Permittee shall acquire sufficient resources and qualified personnel to carry out the program implementation procedures described in this permit. [Minn. R. 7049]
	5.12.93	Program Modification. [Minn. R. 7049]
	5.12.94	The Permittee shall submit to the MPCA a statement of the basis for desired program modifications and a modified program description for all substantial modifications as defined in Minnesota Rules 7049.0980. The Permittee shall await formal approval from the MPCA before implementing substantial program modifications. [Minn. R. 7049]
	5.12.95	The Permittee shall notify the MPCA of non-substantial modifications to its pretreatment program at least 45 days prior to implementing the modification. [Minn. R. 7049]

	5.12.96	Non-substantial modifications are deemed approved unless the MPCA notifies the Permittee otherwise within 45 days. [Minn. R. 7049]
	5.12.97	Multijurisdictional Agreements. [Minn. R. 7049]
	5.12.98	The Permittee must maintain agreements with its contract cities to maintain required pretreatment legal authority and procedures in the contract cities. [Minn. R. 7049]
	5.12.99	Notification Requirements. [Minn. R. 7049]
	5.12.100	The Permittee shall notify the MPCA of planned or actual changes in the discharges from SIUs which will require changes to the user's control document and which may affect the Permittee's effluent. [Minn. R. 7049]
	5.12.101	The Permittee shall supply the MPCA with information regarding the discharge, compliance status, or enforcement actions taken for any industrial user upon request. [Minn. R. 7049]
	5.12.102	Pretreatment Annual Report. [Minn. R. 7049]
	5.12.103	The Permittee shall submit a pretreatment annual report: Due by February 28 of each year following permit issuance. [Minn. R. 7049]
	5.12.104	The Permittee shall submit the pre-treatment report annually to the following address: MPCA Attn: WQ Submittals Center 520 Lafayette Road North St. Paul, Minnesota 55155-4194 The report shall describe the Permittee's pretreatment activities during the previous calendar year and is due on February 28 of each year and shall contain at least the following information. [Minn. R. 7049]
	5.12.105	The Pretreatment Annual Report shall describe the pretreatment activities during the previous calendar year and shall contain the following lists: a. An updated list of the Permittee's significant industrial users including their names, addresses, any applicable federal categorical standards, and a summary total of significant industrial users and categorical industrial users. b. A separate list of deletions from and additions to previously submitted lists of SIUs, with a brief explanation for each deletion. c. A list of SIUs with expired permits. [Minn. R. 7049]
	5.12.106	The Pretreatment Annual Report shall contain the following descriptions: a. A characterization of the compliance status of each SIU during the reporting year. The compliance characterization shall at least indicate status as follows: 1. no violations noted with discharge limits, and compliance with monitoring and reporting requirements is sufficient to determine compliance with discharge limitations; 2. violations were noted with discharge limits, or violations of monitoring and reporting requirements that may have impaired the Permittee's ability to determine compliance with discharge limitations were noted, but the noncompliance does not meet the definition of significant noncompliance as referenced below; 3. significant noncompliance (as defined by 40 CFR 403.8(f)(2)(vii)); or 4. status unknown. b. A description of the standards or requirements that were violated for SIUs that are out of compliance with pretreatment standards. For an SIU in significant noncompliance, the characterization shall note the reason for the significant violations (if known) and whether the SIU is on a compliance schedule. If the SIU is on a compliance schedule, the date of final compliance shall be noted in the report.

		c. A description of any upsets, interference, or pass through incidents at the POTW which the Permittee knows or suspects were caused by Industrial Users of the POTW system. The description shall include the reasons why the incidents occurred, the corrective actions taken, and the Industrial Users responsible, if known. [Minn. R. 7049]
	5.12.107	The permittee shall, for all pollutants of concern, obtain sufficient data to allow the permittee to evaluate the need for local limits, and shall set local limits it they are needed. Monitoring shall be done at a sensitivity adequate to evaluate the need for local limits and set local limits if they are needed. [Minn. R. 7049]
	5.12.108	The Pretreatment Annual Report shall contain the following summaries: a. A summary of the discharge monitoring data for each SIU for the reporting year. This summary shall include all available data and shall accurately represent the discharge by the user. b. A summary of the inspection and sampling activities conducted by the POTW during the reporting year to gather information and data regarding Industrial Users. The summary shall include identification of the Industrial Users subject to surveillance by the POTW and an indication of the type (inspection or sampling) and the number of surveillance activities performed. c. A summary of the enforcement actions by the POTW during the reporting year. The summary shall include the names and addresses of the Industrial Users that were the subject of enforcement action, the enforcement action taken, and whether the Industrial User has returned to compliance. d. A summary of the Permittee's pretreatment budget for the reporting year, including the cost of personnel, equipment and services employed in the pretreatment program. e. A summary of public participation activities to involve and inform the public. This shall include a copy of the annual publication of significant noncompliance, if such publication was needed to comply with 40 CFR 403.8(f)(2)(vii). [Minn. R. 7049]
		Biosolids: Land Application
	5.13.109	**Authorization**. [Minn. R. 7041]
	5.13.110	This permit authorizes the Permittee to store and land apply domestic wastewater treatment biosolids in accordance with the provisions in this section and Minn. R. ch. 7041. [Minn. R. 7041]
	5.13.111	Permittees who prepare bulk biosolids shall obtain approval of the sites on which bulk biosolids are applied before they are applied unless they are Exceptional Quality Biosolids. Site application procedures are set forth in Minn. R. 7041.0800. [Minn. R. 7041.0800]
	5.13.112	**Compliance Responsibility**. [Minn. R. 7041]
	5.13.113	The Permittee is responsible for ensuring that the applicable requirements in this section and Minn. R. ch. 7041 are met when biosolids are prepared, distributed, and/or applied to the land. [Minn. R. 7041]
	5.13.114	**Notification Requirements**. [Minn. R. 7041]
	5.13.115	The Permittee shall provide information needed to comply with the biosolids requirements of Minn. R. ch. 7041 to others who prepare or use the biosolids. [Minn. R. 7041]
	5.13.116	**Pollutant Limits**. [Minn. R. 7041]
	5.13.117	Biosolids which are applied to the land shall not exceed the ceiling concentrations in Table 1 and shall not be applied so that the cumulative amounts of pollutant in Table 2 are exceeded.

		Table 1 Ceiling Concentrations (dry weight basis) Parameter in units mg/kg Arsenic 75 Cadmium 85 Copper 4300 Lead 840 Mercury 57 Molybdenum 75 Nickel 420 Selenium 100 Zinc 7500 Table 2 Cumulative Loading Limits Parameter in units lbs/acre Arsenic 37 Cadmium 35 Copper 1339 Lead 268 Mercury 15 Molybdenum not established* Nickel 375 Selenium 89 Zinc 2500 *The cumulative limit for molybdenum has not been established at the time of permit issuance. [Minn. R. 7041.1100]
	5.13.118	**Pathogen and Vector Attraction Reduction.** [Minn. R. 7041]
	5.13.119	Biosolids shall be processed, treated, or be incorporated or injected into the soil to meet one of the vector attraction reduction requirements in Minn. R. 7041.1400. [Minn. R. 7041.1400]
	5.13.120	Biosolids shall be processed or treated by one of the alternatives in Minn. R. 7041.1300 to meet the Class A or Class B standards for the reduction of pathogens. When Class B biosolids are applied to the land, the site restrictions in Minn. R. 7041.1300 shall also be met. [Minn. R. 7041.1300]
	5.13.121	The minimum duration between application and harvest, grazing, or public access to areas where Class B biosolids have been applied to the land is as follows: A. 14 months for food crops whose harvested parts may touch the soil/biosolids mixture (such as melons, squash, tomatoes, etc.), when biosolids are surface applied, incorporated, or injected; B. 20 months or 38 months depending on the application method for food crops whose harvested parts grow in the soil (such as potatoes, carrots, onions, etc). The 20 month time period is required when biosolids are surface applied or surface applied and incorporated after they have been on the soil surface for at least four months. The 38 month time period is required when the biosolids are injected or surface applied and incorporated within four months of application; C. 30 days for feed crops, other food crops (such as field corn, sweet corn, etc.), hay, or fiber crops when biosolids are surface applied, incorporated, or injected; D. 30 days for grazing of animals when biosolids are surface applied, incorporated, or injected; and E. One year where there is a high potential for public contact with the site (such as a reclamation site located in populated areas, a construction site located in a city, turf

		farms, plant nurseries, etc.) and 30 days where there is low potential for public contact (such as agricultural land, forest, a reclamation site located in an unpopulated area, etc.) when biosolids are surface applied, incorporated, or injected. [Minn. R. 7041]
	5.13.122	**Management Practices**. [Minn. R. 7041]
	5.13.123	The management practices for the land application of biosolids are described in detail in Minn. R. 7041.1200 and shall be followed unless specified otherwise in a site approval letter or a permit issued by the MPCA. [Minn. R. 7041]
	5.13.124	Overall management requirements: A. Biosolids shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated critical habitat; B. Biosolids shall not be applied to flooded, frozen, or snow covered ground so that the biosolids enter wetlands or other waters of the state; C. Biosolids shall be applied at an agronomic rate unless specified otherwise by the MPCA in a permit; and D. Biosolids shall not be applied within 33 feet of a wetland or waters of the state unless specified otherwise by the MPCA in a permit. [Minn. R. 7041]
	5.13.125	**Monitoring Requirements**. [Minn. R. 7041]
	5.13.126	Representative samples of biosolids applied to the land shall be analyzed by methods specified in Minn. R. 7041.3200 for the following parameters: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, Kjeldahl nitrogen, ammonia nitrogen, total solids, volatile solids, phosphorus, potassium, and pH. [Minn. R. 7041.3200]
	5.13.127	At a minimum, biosolids shall be monitored at the frequencies specified in Table 3 for the parameters listed above, and any pathogen or vector attraction reduction requirements in Minn. R. pts. 7041.1300 and 7041.1400 if used to determine compliance with those parts. Table 3 Minimum Sampling Frequencies Biosolids Applied* (metric tons/365-day period) period) — Biosolids Applied* (tons/365-day period) — Frequency (times/365-day >0 but <290 — >0 but <320 — 1 >=290 but <1,500 — >=320 but <1,650 — 4 >=1,500 but <15,000 — >=1,650 but <16,500 — 6 >=15,000 — >=16,500 — 12 * Either the amount of bulk biosolids applied to the land or the amount of biosolids received by a person who prepares biosolids that are sold or given away in a bag or other container for application to the land (dry weight basis). [Minn. R. 7041.1400]
	5.13.128	Representative samples of biosolids that are transferred to storage units and are stored for more than two years shall be analyzed by methods specified in Minn. R. 7041.3200 for each cropping year they are stored for the following parameters: arsenic, cadmium, copper, lead, molybdenum, nickel, selenium, and zinc. Mercury is specifically NOT included in the stored biosolids analysis because of the short holding time (28 days) required between sampling and analysis. [Minn. R. 7041..1300, Minn. R. 7041.3200]
	5.13.129	Increased sampling frequencies are specified for the parameters listed in Table 4.

Table 3 Minimum Sampling Frequencies (as printed within 5.13.127):

Biosolids Applied* (metric tons/365-day period) period)	Biosolids Applied* (tons/365-day period)	Frequency (times/365-day
>0 but <290	>0 but <320	1
>=290 but <1,500	>=320 but <1,650	4
>=1,500 but <15,000	>=1,650 but <16,500	6
>=15,000	>=16,500	12

		Sampling at a frequency at twice the minimum frequencies in Table 3 is required if concentrations listed in Table 4 are exceeded (based on the average of all analyses made during the previous cropping year). Table 4 Increased Frequency of Sampling Parameter (mg/kg dry weight basis) Arsenic 38 Cadmium 43 Copper 2150 Lead 420 Mercury 28 Molybdenum 38 Nickel 210 Selenium 50 Zinc 3750. [Minn. R. 7041]
	5.13.130	**Records**. [Minn. R. 7041]
	5.13.131	The Permittee shall keep records of the information necessary to show compliance with pollutant concentrations and loadings, pathogen reduction requirements, vector attraction reduction requirements, and management practices as specified in Minn. R. 7041.1600, as applicable to the quality of biosolids produced. [Minn. R. 7041.1600]
	5.13.132	**Reporting Requirements**. [Minn. R. 7041]
	5.13.133	The Permittee shall submit a biosolids annual report: Due annually, by the 31st of December on a form provided by or approved by the MPCA. The report shall include the requirements in Minnesota Rules, part 7041.1700. [Minn. R. 7041.1700]
	5.13.134	The Permittee shall submit a Biosolids Annual Report by December 31 of each year for biosolids storage and/or transfer activities occurring during the cropping year previous to December 31. The report shall indicate whether or not biosolids were transferred and/or stored. If biosolids were transferred, the report shall describe how much was transferred, where it was transferred to, the name of the facility that accepted the transfer, and the contact person at that facility. "Cropping year" means a year beginning on September 1 of the year prior to the growing season and ending August 31 the year the crop is harvested. For example, the 2019 cropping year began September 1, 2018 and ended August 31, 2019. [Minn. R. 7041]
	5.13.135	For biosolids that are stored for more than two years, the Biosolids Annual Report shall also include the analytical data from the representative sample of the biosolids generated during the cropping year. [Minn. R. 7041]
	5.13.136	The Biosolids Annual Report is found on the MPCA website at URL; https://www.pca.state.mn.us/water/wastewater-operator-resources The Permittee shall submit the Biosolids Annual Report to the MPCA, WQ Submittals Center. [Minn. R. 7041]
	5.13.137	The Permittee shall notify the MPCA in writing when 90 percent or more of any of the cumulative pollutant loading rates listed for any land application sites has been reached for a site. [Minn. R. 7041]
		Total Residual Oxidants
	5.14.138	**General Requirements**. [Minn. R. 7001]

	5.14.139	Total Residual Chlorine (TRC) shall be analyzed immediately. This means within 15 minutes or less of sample collection. [40 CFR 136.6]
	5.14.140	A Reportable Limit (RL) shall be established for this parameter. This must be based on the analysis of a standard at or below the RL. [Minn. R. 7001]
	5.14.141	A RL of 0.04 mg/L is considered in compliance with the 0.038 mg/L limit. [Minn. R. 7001]
	5.14.142	The RL shall be verified against a known standard at least monthly during the monitoring period. For successful verification, the standard needs to be recovered at +/- 40% of the actual value. [Minn. R. 7001]
	5.14.143	Monitoring results below the RL should be reported as "<" the RL. If the RL is 0.01 mg/L, based on the analysis of a standard at or below that level, and a parameter is not detected at a value of 0.01 mg/L or greater, the concentration shall be reported as "<0.01 mg/L." The symbol "<" means "less than." [Minn. R. 7001]
	5.14.144	**Compliance with a Daily Maximum limit.** [Minn. R. 7001]
	5.14.145	Compliance with a Daily Maximum limit for Total Residual Chlorine (TRC) concentration limits can be evaluated using one of the two following methods. [State Definitions]
	5.14.146	Single Sample Value - A single sample taken in a 24-hour period with a value of 0.038 mg/L or less is considered in compliance; or. [Minn. R. 7001]
	5.14.147	Multiple Sample Value - If the single value sample is greater than 0.038 mg/L, an average can be calculated using two to twelve samples analyzed in a 24-hour period. To calculate using multiple samples: A. The second sample shall be taken two hours after the initial sample; and B. Subsequent samples shall be taken at one-hour intervals not to exceed twelve samples in a 24-hour period The average value of the multiple samples must be 0.038 mg/L or less to be considered in compliance. Values below the RL for TRC are assumed to be zero for averaging purposes only. [Minn. R. 7001]
		Total Facility Requirements (NPDES/SDS)
	5.15.148	**Definitions.** Refer to the Permit User's Manual found on the MPCA's website (https://www.pca.state.mn.us) for standard definitions. [Minn. R. 7001]
	5.15.149	**Incorporation by Reference.** This permit incorporates the following applicable federal and state laws applicable to the Permittee and enforceable parts of this permit: 40 CFR pts. 122.41, 122.42, 136, 403 and 503; Minn. R. chs. 7001, 7041, 7045, 7050, 7052, 7053, 7060, and 7080; and Minn. Stat. chs. 115 and 116. [Minn. R. 7001]
	5.15.150	**Permittee Responsibility.** The Permittee shall perform the actions or conduct the activity authorized by this permit in compliance with the conditions of the permit and, if required, in accordance with the plans and specifications approved by the MPCA. [Minn. R. 7001.0150, subp. 3(E)]
	5.15.151	**Toxic Discharges Prohibited.** Whether or not this permit includes effluent limitations for toxic pollutants, the Permittee shall not discharge a toxic pollutant except according to 40 CFR pts. 400 to 460 and Minn. R. chs. 7050, 7052, 7053 and any other applicable MPCA rules. [Minn. R. 7001.1090, subp. 1(A)]
	5.15.152	**Nuisance Conditions Prohibited.** The Permittee's discharge shall not cause any nuisance conditions including, but not limited to: floating solids, scum and visible oil film, excessive suspended solids, material discoloration, obnoxious odors, gas ebullition, deleterious sludge deposits, undesirable slimes or fungus growths, aquatic habitat degradation, excessive growths of aquatic plants, acutely toxic conditions to aquatic life, or other adverse impact on the receiving water. [Minn. R. 7050.0210, subp. 2]
	5.15.153	**Property Rights.** This permit does not convey a property right or an exclusive

		privilege. [Minn. R. 7001.0150, subp. 3(C)]
	5.15.154	**Liability Exemption.** In issuing this permit, the State and the MPCA assume no responsibility for damage to persons, property, or the environment caused by the activities of the Permittee in the conduct of its actions, including those activities authorized, directed, or undertaken under this permit. To the extent the State and the MPCA may be liable for the activities of its employees, that liability is explicitly limited to that provided in the Tort Claims Act. [Minn. R. 7001.0150, subp. 3(O)]
	5.15.155	The MPCA's issuance of this permit does not obligate the MPCA to enforce local laws, rules, or plans beyond what Minnesota statutes authorize. [Minn. R. 7001.0150, subp. 3(D)]
	5.15.156	**Liabilities.** The MPCA's issuance of this permit does not release the Permittee from any liability, penalty, or duty imposed by Minnesota or federal statutes or rules or local ordinances, except the obligation to obtain the permit. [Minn. R. 7001.0150, subp. 3(A)]
	5.15.157	The issuance of this permit does not prevent the future adoption by the MPCA of pollution control rules, standards, or orders more stringent than those now in existence and does not prevent the enforcement of these rules, standards, or orders against the Permittee. [Minn. R. 7001.0150, subp. 3(B)]
	5.15.158	**Severability.** The provisions of this permit are severable and, if any provisions of this permit or the application of any provision of this permit to any circumstance are held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby. [Minn. R. 7001]
	5.15.159	**Compliance with Other Rules and Statutes.** The Permittee shall comply with all applicable air quality, solid waste, and hazardous waste statutes and rules in the operation and maintenance of the facility. [Minn. R. 7001]
	5.15.160	**Inspection and Entry.** When authorized by Minn. Stat. ch. 115.04, 115B.17, subd. 4, and 116.091, and upon presentation of proper credentials, the Permittee shall allow the MPCA, or an authorized employee or agent of the MPCA, to enter at reasonable times upon the property of the Permittee to examine and copy books, papers, records, or memoranda pertaining to the construction, modification, or operation of the facility covered by the permit or pertaining to the activity covered by the permit; and to conduct surveys and investigations, including sampling or monitoring, pertaining to the construction, modification, or operation of the facility covered by the permit or pertaining to the activity covered by the permit. [Minn. R. 7001.0150, subp. 3(I)]
	5.15.161	**Control Users.** The Permittee shall regulate the users of its facility to prevent the introduction of pollutants or materials that may result in the inhibition or disruption of the conveyance system, treatment facility or processes, or disposal system that would contribute to the violation of the conditions of this permit or any federal, state, or local law or regulation. [Minn. R. 7001.0150, subp. 3(F)]
	5.15.162	**Sampling**. [Minn. R. 7001]
	5.15.163	**Representative Sampling.** The Permittee shall conduct samples and measurements required by this permit as specified in this permit and shall be representative of the discharge or monitored activity. [Minn. R. 7001.0150, subp. 2(B)]
	5.15.164	**Additional Sampling.** If the Permittee monitors more frequently than required, they shall report the results and the frequency of monitoring on their eDMR for that reporting period. [Minn. R. 7001.1090, subp. 1(E)]
	5.15.165	**Certified/Accredited Laboratory.** A laboratory accredited by the Minnesota Department of Health [Minn. R. 4740.2010 through Minn. R. 4740.2120] and/or certified by the MPCA [Minn. R. 7001.4310 through Minn. R. 7001.4390] shall conduct analyses required by this permit, unless approved in writing by the MPCA. A certified/accredited laboratory does not need to complete analyses of dissolved oxygen, pH, temperature, specific conductance, and total residual oxidants (chlorine,

		bromine). Those analyses shall comply with 40 CFR pt. 136. Dissolved oxygen, pH, and total residual oxidants must be performed on-site. Follow the manufacturer's specifications for equipment maintenance and use. [Minn. R. 4740.2010-4740.2120, Minn. R. 7001.4310-7001.4390]
	5.15.166	**Sample Preservation and Procedure.** Sample preservation and test procedures for the analysis of pollutants shall conform to 40 CFR pt. 136 and Minn. R. 7041.3200. [Minn. R. 7001.0150, subp. 2(B), Minn. R. 7041.3200]
	5.15.167	**Equipment Calibration.** The Permittee shall check and/or calibrate flow meters, pumps, flumes, lift stations, or other flow monitoring equipment used for purposes of determining compliance (within plus or minus ten percent of the true flow values) with permit requirements at least twice annually. [Minn. R. 7001.0150, subp. 2(B & C)]
	5.15.168	**Maintain Records.** The Permittee shall keep the records required by this permit for at least three years, including any calculations, original recordings from automatic monitoring instruments, and laboratory sheets. The Permittee shall extend these record retention periods upon request of the MPCA. The Permittee shall maintain records for each sample and measurement. The records shall include the following information: A. The exact place, date, and time of the sample or measurement; B. The date of analysis; C. The name of the person who performed the sample collection, measurement, analysis, or calculation; D. The analytical techniques, procedures, and methods used; and E. The results of the analysis. [Minn. R. 7001.0150, subp. 2(C)]
	5.15.169	**Completing Reports.** The Permittee shall submit the results of the required sampling and monitoring activities on the forms provided, specified, or approved by the MPCA. The Permittee shall record the information in the specified areas on those forms and in the units specified. Required forms may include a Sample Values Form. If required, the Permittee shall record individual values for each sample and measurement on the Sample Values Form provided by the MPCA. The Permittee shall submit Sample Values Form with the appropriate eDMRs. The Permittee may design and use their own Sample Values Form; however, the Permittee shall not use their form until the MPCA reviews and approves the form. Note: The Permittee shall also record required summary information on their eDMR. Permittee submitted summary information contained only on the Sample Values Form does not comply with reporting requirements. [Minn. R. 7001.0150, subp. 2(B), Minn. R. 7001.1090, subp. 1(D)]
	5.15.170	**Submitting Reports.** The Permittee shall submit eDMRs, Sample Values Forms, and other supplemental attachment forms via MPCA e-Services after the MPCA approves their authorization request. The Permittee shall electronically submit eDMRs, Sample Values Forms, and other supplemental attachment forms by the 21st day of the month following the sampling period or otherwise as specified in this permit. The Permittee shall complete eDMR submittal on or before 11:59 PM of the 21st day of the month following the sampling period or as otherwise specified in this permit. The Permittee shall submit an eDMR for each required station even if no discharge occurred during the reporting period. The Permittee shall submit other reports required by this permit electronically or by mail. The Permittee shall submit reports by the date specified in this permit. For electronic submittals, the Permittee shall submit on or before 11:59 PM on the date specified in this permit. For mailed submittals, the Permittee shall ensure that

		submittals via U.S. Postal Service or other hand delivery method contain postmarks by the date specified in this permit. Whole Effluent Testing (WET) and Pretreatment Annual Reports must be mailed to the WQ Submittals Center. Electronically: wq.submittals.mpca@state.mn.us Include Water quality submittals form: www.pca.state.mn.us/sites/default/files/wq-wwprm7-71.docx Or by mail: Attention: WQ Submittals Center Minnesota Pollution Control Agency 520 Lafayette Road North St. Paul, MN 55155-4191. [Minn. R. 7001.0150, subp. 2(B), Minn. R. 7001.0150, subp. 3(H)]
	5.15.171	**Incomplete or Incorrect Reports.** The Permittee shall immediately submit an electronically amended report or eDMR to the MPCA upon discovery by the Permittee or notification by the MPCA that it has submitted an incomplete or incorrect report or eDMR. The amended report or eDMR shall contain the missing or corrected data along with a comment on the eDMR explaining the circumstances of the incomplete or incorrect report. If it is impossible to amend the report or eDMR electronically, the Permittee shall immediately notify the MPCA and the MPCA will provide direction for the amendment submittals. [Minn. R. 7001.0150, subp. 3(G)]
	5.15.172	**Required Signatures.** The Permittee or the duly authorized representative of the Permittee shall sign all eDMRs, forms, reports, and other documents submitted to the MPCA per Minn. R. 7001.0150, subp. 2(D). The person or persons who sign the eDMRs, forms, reports, or other documents shall certify that he or she understands and complies with the certification requirements of Minn. R. chs. 7001.0070 and 7001.0540, including the penalties for submitting false information. A registered professional engineer shall certify technical documents, such as design drawings and specifications, and engineering studies submitted as part of a permit application or by permit conditions. [Minn. R. 7001.0540]
	5.15.173	**Reporting Limit (RL).** The Permittee shall report monitoring results below the RL of a particular instrument as "<" the value of the RL. For example, if an instrument has a RL of 0.1 mg/L and a parameter is not detected at a value of 0.1 mg/L or greater, the Permittee shall report the concentration as "< 0.1 mg/L." The Permittee shall not use "non-detected," "undetected," "below detection limit," or "zero" when reporting results. The MPCA considers these terms as permit reporting violations. Where sample values are less than the RL and the permit requires reporting of an average, the Permittee shall calculate the average as follows: A. If some values are less than (<) the RL, substitute zero for all non-detectable values to use in the average calculation; B. If all values are less than (<) the RL, calculate the average and report as < the RL average concentration; and C. To calculate a mass loading with a less than (<) the RL concentration, use the RL value in the calculation and then add the "<" to the product of the concentration and the volume. [Minn. R. 7001.0150, subp. 2(B)]
	5.15.174	**Records.** The Permittee shall, when requested by the MPCA, submit within a reasonable time the information and reports that are relevant to the control of pollution regarding the construction, modification, or operation of the facility covered by the permit or regarding the conduct of the activity covered by the permit. [Minn. R. 7001.0150, subp. 3(H)]

	5.15.175	**Confidential Information.** Except for data determined to be confidential according to Minn. Stat. ch. 116.075, subd. 2, all reports required by this permit are available for public inspection. The MPCA does not consider effluent data confidential. To request the MPCA maintain data as confidential, the Permittee shall follow Minn. R. 7000.1300. [Minn. R. 7000.1300]
	5.15.176	**Noncompliance and Enforcement.** [Minn. R. 7001]
	5.15.177	**Subject to Enforcement Action and Penalties.** Noncompliance with a term or condition of this permit subjects the Permittee to penalties provided by federal and state law set forth in section 309 of the Clean Water Act; United States Code, title 33, section 1319, as amended; and in Minn. Stat. ch. 115.071 and 116.072, including monetary penalties, imprisonment, or both. [Minn. R. 7001.1090, subp. 1(B)]
	5.15.178	**Criminal Activity.** The Permittee shall not knowingly make a false statement, representation, or certification in a record or other document submitted to the MPCA. A person who falsifies a report or document submitted to the MPCA, or tampers with, or knowingly renders inaccurate a monitoring device or method that requires maintenance under this permit is subject to criminal and civil penalties provided by federal and state law. [Minn. R. 7001.0150, subp. 3(G), Minn. R. 7001.1090, subp. 1(G & H), Minn. Stat. ch. 609.671, subd. 1]
	5.15.179	**Noncompliance Defense.** It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. [40 CFR 122.41(c)]
	5.15.180	**Effluent Violations.** If sampling by the Permittee indicates a violation of any discharge limitation specified in this permit, the Permittee shall immediately make every effort to verify the violation by collecting additional samples, if appropriate, investigate the cause of the violation, and take action to prevent future violations. If the Permittee discovers that noncompliance with a condition of the permit occurred and that the noncompliance could endanger human health, public drinking water supplies, or the environment, the Permittee shall within 24 hours of the discovery of the noncompliance orally notify the Commissioner and submit a written description of the noncompliance within five days of the discovery. If the Permittee discovers other noncompliance that does not explicitly endanger human health, public drinking water supplies, or the environment, the Permittee shall report the description of noncompliance within 30 days of the discovery. If no eDMR is required within 30 days, the Permittee shall submit a written report including the description of noncompliance within 30 days of the discovery of the noncompliance. This description shall include the following information: A. A description of the event including volume, duration, monitoring results, and receiving waters; B. The cause of the event; C. The steps taken to reduce, eliminate, and prevent reoccurrence of the event; D. The exact dates and times of the event; and E. Steps taken to reduce any adverse impact resulting from the event. [Minn. R. 7001.0150, subp. 3(K)]
	5.15.181	**Upset Defense.** In the event of temporary noncompliance with applicable effluent limitation(s) resulting from an upset at the Permittee's facility due to factors beyond the control of the Permittee, the Permittee has an affirmative defense to an enforcement action brought by the MPCA as a result of the noncompliance if the Permittee demonstrates by a preponderance of competent evidence: A. The specific cause of the upset; B. That the upset was unintentional;

		C. That the upset resulted from factors beyond the reasonable control of the Permittee and did not result from operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or increases in production which are beyond the design capability of the treatment facilities; D. That at the time of the upset the facility was being properly operated; E. That the Permittee properly notified the Commissioner of the upset in accordance with Minn. R. 7001.1090, subp. 1(I); and F. That the Permittee implemented the remedial measures required by Minn. R. 7001.0150, subp. 3(J). [Minn. R. 7001.1090]
	5.15.182	**Release**. [Minn. R. 7001]
	5.15.183	**Unauthorized Releases of Wastewater Prohibited.** This permit prohibits overflows, discharges, spills, or other releases of wastewater or materials to the environment, whether intentional or not, except for discharges from outfalls specifically authorized by this permit. The MPCA will consider the Permittee's compliance with permit requirements, frequency of release, quantity, type, location, and other relevant factors when determining appropriate action. [40 CFR 122.41, Minn. Stat. ch. 115.061]
	5.15.184	**Discovery of a Release.** Upon discovery of a release, the Permittee shall: A. Take all reasonable steps to immediately end the release; B. Notify the Minnesota Department of Public Safety Duty Officer at 1(800)422-0798 or (651)649-5451 (metro area) immediately upon discovery of the release. The Permittee may contact the MPCA during business hours at 1(800)657-3864 or (651)296-6300 (metro area); and C. Recover as rapidly and as thoroughly as possible all substances and materials released or immediately take other action as may be reasonably possible to minimize or abate pollution to waters of the state or potential impacts to human health caused thereby. If the Permittee cannot immediately or completely recover the released materials or substances, the Permittee shall contact the MPCA. If directed by the MPCA, the Permittee shall consult with other local, state, or federal agencies (such as the Minnesota Department of Natural Resources and/or the Wetland Conservation Act authority) for implementation of additional clean up or remediation activities in wetland or other sensitive areas. [Minn. R. 7001.1090]
	5.15.185	**Sampling of a Release.** Upon discovery of a release, the Permittee shall: A. Collect representative samples of the release. The Permittee shall sample the release for permitted effluent parameters and other parameters of concern immediately following discovery of the release. The Permittee may contact the MPCA during business hours to discuss the sampling parameters and protocol. In addition, the Permittee shall collect fecal coliform bacteria samples where the Permittee determines that the release contains or may contain sewage. If the Permittee cannot immediately stop the release, the Permittee shall consult with the MPCA regarding additional sampling requirements. The Permittee shall collect samples at least, but not limited to, two times per week for as long as the release continues; and B. Submit the sampling results on the Release Report located on the MPCA's website at https://www.pca.state.mn.us/water/discharge-monitoring-reports. The Permittee shall submit the Release Report to the MPCA with the next eDMR or within 30 days, whichever is sooner. [Minn. R. 7001.1090]
	5.15.186	**Bypass**. [Minn. R. 7001]
	5.15.187	**Anticipated Bypass.** The Permittee may allow any bypass to occur that does not cause effluent limitation exceedances, but only if the bypass is for essential maintenance to assure efficient operation of the facility. The Permittee shall submit prior notice to the MPCA at least ten days before the date of the bypass, if possible. The notice of the need for an anticipated bypass shall include the following information:

		A. The proposed date and estimated duration of the bypass; B. The alternatives to bypassing; and C. A proposal for effluent sampling during the bypass. Any bypass wastewater shall enter waters of the state from outfalls specifically authorized by this permit. Therefore, the Permittee shall collect samples at the frequency and location identified in this permit or two times per week for as long as the bypass continues, whichever is more frequent. [40 CFR 122.41(m)(2 & 3), Minn. R. 7001.1090, subp. 1(J)]
	5.15.188	This permit prohibits all other bypasses. The MPCA may take enforcement action against the Permittee for a bypass, unless the specific conditions described in Minn. R. 7001.1090 subp. 1(K) and 40 CFR 122.41(m)(4)(i) are met. In the event of an unanticipated bypass, the Permittee shall: A. Take all reasonable steps to immediately end the bypass; B. Notify the Minnesota Department of Public Safety Duty Officer at 800-422-0798 or 651-649-5451 (metro area) immediately upon commencement of the bypass. The Permittee may contact the MPCA during business hours at 800-657-3864 or 651-296-6300 (metro area); C. Immediately take action as may be reasonably possible to minimize or abate pollution to waters of the state or potential impacts to human health caused thereby. If directed by the MPCA, the Permittee shall consult with other local, state, or federal agencies for implementation of abatement, clean up, or remediation activities; and D. Only allow bypass wastewater as specified in this section to enter waters of the state from outfalls specifically authorized by this permit. The Permittee shall collect samples at the frequency and location identified in this permit or two times per week for as long as the bypass continues, whichever is more frequent. The Permittee shall also follow the reporting requirements for effluent violations as specified in this permit. [40 CFR 122.41(m)(4)i, Minn. R. 7001.1090, subp. 1(K), Minn. Stat. ch. 115.061]
	5.15.189	**Operation and Maintenance**. [Minn. R. 7001]
	5.15.190	The Permittee shall at all times properly operate and maintain the facilities and systems of treatment and control, and the appurtenances related to them which are installed or used by the Permittee to achieve compliance with the conditions of the permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. The Permittee shall install and maintain appropriate backup or auxiliary facilities if they are necessary to achieve compliance with the conditions of the permit and, for all permits other than hazardous waste facility permits, if these backup or auxiliary facilities are technically and economically feasible. [Minn. R. 7001.0150, subp. 3(F)]
	5.15.191	In the event of a reduction or loss of effective treatment of wastewater at the facility, the Permittee shall control production or curtail discharges to the extent necessary to maintain compliance with the terms and conditions of this permit. The Permittee shall continue this control or curtailment until they restore facility treatment processes or until the Permittee provides an alternative method of treatment. [Minn. R. 7001.1090, subp. 1(C)]
	5.15.192	**Solids Management.** The Permittee shall properly store, transport, and manage biosolids, septage, sediments, residual solids, filter backwash, screenings, oil, grease, and other substances so that pollutants do not enter surface waters or groundwaters of the state. The Permittee shall manage solids in accordance with local, state, and federal requirements. [40 CFR 503, Minn. R. 7041]
	5.15.193	**Scheduled Maintenance.** The Permittee shall schedule maintenance of the treatment works during non-critical water quality periods to prevent water quality degradation, except where the facility requires emergency maintenance to prevent a condition that

		would be detrimental to water quality or human health. [Minn. R. 7001.0150, subp. 2(B), Minn. R. 7001.0150, subp. 3(F)]
	5.15.194	**Control Tests.** The Permittee shall conduct in-plant control tests at a frequency adequate to ensure compliance with the conditions of this permit. [Minn. R. 7001.0150, subp. 2(B), Minn. R. 7001.0150, subp. 3(F)]
	5.15.195	**Changes to the Facility or Permit**. [Minn. R. 7001]
	5.15.196	**Permit Modifications.** Except as provided under Minn. Stat. ch. 115.07, subd. 1 and 3, no person required by statute or rule to obtain a permit may construct, install, modify, or operate the facility to be permitted, nor shall a person commence an activity for which a permit is required by statute or rule until the MPCA issues a written permit for the facility or activity. Permittees that propose to make changes to the facility or discharge that requires permit modification shall follow Minn. R. 7001.0190. If the Permittee cannot determine whether the proposed changes require a permit modification, the Permittee shall contact the MPCA prior to any action. The MPCA recommends that Permittees submit the application for permit modification to the MPCA at least 180 days prior to the planned change. [Minn. R. 7001.0030]
	5.15.197	This permit does not require plans, specifications, and MPCA approval when maintenance dictates the need for installation of new equipment, provided the equipment is the same design size and has the same design intent. For instance, Permittees can replace a broken pipe, lift station pump, aerator, or blower with the same design-sized equipment without MPCA approval. If this permit does not expressly authorize the Permittee proposed construction, the MPCA may require a permit modification. If the proposed construction project requires an Environmental Assessment Worksheet under Minn. R. 4410, no construction shall begin until the MPCA issues a negative declaration and the Permittee receives or implements all approvals. [Minn. R. 7001.0030]
	5.15.198	**Report Changes.** The Permittee shall give advance notice as soon as possible to the MPCA of any substantial changes in operational procedures, activities that may alter the nature or frequency of the discharge, and/or material factors that may affect compliance with the conditions of this permit. [Minn. R. 7001.0150, subp. 3(M)]
	5.15.199	**Chemical Additives.** The Permittee shall receive prior written approval from the MPCA before increasing the use of a chemical additive authorized by this permit, or using a chemical additive not authorized by this permit, in quantities or concentrations that have the potential to change the characteristics, nature, and/or quality of the discharge. The Permittee shall request approval for an increase or new use of a chemical additive at least 60 days, or as soon as possible, before the proposed increase or new use. The Permittee shall include at least the following information for the proposed additive as instructed in the chemical additive approvals section on the MPCA website at https://www.pca.state.mn.us/water/wastewater-additional-guidance-and-information: A. The process for which the additive will be used; B. Safety Data Sheet (SDS) which shall include aquatic toxicity, human health, and environmental fate information for the proposed additive. The aquatic toxicity information shall include at minimum the results of: a) a 48-hour LC50 or EC50 acute study for a North American freshwater planktonic crustacean (either Ceriodaphnia or Daphnia sp.) and b) a 96-hour LC50 acute study for rainbow trout, bluegill, or fathead minnow or another North American freshwater aquatic species other than a

		planktonic crustacean; C. A complete product use and instruction label; D. The commercial and chemical names and Chemical Abstract Survey (CAS) number for all ingredients in the additive (If the SDS does not include information on chemical composition, including percentages for each ingredient totaling to 100%, the Permittee shall contact the supplier to have this information provided); and E. The proposed method of application, application frequency, concentration, and daily average and maximum rates of use. Upon review of the information submitted regarding the proposed chemical additive, the MPCA may require additional information be submitted for consideration. This permit may be modified to restrict the use or discharge of a chemical additive and include additional influent and effluent monitoring requirements. Approval for the use of an additive shall not justify the exceedance of any effluent limitation nor shall it be used as a defense against pollutant levels in the discharge causing or contributing to the violation of a water quality standard. [Minn. R. 7001.0170]
	5.15.200	**MPCA Initiated Permit Modification, Suspension, or Revocation.** The MPCA may modify or revoke and reissue this permit pursuant to Minn. R. 7001.0170. The MPCA may revoke without reissuance of this permit pursuant to Minn. R. 7001.0180. [Minn. R. 7001.0170, Minn. R. 7001.0180]
	5.15.201	**Total Maximum Daily Load (TMDL) Impacts.** The MPCA may require facilities that discharge to an impaired surface water, watershed, or drainage basin to comply with additional permits or permit requirements. These requirements can include additional restriction or relaxation of limits and monitoring as authorized by the CWA 303(d)(4)(A) and 40 CFR ch. 122.44(l)(2)(i), necessary to ensure consistency with the assumptions and requirements of any applicable EPA approved waste load allocations resulting from TMDL studies. [40 CFR 122.44(l)(2)i]
	5.15.202	**Permit Transfer.** This permit is not transferable to any person without the express written approval of the MPCA after compliance with the requirements of Minn. R. 7001.0190. A person who receives permit transference shall comply with the conditions of this permit. [Minn. R. 7001.0150, subp. 3(N)]
	5.15.203	**Facility Closure.** The Permittee is responsible for closure and post-closure care of the facility. The Permittee shall notify the MPCA of a significant reduction or cessation of the activities described in this permit at least 180 days before the reduction or cessation. The MPCA may require the Permittee to provide a Facility Closure Plan to the MPCA for approval. The MPCA may require a permit modification or reissuance for facility closure that could result in a potential long-term water quality concern, such as the ongoing discharge of wastewater to surface or groundwater. The MPCA may require the Permittee to establish and maintain financial assurance to ensure performance of certain obligations under this permit, including closure, post-closure care, and remedial action at the facility. If the MPCA requires financial assurance, the MPCA shall approve the amount and type of financial assurance, and proposed modifications to previously MPCA-approved financial assurance. [Minn. Stat. ch. 116.07, subd. 4]
	5.15.204	**Permit Reissuance.** If the Permittee desires to continue permit coverage beyond the date of permit expiration, the Permittee shall submit an application for permit reissuance: Due by 180 days prior to permit expiration. [Minn. R. 7001.0040]
	5.15.205	If the Permittee does not intend to continue the activities authorized by this permit after the expiration date of this permit, the Permittee shall notify the MPCA in writing at least 180 days before permit expiration. If the Permittee has submitted a timely application for permit reissuance, the Permittee may continue to conduct the

		activities authorized by this permit, in compliance with the requirements of this permit, until the MPCA takes final action on the application, unless the MPCA determines any of the following: A. The Permittee is not in substantial compliance with the requirements of this permit, or with a stipulation agreement or compliance schedule designed to bring the Permittee into compliance with this permit; B. The MPCA, as a result of an action or failure to act by the Permittee, has been unable to take final action on the application on or before the expiration date of the permit; or C. The Permittee has submitted an application with major deficiencies or has failed to properly supplement the application in a timely manner after being informed of deficiencies. [Minn. R. 7001.0040, Minn. R. 7001.0160]

6. Submittal action summary

SD 001	**Effluent To Surface Water**	
		Surface Discharge: Class A Major Facility Effluent Requirements
	6.1.1	The Permittee shall submit a monthly DMR: Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
		Acute Toxicity Requirements
	6.2.2	The Permittee shall submit semi-annual toxicity test battery results: Due 180 calendar days after Permit Issuance Date every 6 months thereafter. [Minn. R. 7001]
		Priority Pollutant Requirements
	6.3.3	The Permittee shall submit the first priority pollutant monitoring report: Due 1095 calendar days before Permit Expiration Date. (By two years after permit issuance date). [Minn. R. 7001]
	6.3.4	The Permittee shall submit the second priority pollutant monitoring report: Due 730 calendar days before Permit Expiration Date. (By three years after permit issuance date). [Minn. R. 7001]
	6.3.5	The Permittee shall submit the third priority pollutant monitoring report: Due 365 calendar days before Permit Expiration Date. (By four years after permit issuance date). [Minn. R. 7001]
WS 001	**Influent Waste**	
		Waste Stream: Class A Major Facility Influent Requirements
	6.4.1	The Permittee shall submit a monthly DMR: Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
MN0030147	**Winona WWTP**	
		Compliance Construction Schedule
	6.5.1	The Permittee shall submit a facility plan: Due before 03/01/2022 The Permittee shall submit an approvable facility plan due by March 1, 2022. [Minn. R. 7001]
	6.5.2	The Permittee shall submit annual progress reports : Due 03/01/2023 annually in March The Permittee shall submit annual project progress reports due by March 1, 2023 and annually by March 1st thereafter. The annual report shall provide a project update and describe all of the design, funding, and construction activities completed during the calendar year to meet the final total phosphorus effluent limit. [Minn. R. 7001]
	6.5.3	The Permittee shall submit plans and specifications: Due before 12/01/2023 The Permittee shall submit plans and specifications due by December 1, 2023. Plans and specifications shall be at least 90% complete. [Minn. R. 7001]
	6.5.4	The Permittee shall initiate operation initiate operation: Due before 09/30/2027 The Permittee shall initiate operation due by September 30, 2027. [Minn. R. 7001]
	6.5.5	The Permittee shall attain compliance with final effluent limits : Due by 90 days after

		the initiation of operation date The Facility shall attain compliance with the final total phosphorus effluent limit of 27 kg/day within 90 days after the initiation of operation date. Final compliance shall be attained as soon as possible, but no later than January 1, 2028. [Minn. R. 7001]
		Mercury Minimization Plan
	6.6.6	The Permittee shall submit a mercury pollutant minimization plan: Due by 180 days after permit issuance. [Minn. R. 7001]
		Phosphorus Management Plan
	6.7.7	The Permittee shall submit a phosphorus management plan: Due by 180 days after permit issuance. [Minn. R. 7001]
		Pretreatment: Delegated Requirements
	6.8.8	The Permittee shall submit a pretreatment annual report: Due by February 28 of each year following permit issuance. [Minn. R. 7049]
		Biosolids: Land Application
	6.9.9	The Permittee shall submit a biosolids annual report: Due annually, by the 31st of December on a form provided by or approved by the MPCA. The report shall include the requirements in Minnesota Rules, part 7041.1700. [Minn. R. 7041.1700]
		Total Facility Requirements (NPDES/SDS)
	6.10.10	**Permit Reissuance.** If the Permittee desires to continue permit coverage beyond the date of permit expiration, the Permittee shall submit an application for permit reissuance: Due by 180 days prior to permit expiration. [Minn. R. 7001.0040]

7. Limits and monitoring

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
SD 001 Total Facility Discharge	Bicarbonates (HCO3)						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	BOD, Carbonaceous 05 Day (20 Deg C)	907 calendar month average	1452 maximum calendar week average	kilograms per day		25 calendar month average	40 maximum calendar week average	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	BOD, Carbonaceous 05 Day (20 Deg C) Percent Removal				85 minimum calendar month average			percent	once per month	Calculation	Jan-Dec	
SD 001 Total Facility Discharge	Calcium, Total (as Ca)						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Chloride, Total						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Chlorine, Total Residual						0.038 daily maximum	milligrams per liter	once per day	Grab	Jan-Dec	
SD 001 Total Facility Discharge	Fecal Coliform, MPN or Membrane Filter 44.5C					200 calendar month geometric mean		organisms per 100 milliliter	3 times per week	Grab	Apr-Oct	

		Discharge limitations						Monitoring requirements				
Subject item	**Parameter**	**Quantity /Loading avg.**	**Quantity /Loading max.**	**Quantity /Loading units**	**Quality /Conc. min.**	**Quality /Conc. avg.**	**Quality /Conc. max.**	**Quality/ Conc. units**	**Frequency**	**Sample type**	**Effective period**	**Notes**
SD 001 Total Facility Discharge	Flow		Monitor only. calendar month total	million gallons		Monitor only. calendar month average	Monitor only. calendar month maximum	million gallons per day	once per day	Measurement, Continuous	Jan-Dec	
SD 001 Total Facility Discharge	Hardness, Calcium & Magnesium, Calculated (as CaCO3)						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Magnesium, Total (as Mg)						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Mercury, Dissolved (as Hg)						Monitor only. calendar month maximum	nanograms per liter	once per month	Grab	May, Sep	
SD 001 Total Facility Discharge	Mercury, Total (as Hg)						Monitor only. calendar month maximum	nanograms per liter	once per month	Grab	May, Sep	
SD 001 Total Facility Discharge	Nitrite Plus Nitrate, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Nitrogen, Ammonia, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Nitrogen, Kjeldahl, Total					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	

		Discharge limitations							Monitoring requirements			
Subject item	**Parameter**	**Quantity /Loading avg.**	**Quantity /Loading max.**	**Quantity /Loading units**	**Quality /Conc. min.**	**Quality /Conc. avg.**	**Quality /Conc. max.**	**Quality/ Conc. units**	**Frequency**	**Sample type**	**Effective period**	**Notes**
SD 001 Total Facility Discharge	Nitrogen, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	Calculation	Jan-Dec	
SD 001 Total Facility Discharge	Oxygen, Dissolved				Monitor only. calendar month minimum			milligrams per liter	once per day	Grab	Jan-Dec	
SD 001 Total Facility Discharge	pH				6.0 calendar month minimum		9.0 calendar month maximum	standard units	once per day	Grab	Jan-Dec	
SD 001 Total Facility Discharge [redacted]	Phosphorus, Total (as P)	Monitor only. calendar month average		kilograms per day					once per week	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge [redacted]	Phosphorus, Total (as P)	Monitor only. calendar month average		kilograms per day					once per week	24-Hour Flow Composite	Oct-May	
SD 001 Total Facility Discharge [redacted]	Phosphorus, Total (as P)	27 calendar month average		kilograms per day					once per week	24-Hour Flow Composite	Jun-Sep	
SD 001 Total Facility Discharge	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	once per week	24-Hour Flow Composite	Jan-Dec	

		Discharge limitations						Monitoring requirements				
Subject item	**Parameter**	**Quantity /Loading avg.**	**Quantity /Loading max.**	**Quantity /Loading units**	**Quality /Conc. min.**	**Quality /Conc. avg.**	**Quality /Conc. max.**	**Quality/ Conc. units**	**Frequency**	**Sample type**	**Effective period**	**Notes**
SD 001 Total Facility Discharge	Potassium, Total (as K)						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Sodium, Total (as Na)						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Solids, Total Dissolved (TDS)						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Solids, Total Suspended (TSS)	1089 calendar month average	1633 maximum calendar week average	kilograms per day		30 calendar month average	45 maximum calendar week average	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec	
SD 001 Total Facility Discharge	Solids, Total Suspended (TSS) Percent Removal				85 minimum calendar month average			percent	once per month	Calculation	Jan-Dec	
SD 001 Total Facility Discharge	Solids, Total Suspended (TSS), grab (Mercury)						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	May, Sep	
SD 001 Total Facility Discharge	Specific Conductance						Monitor only. calendar month maximum	micromhos per cm	once per month	Measurement	Jan-Dec	
SD 001 Total Facility Discharge	Sulfate, Total (as SO4)						Monitor only. calendar month maximum	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	

		Discharge limitations						Monitoring requirements				
Subject item	**Parameter**	**Quantity /Loading avg.**	**Quantity /Loading max.**	**Quantity /Loading units**	**Quality /Conc. min.**	**Quality /Conc. avg.**	**Quality /Conc. max.**	**Quality/ Conc. units**	**Frequency**	**Sample type**	**Effective period**	**Notes**
SD 001 Total Facility Discharge	Zinc, Total (as Zn)						Monitor only. daily maximum	micrograms per liter	once per month	24-Hour Flow Composite	May, Sep	
WS 001 Influent Waste Stream	BOD, Carbonaceous 05 Day (20 Deg C)					Monitor only. calendar month average	Monitor only. calendar month maximum	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec	
WS 001 Influent Waste Stream	Flow		Monitor only. calendar month total	million gallons		Monitor only. calendar month average	Monitor only. calendar month maximum	million gallons per day	once per day	Measurement, Continuous	Jan-Dec	
WS 001 Influent Waste Stream	Nitrite Plus Nitrate, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
WS 001 Influent Waste Stream	Nitrogen, Kjeldahl, Total					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
WS 001 Influent Waste Stream	Nitrogen, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	Calculation	Jan-Dec	
WS 001 Influent Waste Stream	pH				Monitor only. calendar month minimum		Monitor only. calendar month maximum	standard units	once per day	Grab	Jan-Dec	
WS 001 Influent Waste Stream	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	once per week	24-Hour Flow Composite	Jan-Dec	

		Discharge limitations							Monitoring requirements			
Subject item	**Parameter**	**Quantity /Loading avg.**	**Quantity /Loading max.**	**Quantity /Loading units**	**Quality /Conc. min.**	**Quality /Conc. avg.**	**Quality /Conc. max.**	**Quality/ Conc. units**	**Frequency**	**Sample type**	**Effective period**	**Notes**
WS 001 Influent Waste Stream	Precipitation		Monitor only. calendar month total	inches					once per day	Measurement	Jan-Dec	
WS 001 Influent Waste Stream	Solids, Total Suspended (TSS)					Monitor only. calendar month average	Monitor only. calendar month maximum	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec	

Appendix C

Notifications and Comments from Review Agencies

SEH

Building a Better World for All of Us®

December 7, 2021

RE: Winona WWTF Improvements Project
City of Winona, Minnesota
SEH No. WINON 160394 14.00

Sarah J. Beimers
Environmental Review Program Manager
State Historic Preservation Office
50 Sherburne Avenue, Suite 203
Saint Paul, MN 55155

Dear Ms. Beimers:

We are initiating consultation on this project under Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800 and pursuant to the 2016 Memorandum of Understanding between the Minnesota Pollution Control Agency and the Minnesota State Historic Preservation Office (SHPO). This project is being funded under the Clean Water State Revolving Fund administered by the Minnesota Public Facilities Authority and the Minnesota Pollution Control Agency. Below is the information about this project:

PROJECT TITLE: WINONA WWTF UPGRADE AND PHOSPHORUS REMOVAL

Detailed project description:

This project is comprised of five parts to address new phosphorous limits, improvements to the existing digester building and dewatering equipment, rehabilitation of the existing primary clarifiers due to age, upsized waste activated sludge thickening, and additional biosolids storage.

Phosphorous Removal:

The proposed project consists of modifying the existing treatment plant within the existing property area.

The two (2) existing trickling filters and effluent boxes will be removed as part of this project. The filters, constructed in 1970, are at the end of their useful life and will not be used as part of the new treatment train. The existing splitter structure that directs flow from the primary clarifiers to the trickling filters can remain in place and primary effluent can flow through the structure to the screw pumps.

The two (2) existing solids contact tanks will be converted to aeration basins. Each tank currently has two internal walls that were constructed in 1996 as part of a past improvements project. One wall in each basin will be removed, and a new wall constructed to split the basin into two parts, 75% will be aerated and 25% will be anoxic. The basins will also require a new diffuser grid and blowers.

The recirculation pump station is old and is not up to code. The following section describes the addition of new equipment in the building, which will require the structure to be brought up to code. This will entail several improvements to the HVAC and electrical system.

As the aeration basins require new aeration equipment, the blowers in Blower Building 2 will need replacement. As this building is also old and not up to code, it will require electrical and HVAC improvements to bring to current code.

New mixers are required in the solids contact combined effluent boxes, WAS, and RAS splitter boxes. A new drum screen will be installed in the recirculation pump station following the WAS pumps to retain granules produced in the aeration basin. These granules will be pumped back into each aeration basin.

A new chemical feed building is required to provide chemical phosphorous removal redundancy. The proposed footprint is 18 feet by 36 feet. The building will contain chemical feed pumps, a 500-gallon chemical tank, chemical transfer pump, HVAC, electrical, and controls.

Although limited, there will be some modifications to site piping as a result of the removal of the trickling filters and the addition of the rotary drum screen.

Site piping for the new chemical phosphorous removal system will also be required. Piping will be provided from the new structure to the aeration basins.

Digester Building and Dewatering Improvements:

This project includes improvements to the existing digester building. New equipment includes a belt press, control panel, polymer feed system, sludge feed pumps, booster pumps, screw conveyor, comminutor, recirculation pumps, sludge transfer pumps, and heat exchanger. Minor structural, electrical, and HVAC improvements are required to accommodate the new equipment.

Primary Clarifier Rehabilitation:

The mechanisms of the primary clarifiers are approaching the end of their useful lives and need to be replaced. Both primary clarifiers will receive new mechanisms and a walkway above the weirs to allow for operators to properly maintain weirs.

Waste Activated Sludge Thickening:

A DAF thickener is proposed to provide additional thickening for Waste Activated Sludge (WAS). This DAF thickener will be a 17-foot diameter circular tank with 8 feet of water depth. A new control building will need to be constructed to house electrical equipment, air compressor, chemical feed system, and pumps.

Biosolids Storage Expansion:

Additional storage for biosolids is required. A new 125-foot by 245-foot storage pad will be constructed. A membrane cover will also be provided.

Project location (Township-Range-Section): 107-007-36

Area of Potential Effects (APE) discussion (see enclosed map):

Area of potential effects is limited to the existing WWTF property.

Identification of historic properties within the APE:

There are no historic properties within the APE.

Preliminary determination of effect on historic properties:

No buildings will be demolished as part of this project. There are no historic buildings or roads in the project area that will be affected by this project.

These items should be included with your consultation letter:

- ☒ Copy of a 7.5 minute USGS map or city map with the APE for the project clearly delineated
- ☒ Copy of the project site plan
- ☒ Photos of existing site location
- ☒ Photos incorporating a 360 degree view from the center of the site

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

Susan Danzl

Susan Danzl, PE
Principal | Project Engineer
(Lic. CA, CO, MN, VA)

dmk
Attachments

x:\uz\w\winon\160394\4-prelim-dsgn-rpts\43-prelim-dsgn\draft facility plan report\appendices\appendix a - environmental information worksheet\mnhpo letter\mnhpo letter.docx

Supplemental instructions for the template letter

Detailed project description: Describe the **entire** project, all components.

Project location: City or Township – **must include the Township Range and Section(s) of your project area**

Area of Potential Effects (APE): Define the geographic area or areas within which a project may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of the project and may be different for different kinds of effects caused by the project (**direct effects** include physical effects to a historic property and **indirect effects** can include visual effects to a historic property, a change in the use or access to a historic property or cumulative effects due to major development, etc.). The APE must be delineated and clearly marked on a USGS map or city/county map, depending on the scale of the project. Aerial photographs with same APE marked are acceptable as supporting documentation.

Site plans: Submit a copy of the project plans or site plan as well as the following:

1. Site plan showing the footprint/extent of the new construction.
2. Rendering or elevation drawing for any new above ground features.
3. A map showing the location of all currently recorded, historic, or potentially historic, properties within one-quarter mile of the project site as identified in the database search provided by Jim Krumrie, SHPO Cultural Resources Information Manager (see below for instructions).
4. A list of any historic properties in the area that are not in the database search, but may be eligible for listing in the National Register of Historic Places (are 50 years old or older).
5. Photos of all buildings facing the project.
6. Photos of the project from the viewpoint of any identified historic properties with a direct view of the project.
7. A description of the visual impacts, traffic, noise, dust, etc. impacts to each identified historic property within one-quarter mile of the project.
8. Either a statement that no buildings will be demolished, or the following for each building to be demolished:
   a. Photos from all sides
   b. Address
   c. Age/year of construction
   d. Past Uses of the building
   e. Building integrity, ability to save or repurpose
   f. Any revisions to the building from original construction

Photos: Submit photos of the project location and photos of the surrounding project area (360 degrees from project location).

Identification of historic properties within the project APE: Historic properties are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places.

The SHPO has historic structure and archaeological site databases that can help you identify historic properties within your project APE. See information regarding SHPO files on the Minnesota Department of Administration's website at https://mn.gov/admin/shpo/about/files/. Database searches can be obtained by contacting Jim Krumrie with the SHPO at datarequestshpo@state.mn.us and asking for an "archaeological site and historic structures database search." Please provide Jim with the Township Range and Section(s) for your project area. He will conduct the searches and email you back with the results. Please be aware that the database searches and files are for known archaeological sites and historic structures only. There may be other historic properties within your project area that have not been previously identified. The photos included with your submittal may help with identifying additional, potential historic properties within the project APE.

Preliminary determination of effect on historic properties: Any information gathered regarding historic properties within the project APE should be incorporated into your review submittal along with an initial determination of whether any of the properties will be affected by the proposed project.

Example project determinations of effect:

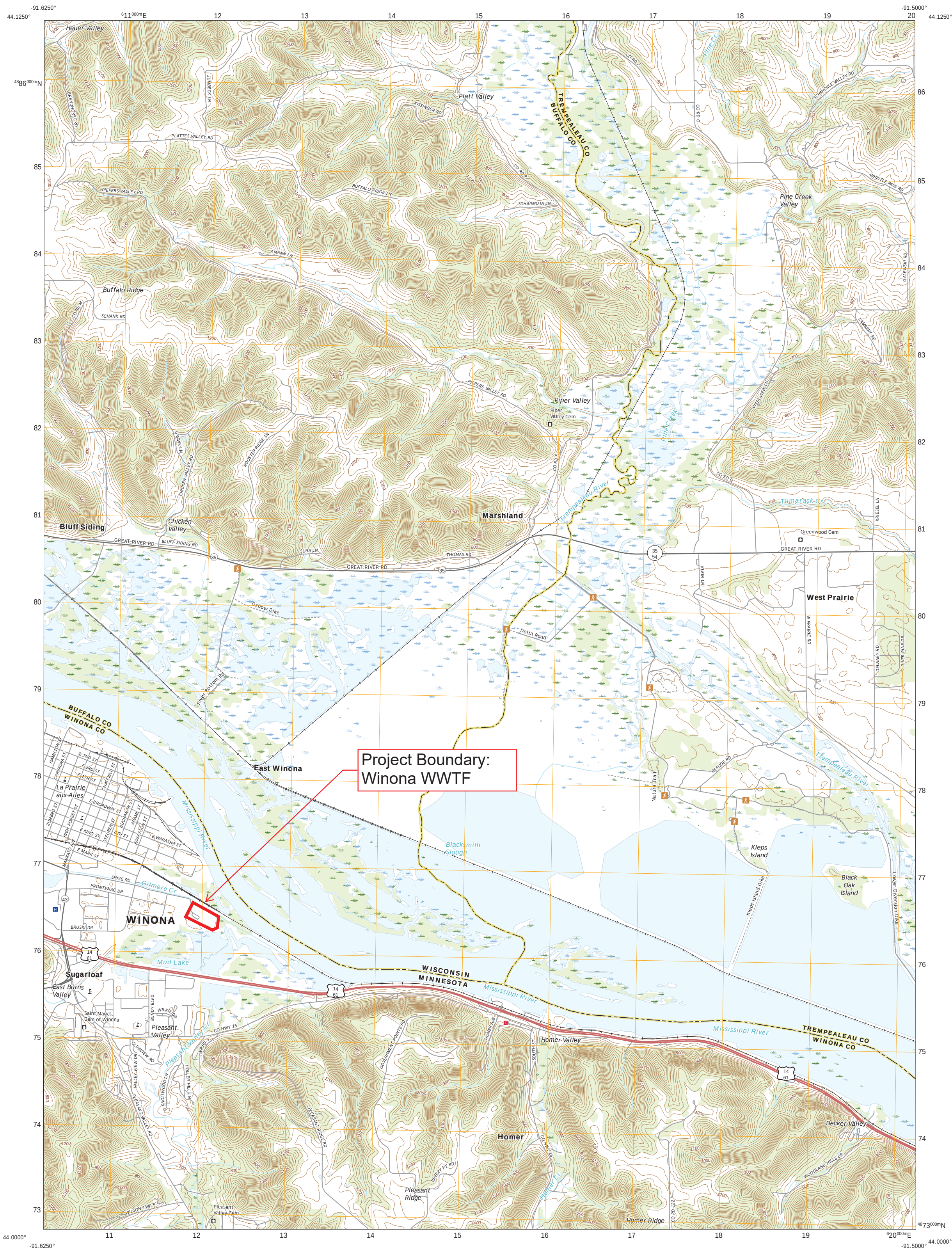
- **No historic properties affected:** This determination is made when there are no historic properties located within the APE for the project.
- **No adverse effect:** This determination is made when there are historic properties located within the APE for the project but they will not be adversely affected by the project.
- **Adverse effect:** This determination is made when there are historic properties located within the APE for the project and the project will have a detrimental impact on historic properties.

Questions: Please feel free to contact Kelly Gragg-Johnson, Environmental Review Specialist, SHPO at 651-201-3285 or kelly.graggjohnson@state.mn.us with any questions regarding project submittal or the SHPO review process.

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

WINONA EAST QUADRANGLE
MINNESOTA - WISCONSIN
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 15T

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery....NAIP, July 2017 - November 2017
Roads.... U.S. Census Bureau, 2016 - 2018
Names....GNIS, 1980 - 2018
Hydrography....National Hydrography Dataset, 1899 - 2018
Contours....National Elevation Dataset, 1998
Boundaries....Multiple sources; see metadata file 2017 - 2018
Public Land Survey System....BLM, 2017 - 2018
Wetlands....FWS National Wetlands Inventory 2001 - 2011

MN
GN
1°11´
21 MILS
1°0´
18 MILS

UTM GRID AND 2019 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
XJ
Grid Zone Designation 15T

SCALE 1:24 000

KILOMETERS 1 0.5 0 1 2
METERS 1000 500 0 1000 2000
MILES 1 0.5 0 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

MINNESOTA
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 Fountain City
2 Dodge
3 Tamarack
4 Winona West
5 Trempealeau
6 Wilson
7 Witoka
8 Pickwick

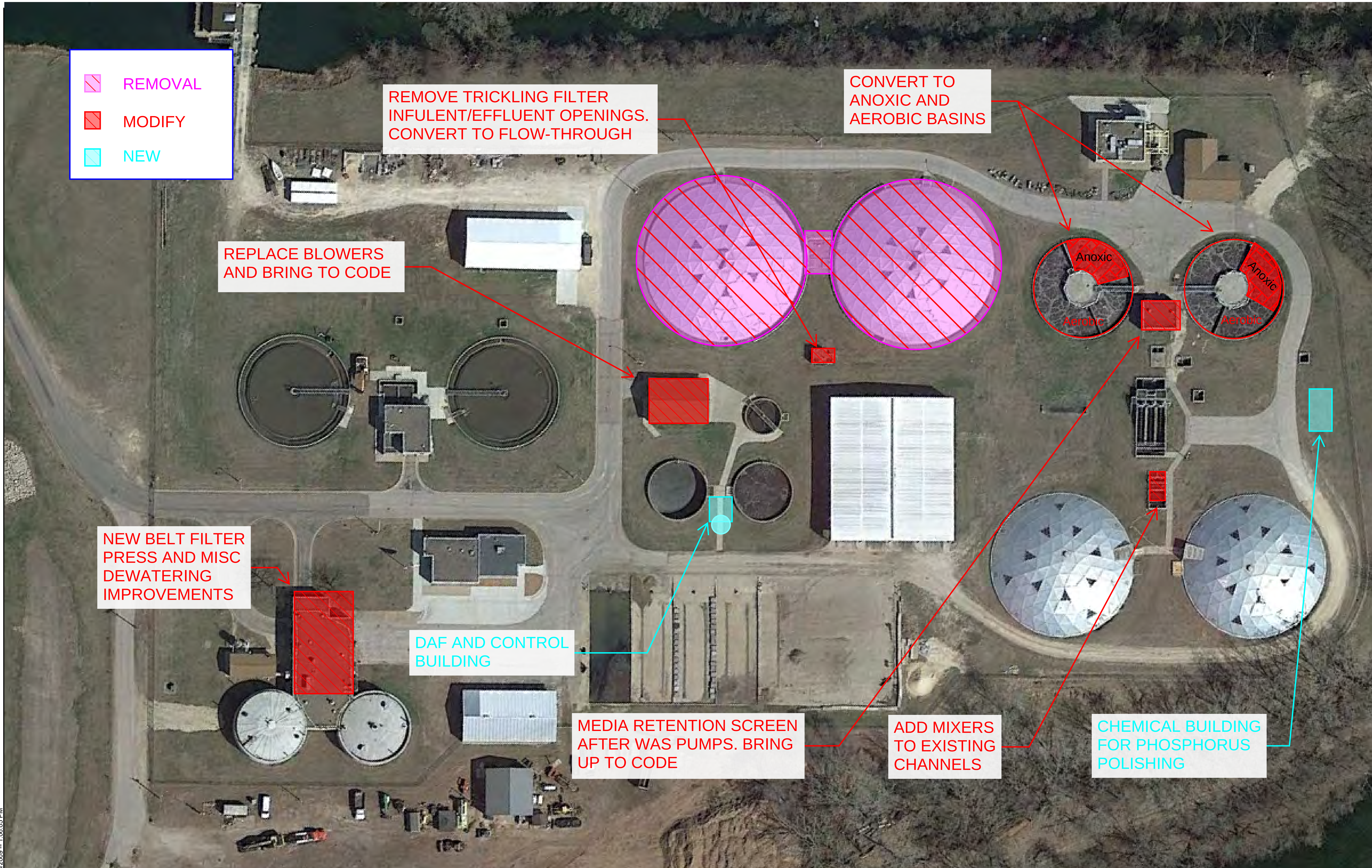
ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

WINONA EAST, MN, WI
2019

NSN, 7643016373574
NGA REF NO. USGSX24K49518



Map Document: (L:\Resources\Cartographic\Templates\EmptyLayouts\B_ANSI_11x17\11x17L_Std1.mxd)
2/13/2009 -- 1:06:05 PM

SEH

3535 VADNAIS CENTER DR.
ST. PAUL, MN 55110
PHONE: (651) 490-2000
FAX: (651) 490-2150
WATTS: 800-325-2055
www.sehinc.com

Project: WINON 160394
Print Date:12 /7/2021

Map by:
Projection:
Source:

PROPOSED SITE PLAN

WINONA WWTF UPGRADES AND PHOSPHORUS REMOVAL
WINONA, MN

Figure
1

Photo 1 Preliminary Treatment Building Mechanical Bar Screen and Dewatering Unit

Photo 2 Preliminary Treatment Building Grit Pump

Photo 3 Preliminary Treatment Building In-Plant Lift Station Pumps

Photo 4 Preliminary Treatment Building Primary Sludge Pumps

Photo 5 Preliminary Treatment Building Influent Flow Meter

Photo 6 Primary Clarifier Tank 1

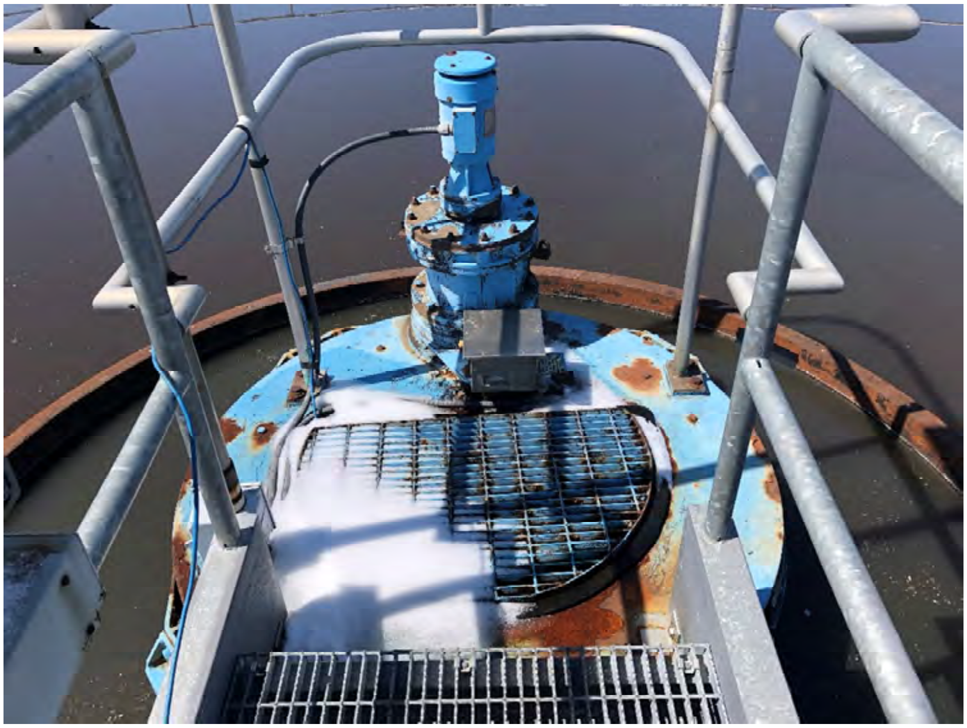


Photo 7 Primary Clarifier Tank 1 Drive

Photo 8 Trickling Filter Tank 1

Photo 9 Trickling Filter Tank 1 Media

Photo 10 Screw Pumps

Photo 11 Solids Contact Tank 1

Photo 12 Final Clarifier Tank 1

Photo 13 Primary Anaerobic Digester Cover

Photo 14 Secondary Anaerobic Digester Cover

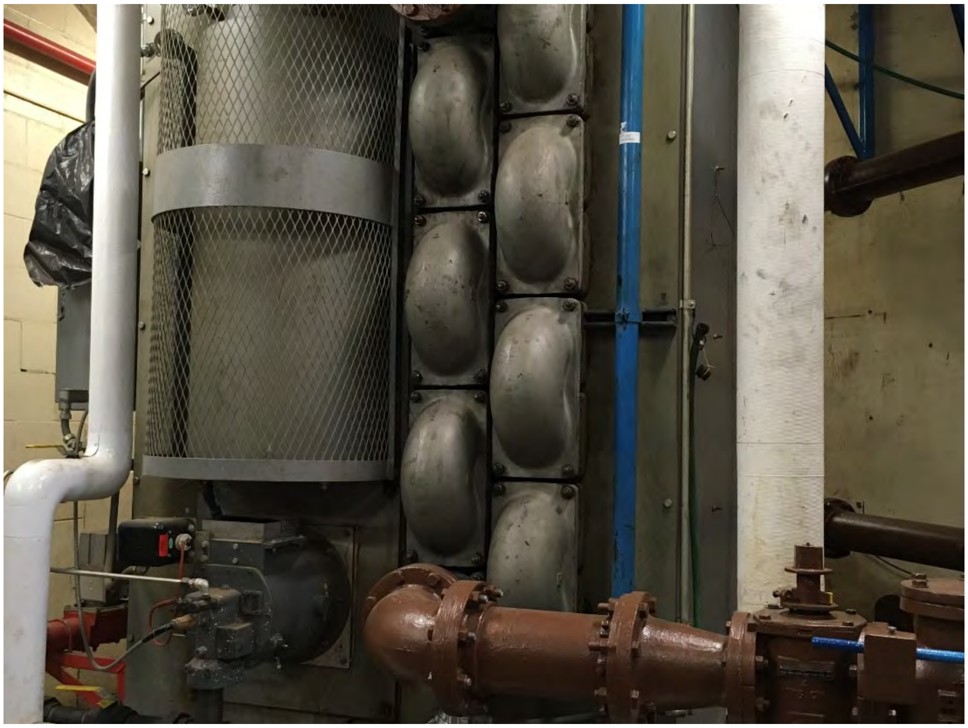


Photo 15 Combination Boiler and Heat Exchanger

Photo 16 Boiler

Photo 17 Digester Recirculation Pump and Grinder

Photo 18 Polymer Mixing Tanks No.1 and No. 2

Photo 19 Belt Filter Press

Photo 20 Dewatered Cake Conveyor

Photo 21 Wash Water Booster Pump

Photo 22 Sludge Storage Beds

Photo 23 Cake Storage Building

Photo 24 Administration Building

DEPARTMENT OF ADMINISTRATION
STATE HISTORIC PRESERVATION OFFICE

January 10, 2022

Susan Danzl
Short Elliot Hendrickson Inc.
3535 Vadnais Center Dr
St. Paul, MN 55110-3507

RE: SEH No WINON 160394 14.00
Winona WWTF Improvements Project
T107 R7 S35, Winona, Winona County
SHPO Number: 2022-0554

Dear Susan Danzl:

Thank you for the opportunity to comment on the above referenced project. Information received on December 27, 2021 has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and implementing federal regulations at 36 CFR 800, pursuant to the provisions of the Memorandum of Understanding among the Minnesota Public Facilities Authority, the Minnesota Pollution Control Agency, and the Minnesota State Historic Preservation Office, and pursuant to the responsibilities given the State Historic Preservation Office by the Minnesota Historic Sites Act (Minn. Stat. 138.665-666) and the Minnesota Field Archaeology Act (Minn. Stat. 138.40).

We have reviewed the documentation included with your submission and based on information that is available to us at this time, we have determined that **no historic properties will be affected** by the project as it is currently proposed.

Implementation of the undertaking in accordance with this finding, as documented, fulfills the agency's responsibilities under Section 106. If the project is not constructed as proposed, including, but not limited to, a situation where design changes to the currently proposed project diverts substantially from what was presented at the time of this review, then the agency will need to reopen Section 106 consultation with our office pursuant to 36 CFR 800.5(d)(1).

If you have any questions regarding our review of this project, please contact Kelly Gragg-Johnson, Environmental Review Program Specialist, at kelly.graggjohnson@state.mn.us.

Sincerely,

Sarah J. Beimers

Sarah J. Beimers
Environmental Review Program Manager

cc: Bill Dunn, MN Pollution Control Agency

Appendix D

Flow Memo

Building a Better World
for All of Us®

MEMORANDUM

TO: Brian DeFrang & Paul Drazkowski (City of Winona), Corey Hower (MPCA)

FROM: Susan Danzl (Lic. MN, CA, CO, VA)

DATE: August 3, 2021

RE: Flow Conditions
SEH No. WINON 160394 14.00

SEH has updated the flow and loading summary with data from 2018 through 2021, as the Solids Preliminary Design Report used data up through part of 2018 only. The Solids Preliminary Design Report noted that the flows were well below the design capacity and no growth was anticipated. However, this more recent flow data shows that 2019 was a peak flow year, which differed vastly from the 2016-2018 data reviewed previously. This memorandum reviews the flow conditions, evaluates the 2019 river level conditions, and evaluates the historical basis for the flow projections for the Winona wastewater treatment facility (WWTF).

In considering this historical data, it is important to not oversize the wastewater treatment facility, as this results in poor treatment performance under normal conditions and is more costly than correcting infiltration/inflow (I/I) within the collection system. Based on the data summarized herein, SEH recommends that the plant capacity remain unchanged, and the City continue to work to address I/I.

INFLUENT WASTEWATER DATA SUMMARY

Table 1 below summarizes the annual influent wastewater flows each year, from 2016 through part of 2021. The 2019 average annual flow and maximum day flow were significantly greater than the previous years because of a sustained spring flood event where there were 39 consecutive days with influent flows greater than 10 million gallons per day (MGD) (between April 2 and May 10). The peak month flow (determined by the greatest 30-day rolling average) is also reported. In 2019, the peak month flow was 12.01 MGD. This is significant because the MPCA bases facility capacity upon the *Average Wet Weather* (AWW) or peak month flow, and the facility is currently rated at an AWW design capacity of only 9.6 MGD.

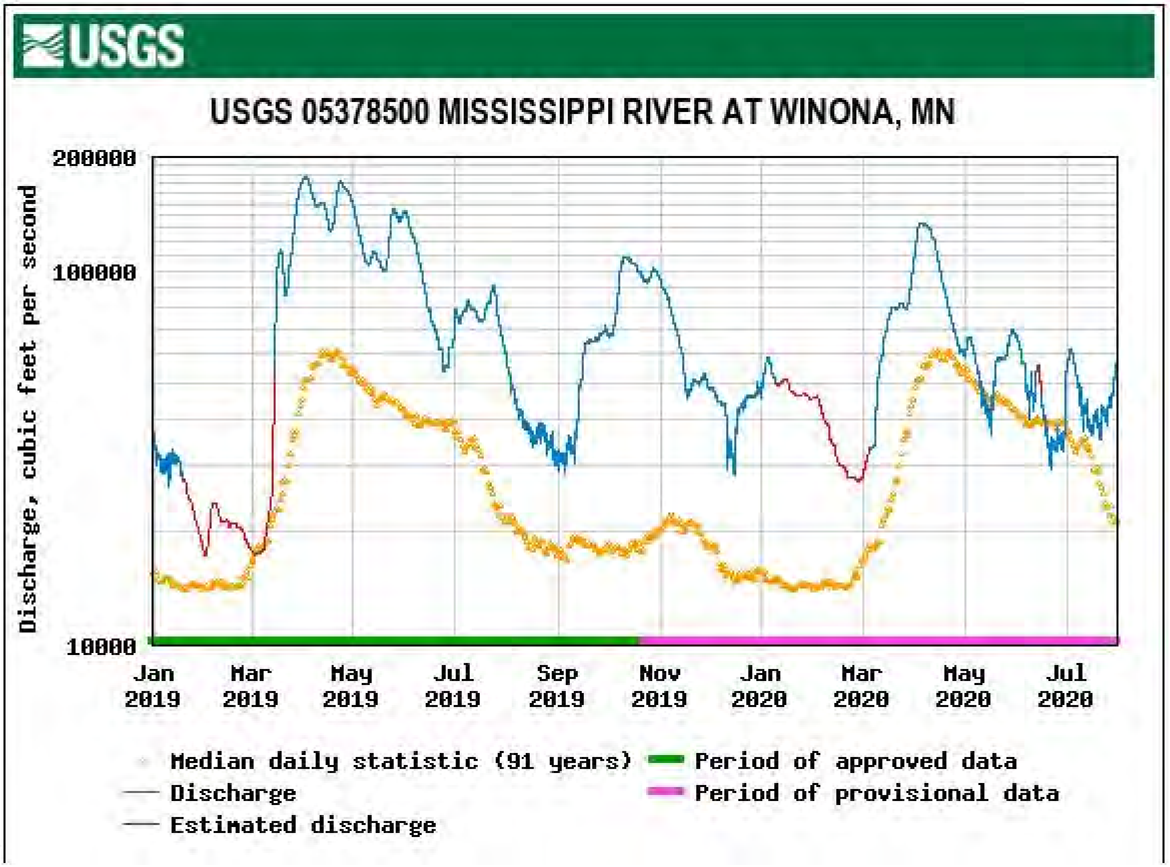
Table 1: Influent Flow Summary by Year

Year	Unit	Avg Annual Flow	Avg Dry Weather Flow	Avg Flow during max 30 days of flow	Max Daily Flow
2016	MGD	3.39	3.12	4.14	4.95
2017	MGD	3.76	3.08	5.97	6.74
2018	MGD	4.46	3.36	6.81	7.35
2019	**MGD**	**6.228**	**3.683**	**12.01**	**13.05**
2020	MGD	4.01	3.88	6.61	7.82
2021 (Jan-Mar)	MGD	3.027	2.955	3.16	3.44
Permitted Design Capacity	MGD		6.74	9.60	

2019 CONDITIONS

Winona experienced a flood event in spring 2019, which was less than a 50-year flood event based on the Mississippi River discharge at Winona. The 50-yr discharge for the area is 214,000 cubic feet per second (cfs). Figure 1 below shows data from USGS for 2019 – 2020, with spring of 2019 showing a discharge just under 200,000 cfs.

Figure 1: Mississippi River at Winona Discharge in 2019



The period of high influent wastewater flow in 2019 correlates with the Mississippi River stage and discharge volume, refer to Figures 2 and 3, respectively. The wastewater influent flow (blue line in Figures 2 and 3) trends closely with both the river stage and discharge volume. This shows that the wastewater influent volume is directly related to the river level/discharge and also strongly points to infiltration as a source of the high flows.

Figure 2: Mississippi River at Winona Stage and Wastewater Influent Flow

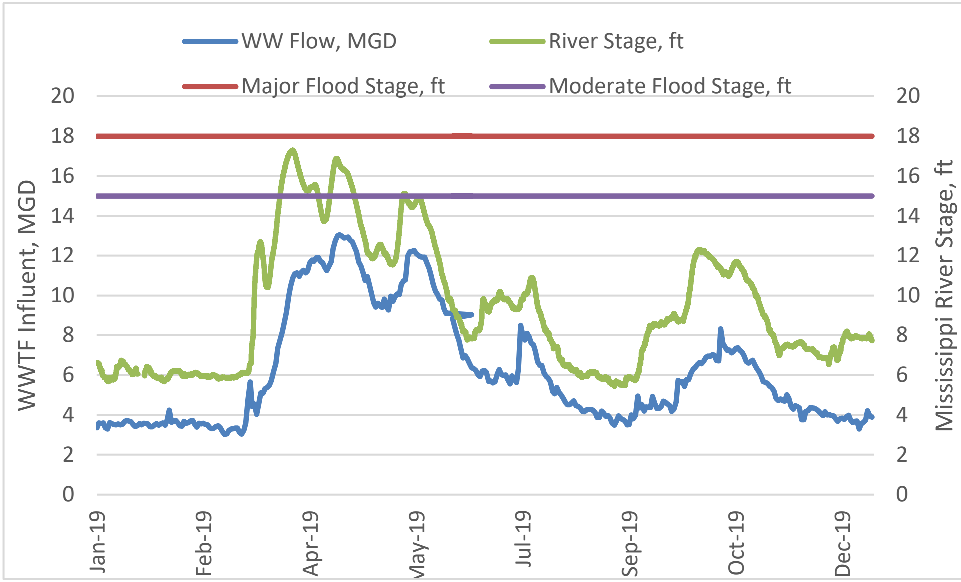
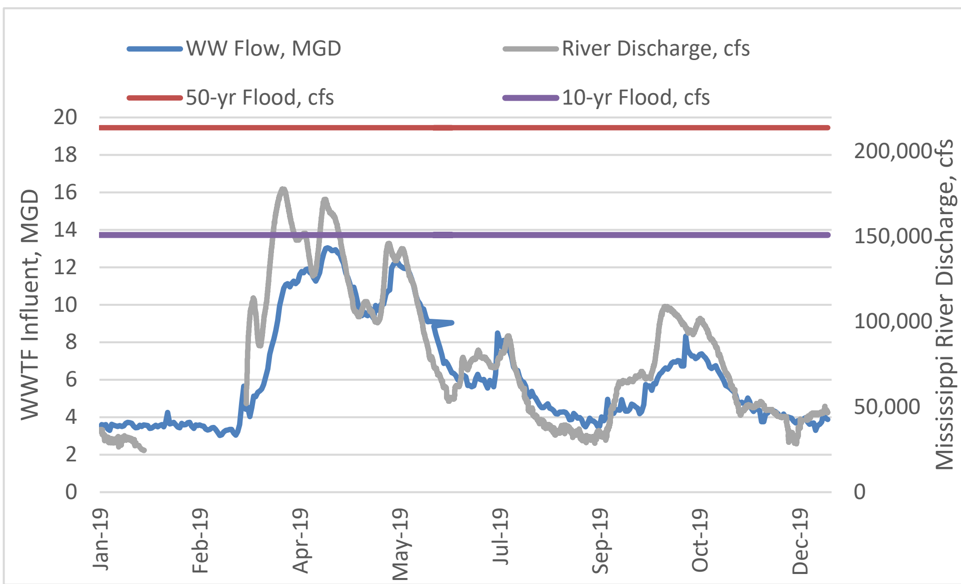


Figure 3: Mississippi River at Winona Discharge and Wastewater Influent Flow



During this 2019 event, the facility maintained compliance with its permit limits. The facility is sized to handle a peak hour/peak instantaneous flow of 15.0 MGD, and did not bypass in order to treat this sustained high flow. Further, the facility maintained compliance with permit limits during this sustained peak event.

Table 2: Flood Event Effluent Quality

Parameter	Limit	Max from April 2, 2019 to May 10, 2019
BOD, Carbonaceous 5 Day	40 mg/L	28 mg/L
Fecal Coliform	200 #/100 mL	200
TSS	45 mg/L	13 mg/L

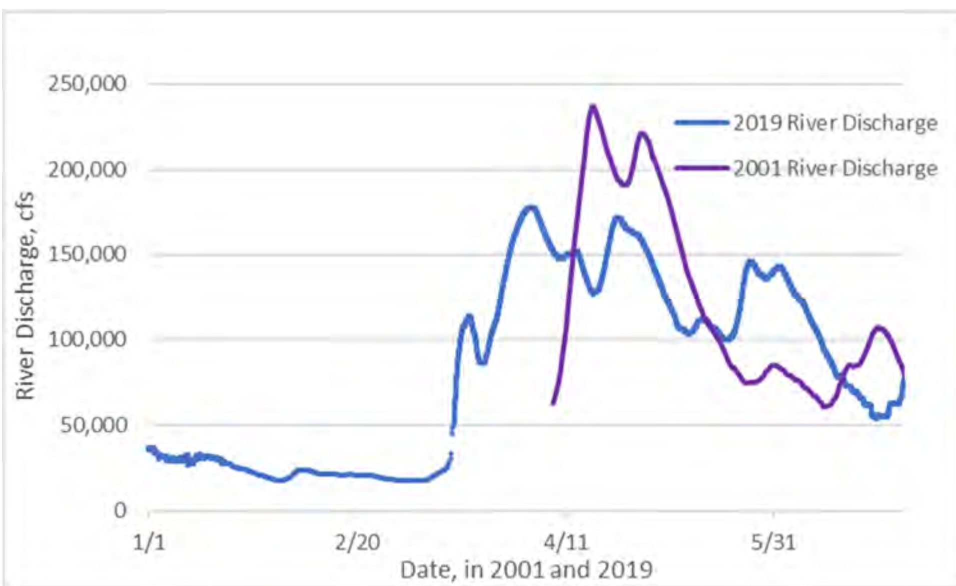
OTHER FLOOD EVENTS

The duration of the 2019 high flow event stands out compared to other similarly sized flood events. USGS River discharge data available back to 1994 was reviewed. The recorded river discharge exceeded the 10-yr discharge event (151,000 cfs) four times since 1994. Table 3 summarizes these events. In 2001, there was a flood event where the river discharge volume exceeded the 10-year event for 26 days. Figure 4 compares the river discharge from January 1 – July 1 for both 2001 and 2019. From this, one can see that while the 2001 event had a higher discharge, the duration was shorter.

Table 3: Historical Flood Events

Event Start	Event End	Duration, days	Average Discharge, cfs
4/7/1997	4/21/1997	14	178,309
4/12/2001	5/8/2001	26	200,607
4/10/2011	4/18/2011	8	161,110
3/28/2019	4/30/2019	33	156,601

Figure 4: River Discharge from January 1 to July 1 in 2001 and 2019



Using the MPCA Wastewater Data Browser, the wastewater influent flows during the 2001 flood were evaluated. The maximum month flow occurred May 2001 with an average daily flow of 7.12 MGD. The maximum day during this flood was 8.946 MGD, compared with 13.01 MGD during the 2019 flood. While the 2001 flood event was 20 years ago, population change is not likely contributing to this flow difference, as there is estimated to be less than 1% population growth over these 20 years (2000 population: 27,069; 2019 population estimate: 27,252). While the 2001 flood event had a higher river discharge than 2019, the duration was shorter and the WWTF did not see the same significant prolonged flows experienced in 2019.

In working to understand other differences between the 2001 flood and the 2019 flood, the only difference the City noted was that they replaced the influent flow meter in February 2018. The previous meter, a doppler meter, did not read accurately when the influent was clear, as occurs when there is significant I/I. The new meter is a mag meter and staff report that the flows are much more accurate, this based on flow meters at lift stations in the collection system, which were not in place for comparison in 2001.

DATA OBSERVATIONS

Based on the information above, the wastewater influent flow correlates with the Mississippi River level, not a specific storm event. This means the collection system is more significantly influenced by infiltration (groundwater) rather than inflow (stormwater).

The 2019 flood was a significant event which has 2-10 percent chance of occurring in any given year (10 to 50-yr flood event). However, the duration of this flood event, which caused the prolonged high flows at the wastewater plant, makes this event even more unique. The duration of this event was so significant that it impacts the average annual flow (Table 1).

It is not possible to estimate the recurrence of an event equivalent to the flood of 2019, with its duration and magnitude, but it should be less than the 2-10 percent chance of occurrence based on magnitude alone. For comparison, the MPCA guidance for estimating *peak instantaneous* flows considers storm events that have a 4-20% chance of occurring in any given year (25-year and 5-year rain events). For this reason, SEH believes that the 2019 data should not be used in determining the existing average annual or average wet weather flows to the facility.

INFLOW/INFILTRATION DETERMINATION

The MPCA defines inflow and infiltration as follows:

> *Inflow:* water other than wastewater that enters a sewer system directly from sources such as roof leaders, foundation drains, yard drains, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, storm water runoff and other drainage structures. Excessive inflow means the quantity of flow during storm events that results in chronic operational problems related to hydraulic overloading of the treatment system or that results in a total flow of more than 275 gpcd (domestic and industrial base flow plus infiltration and inflow). Chronic operational problems may include surcharging, backups, bypasses, and overflows.
>
> *Infiltration*: water other than wastewater that enters the sewer system from the ground through defective pipe, pipe joints, and manholes. Excessive infiltration means the quantity of flow that is more than 120 gpcd (domestic base flow and infiltration).

The MPCA Design Flow and Loading Determination Guidelines state that the inflow and infiltration should be calculated using hourly flow data. The City of Winona provided SCADA screenshots for specific days as requested. The MPCA Guidelines direct that 24-hour data from three days be overlayed to determine the inflow, infiltration, and peak hourly flow. The three days are described as Curves X, Y, and Z which are defined as:

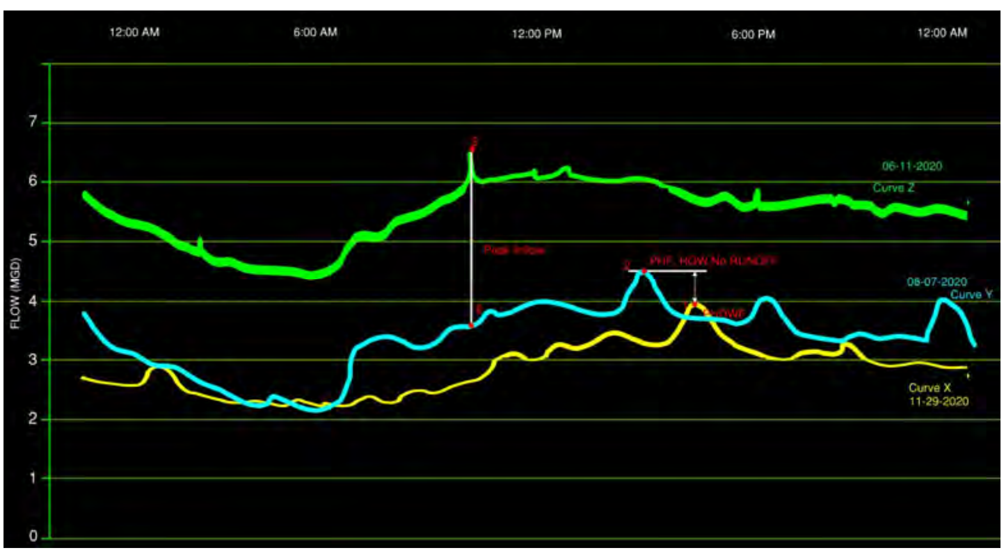
- Curve X: A day with normal groundwater levels and no precipitation for at least seven days.
- Curve Y: A day with high groundwater levels and no precipitation for at least seven days.
- Curve Z: A day with high groundwater levels and high precipitation.

2020 data was used to include recent increases in industry flows. The curves were selected on days within a steady flow period (preceding and following days had similar average day flows and precipitation). Based upon the MPCA guidance, the curves were labeled as follows:

- The Peak Hourly Dry Weather Flow (Point 1) is the maximum point on Curve X.
- The Peak Hourly Wet Weather Flow (Point 2) is the max point on Curve Y. Normally, this would occur at the same time as the peak of Curve X. Comparing the curves, it appears that the peaks of Curve Y occur slightly earlier than the peaks of Curve X. As the time between the two peaks is not significantly different, the Peak Hourly Wet Weather Flow was assumed as the max of Curve Y.
- Peak Infiltration is defined as the difference between Points 1 and 2.
- Point 5 is the maximum flow on Curve Z.
- Point 6 is the corresponding flow on Curve Y at the same instant in time as Point 5.
- Peak Inflow is the difference between Points 5 and 6.

The above points, values, and data for 2020 are presented in Figure 5.

Figure 5: Plot of 24-Hour Flow Data for Three Representative Days in 2020



As 2019 experienced record flooding, understanding the flow, inflow, and infiltration during that time is vital to understanding how flooding affected I/I. Using the same criteria, a 24-hour flow plot was created using 2019 data (Figure 6).

Figure 6: Plot of 24-Hour Flow Data for Three Representative Days in 2019

The values of Peak Hourly Flow, Inflow, and Infiltration for 2019 and 2020 are compared in Table 4:

Table 4: Comparison of flows, inflow, and infiltration

	Units	2019	2020
Peak Hour Dry Weather Flow	MGD	5.0	4.0
Peak Hour Wet Weather Flow	MGD	11.2	4.5
Infiltration	MGD	6.2	0.5
Inflow	MGD	2.0	3.0

On a per capita basis, the 2019 infiltration values exceed the MPCA guidance for infiltration, but not in 2020. Inflow estimates are less than the MPCA guidance thresholds.

The City has been working to reduce I/I and will continue to do so. Approximately 75% of the City's collection system is vitrified clay pipe, installed with short pipe sections. Each pipe joint is an opportunity for infiltration to enter the collection system. Much of the oldest part of the collection system has trunk mains that are below groundwater. Below are the steps the City has taken to address I/I:

- Budget annually for approximately 1,000 LF ($100.000 - $150,000) of cured-in-place pipe lining of the City's deepest mains.
- Starting in 2020, implemented a strategy to televise one of the seven sewer districts each year. First the city cleans the pipe, then televises noting roots, cracks, lateral issues, etc. Issues are corrected that year and then re-televised.
- Manholes with known issues have been sealed.
- Install flow metering a lift stations. Adding flow measurement allows the City the ability to strategically target I/I reduction strategies.
- In 2020, the City completed the airport lining project, where 1200 ft of sewer was lined. This has reduced the infiltration during normal groundwater conditions by approximately 200,000 gpd, and is expected to have contributed possibly up to 400,000 gpd of infiltration during the 2019 flood. The lift station serving this area was also redone in 2019, so there is some metering data to support these reduction estimates.

Going forward, the City plans to:

- Install flow measurement at smaller lift station in subdivisions. This will help identify areas where drain tiles are plumbed into the sanitary sewer. This would precede and help focus any home inspection program.
- Move forward with collection system flow monitoring to better understand problem areas. Advancements in technology allow for cloud-based monitoring with temporary meters that can be moved around in the collection system. This will further allow the City to focus I/I reduction efforts.
- Once problem areas are identified, use smoke testing, manhole scanning, and/or televising to pinpoint the specific area to be corrected.
- Prioritization of City pipe and manhole rehabilitation projects based on flow monitoring and investigation findings.
- Address remaining combined sewer. While the combined sewer mostly impacts inflow, a large inflow event stacked on top of infiltration does cause high short-duration flows.

RECOMMENDATIONS

While the peak month flow was 12.01 MGD in 2019, sizing the wastewater treatment plant for this as an average wet weather capacity would be grossly oversizing the facility, particularly given the average annual flow is only 4.46 MGD (if excluding 2019).

The peak hour design capacity of the facility is 10,500 gpm (15 MGD) and hydraulically, the facility was able to pass the sustained high flows in 2019 while providing effective treatment.

Based on the flows reported in Table 1, SEH recommends that the facility capacity remain unchanged, as summarized in Table 5.

Table 5: Recommended Design Conditions

Year	Unit	Avg Annual Flow	Avg Dry Weather Flow	Average Wet Weather Flow	Max Daily Flow	Peak Hour/Peak Instantaneous Flow[1]
2016	MGD	3.39	3.12	4.14	4.95	
2017	MGD	3.76	3.08	5.97	6.74	
2018	MGD	4.46	3.36	6.81	7.35	
2019	MGD	6.228	3.683	12.01	13.05	11.2
2020	MGD	4.01	3.88	6.61	7.82	4.5
2021 (Jan-Mar)	MGD	3.027	2.955	3.16	3.44	
Historical Basis	MGD	4.46	3.36	6.81	7.82	
Future Growth	MGD	4.55[2]		6.90[2]		
Recommended Design Conditions	MGD		6.74	9.60		15.0

[1] Peak Hour Wet Weather Flow from Table 3

[2] Based on an estimated industry increase of 0.09 MGD and no increase in residential flows.

The current facility capacity is adequate to treat the current and expected future flows assuming:

- Future I/I reduction measures are effective at reducing I/I entering the system
- The flows experienced in 2019 due to flooding were a rare occurrence and are not expected to contribute regularly to the plant influent
- No significant increase in population or water usage from industry.

dmk

c: Eden Wilcox – City of Winona
Celina Tragesser – SEH

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Appendix E

Cost and Effectiveness

Minnesota Pollution
Control Agency
520 Lafayette Road
St.Paul, MN 55155-4194

State Revolving Fund

Project Schedule Form

Minnesota Rules 7077.0274, Subp. 3.A.

Municipality Name: City of Winona, MN

Project Number:

ACTIVITY		Proposed Completion Dates: Treatment System (Month/Year)	Proposed Completion Dates: Collection System (Month/Year)
1.	Award Construction Contracts	5/2024	
2.	Issue Notice to Proceed with Construction	6/2024	
3.	Collection System and All Connections Complete		
4.	Initiate Facilities Operation	3/2026	
5.	Municipality Submits a One-year Certification Form stating that the project conforms to the approved plans and specifications and meets the permit effluent limitations (12 months from initiation of operation).	3/2027	

Print Authorized Representative Name: Brian DeFrang

Title: Public Works Director

Signature: [signature]

Date: 2/23/22

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

CWRF cost and effectiveness certification form

Clean Water Revolving Fund (CWRF) Program

Federal Water Pollution Control Act Section 602(b)(13)
and Minn. R. 7077.0272, subp. 2.D. or 7077.0277, subp. 2.C.

Instructions: The project representative must check boxes 1), 2), and either Z) or ZZ) below, and the form must be signed by both the Project Representative and the Professional Engineer for the project.

☒ 1) The municipality has studied and evaluated the cost and effectiveness of the processes, materials, techniques, and technologies for carrying out the proposed project or activity for which the assistance is sought under the Clean Water Revolving Fund (Minn. Stat. § 446.07); and

☒ 2) The municipality has selected, to the maximum extent practicable, a project or activity that maximizes the potential for efficient water use, reuse, recapture, conservation, and energy conservation[Z&ZZ], taking into account:

a) The cost of constructing the project or activity.
b) The cost of operating and maintaining the project or activity over the life of the project or activity.
c) The cost of replacing the project or activity.

☒ Z) If this project exempt from Building, Benchmarks, and Beyond (B3) provisions of the Sustainable Building (SB) 2030 Guidelines (B3 SB 2030) Wastewater Treatment Plants (WWTP) Review (attach a completed *B3 SB 2030 exemption form*).

☐ ZZ) If this project not exempt from B3 SB 2030 WWTP Review.

Project information

Municipality name: City of Winona, MN

Project number: ____

Certification

We certify that the project has completed requirements (1 and 2, and either Z or ZZ) as checked above.

Project Representative

Print name: Brian DeFrang

Signature: B DeFrang

Date (mm/dd/yyyy): 02/23/2022

Professional Engineer

Print name: Susan Danzl

Signature: Susan Danzl

Date (mm/dd/yyyy): 11/22/2021

Footnote: If ZZ) is checked, the Professional Engineer has submitted a Facilities Plan to the B3 SB 2030 WWTP Review and will consider the Review water and energy conservation recommendations.

MINNESOTA POLLUTION CONTROL AGENCY

520 Lafayette Road North
St. Paul, MN 55155-4194

CWRF B3 SB 2030 exemption form

Clean Water Revolving Fund (CWRF) Program
Wastewater Projects

(Minn. Stat. § 216B.241, sub. 1-10 and 16B, sub. 1-4)

Instructions: If at least one of the "**Yes**" statements is checked, the project is considered to have completed these requirements and is not required to submit additional information to meet the Building, Benchmarks, and Beyond (B3) provisions of the Sustainable Building (SB) 2030 Guidelines (B3 SB 2030). Sign and send the completed form to the Minnesota Pollution Control Agency (MPCA) project engineer.

If the answer to **all of the statements is** "**No**", the project will submit a preliminarily approved Facilities Plan [Minn. R. 7077.0272] to B3 SB 2030 Wastewater Treatment Plant Review. Sign and send the completed form to the MPCA project engineer.

Project information

Project name: City of Winona WWTF - Upgrades and Phosphorus Treatment

MPCA review engineer: Corey Hower MPCA project number:

Exempt criteria

	Yes	No
1. The project is limited to environmental study.	☐	☒
2. The project is limited to planning and design.	☐	☒
3. The project is for emergency/disaster relief and/or protection.	☐	☒
4. The project is limited to minor modifications to an existing treatment facility.	☐	☒
5. The project is limited to modifications within a new or an existing building less than 10,000 square feet.	☒	☐
6. The project is limited to a new or existing collection system including lift stations.	☐	☒
7. The project is limited to pond system.	☐	☒
8. The project is limited to installation of a backup power generator.	☐	☒
9. The project is limited to a stormwater project	☐	☒

If "Yes" to any of 1- 9 above, please provide a brief written description of the project and complete the Certification Statement below.

Certification statement

I certify that the information provided on this form is complete and accurate and that this project:

☒ Meets the exempt criteria established by the Minnesota Pollution Control Agency.

☐ Does not meet the exempt criteria and a preliminary approved Facilities Plan will be sent to the B3 SB 2030 Wastewater Treatment Plant Review

Project Representative or Professional Engineer

Print name: Susan Danzl

Organization: SEH

Signature: Susan Danzl

Date (mm/dd/yyyy): 11/22/2021

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

CWRF cost and effectiveness checklist

Clean Water Revolving Fund (CWRF) Program

Instructions: This checklist must be used with the Minnesota Pollution Control Agency (MPCA) *Minnesota Clean Water Revolving Fund (CWRF) cost and effectiveness guidance* document dated March 2018. The guidance document assists the consulting engineer in completing the cost and effectiveness analysis required by the Federal Water Pollution Control Act (FWPCA) Section 602(b)(13). The cost and effectiveness analysis for a project must be further documented in the project Facilities Plan. This checklist is also an attachment to the MPCA *Facilities Plan submittal checklist.*

Project information

Project name: Upgrade and Phosphorus Removal Date submitted (mm/dd/yyyy): 1/2/2022

City: Winona, MN

City's authorized representative: Brian DeFrange

Consulting engineer: Susan Danzl (SEH)

Cost analysis items

Cost analysis items to be completed for all CWRF wastewater projects.

Section		Yes	No
II.	Does the project owner have an Asset Management system in place? Where is the Asset Management system documented in the Facilities Plan: *Section 4*	☒	☐
IVA.	Did the Facilities Plan address Energy Conservation Opportunities? Where is the Energy Conservation discussion documented in the Facilities Plan: *Section 5.7.3*	☒	☐
IVB.	Did the Facilities Plan address Renewable Energy Opportunities? Where is the Renewable Energy discussion documented in the Facilities Plan: *Section 5.7.2*	☒	☐
IV.C.i.	Has the Facilities Plan analyzed Water Reuse options? Where is the Water Reuse options analysis documented in the Facilities Plan: *Section 5.7.1*	☒	☐
IV.C.ii.	Has the Facilities Plan analyzed installation of Water Efficient Devices? Where is the use of Water Efficient Devices analysis documented in the Facilities Plan: *Section 5.7.1*	☒	☐
IV.C.iii.	Has the Facilities Plan analyzed installation of new Water Meters or replacement of existing Water Meters? Where is the installation of new or replacement Water Meters analysis documented in the Facilities Plan: *Section 5.7.1*	☒	☐
IV.C.iv.	Has the Facilities Plan considered or completed Water Audits and/or Conservation Plan? Where is the discussion of Water Audits and/or Conservation Plan documented in the Facilities Plan: *Section 5.7.1*	☒	☐
IV.D.	Did the Facilities Plan for the project complete a Buildings, Benchmark, and Beyond (B3) Sustainable Building (SB) Wastewater Treatment Plant (WWTP) or B3 SB 2030 *WWTP exemption form*? Where is the B3 SB 2030 *WWTP exemption form* documented in the Facilities Plan: *Appendix E*	☒	☐

Nonmonetary analysis items   Applicable: Yes ☒ No ☐

Nonmonetary analysis items to be completed for all new wastewater treatment facilities with design average wet weather (AWW) flow of greater than 100,000 gallons per day, or significant upgrades meaning work on three or more major treatment units for any wastewater treatment facilities with a design AWW flow of greater than 1 million gallons per day.

Section		Yes	No
V.A.i.	Does the Facilities Plan analyze the project sustainability and climate resilience? Where is the discussion on project sustainability and climate resilience documented in the Facilities Plan: *Section 5.5*	☒	☐
V.A.ii.	Does the Facilities Plan analyze how a project addresses Water Quality objectives? Where is the discussion on how the project addresses Water Quality objectives documented in the Facilities Plan: *Section 5.1*	☒	☐
V.A.iii.	During the project planning process, did the owner consider project alternatives, such as consolidation or regionalization with another or other service area? Where is the discussion on how the project addresses possible consolidation or regionalization documented in the Facilities Plan: *Section 5.1*	☒	☐
V.B.i.	Is the project location and physical aspects discussed in the Facilities Plan? Where is the discussion on the project location and physical aspects located in the Facilities Plan: *Section 1*	☒	☐
V.B.ii.	Is the project reliability discussed in the Facilities Plan? Where is the discussion on the project reliability located in the Facilities Plan: *Section 5.5 (Stability)*	☒	☐
V.B.iii.	Is the project feasibility and operability discussed in the Facilities Plan? Where is the discussion on the project feasibility and operability located in the Facilities Plan: *Section 5.5*	☒	☐
V.C.i.	Are possible water conservation practices, water reuse and/or water recapture opportunities discussed in the Facilities Plan? Where is the discussion on the project water conservation practices, water reuse, and/or water recapture opportunities located in the Facilities Plan: *Section 5.7.1*	☒	☐
V.C.ii.	Are possible energy conservation practices discussed in the Facilities Plan? Where are the possible energy conservation practices discussed in the Facilities Plan: *Section 5.7.3*	☒	☐
V.C.iii.	Are possible opportunities to recover and recycle or reuse other resources discussed in the Facilities Plan? Where are possible opportunities to recover and recycle or reuse other resources options discussed in the Facilities Plan: *Section 5.7.4*	☒	☐
V.C.iv.	Are possible opportunities to use green infrastructure components within the project discussed in the Facilities Plan? Where are possible opportunities to use green infrastructure components within the project discussed in the Facilities Plan: *Section 6.6*	☒	☐
V.C.v.	Are possible other environmental impacts of the project discussed in the Facilities Plan? Where are the possible other environmental impacts of the project discussed in the Facilities Plan: *Section 5.5*	☒	☐

Section		Yes	No
V.D.i.	Are possible considerations which may be part of a local trend or demographics affecting the need or demand for a project discussed in the Facilities Plan? Where are the possible considerations which may be part of a local trend or demographics affecting the need or demand for a project discussed in the Facilities Plan: *Section 3.4*	☒	☐
V.D.ii.	Are possible considerations which may be part of a local trend or demographics affecting the need or demand for a project discussed in the Facilities Plan? Where are the possible considerations which may be part of a local trend or demographics affecting the need or demand for a project discussed in the Facilities Plan: *Section 3.4*	☒	☐
V.D.iii.	Are there possible environmental justice issues which may be considered for the project discussed in the Facilities Plan? Where are the possible environmental justice issues which may be considered for the project discussed in the Facilities Plan: *not-applicable*	☒	☐
V.D.iv.	Are there possible acceptability or affordability issues which may be considered for the project discussed in the Facilities Plan? Where are the possible acceptability or affordability issues which may be considered for the project discussed in the Facilities Plan: *Section 6.8*	☒	☐

Integrating cost and effectiveness analysis **Applicable: Yes ☒ No ☐**

Integrating cost and effectiveness analysis to be completed for all new wastewater treatment facilities with design AWW flow of greater than 100,000 gallons per day, or significant upgrades meaning work on three or more major treatment units for any wastewater treatment facilities with a design AWW flow of greater than 1 million gallons per day.

Section		Yes	No
VI.	Has an integrated cost and effectiveness analysis of the cost factors and the other/nonmonetary factors for a project been completed in the Facilities Plan? Where is the integrated cost and effectiveness analysis of the cost factors and the other/nonmonetary factors for a project discussed/located in the Facilities Plan? Section 5.5, Appendix M	☒	☐

Appendix F

Public Hearing Summary

Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194

State Environmental Review Process (SERP) Mailing List Form

Clean Water State Revolving Fund Program

Minnesota Rules 7077.0272, subp. 2.a.A.
Minnesota Rules 7077.0277, subp. 3.B.

Doc Type: Wastewater Point Source

Instructions: This is the complete mailing list that the Minnesota Pollution Control Agency (MPCA) will use to public notice the Environmental Summary or other environmental review documents. Please type names and addresses on this form and return to the MPCA staff engineer. This list should be considered minimum. If a more substantial mailing list is available for the Public Participation Program, it should be added to this mailing list. **Please return this mailing list in MS Word format only.**

Example address blocks:

The Honorable Mark Anderson
Minnesota State Senator
135 State Office Building
St. Paul, MN 55113

Marv Johnson, City Administrator
City of Willmar
236 Oriole Avenue
Willmar, MN 55699

Municipality name: City of Winona **Project number:**

Contact name: Brian DeFrang **Phone number:** 507-457-8237
(person completing the form)

Public notice address information

1.	**The Honorable State Senator:**	**6.**	**City Administrator/Clerk:**
	The Honorable Jeremy Miller Minnesota State Senator 95 University Avenue W. Minnesota Senate Bldg., Room 3113 St. Paul, MN 55155		Monica Hennessy Mohan City Clerk 207 Lafayette Street Winona, MN 55987
2.	**The Honorable State Representative:**	**7.**	**Engineering Consultant:**
	The Honorable Gene Pelowski Minnesota State Representative 491 State Office Building St. Paul, MN 55155		Susan Danzl, PE Short Elliott Hendrickson Inc. 3535 Vadnais Center Dr St. Paul, MN 55110
3.	**The Honorable County Board Chair:**	**8.**	**County Planning and Zoning Office:**
	The Honorable Chris M. Meyer First District County Board 322 High Forest Street Winona, MN 55987		Kay Qualley Planning and Environmental Services Director 202 W Third Street Winona, MN 55987
4.	**The Honorable Mayor:**	**9.**	**Watershed District (if established):**
	The Honorable Scott D. Sherman Mayor 631 West King Street Winona, MN 55987		
5.	**Township Board Clerk:***	**10.**	**Regional Development Commission:**

******Include if any portion of the project (including the facility, interceptor, influent or outfall lines) will be located in the township(s).*

To add rows, place your cursor in the last row of the second column and hit tab.

Interested citizens:	**Interested groups:** (i.e., homeowners associations, environmental, business, civic, etc., organizations)

To add rows, place your cursor in the last row of the second column and hit tab.

Property owners:

Property owner list should include all property owners of the site to be, or which has been previously acquired. For pond systems, include the property owner(s) of the pond site, spray irrigation site(s) and all property owners of homes within one-fourth mile of the pond site and any clusters of homes within one-half mile of the pond site.

Federal agencies:

ATTN: Field Supervisor
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425-1665

ATTN: Environmental Compliance Chief
U.S. Army Corps of Engineers
St. Paul District
180 Fifth Street East, Suite 700
St. Paul, MN 55101-1678

ATTN: Regional Environmental Officer
Federal Emergency Management Agency
Region V Office
536 South Clark Street, 6th Floor
Chicago, IL 60605

State agencies:

ATTN: Environmental Review Supervisor
MN Department of Natural Resources
Division of Ecological and Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155 -4025

ATTN: Manager of Government Programs and Compliance
MN Historical Society
Minnesota Historic Preservation Office
345 West Kellogg Boulevard
St. Paul, MN 55102-1906

ATTN: Cultural Resource Director
MN Indian Affairs Council
161 St. Anthony Avenue, Suite 919
St. Paul, MN 55103

MPCA regional office(s):

Appendix G

Resolution of Governing Body

Appendix H

Sewer Ordinance

CHAPTER 27

SEWERS AND SEWER SERVICE

27.38 FALSIFYING INFORMATION

27.39 PENALTIES

27.40 PORTABLE RESTROOMS UNITS AND HAULED WASTEWATER

SEWER AND SEWER SERVICE

27.00 PURPOSE AND POLICY

This section sets forth uniform requirements for discharges into the City's wastewater disposal system and enables the City to comply with all State and Federal laws.

The objectives of this section are:

(a) to prevent the introduction of pollutants into the wastewater disposal system which will interfere with the operation of the system or the use or disposal of sludge;

(b) to prevent the introduction of pollutants into the wastewater disposal system which will pass through the system inadequately treated into receiving waters or the atmosphere or otherwise be incompatible with the system; and

(c) to improve the opportunity to recycle and reclaim wastewater and sludge from the system.

This section provides for the regulation of discharges into the City's wastewater disposal system through enforcement of the requirements, authorized monitoring and enforcement activities, and requires user reporting.

27.01 DEFINITIONS

For the purposes of this chapter, the following words and phrases shall have the meaning respectively ascribed to them by this section:

(a) City Manager: The city manager or his designated representative.

(b) Notice: A written notification sent by first class or certified mail from the city manager to a person.

(c) Sanitary Sewerage System or Sewerage System: The city system of pipes and appurtenances collecting and transferring sanitary sewage, not including surface run-off waters.

(d) Property: A lot, parcel or land, or real estate, building or premise in the city.

(e) Sanitary Sewer: A public sewer or other wastewater conveyance device which is part of the sanitary sewerage system.

(f) Owner: Owner, lessee, occupant or agent.

(g) Sewage Service Charge or Service Charge: The charge made by the city for the purposes of providing funds as provided in Section 27.19.

(h) Domestic Sewage: The waste from water closets, lavatories, sinks, bathtubs, showers, household laundries, cellar floor drains, soda fountains, cuspidors, refrigerator drips and drinking fountains.

(i) Wastewater Disposal System: The combined sanitary sewerage system and wastewater treatment plant, including sludge treatment and disposal facilities.

(j) Wastewater Treatment Plant (Sewage Treatment Plant): The facilities which process the wastewater discharged to the sanitary sewer system.

(k) Single and Two-Family Dwellings: Single and two-family dwellings are those dwellings meeting the definition given in Section 43.01.

(l) Agreement: Agreement is a written contract between the city and a person.

(m) Industrial User: A person who discharges or intends to discharge non-domestic wastewater into the sanitary sewer system.

(n) Pretreatment: The process of reducing the amount of pollutants, eliminating pollutants, or altering the nature of pollutant properties in wastewater to a less harmful state prior to or in lieu of discharging or otherwise introducing such pollutants into the City's sanitary sewerage system. The reduction, elimination, or alteration may be obtained by physical, chemical, or biological processes, process changes, or other means, except as prohibited by Section 27.23.

(o) Sludge: The solids removed from the waste waters and treated at thewastewater treatment plant.

(p) Wastewater (Sewage): The liquid and water-carried industrial or domestic wastes from dwellings, commercial buildings, industrial facilities, and institutions, whether treated or untreated, which is discharged into or permitted to enter the city's sanitary sewerage system.
Ord. No. 3452 05/15/00

(q) NPDES or National Pollution Discharge Elimination System: Permit issued through Minnesota Pollution Control Agency to the city's wastewater treatment plant for discharge to the Mississippi River.

(r) Biochemical Oxygen Demand (BOD_5): The quality of oxygen utilized in the biochemical oxidation or organic matter under standard laboratory procedure in five (5) days at 20° Centigrade expressed in terms of weight and concentration.

(s) Milligrams per liter: mg/l.

(t) Interference: The inhibition or disruption of the city's wastewater disposal system processes or operations which causes or significantly contributes to a violation of any requirement of the city's NPDES Permit. The term includes prevention of sewage sludge or disposal by the city.

(u) Non-Contact Cooling Water: The water discharged from any use such as air conditioning, cooling or refrigeration, or during which the only pollutant added to the water is heat.

(v) pH: The logarithm of the reciprocal of the concentration of hydrogen ions in grams per liter of solution.

(w) Suspended Solids: The total suspended matter that floats on the surface of, or is suspended in, water, wastewater or other liquids, and which is removable by a standard glass fiber filter.

(x) Composite Sample: A combination of individual samples, taken based on time or flow, which represents the wastewater discharged over the sample period.

(y) Grab Sample: A single sample of wastewater.

(z) Person: Includes any person, firm, association, organization, partnership, business trust, corporation or company, and where appropriate "owner" as herein defined.

(aa) Significant Industrial User: A significant industrial user shall include:

(i) all categorical industrial users;

(ii) any noncategorical industrial user that discharges 25,000 gallons per day or more of process wastewater ("process wastewater" excludes sanitary noncontact cooling and boiler blowdown wastewaters) or contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic (BOD, TSS, etc.) capacity of the treatment plant or has a reasonable potential, in the opinion of the city manager, to adversely affect the wastewater treatment plant (inhibition, pass-through of pollutants, sludge contamination, or endangerment of wastewater treatment plant workers).

Ord. No. 3021 06/04/90

27.02 SUPERVISION BY CITY ENGINEER

The city engineer shall have the control of the sewers and drains of the city and their connections, and shall take charge of the buildings and repairs of the same and all matters in connection with the sewers and drains of the city except in cases where the city council shall, by resolution in writing, employ some other person to perform certain duties definitely defined in such resolution relating to sewers and drains.

27.03 CONNECTIONS BY LICENSEES ONLY

No connection shall be made with any sewer or drain, except by persons regularly licensed to perform that description of work and no permit shall be granted to any person except such regularly licensed person. If the licensed person elects to have another person perform the work of installing or connecting sewer or water lines, the licensee must be present and oversee critical portions of the pipe installation and be present for final inspection. The licensee shall be required to guarantee the work for a period of two years following completion of the work. Any and all costs associated with work not completed in accordance with the standards set forth in this Code or other plans and

specifications approved by the City shall be borne solely by the licensee. In addition, any person performing work shall be registered to perform work in the City's right of way.
Ord. No. 4046 01/03/2017

27.04 WATER, SEWER AND DRAIN LAYERS LICENSE

(a) Application. Any persons desiring a license to make connections with water, sewers and drains in the city shall make application in writing therefor to the city engineer, and furnish the city engineer satisfactory evidence that he is, or has in his employ, a person regularly trained and skilled in the business and qualified to receive a license. If satisfied that the applicant is properly qualified, the city engineer may issue a license to him on his complying with the requirements contained in this section. All applicants must have a licensed master plumber or a certified drainlayer on staff and that person must be on site during connection and installation of sewer or water pipe.
Ord. No. 3452 05/15/00 Ord. No. 4046 01/03/2017

(b) Bond Required. No license shall be issued to any person to make water, sewer or drain connections until he shall have executed and deposited in the office of the city engineer a bond to the city in the sum of $10,000, executed by himself and a corporate surety or two sufficient sureties and approved by the city attorney, conditioned that he will indemnify and save harmless the city from all suits, accidents and damages consequent thereupon, for or by reason of any opening in any street, alley or public ground, made by him or by those in his employment, for making any connection to any public or private sewer or drain, or for any other purpose or object whatever, and that he will also replace and restore the street over such opening to as good a state and condition as he found it, keep guard by day and red lights by night and keep and maintain the same in good order, to the satisfaction of the city engineer for his acceptance, and shall conform in all respects to the ordinances relative to the streets, sewers and drains, and pay fine that may be imposed upon him by law.
Ord. No. 3452 05/15/00

(c) Record of License. Every person licensed shall have recorded in the city engineer's office his place of business, the name under which the business is transacted, and shall immediately notify the city engineer of any changes.

27.05 SEWER CONNECTION PERMIT

(a) Required. No connection shall be made with any sewers without a permit from the city engineer. No opening or connection shall be made into any sewer in any manner different from the specifications prescribed for such opening or connection by this chapter.

No permit shall be granted to any person to tap or connect with any sewer when the property sought to be drained is situated without the boundary lines of the sewer district as established by the city council. A significant industrial user, as defined above, shall obtain a wastewater discharge permit from the city.

A new industrial user or a new significant industrial user shall submit a statement to the city providing typical wastewater discharges anticipated. All industrial

users shall promptly notify the city manager in advance of any substantial change in the volume or character of pollutants in their discharge. Any existing industrial user intending to alter its wastewater shall obtain a new permit from the city.
Ord. No. 3021 06/04/90

(b) Payment of Fee. No permit required by this section shall be granted until the person applying for such permit has paid to the city treasurer a fee for such permit.

(c) Assessment or Access Fee. The City engineer shall issue a permit for a sanitary sewer connection if the property has been assessed for a sanitary sewer or if an access fee is paid in lieu of assessment.
Ord. No. 3501 09/04/01
Ord. No. 3698 6/19/06

The access fee shall be established annually by the City Council and shall be set forth in Section 51.01 of this Code. The fee shall be paid to the City treasurer.
Ord. No. 3501 09/04/01
Ord. No. 3698 06/19/06

If the person requesting the permit must construct a sewer lateral past the frontage of another person's property, he shall receive a removal credit to be deducted from the access fee. The removal credit shall be calculated by multiplying the frontage in feet of the other person's property by $6; provided, however, that the removal credit shall not exceed the access fee.
Ord. No. 3452 05/15/00
Ord. No. 3698 06/19/06

(d) Work Authorized by Permit. An application for a permit to perform work under this chapter shall be made by the person employed to do the work, and shall state the location, name of the owner, number of buildings to be connected, and how occupied. No person shall extend any private drain beyond the limits of the building or property for which the permit has been given.
Ord. No. 2793 03/17/86

27.06 SPECIFICATIONS FOR SEWER CONNECTIONS

(a) All connections with the public sewers shall be made with ductile iron or PVC schedule 40 pipe having a minimum internal diameter of 4 inches. No sewer pipe connecting with any public sewer shall have a fall of less than 6 inches per hundred feet for 6 inch pipe and 12 inches per hundred feet for 4 inch pipe. All drains and soil pipes within a building and where the same passes through the walls of a building shall be of iron.
Ord. No. 3452 05/15/00

(b) All pipe shall be inspected by the city engineer before the same is laid and be subject to his approval. Subject to the above limitations all pipe shall be laid and all joints shall be made as directed by the city engineer, and all work thereon shall be done only by a licensed person as provided in this chapter. All connections with public mains, whether they are sanitary, storm, or water, shall be left uncovered until they are inspected and approved. The Engineering

Department must be notified at least two hours prior to time of inspection. Notification must be made during normal business hours. Inspections will be done during normal business hours. Normal business hours are 7:00 a.m. to 4:00 p.m. Monday through Friday, except holidays. Property owners are fully responsible for any problems that occur after inspection.

Ord. No. 3452 05/15/00
Ord. No. 3497 07/02/01

(c) The street shall be opened and the paving and earth deposited in such a manner that will occasion the least inconvenience to the public, and provide for the passage of water along the gutters; one half of the street shall be left clear for the passage of vehicles and bridge-ways provided on sidewalks for foot passengers; in refilling the trench, the earth shall be laid in layers not more than 12 inches in depth, and each layer thoroughly tamped to prevent settlement. The paving, flagging and sidewalks shall be restored to at least as good condition as previous to the excavation, and all rubbish and surplus earth shall be immediately removed.

Ord. No. 3452 05/15/00

27.07 STANDARDS FOR EXTENDING DRAINS INTO OR UNDER BUILDINGS

No person shall construct or extend any drain for the reception of sewerage or waste water under or into any dwelling or any building, or to connect the same with any public sewer, unless the drain shall in its plan and construction, conform to the following requirements and be approved by the city engineer;

(a) There shall be in the drain a trap, so constructed as to bar the passage of air from beyond the trap into the house, by an obstacle equal to at least one inch in depth of water.

(b) Between the trap and the foot of the soil pipe, there shall be connected with the drain, an inlet pipe of the same diameter as the drain for the admission of fresh air and the soil pipe within the house shall be continued above the roof and undiminished in size to such height as may be directed by the city engineer, not less than two feet, and left open so that the whole drain may be thoroughly and constantly ventilated.

27.08 DRAIN COURSE PLAN

When a person desires to construct a house drain or make any addition to any drain which may be already laid as far as the property line, or make any extension or alteration of the drainage in any building, intended to be connected with or discharge into any sewer, he shall, before beginning work upon the same, give the city engineer a plan thereof, which shall show the whole course of the drain, from its connection with the sewer to its terminus within the house, with the location of all branches, traps and fixtures connected therewith; such plan or copy thereof to be left on file in the office of the city engineer. If, upon inspection of the plan, the city engineer shall find that the plan does not conform to the requirements of this chapter, he shall not issue any permit for its construction, extension or alteration or connection with any sewer.

27.09 RIGHT TO ENTER PREMISES

The city manager, the city engineer and their authorized agents shall have the right to enter upon the premises drained by any house drain and connected with any public sewer, at all reasonable hours, to ascertain whether the provisions of this code or any other ordinances in regard to house drains have been complied with, and if he shall find that the drain or its attachments do not conform to the provisions of law in regard thereto, he shall notify the owner of the premises of this fact. It shall thereupon be the duty of the owner to cause the drain or its attachments to be altered, repaired, or reconstructed so as to make them conform to the requirements of law in regard thereto, within 15 days from the time of receiving such notice.

27.10 NOTICE TO INSPECT

Notice in writing must be given to the city engineer at his office, by the person who is to make the connection with any sewer or drain when such work will be ready for inspection, at such stages during the progress of such work as the city engineer may direct.

27.11 CONNECTING BUILDINGS ON LOTS ABUTTING STREETS WITH PUBLIC SEWERS

(a) Duty to Connect. Every owner of a building constructed after October 1, 2001, and located upon a lot or parcel of land in the city, which lot or parcel of land abuts a street or alley in which there is located a public sanitary sewer, shall properly connect such building or cause such building to be connected with such public sanitary sewer in the manner set forth in this chapter so that all sewage from such building may thereafter be carried into the public sanitary sewers of the city; provided, that the use for which such building is to be put requires or makes necessary a provision for the disposal of sewage or human excrement.
Ord. No. 3501 09/04/01

(b) Ordering Connection with Sewer. The city manager is empowered, whenever there is a sanitary sewer in the public highway or public ground upon which any property abuts, to cause the owner to connect such property with such sanitary sewer by a sufficient sanitary sewer whenever in his judgment the same may be necessary for the preservation of the public health. He shall give notice to the owner specifying the date when such sewer connection or connections must be completed, and if such owner neglects to complete the same within the time specified, the city council may cause the same to be done and may either recover the whole amount of the expense thereof by an action against the owner in the name of the city before any court having jurisdiction thereof or certify the same to the county auditor pursuant to Minnesota Statutes, Section 444.075.

(c) Every owner of a property containing an individual sewage treatment system shall submit to the City Engineering Department a certificate of compliance with State standards, prepared by an individual licensed and registered by the State to perform inspections. The certificate shall be valid for three years following the date of its issuance. A new certificate of compliance shall be obtained and be filed with the City every 3 years thereafter until such time as hookup to the public sanitary sewer system occurs.
Ord. 3501 09/04/01

27.12 CONNECTION OF STEAM EXHAUST TO SEWERS

No steam exhaust or blowoff shall be connected with any soil or waste plant, or drain which communicates with a public sewer.

27.13 CESSPOOLS PROHIBITED WHERE SEWERS AVAILABLE

All privy vaults and all cesspools and other arrangements for the reception of human excrement and sewage, not connected with a public sanitary sewer and located on lots or parcels of land in the city abutting a street or alley in which there is located a public sanitary sewer, are declared to be a health nuisance and the building, maintenance or permitting such structure to remain is prohibited. Existing individual sewage treatment systems meeting State standards are not included in this prohibition. Every such vault, cesspool and other arrangement for the reception of human excrement and sewage located in the city upon premises not capable of being connected with a public sanitary sewer shall be destroyed and the contents thereof disposed of within 30 days after a public sanitary sewer shall have been fully constructed in a public street or alley, adjacent to such premises.

Ord. 3501 09/04/01

27.14 LEAKY OR UNUSED SEWERS

No owner of real estate served with a sanitary or storm sewer connected to a public sewer shall:

(a) Permit his sewer to leak after a leak has been discovered.

(b) Keep his sewer connected to the public sewer when there is no need for the connection. It shall be presumed there is no need if no sewage or water is carried through the owner's sewer for a period of 300 consecutive days.

27.15 INDIVIDUAL SEWAGE TREATMENT SYSTEMS AND HAULED WASTEWATER

(a) Definitions. For the purpose of this section the following words and phrases shall have the meanings respectively ascribed to them by this section:

Empty: Empty, clean or removed.

Individual Sewage Treatment System: A sewage treatment system, or part thereof, serving a dwelling that uses subsurface soil treatment and disposal, or a holding tank.

Hauled Wastewater: Liquid of water-carried industrial or domestic sewage which is transported from the place of origin to the place of discharge.

(b) Offensive or Hazardous. No person shall suffer or permit an individual sewage treatment system upon any premises belonging to him or occupied by him to overflow, become uncovered, become foul, emit odors offensive to any person in the neighborhood or become hazardous to the public health.

(c) Declaration of Nuisance and Abatement. An individual sewage treatment system is a nuisance if it overflows, becomes uncovered, becomes foul, emits odors offensive to any person in the neighborhood or if it becomes hazardous to the public health. The owner of such individual sewage treatment system shall abate the same on order of the city council and in the manner directed by the city council.

(d) License to Provide Service to Individual Sewage Treatment Systems. No person shall maintain, pump, inspect or provide service to an individual sewage treatment system unless licensed to do so by the State of Minnesota.

(e) Permit Required for Discharge to City's Wastewater Treatment System. No person shall discharge hauled wastewater, septage or any other wastewater, material or substance, obtained from an individual sewage treatment system or any other source, into the City's wastewater system without first obtaining a Permit to Discharge Hauled Wastewater for the City of Winona Wastewater Treatment Plant (WWTP). The application for a Permit to Discharge Hauled Wastewater may be obtained from the city clerk.
Ord. No. 3885 11/7/2011

27.16 EMPTYING HOLDING TANKS ON TRAVEL TRAILERS

A person who owns or operates a travel trailer or self-contained vehicle which has a holding tank on board may empty the contents thereof into the city facility at Prairie Island.

27.17 DISCHARGE OF WASTES INTO PUBLIC WATERS

No person shall discharge or place or permit to be discharged or placed into any public water or waterway within the corporate limits any nauseous or dangerous substance or object or any substance which will pollute or tend to pollute water, including, but not limited to, garbage, offal, rubbish, body of a dead animal, oil or an oil derivative, sewage, a chemical, metal, plastic, mortar, brick, rock, stone or glass.

27.18 PRIVY VAULTS OUTSIDE CITY

No licensee shall dump the contents of a privy vault, which contents have been taken from a privy vault outside the city, unless specific written consent to so dump has been given by the city.

27.19 SEWER SERVICE CHARGES

(a) Purpose. For the purpose of providing funds to meet the costs of operating the sewerage system and sewage treatment plant, the facilities connected therewith and the payment of capital charges represented by bonds, certificates of indebtedness or otherwise which may be issued to finance the cost of such treatment facilities and the payment of all other costs allowed by law, there is hereby imposed upon each owner of the property a sewer service charge as hereinafter provided. The sewer service charge is a charge against the owner, lessee and occupant; a sewer service charge unpaid and delinquent on August 15 of each year may be certified to the county auditor with taxes against the property served for collection pursuant to law. Where a sanitary sewer is available and written notice has been given to an owner to eliminate a private sanitary sewerage system which does not comply with the ordinances of the city or laws or regulations of the state and to connect to the sanitary sewer, a sewer service charge may be made at the next billing period even though physical connection is not immediately made to the sanitary sewer. Prior to submission of the assessment to the county on the date the assessment is confirmed by the city council, the council shall add an administrative fee of 15 percent of the amount then due.

Ord. No. 3851 9/20/2010

(b) Basis of Service Charge. Except as otherwise herein provided, the service charge shall be based upon the quantity of water used at the property as the water is measured by the water meter or water meters there in use. The minimum sewage service charge to a property owner using a private water supply shall be the same as charged to a person using city water.

(c) Industrial User. A property with water meters of two inch or over shall be considered an industrial user, regardless of the use of property.

Ord. 3538 07-01-02

(d) Property Outside City. Property outside the city which is served by and uses the sewerage system and which produces domestic or class 1 industrial sewage shall pay double the amount of the service charge prescribed in the above schedule for a property inside the city. A service charge for a property outside the city limits which is served by a collection system maintained by another governmental subdivision shall be the subject of an agreement between the city and such other governmental subdivision. A charge for a property outside the city limits which is served by and uses the sewerage system and which produces class 2 industrial sewage shall be based on the amount and strength of sewage contributed to the system and shall be the subject of an agreement between the city and the owner.

(e) Computation of Amount of Charge. The amount due for the service charge shall be computed in accordance with the provisions of city ordinances and statements rendered at the same time and on the same bill with the city water statement. A sewer service charge statement is rendered under the same conditions as a water statement and the items are not separable in payment. If a property supplies its own water, a bill will be rendered for sewer service only.

(f) Deposit of Funds. The monies received from the charges herein established shall be deposited in a separate fund of the city.

27.20 METERING WATER SOURCES

In the event any property discharging sanitary sewage, industrial wastes, water or other liquids into the sewerage system of the city, either directly or indirectly, is supplied in whole or in part with water not obtained from the city, the owner of such property shall cause to be installed necessary metering equipment approved by the city manager to measure the quantity of water pumped or used, and sewer service charge shall be based on the quantity of water so measured. The owner shall install and maintain such metering equipment in good working condition at his own expense. Whenever the owner fails to install such metering equipment or where it is not practicable to measure the water consumed on the property by a meter or meters, the city manager shall cause to be determined in such manner and by such methods as may be practicable, considering conditions and attendant circumstances in each case, the estimated volume of water from private sources which discharge into the sewerage system and such estimates shall be used in lieu of the meter volume of water from private sources to determine the service charge.

The city manager may authorize sale of meters purchased by the city, and such sales may be made at cost to the city. The city manager may authorize payment for a meter to be spread over equal, or nearly equal, payments, the same to be added to the water bill; provided, however, that the purchaser authorizes billing in the manner prescribed at the time the meter is purchased.

27.21 TESTING STRENGTH OF INDUSTRIAL SEWAGE

(a) In determining the strength of industrial sewage, actual tests shall be conducted as directed by the city manager, the cost to be paid by the owner requesting or required to have such test. Each test shall be performed in accordance with methods described in the current edition of "Standard Methods Examination of Water and Waste Water" published by the American Public Health Assoc., the American Water Works Association and the Water Pollution Control Federation latest edition, or as approved by the U.S. Environmental Protection Agency and/or the Minnesota Pollution Control Agency.

(b) If directed by the city manager, the owner shall conduct routine analyses of the sewage and shall submit the results in periodic reports as required by the Federal Pretreatment regulations and/or as required by the city manager.

27.22 ENTERING MANHOLE

No person shall enter a sewer manhole or open the same for any person whatever unless authorized by the city manager or the city council.

27.23 PROHIBITED DISCHARGES

No person shall deposit or discharge any pollutant which would cause the city to violate its NPDES Permit, any pollutant in concentrations exceeding State or Federal limitations, or any of the following, whichever is more stringent:

(a) Any waste which will physically damage the sewerage system, sewage treatment plant or facilities connected therewith, or interfere with the treatment process standards required by the Minnesota Pollution Control Agency.

(b) Any wastewater having a temperature greater than 150 degrees F. or 65.6 degrees C. or causing, individually or in combination with other wastewater, the influent at the wastewater treatment plant to have a temperature exceeding 104 degrees F. or 40 degrees C.

(c) Water or waste containing more than 100 parts per million by weight of fat, oil or grease.

(d) Pollutants which create a fire or explosion hazard in the Wastewater Disposal System, including but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21, July 24, 1990. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.
Ord. No. 3042 11/05/90

(e) Garbage, either household or commercial, that has not been shredded, so that the garbage particles are smaller than 3/8 inch in their largest dimension. Adequate water flow volume to wash such garbage through the sewers shall be provided.

(f) Ashes, hair, peelings, refuse, rages, sticks, cinders, earth, mortar or concrete, feathers, glass, metal, animal or poultry solids, plastics, or any solid or viscous matter capable of causing obstruction in the flow of a sanitary sewer reduction in the capacity of a sanitary sewer, or interference with the proper operation of the sewerage system.

(g) Water or waste containing an acid of toxic or radioactive or poisonous substance in sufficient quantity to injure or interfere with the treatment process or cause a hazard to humans, animals or aquatic life, in the receiving waters of the sewerage system.

(h) Waste containing suspended solids of such character and quantity that special attention or expense is required to handle such materials through the sewerage system.

(i) Noxious or malodorous gas or substance capable of creating a nuisance.

(j) Any wastewater having a pH less than 5.0, or higher than 11.0, or having any other corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sanitary sewerage system.
Ord. No. 3488 04/02/01

(k) Roof, ground or surface water, non-contact cooling water or means of introducing such water into the sewerage system.

(l) Any slug load, which shall mean any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge of such volume or strength as to cause inhibition or disruption in the sanitary sewerage system. In no case shall a slug load have a flow rate or contain concentrations or quantities or pollutants that exceed for any time period longer than fifteen minutes more than five times the average twenty-four hour concentrations, quantities, or flow of the user during normal operation.

(m) Any wastewater having a BOD-5 greater than 210 mg/l or having a suspended solids concentration greater than 180 mg/l. Sewage with greater concentrations may be discharged only through a special use permit. Charges will be levied for wastewater having a strength greater than 210 mg/1 BOD-5 or 180 mg/l suspended solids.
Ord. No. 3291 05/20/96

(n) Any wastewater having a concentration greater than:

Zinc	(Total)	6.0 mg/l
Chromium	(Total)	8.0 mg/l
Cadmium	(Total)	2.0 mg/l
Copper	(Total)	3.5 mg/l
Lead	(Total)	1.0 mg/l
Nickel	(Total)	6.0 mg/l
Cyanide	(Total)	1.8 mg/l
Mercury	(Total)	0.040 mg/l
Silver	(Total)	10.0 mg/l

Ord. 3544 9/03/02

(o) Any wastewater having total toxic organics (TTO) exceeding 2.13 mg/l for any one day. TTO is defined in the Federal Register 40 CFR 433.11(e) of Vol. 48, No. 137/Friday July 15, 1983/Rules and Regulations as "the summation of all quantifiable values greater than 0.01 milligrams per liter in the above cited Federal Register".
Ord. No. 2978 06/19/89

(p) Garbage, discarded material and grease from non-domestic sources which results from the handling, processing, storage, preparation, serving and consumption of food, when the effect of such disposal into public sewers is the avoidance of off-site solid waste disposal.
Ord. No. 3138 07/20/92

(q) Waste antifreeze or coolant. This prohibition shall not apply to the small amount of antifreeze or coolant that may be in the water used to flush a heating/cooling system after the antifreeze or coolant has been drained down and captured.
Ord. No. 3368 07/06/98

(r) The City may develop Best Management Practices by ordinance, in general permits, in individual wastewater permits, or to establish standard practice, to implement local limits and the requirements of Chapter 27.
Ord. No. 3833 3/15/2010

27.24 GREASE TRAPS

No owner of a hotel, restaurant, school, food handling establishment, processing plant or manufacturing plant handling foodstuff or greasy materials shall have a sewer connection that is not equipped with a grease trap of standard and adequate design. Each grease trap shall be properly constructed and maintained to function properly at the expense of the owner.

27.25 NOTIFICATION OF SPILLAGE OR NONCOMPLIANCE

(a) In the event of a spillage into the sanitary sewer system of any waste which could be harmful to persons or the wastewater disposal system, the person responsible for the spillage shall immediately, on becoming aware of the spillage, notify the city manager of the quantity and characteristics of the spilled material. The person responsible for the spillage shall also repeat sampling and analysis and submit the result of the repeat analysis to the city manager within 30 days after becoming aware of the spillage.

(b) In the event of noncompliance with the requirements of Section 27.23, any person, upon becoming aware of the noncompliance, shall notify the city manager within 24 hours of becoming aware of the noncompliance. The person responsible for the noncompliance shall also repeat sampling and analysis and submit the results of the repeat analysis to the city manager within 30 days after becoming aware of the noncompliance.

(c) The person responsible for the spillage or noncompliance shall submit, in writing, to the city manager the description, cause, period of occurrence, correction procedures, and procedures for prevention of reoccurrence of the spillage or noncompliance.
Ord. No. 3021 06/04/90

27.26 PRETREATMENT FACILITIES

Pretreatment facilities shall be provided where required to meet the discharge limitations addressed under Section 27.23. An owner, discharging waste, shall submit to the city manager a schedule outlining the steps to be taken to provide the required pretreatment facilities. Pretreatment facilities shall be properly constructed and maintained at the owner's expense.

(a) Grease, Oil and/or Sand Interceptors. Grease, oil and sand interceptors shall be provided when, in the opinion of the City Manager, they are necessary for the proper handling of liquid wastes containing floatable oil or grease in an excessive amount, or sand or other harmful ingredients. All interceptors shall be of a type and capacity approved by the City Manager, and shall be located so as to be readily accessible for cleaning and inspection. The user shall clean and maintain these interceptors as required to maintain efficient removal of grease, oil and/or sand. In maintaining these interceptors, the owner(s) shall be responsible for the proper removal and disposal by appropriate means of the captured material, and shall maintain records, which are subject to review by the City Manager, or the dates and means of disposal, including manifests, if used.
Ord. No. 3368 07/06/98

27.27 SLUDGE, ETC.

No person shall dispose of sludge, floats, skimmings, etc., generated by a pretreatment system into the city's sanitary sewerage system. Such sludge shall be contained, transported, and disposed of in accordance with all Federal, State and local regulations.

27.28 CONTROL MANHOLES

The city may require a control manhole to be built on the building sewer at the owner's expense to facilitate observation, sampling, inspection and measurement of wastes; when required, such manhole shall be accessible, safely located and built in accordance with city standards for sewer manholes. The necessity for a control manhole will be based on sewage volume, whether it is a processing waste or an industrial waste and whether the waste requires control within the operation to meet acceptable conditions for discharge to the sewerage system.

27.29 SPECIAL AGREEMENTS WITH CITY FOR HANDLING OF CERTAIN WASTES

Nothing in this chapter requires the city to provide sewer service at published rates when an owner deposits waste in the sewerage system or causes a higher than normal expense in the operation of the sewerage system. Nothing in this chapter prohibits the city from the handling of deleterious wastes, requiring pretreatments or setting a service charge higher than the published rates on an agreement basis. Such an agreement shall be made by the city and the owner after considering the problems in handling the effect on the sewerage system and the cost of handling the waste, among other things, but not limited to, fees for industrial discharge and pretreatment monitoring, inspections, and surveillance procedures.

27.30 DAMAGE TO SEWERAGE SYSTEM

No person shall cause damage to the sewerage system. A contractor employed on a city contract or a plumber or other person engaged in work where there if a possibility of damage to the sewerage system, shall exercise particular care to prevent such damage and the entrance of foreign material into the system and shall perform all work in a workmanlike and neat manner. Upon a failure to comply, the city manager may cause the damage to be repaired, the material to be removed or the work to be redone at the expense of the person responsible; provided, that the city manager shall give a 5-day written notice to the person of the city's intention to proceed before acting, except in an emergency situation when he may proceed without such notice.

27.31 DISCHARGE OF SURFACE WATER

(a) No person shall connect a roof, ground water or surface water drain to the sanitary sewerage system. Water used for cooling and condenser purposes which does not exceed 25 parts per million BOD and other industrial or domestic water which does not contain discoloration, harmful chemicals, sediment, solids, noxious odors and does not exceed 25 parts per million BOD may be discharged directly into the storm sewer system, and if metered, shall be deducted from any service charge.

(b) Within 30 days after notice given by the city manager, the owner having a roof, ground water or surface water drain connected with the sewerage system shall disconnect the same. The opening in the sewerage system shall be closed in a neat and workmanlike manner.

(c) The owner of a building without a yard reasonably adequate to absorb surface water on the property shall equip the building with a proper metallic leader or leaders to conduct such water to the street or alley gutter and shall connect such leader or leaders to a storm sewer whenever there is such a sewer within 50 feet of such building.

(d) If a residential dwelling unit has a sump pit in the basement, a sump pumpshall be installed. The discharge from the sump pump shall be to the outside of the building. The discharge shall not be to the sanitary sewer.
Ord. No. 2946 10/17/88

27.32 ADDITIONAL REMEDIES

In addition to any other remedy provided by law, the city manager is authorized to do one or more of the following:

(a) To cause collection of a delinquent sewer charge by civil action in a court of competent jurisdiction;

(b) To cause the water supply and/or sewer service furnished to a property to be closed off until the expense of closing off the water and/or sewer service and restoring it is paid and compliance with this chapter is assured;

(c) To cause to be done whatever is required by this chapter and is not done by an owner and to cause collection of the cost thereof in the same manner use for collection of a sewer charge as provided for in this chapter.

(d) Slug or Accidental Discharges. The city manager may immediately suspend the sanitary sewerage service of a person using the service when such suspension is necessary, in the opinion of the city manager, in order to stop an actual or threatened discharge which presents or may present an imminent or substantial endangerment to the health or welfare of persons. The city manager may suspend the sanitary sewer service of a person using the service after written notice, in order to stop a discharge which could be a threat to the environment, the sanitary sewer system, the wastewater treatment plant, or would cause the city to violate any condition of its NPDES or State Disposal System Permit.

(e) Legal Action. If any person discharges sewage, industrial wastes, or other wastes into the city's sanitary sewerage system contrary to the provisions of this ordinance, Federal or State pretreatment requirements, or any order of the city, the city attorney may commence an action for appropriate legal and/or equitable relief, including injunctive relief.

(f) Annual Publication. A list of persons who were significantly violating applicable pretreatment requirements or national categorical pretreatment standards during the twelve (12) previous months, which resulted in the city manager exercising his emergency enforcement authority under this ordinance, may be annually published by the city in a local newspaper. The notification shall summarize any enforcement actions taken against the user during the same twelve months. For the purposes of this provision, significant violations would be those violations which remain uncorrected 45 days after notification of noncompliance, which are part of a pattern of noncompliance over a twelve month period, or which involve a failure to accurately report noncompliance.

27.33 NATIONAL CATEGORICAL PRETREATMENT STANDARDS

National Categorical Pretreatment Standards promulgated by the U.S. Environmental Protection Agency, incorporated herein by reference, shall be met by all persons who are subject to such standard, as they go into effect, unless the city manager has obtained approval to modify the standards from the Minnesota Pollution Control Agency. The city manager shall deny any new, changed or increased discharge which does not meet the requirements of any national categorical pretreatment standard. Schedules for installation of pretreatment treatment facilities, where required, will be submitted for approval by the city manager.

27.34 DILUTION

No person shall increase the use of process water or, in any way, attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained herein, contained in the National Categorical Pretreatment Standards, or contained in any State requirements.

27.35 INSPECTION AND SAMPLING

The city manager shall inspect the facilities of any person to ascertain whether the purpose of this ordinance is being met and all requirements are being complied with. An owner of premises where wastewater is created or discharged shall allow the city manager ready access at all reasonable times to all parts of the premises for the purposes of inspection, sampling, records examination or in the performance of any of their duties.

27.36 CONFIDENTIAL INFORMATION

Information and data on a person obtained from applications, permits, monitoring programs and inspections shall be available to the public or other government agencies without restriction unless the person specifically requests and is able to demonstrate to the satisfaction of the city manager that the release of such information would divulge information, processes or methods of production entitled to protection as trade secrets of the person. When requested by the person furnishing a report and until such time as the information is determined not to be confidential, the portions of a report which might disclose trade secrets or secret processes shall not be made available for inspection by the public but shall be made available upon written request to governmental agencies for uses related to this ordinance, the NPDES Permit, State Disposal System Permit and/or the pretreatment programs; provided, however, that such portions of a report shall be available for use by the State and any State agency in judicial review or enforcement proceedings involving the person furnishing the report. Wastewater constituents and characteristics will not be recognized as confidential information. Information accepted by the city manager as confidential shall not be transmitted to any governmental agency or to the general public by the city manger until and unless a ten-day notification is given to the person providing the information.

27.37 NOTIFICATION OF VIOLATION

Whenever the city manager finds that any person has violated or is violating any prohibition, limitation or requirements contained herein, the city manager may serve upon such person a written notice stating the nature of the violation. Within 30 days of the date of the notice, unless a shorter time frame is necessary due to the nature of the violation, a plan for the satisfactory correction thereof shall be submitted to the city by the user.

27.38 FALSIFYING INFORMATION

Any person who knowingly makes any false statements, representation or certification in any application, record, report, plan or other document filed or required to be maintained pursuant to this ordinance or Wastewater Discharge Permit, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under this ordinance, shall, upon conviction, be punished by a fine or by imprisonment or by both.

27.39 PENALTIES

Any user who has failed to comply with any provision of this chapter and the orders, rules, regulations and permits issued hereunder, shall be fined not less than One Hundred Dollars ($100.00) nor more than Five Thousand Dollars ($5,000.00) for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided herein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by an appropriate action against the person found to have violated this chapter or the orders, rules, regulations, and permits issued hereunder.

Ord. No. 3138 07/20/92
Ord. No. 3833 03/15/10

27.40 PORTABLE RESTROOM UNITS AND HAULED WASTEWATER

(a) License Required for Placement. No person, contractor or organization shall place a portable restroom (a unit that is temporary, mobile and above ground) on city-owned property or right-of-way, unless said person, contractor or organization has been granted a license to do so from the city.

(b) Application for License. An application for a license under this chapter shall be made to the city clerk on a form provided by the city. The application shall contain the full name of the applicant, the applicant's residential and business addresses and telephone numbers, the name and nature of the business for which the license is sought, and any additional information the city deems necessary. Upon receipt of the application, the city clerk shall forward the application to the Public Works Department for review and approval. If the application is found to be incomplete, the city clerk shall return the application to the applicant with notice of the information necessary to make the application complete.

(c) Approval or Denial. The City Council may either approve or deny the license required under this chapter. If the City Council approves the license, the applicant shall enter into a license agreement with the City which shall set forth the terms and conditions of the license including, but not limited to, required insurance coverage, indemnification provisions, and site approval. If the City Council denies the license, notice of the denial shall be given to the applicant by the city clerk.

(d) Fees. No license shall be issued under this chapter until the appropriate license fee shall be paid in full. The license fee shall be the amount duly established by ordinance of the city council from time to time. The license fee shall not be prorated for licenses issued for less than a full year.

(e) Term. All licenses issued under this chapter shall be valid until December 31 of the year of issue.

(f) Renewal. The renewal of a license issued under this chapter shall be handled in the same manner as the original application. The request for a renewal shall be made at least 30 days but not more than 60 days before the expiration of the current license. The issuance of a license under this chapter shall be considered a privilege and not an absolute right of the applicant and shall not entitle the holder to an automatic renewal of the license.

(g) Transferability. Every license issued under this chapter shall be valid only for the person, contractor or organization to whom the license was issued. No transfer of any license to another location or person shall be valid without the prior written approval of the City of Winona.

(h) Revocation or Suspension. Any license issued under this chapter may be revoked or suspended as provided in chapter 51 of this code.

(i) Payment of Real Estate Taxes, Assessments and Other Charges. All real estate taxes due and payable in the calendar year preceding the term of the license, and assessments payable therewith and applicable to the location of the applicant’s business to whom the license is sought, as well as all pending assessments for unpaid municipal charges, and all other unpaid municipal charges applicable to the location of the applicant’s business to whom the license is sought, shall be paid in full prior to issuance to the applicant of any license or renewal license pursuant to this chapter.

(j) Notice of Violation. No license pursuant to this chapter or a Permit to Discharge Hauled Wastewater shall be issued to a person, contractor or organization who has an outstanding and incomplete notice of violation issued by the city and the terms of which have not been released in writing by the city.

(k) Permit Required for Discharge. No person, contactor or organization shall discharge hauled wastewater obtained from a portable restroom unit or any other source into the city’s wastewater treatment system without first obtaining a

Permit to Discharge Hauled Wastewater from the Winona Wastewater Treatment Plant (WWTP). A license to place a portable restroom unit on city owned property or right-of-way as provided in this chapter does not constitute a permit to discharge into the city's wastewater treatment system, unless the license includes as an attachment the permit required hereby. An application for a Permit to Discharge Hauled Wastewater may be obtained from the city clerk.

(l) Basis of Denial. The following shall be grounds for denying the issuance or renewal of a license or permit required under this chapter, provided that, except as may otherwise be required by law, the existence of any particular ground for denial does not mean that the city must deny the license or permit:

(1) The applicant is under the age of 18 years.

(2) The applicant has been convicted of a crime within the past five years of any violation of a federal, state, or local law, ordinance, or other regulation relating to the purpose for which the license or permit is sought.

(3) The applicant has had a license or permit under this chapter revoked, or suspended for more than 30 days, within the preceding 12 months of the date of application.

(4) The applicant fails to provide any information required on the application or provides false or misleading information.

(5) The applicant is prohibited by federal, state, or other local law, ordinance, or other regulation from holding such a license or permit.

(6) The applicant fails to take corrective action as required by the city for the city to complete and release an outstanding notice of violation issued by the city to the applicant.

Ord. No. 3885 11/07/2011

Appendix I

Signed SIU Agreements

ACUITY BRANDS

d.b.a. WINONA LIGHTING STUDIOS

WASTEWATER DISCHARGE PERMIT

Permit Expiration: 2/15/2025

Acuity Brands acquired Winona Lighting Studios in 2010, and has since been using the facility to produce an assortment of lighting fixtures. This facility performs chemical etching on their products to get the desired metal finishes/appearances, through the use of acid/caustic dip baths, making them a categorical industrial user under 40 CFR 433 – Metal Finishing. Wastewater is pretreated by collecting the acid, caustic, and rinse baths from the chemical etching processes and combining them in large bins (that are pH monitored) to allow for neutralization of the chemicals before discharging to the sewer.

Amendment 8/10/2020

Page 6. SELF-MONITORING REQUIREMENTS

Acuity relocated both wet-jets (hydrocutting discharge) from the 6th Street location to their main plant (4th street). Sampling procedure for these will remain the same, sampling from the final compartment of the settling tank just prior to discharge. The location of premise permitted will now only include the 4th street location.

Amendment 1/11/2021

Page. 7 REPORTING REQUIREMENTS, A.

Removal of "or half hour" to reflect similar language regarding the method of obtaining a composite sample as outlined on Page 6.

WASTEWATER DISCHARGE PERMIT

SECTION 1. COMPANY INFORMATION

Acuity Brands d.b.a. Winona Lighting Studios
(Company Name)

Business Address:

Street: 3760 West 4th Street

City: Winona, MN Zip Code: 55987

Location of Premise Permitted:

Street: 3760 West 4th Street

City: Winona, MN Zip Code: 55987

The above named Industrial User is hereby authorized to discharge wastewater to the Winona, Minnesota, Wastewater Disposal System, subject to said Industrial User's compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date: **2/15/2020**

Brian Detzng 1-12-21

Director of Public Works Date

1-11-21

City Manager Date

SECTION 2. DISCHARGE LIMITATIONS

A. Discharge of surface waters:

1. No person shall connect a roof, ground water or surface drain to the sanitary sewer.

2. Within 30 days after notice given by the city manager, the owner having a roof, ground water or surface water drain connected with the sewerage system shall disconnect the same. The opening in the sewerage system shall be closed in a neat and workmanlike manner.

3. The owner of a building without a yard reasonably adequate to absorb surface water on the property shall equip the building with the proper metallic leader or gutter and shall connect such leader or leaders to a storm sewer whenever there is such a sewer within 50 feet of such building.

B. Prohibited Discharges. No person shall deposit or discharge any pollutant which would cause the city to violate its NPDES Permit, any pollutant in concentrations exceeding State or Federal limitations, or any of the following, whichever is more stringent:

1. A waste which will physically damage the sewerage system, sewerage treatment plant or facilities connected therewith, or interfere with the treatment process standards required by the Minnesota Pollution Control Agency.

2. Any wastewater having a temperature greater than 150 degrees F or causing, individually or in combination with other wastewater, the influent at the wastewater treatment plant to have a temperature exceeding 104 degrees F or 40 degrees C.

3. Water or waste containing more than 100 parts per million by weight of fat, oil or grease.

4. Pollutants which create a fire or explosion hazard in the Wastewater Disposal System, including, but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees F or 60 degrees C using the test methods specified in 40 CFR 261.21, July 24, 1990. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.

5. Garbage, either household or commercial, that has not been shredded, so that the garbage particles are smaller than 3/8 inch in their largest dimension. Adequate water flow volume to wash such garbage through the sewers shall be provided.

6. Ashes, hair, peelings, refuse, rags, sticks, cinders, earth, mortar or concrete, feathers, glass, metal, animal or poultry solids, plastics, or any solid or viscous matter capable of causing obstruction in the flow of a sanitary sewer, or interference with the proper operation of the sewerage system.

7. Water or waste containing an acid (or), toxic (or), radioactive or poisonous substance in sufficient quantity to injure or interfere with the treatment process or cause a hazard to humans, animals or aquatic life, in the receiving waters of the of the sewerage system.

8. Waste containing suspended solids of such character and quantity that special attention or expense is required to handle such materials through the sewerage system.

9. Noxious or malodorous gas or substances capable of creating a nuisance.

10. Any wastewater having a pH less than 5.0, or higher than 11.0, or having any corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sanitary sewerage system.

11. Roof, ground or surface water, non-contact cooling water or means of introducing such water into the sewerage system.

12. Any slug load, which shall mean any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge of such volume or strength as to cause inhibition or disruption in the sanitary sewerage system. In no case shall a slug load have a flow rate or contain concentrations or quantities of pollutants that exceed for any time period longer than fifteen minutes more than five times the average twenty-four hour concentrations, quantities, or flow of the user during normal operation.

13. Any wastewater having a BOD-5 greater than 210 mg/l or having a suspended solids concentration of greater than 180 mg/l. Sewage with greater concentrations may be discharged only through a special use permit. Charges will be levied for wastewater having a strength greater than 210 mg/L BOD-5 or 180 mg/L suspended solids.

14. Any wastewater having a concentration greater than:

Mercury	0.04	-
Cadmium	0.69	0.26
Chromium	2.77	1.71
Copper	3.38	2.07
Lead	0.69	0.43
Nickel	3.98	2.38
Zinc	2.61	1.48
Silver	0.43	0.24
Cyanide	1.20	0.65
TTO	2.13	-

*Acuity Brands is a Metal Finisher subject to the regulations in 40 CFR 433. The limits in the table above, with the exception of the mercury limit, are taken from 40 CFR 433.15. There is no mercury limit in 40 CFR 433 so Acuity must meet the local limit for that parameter.

15. Any wastewater having total toxic organics (TTO) exceeding 2.13 mg/l for any one day. TTO is defined in the Federal Register 40 CFR 433.11(e) of Vol. 48, No. 137/Friday July 15, 1983/Rules and Regulations as "the summation of all quantifiable values greater than 0.01 milligrams per liter in the above cited Federal Register."

16. Garbage, discarded material and grease from non-domestic sources which results from the handling, processing, storage, preparation, serving and consumption of food, when the effect of such disposal into public sewers is the avoidance of off-site solid waste disposal.

17. Waste antifreeze or coolant. This prohibition shall not apply to the small amount of antifreeze or coolant that may be in the water used to flush a heating/cooling system after the antifreeze or coolant has been drained down and captured.

C. **National Categorical Pretreatment Standards.** National categorical pretreatment standards promulgated by the U.S. Environmental Protection Agency shall be met by all Users which are subject to such standards, as they go into effect, unless the city manager has obtained approval to modify the standards from the Minnesota Pollution Control Agency. The city manager will deny any new, changed or increased discharge of wastewater which does not meet the requirements of any national categorical pretreatment standard.

SECTION 3. SELF-MONITORING REQUIREMENTS

SIGNIFICANT CATEGORICAL INDUSTRIAL USER

SELF MONITORING SCHEDULE

Sampling Point	Wastewater Description	Frequency	Type	Pollutants to be Analyzed
Pretreatment tank[1]	Conversion coating wastewater, Old Cleaning Area wastewater	1/Quarter	Grab	pH
Pretreatment tank	Conversion coating wastewater, Old Cleaning Area wastewater	1/Quarter	Composite*	Zinc, Copper, TSS
Pretreatment tank	Conversion coating wastewater, Old Cleaning Area wastewater	2/Year	Composite*	Cd, Cr, Pb, Ni, Ag
Pretreatment tank	Conversion coating wastewater, Old Cleaning Area wastewater	2/Year	Grab	Cyanide
Settling Tank[1]	Hydrocutting discharge	1/Quarter	Grab	pH
Settling Tank	Hydrocutting discharge	1/Quarter	Composite*	Zinc, Copper, TSS
Settling Tank	Hydrocutting discharge	2/Year	Composite*	Cd, Cr, Pb, Ni, Ag
Settling Tank	Hydrocutting discharge	2/Year	Grab	Cyanide

*A composite sample in this situation is defined as an hourly-Grab composite. Grab samples are pulled every hour during a normal work/production day and combined for a composite sample.

1. Grab samples for pH analysis are to be taken from the same wastewater sources as the composite samples that are being prepared. These samples will be analyzed within 15 minutes of sampling by Acuity's representative with a pH meter. This pH meter must be properly maintained (calibrated once a quarter, etc.) and a record (calibration log) of this shall be kept.

All sampling points are located at the 4th street address. Previously the hydrocutting discharge had been located at Acuity's 6th street location, but these were moved to the main plant (4th street) in 2020.

SECTION 4. REPORTING REQUIREMENTS

A. Quarterly Monitoring Reports

Any Industrial User subject to a categorical Pretreatment Standard, after the compliance date of such Pretreatment Standard, or, in the case of a New Source, after commencement of the discharge into the POTW, shall submit to the City quarterly, unless required more frequently by the Pretreatment Standard or the City, a report indicating the concentration of the pollutants in their effluent (specified in Section 3. Self-Monitoring Requirements) and the volume of their effluent for that quarter. These reports are due on or before the 20th day of the month following the end of each quarter (April, July, October, January). **An administrative charge of $50.00 will be assessed to the discharger for every monitoring report that is received after the due date or is submitted incomplete. This charge may be waived, at the discretion of the City, if the City determines that the report is either late or incomplete as a result of events or circumstances that are beyond the control of the discharger.**

These reports shall be based on sampling and analysis performed in the period covered by the report, and performed in accordance with the techniques outlined in Standard Methods. Representative samples may be taken every hour, properly refrigerated, preserved and composited in proportion to the wastewater flow or a continuous sample may be taken and mixed from which a representative 24 hour sample is taken.

B. Automatic Resampling

In the event that the permittee has a noncompliant analysis result as an outcome of either routine sampling by the permittee or compliance sampling done by the City, the permittee will be expected to follow the steps below:

1. Inform the Pretreatment Coordinator of the violation within 24 hours,

2. Repeat the sampling and pollutant analysis and submit the results of this second analysis using the Compliance Report Form within 30 days of becoming aware of the first violation.

C. Accidental Discharge

The permittee must notify the City immediately upon the occurrence of spills, including, but not limited to, accidental discharges, discharges of a non-routine, episodic nature, a non-customary batch discharge, slug loads or slug discharges, that might cause potential problems for the WWTP, or spills that might enter the public sewer. The notification must include location of discharge; date and time of discharge; type of waste and volume; and corrective actions taken. The permittee's notification of accidental releases in accordance with this section does not relieve it of other reporting requirements that arise under local, state, or federal laws.

Within 5 days following an accidental discharge, the permittee shall submit to the City a detailed written report. The report must specify:

1. Description and cause of the upset, slug load, or accidental discharge; the cause thereof; and the impact on the permittee's compliance status. The description should also include location of discharge and type, and volume of waste.

2. Duration of noncompliance, including exact dates and times of noncompliance and, if the noncompliance is continuing, the time by which compliance is reasonably expected to occur.

3. All steps taken or to be taken to reduce, eliminate, and/or prevent recurrence of such an upset, slug load, accidental discharge, or other conditions of noncompliance.

Provision for Waving the Requirement for Monitoring Certain Pollutants.

On 10/14/05 EPA passed amendments to the Pretreatment Rules that provide for, among other things, the waiving of monitoring requirements for certain pollutants under certain conditions. The rule states the following:

40 CFR 403.12(e)
(2) "The Control Authority may authorize the Industrial User subject to categorical Pretreatment Standards to forego sampling of a pollutant regulated by a categorical Pretreatment Standard if the Industrial User has demonstrated through sampling and other technical factors that the pollutant is neither present nor expected to be present in the Discharge, or is present only at background levels from intake water and without any increase in the pollutant due to activities of the Industrial User........."

The waiver is subject to a number of conditions that are not listed here. If this company wants to apply for such a waiver for certain pollutants, the City will fully inform the company what is required for such a waiver and make clear under what conditions the waiver will be approved.

SECTION 5. COMPLIANCE SCHEDULE

No compliance schedule is required at this time.

SECTION 6. SPECIAL CONDITIONS

None.

SECTION 7. DISCHARGE PERMIT STANDARD CONDITIONS

The following Standard Conditions apply to each Wastewater Discharge Permit issued by the City.

1. Where required, the Industrial User shall provide monitoring facilities, installed and maintained at all times at the User's expense, to allow inspection, sampling, and flow measurement at locations specified in Section III of this permit. All flow measurement equipment shall be calibrated by an independent technician at least once a year or as often as is necessary to maintain accurate flow measurement. There shall be ample room in and near such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the City at all times upon presentation of suitable identification from 8:00 AM to 5:00 PM, five days per week. Authorized representatives of the City shall, under exceptional circumstances, have access upon presentation of suitable identification from 8:00 AM to 5:00 PM, seven days per week. Where required by Federal or State Regulations, such monitoring facilities shall be provided at the end of a process or unit production from which regulated toxic pollutants are discharged.

2. The User shall retain wastewater monitoring records for a period of five (5) years. During this period said records shall be available for inspection and duplication by authorized representatives of the City.

3. The Industrial User shall notify the City prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being discharged from the User's processes.

4. The User shall notify the City immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the spill reporting requirements of the City Code.

5. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the City, is not in conformance with Federal, State, or local laws, ordinances or regulations.

6. The discharge permit issued to the Industrial User by the City may be revoked when, after inspection, monitoring, or analysis, it has been determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations.

7. This permit shall be revoked due to falsification or intentional misrepresentation of data or statements pertaining to the User on the Wastewater Discharge Permit Application or any other required reporting form.

8. The terms and conditions of the permit are subject to modification by the City during the term of the permit as limitations or requirements are modified or for just cause. The User shall be informed of any proposed changes in this permit at least thirty (30) days prior to the effective date of change. Changes or additions to the permit shall include a time schedule for compliance.

9. This permit is issued to the named User for the specific operation or operations permitted and is not transferable without the approval of the City.

10. No later than fourteen (14) days following each date in the compliance schedule and the final date from compliance given by the User in the Wastewater Discharge Permit Application and included as part of this permit, the User shall submit a progress report to the City. This report must indicate whether or not the increment of progress was met on the date on which the User expects to comply with the increment of progress, the reason for delay, and what steps are being taken by the User to return to the schedule established. In no event shall more than nine (9) months elapse between such progress reports to the City.

11. The compliance dates for the increments of progress given in the compliance schedule will be revised only at the discretion of the City. Failure to meet the compliance dates without just reason for delay is in violation of the conditions of this permit.

12. According to 40 CFR 403.8(f)(2)(vi), the City must evaluate, at least once every permit cycle, whether each permitted User needs a Slug Control Plan. If the City determines that such a plan is required, the submitted plan shall meet the requirements of the above mentioned section.

13. If any person discharges sewage, industrial wastes, or other wastes into the City's sanitary sewage system contrary to the provisions of the Winona City Code Chapter 27, Federal or State Pretreatment Regulations, or any order of the City, the City Attorney may commence an action for appropriate legal and/or equitable relief, including injunctive relief.

14. Any User who has failed to comply with any provision of the Winona City Code Chapter 27, and the orders, rules, regulations, and permits issued thereunder, shall be fined not less than One Hundred Dollars ($100.00) nor more than Five Thousand Dollars ($5000.00) for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided therein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by an appropriate action against the person found to have violated Chapter 27 or the orders, rules, regulations, and permits issued thereunder.

15. The duration of this permit shall be for five (5) years unless the City, under special conditions, chooses to establish a shorter duration.

ANOVA

WASTEWATER DISCHARGE PERMIT

Permit No.: MN 0030147-18

GENERAL WASTEWATER DISCHARGE PERMIT

SECTION I

ANOVA

(Company Name)

Business Address:

Street: 1101 East 8th Street

City: Winona, MN Zip Code: 55987

Location of Premise Permitted:

Street: 1101 East 8th Street

City: Winona, MN Zip Code: 55987

The above named Industrial User is hereby authorized to discharge wastewater to the Winona, Minnesota, Wastewater Disposal System, subject to said Industrial User's compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date: **10/24/17**

Director of Public Works 7-31-17 Dated

City Manager 7-31-17 Dated

SECTION II
DISCHARGE LIMITATIONS

A. **Discharge of surface waters:**

1. No person shall connect a roof, ground water or surface drain to the sanitary sewer.

2. Within 30 days after notice given by the city manager, the owner having a roof, ground water or surface water drain connected with the sewerage system shall disconnect the same. The opening in the sewerage system shall be closed in a neat and workmanlike manner.

3. The owner of a building without a yard reasonably adequate to absorb surface water on the property shall equip the building with the proper metallic leader or gutter and shall connect such leader or leaders to a storm sewer whenever there is such a sewer within 50 feet of such building.

B. **Prohibited Discharges.** No person shall deposit or discharge any pollutant which would cause the city to violate its NPDES Permit, any pollutant in concentrations exceeding State or Federal limitations, or any of the following, whichever is more stringent:

1. A waste that will physically damage the sewerage system, sewerage treatment plant or facilities connected therewith, or interfere with the treatment process standards required by the Minnesota Pollution Control Agency.

2. Any wastewater having a temperature greater than 150 degrees F or causing, individually or in combination with other wastewater, the influent at the wastewater treatment plant to have a temperature exceeding 104 degrees F or 40 degrees C.

3. Water or waste containing more than 100 parts per million by weight of fat, oil or grease.

4. Pollutants which create a fire or explosion hazard in the Wastewater Disposal System, including, but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees F or 60 degrees C using the test methods specified in 40 CFR 261.21, July 24, 1990. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.

5. Garbage, either household or commercial, that has not been shredded, so that the garbage particles are smaller than 3/8 inch in their largest dimension. Adequate water flow volume to wash such garbage through the sewers shall be provided.

6. Ashes, hair, peelings, refuse, rags, sticks, cinders, earth, mortar or concrete, feathers, glass, metal, animal or poultry solids, plastics, or any solid or viscous matter capable

of causing obstruction in the flow of a sanitary sewer, or interference with the proper operation of the sewerage system.

7. Water or waste containing an acid (or), toxic (or), radioactive or poisonous substance in sufficient quantity to injure or interfere with the treatment process or cause a hazard to humans, animals or aquatic life, in the receiving waters of the of the sewerage system.

8. Waste containing suspended solids of such character and quantity that special attention or expense is required to handle such materials through the sewerage system.

9. Noxious or malodorous gas or substances capable of creating a nuisance.

10. Any wastewater having a pH less than 5.0, or higher than 11.0, or having any corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sanitary sewerage system.

11. Roof, ground or surface water, non-contact cooling water or means of introducing such water into the sewerage system.

12. Any slug load, which shall mean any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge of such volume or strength as to cause inhibition or disruption in the sanitary sewerage system. In no case shall a slug load have a flow rate or contain concentrations or quantities of pollutants that exceed for any time period longer than fifteen minutes more than five times the average twenty-four hour concentrations, quantities, or flow of the user during normal operation.

13. Any wastewater having a BOD-5 greater than 210 mg/l or having a suspended solids concentration of greater than 180 mg/l.

14. Any wastewater having a concentration greater than:

Pollutant	Daily Limit	Monthly average limit
Zinc (total)	2.61 mg/l	1.48 mg/l
Chromium (total)	2.77 mg/l	1.71 mg/l
Cadmium (total)	0.69 mg/l	0.26 mg/l
Copper (total)	3.38 mg/l	2.07 mg/l
Lead (total)	0.69 mg/l	0.43 mg/l
Nickel (total)	3.98 mg/l	2.38 mg/l
Cyanide (total)	1.20 mg/l	0.65 mg/l
Mercury (total)	0.04 mg/l	No Mo. Ave. limit
Silver (total)	10.0 mg/l	No Mo. Ave. limit
Total Toxic Organics	2.13 mg/l	No Mo. Ave. limit

15. Any wastewater having total toxic organics (TTO) exceeding 2.13 mg/l for any one day. TTO is defined in the Federal Register 40 CFR 433.11(e) of Vol. 48, No. 137/Friday July 15, 1983/Rules and Regulations as "the summation of all quantifiable values greater than 0.01 milligrams per liter in the above cited Federal Register."

16. Garbage, discarded material and grease from non-domestic sources which results from the handling, processing, storage, preparation, serving and consumption of food, when the effect of such disposal into public sewers is the avoidance of off-site solid waste disposal.

17. Waste antifreeze or coolant. This prohibition shall not apply to the small amount of antifreeze or coolant that may be in the water used to flush a heating/cooling system after the antifreeze or coolant has been drained down and captured.

C. **National Categorical Pretreatment Standards.** National categorical pretreatment standards promulgated by the U.S. Environmental Protection Agency shall be met by all Users which are subject to such standards, as they go into effect, unless the city manager has obtained approval to modify the standards from the Minnesota Pollution Control Agency. The city manager will deny any new, changed or increased discharge of wastewater which does not meet the requirements of any national categorical pretreatment standard.

SECTION III

SELF MONITORING REQUIREMENTS

SIGNIFICANT CATEGORICAL INDUSTRIAL USER

Any Industrial User subject to a categorical Pretreatment Standard, after the compliance date of such Pretreatment Standard, or, in the case of a New Source, after commencement of the discharge into the POTW, shall submit to the City quarterly, unless required more frequently by the Pretreatment Standard or the City, a report indicating the concentration of the pollutants specified below in their effluent and the volume of their effluent for the quarter. These reports are due on or before the 20th day of the month following the end of each quarter (April, July, October, and January). **An administrative charge of $50.00 will be assessed to the discharger for every monitoring report that is received after the due date or is submitted incomplete. This charge may be waived, at the discretion of the City, if the City determines that the report is either late or incomplete as a result of events or circumstances that are beyond the control of the discharger.** These reports shall be based on sampling and analysis performed in the period covered by the report, and performed in accordance with the techniques outlined in Standard Methods. Representative samples may be taken every hour or half hour, properly refrigerated, preserved, and composited in proportion to the wastewater flow or a continuous sample may be taken and mixed from which a representative 24-hr sample is taken.

SELF MONITORING SCHEDULE

SAMPLING POINT	FREQUENCY	POLLUTANTS TO BE ANALYZED
Conversion Coating Bath	Prior to each discharge	Total Suspended Solids(TSS) Zinc, Lead, and pH.
Conversion Coating Rinse	Quarterly	TSS, Zinc, Lead, pH, and *Total Toxic Organics.
Floor Washing Tank	Annually	TSS, Zinc, Lead, and pH.
Plasma Table Tank	Annually	TSS, Zinc, Lead, and pH.
Conversion Coating Rinse	Biannually	Cd, Cr, Cu, Ni, Ag, CN

*In lieu of requiring monitoring for Total Toxic Organics (TTO), the City of Winona will allow ANOVA to make the following certification statement after having submitted a TTO management plan: "Based on my inquiry of the person or persons directly responsible for managing compliance with the permit limitation for TTO, I certify that, to the best of my knowledge and belief, no dumping of concentrated toxic organics into the wastewaters has occurred since filing of the last discharge monitoring report. I further certify that this facility is implementing the toxic organics management plan submitted to the City of Winona."

Provision for Waving the Requirement for Monitoring Certain Pollutants.

On 10/14/05 EPA passed amendments to the Pretreatment Rules that provide for, among other things, the waiving of monitoring requirements for certain pollutants under certain conditions. The rule states the following:

40 CFR 403.12(e)
(2) "The Control Authority may authorize the Industrial User subject to categorical Pretreatment Standards to forego sampling of a pollutant regulated by a categorical Pretreatment Standard if the Industrial User has demonstrated through sampling and other technical factors that the pollutant is neither present nor expected to be present in the Discharge, or is present only at background levels from intake water and without any increase in the pollutant due to activities of the Industrial User........."

The waiver is subject to a number of conditions that are not listed here. If this company wants to apply for such a waiver for certain pollutants, the City will fully inform the company what is required for such a waiver and make clear under what conditions the waiver will be approved.

SECTION IV

COMPLIANCE SCHEDULE

None required at this time.

SECTION V

SPECIAL CONDITIONS

Because there is elevated zinc in the conversion coating bath as a result of running galvanized material though it, it will be necessary to sample each bath prior to discharge to determine if the bath complies with applicable limits. If the concentration of zinc or any other pollutant in the bath water exceeds an applicable limit it cannot be discharged without being pretreated. If ANOVA decides to pretreat it will have to resample the pretreated wastewater prior to discharge in order to insure that the pretreated wastewater complies with applicable limits. ANOVA will only have to test the pretreated wastewater for those pollutants that exceeded the limits prior to pretreatment.

These special conditions are subject to review and may be amended if the situation at ANOVA changes appreciably.

SECTION VI

DISCHARGE PERMIT STANDARD CONDITIONS

The following Standard Conditions apply to each Wastewater Discharge Permit issued by the City.

1. Where required, the Industrial User shall provide monitoring facilities, installed and maintained at all times at the User's expense, to allow inspection, sampling, and flow measurement at locations specified in Section III of this permit. All flow measurement equipment shall be calibrated by an independent technician at least once a year or as often as is necessary to maintain accurate flow measurement. There shall be ample room in and near such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the City at all times upon presentation of suitable identification from 8:00 AM to 5:00 PM, five days per week. Authorized representatives of the City shall, under exceptional circumstances, have access upon presentation of suitable identification from 8:00 AM to 5:00 PM, seven days per week. Where required by Federal or State Regulations, such monitoring facilities shall be provided at the end of a process or unit production from which regulated toxic pollutants are discharged.

2. The User shall retain wastewater monitoring records for a period of five (5) years. During this period said records shall be available for inspection and duplication by authorized representatives of the City.

3. The Industrial User shall notify the City prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being discharged from the User's processes.

4. The User shall notify the City immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the spill reporting requirements of the City Code.

5. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the City, is not in conformance with Federal, State, or local laws, ordinances or regulations.

6. The discharge permit issued to the Industrial User by the City may be revoked when, after inspection, monitoring, or analysis, it has been determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations.

7. This permit shall be revoked due to falsification or intentional misrepresentation of data or statements pertaining to the User on the Wastewater Discharge Permit Application or any other required reporting form.

8. The terms and conditions of the permit are subject to modification by the City during the term of the permit as limitations or requirements are modified or for just cause. The User shall be informed of any proposed changes in this permit at least thirty (30) days prior to the effective date of change. Changes or additions to the permit shall include a time schedule for compliance.

9. This permit is issued to the named User for the specific operation or operations permitted and is not transferable without the approval of the City.

10. No later than fourteen (14) days following each date in the compliance schedule and the final date from compliance given by the User in the Wastewater Discharge Permit Application and included as part of this permit, the User shall submit a progress report to the City. This report must indicate whether or not the increment of progress was met on the date on which the User expects to comply with the increment of progress, the reason for delay, and what steps are being taken by the User to return to the schedule established. In no event shall more than nine (9) months elapse between such progress reports to the City.

11. The compliance dates for the increments of progress given in the compliance schedule will be revised only at the discretion of the City. Failure to meet the compliance dates without just reason for delay is in violation of the conditions of this permit.

12. According to 40 CFR 403.8(f)(2)(vi), the City must evaluate, at least once every permit cycle, whether each permitted User needs a Slug Control Plan. If the City determines that such a plan is required, the submitted plan shall meet the requirements of the above mentioned section.

13. If any person discharges sewage, industrial wastes, or other wastes into the City's sanitary sewage system contrary to the provisions of the Winona City Code Chapter 27, Federal or State Pretreatment Regulations, or any order of the City, the City Attorney may commence an action for appropriate legal and/or equitable relief, including injunctive relief.

14. Any User who has failed to comply with any provision of the Winona City Code Chapter 27, and the orders, rules, regulations, and <u>permits</u> issued thereunder, shall be fined not less than One Hundred Dollars ($100.00) nor more than Five Thousand Dollars ($5000.00) for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided therein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by an appropriate action against the person found to have violated Chapter 27 or the orders, rules, regulations, and <u>permits</u> issued thereunder.

15. The duration of this permit shall be for five (5) years unless the City, under special conditions, chooses to establish a shorter duration.

ARTCO

WASTEWATER DISCHARGE PERMIT

Permit Expiration: 7/1/2024

ARTCO (American River Transportation Company) is a river transportation company that operates on the Mississippi River, hauling barges filled with products such as fertilizer, salt, coal, and more. ARTCO is permitted for wastewater discharge by the City of Winona, allowing them to discharge the wastewater associated with cleaning their barges. ARTCO has a settling tank upstream of their connection to the city's sewer, and representative samples of their wastewater are taken just after this settling tank. Based off of their operations and the wastewater they produce, they are a Significant Noncategorical Industrial user, having high strength wastewater (COD, TSS, etc.). The City has ARTCO on a surcharge program to collect cost for treatment of this high strength wastewater.

Amendments (2/28/2020):

1. Added aragonite (calcium carbonate) to the list of allowable barges to be cleaned. (Section 6.5., page 10)

GENERAL WASTEWATER DISCHARGE PERMIT

SECTION 1. COMPANY INFORMATION

ARTCO
(Company Name)

Business Address:

Street: 1155 Riverview Drive

City: Winona, MN Zip Code: 55987

Location of Premise Permitted:

Street: 1155 Riverview Drive

City: Winona, MN Zip Code: 55987

The above named Industrial User is hereby authorized to discharge wastewater to the Winona, Minnesota, Wastewater Disposal System, subject to said Industrial User's compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date: 2/28/2020

Director of Public Works 2/28/2020
Dated

City Manager 2/28/2020
Dated

SECTION 2. DISCHARGE LIMITATIONS

A. Discharge of surface waters:

1. No person shall connect a roof, ground water or surface drain to the sanitary sewer.

2. Within 30 days after notice given by the city manager, the owner having a roof, ground water or surface water drain connected with the sewerage system shall disconnect the same. The opening in the sewerage system shall be closed in a neat and workmanlike manner.

3. The owner of a building without a yard reasonably adequate to absorb surface water on the property shall equip the building with the proper metallic leader or gutter and shall connect such leader or leaders to a storm sewer whenever there is such a sewer within 50 feet of such building.

B. Prohibited Discharges. No person shall deposit or discharge any pollutant which would cause the city to violate its NPDES Permit, any pollutant in concentrations exceeding State or Federal limitations, or any of the following, whichever is more stringent:

1. A waste which will physically damage the sewerage system, sewerage treatment plant or facilities connected therewith, or interfere with the treatment process standards required by the Minnesota Pollution Control Agency.

2. Any wastewater having a temperature greater than 150 degrees F or causing, individually or in combination with other wastewater, the influent at the wastewater treatment plant to have a temperature exceeding 104 degrees F or 40 degrees C.

3. Water or waste containing more than 100 parts per million by weight of fat, oil or grease.

4. Pollutants which create a fire or explosion hazard in the Wastewater Disposal System, including, but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees F or 60 degrees C using the test methods specified in 40 CFR 261.21, July 24, 1990. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.

5. Garbage, either household or commercial, that has not been shredded, so that the garbage particles are smaller than 3/8 inch in their largest dimension. Adequate water flow volume to wash such garbage through the sewers shall be provided.

6. Ashes, hair, peelings, refuse, rags, sticks, cinders, earth, mortar or concrete, feathers, glass, metal, animal or poultry solids, plastics, or any solid or viscous matter capable of causing obstruction in the flow of a sanitary sewer, or interference with the proper operation of the sewerage system.

7. Water or waste containing an acid (or), toxic (or), radioactive or poisonous substance in sufficient quantity to injure or interfere with the treatment process or cause a hazard to humans, animals or aquatic life, in the receiving waters of the of the sewerage system.

8. Waste containing suspended solids of such character and quantity that special attention or expense is required to handle such materials through the sewerage system.

9. Noxious or malodorous gas or substances capable of creating a nuisance.

10. Any wastewater having a pH less than 5.0, or higher than 11.0, or having any corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sanitary sewerage system.

11. Roof, ground or surface water, non-contact cooling water or means of introducing such water into the sewerage system.

12. Any slug load, which shall mean any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge of such volume or strength as to cause inhibition or disruption in the sanitary sewerage system. In no case shall a slug load have a flow rate or contain concentrations or quantities of pollutants that exceed for any time period longer than fifteen minutes more than five times the average twenty-four hour concentrations, quantities, or flow of the user during normal operation.

13. Any wastewater having a BOD-5 greater than 210 mg/L or having a suspended solids concentration of greater than 180 mg/L. Sewage with greater concentrations may be discharged only through a special use permit. Charges will be levied for wastewater having a strength greater than 210 mg/L BOD-5 or 180 mg/L suspended solids.

14. Any wastewater having a concentration greater than:

Zinc	6.0 mg/L
Chromium	8.0 mg/L
Cadmium	2.0 mg/L
Copper	3.5 mg/L
Lead	1.0 mg/L
Nickel	6.0 mg/L
Cyanide	1.8 mg/L
Mercury	0.04 mg/L
Silver	10.0 mg/L

15. Any wastewater having total toxic organics (TTO) exceeding 2.13 mg/L for any one day. TTO is defined in the Federal Register 40 CFR 433.11(e) of Vol. 48, No. 137/Friday July 15, 1983/Rules and Regulations as "the summation of all quantifiable values greater than 0.01 milligrams per liter in the above cited Federal Register."

16. Garbage, discarded material and grease from non-domestic sources which results from the handling, processing, storage, preparation, serving and consumption of food, when the effect of such disposal into public sewers is the avoidance of off-site solid waste disposal.

17. Waste antifreeze or coolant. This prohibition shall not apply to the small amount of antifreeze or coolant that may be in the water used to flush a heating/cooling system after the antifreeze or coolant has been drained down and captured.

C. **National Categorical Pretreatment Standards.** National categorical pretreatment standards promulgated by the U.S. Environmental Protection Agency shall be met by all Users which are subject to such standards, as they go into effect, unless the city manager has obtained approval to modify the standards from the Minnesota Pollution Control Agency. The city manager will deny any new, changed or increased discharge of wastewater which does not meet the requirements of any national categorical pretreatment standard.

SECTION 3. SELF-MONITORING REQUIREMENTS

SIGNIFICANT NONCATEGORICAL INDUSTRIAL USER

SELF MONITORING SCHEDULE

Sampling Point	Wastewater Description	Frequency	Type	Pollutants to be Analyzed
Post-settling tank[1]	Barge wash water: Grain, salt, coal, or fertilizer Barge	1/Month	Grab	pH
Post-settling tank[2]	Barge wash water: Grain, salt, coal, or fertilizer Barge	1/Month	Composite*	COD, TSS, TKN, Ammonia, Total Phosphorus
Post-settling tank[3]	Barge wash water: Fertilizer Barge	1/Month	Composite*	Total Phosphorus

*A composite sample in this situation is defined as a 6-Grab composite. Depending on the volume of wastewater being discharged, it may be determined that more grabs are necessary.

1. Grab samples for pH analysis are to be taken from the same barge wash wastewater as the composite samples that are being prepared. These samples will be analyzed within 15 minutes of sampling by the City's Pretreatment Coordinator on-site with a pH meter. ARTCO must coordinate with the City to determine a time that works for both parties.
2. Wastewater sample can be from any of the barges listed in the Wastewater Description. As mentioned above, a pH sample (grab) must be taken from this same barge wash wastewater.
3. Wastewater sample must be from a Fertilizer barge. In the event that no fertilizer barges are washed in a given month, this sample and its respective pH sample are no longer required.

SECTION 4. REPORTING REQUIREMENTS

A. Quarterly Monitoring Reports

Significant Noncategorical Industrial Users shall submit to the City quarterly, unless the City specifies a different frequency, a report indicating the concentration of the pollutants in their effluent (specified in Section 3. Self-Monitoring Requirements) and the volume of their effluent for that quarter. These reports are due on or before the 20th day of the month following the end of each quarter (April, July, October, January). **An administrative charge of $50.00 will be assessed to the discharger for every monitoring report that is received after the due date or is submitted incomplete. This charge may be waived, at the discretion of the City, if the City determines that the report is either late or incomplete as a result of events or circumstances that are beyond the control of the discharger.**

These reports shall be based on sampling and analysis performed in the period covered by the report, and performed in accordance with the techniques outlined in Standard Methods. Representative samples may be taken every hour or half hour, properly refrigerated, preserved and composited in proportion to the wastewater flow or a continuous sample may be taken and mixed from which a representative 24 hour sample is taken.

B. Automatic Resampling

In the event that the permittee has a noncompliant analysis result as an outcome of either routine sampling by the permittee or compliance sampling done by the City, the permittee will be expected to follow the steps below:

1. Inform the Pretreatment Coordinator of the violation within 24 hours,

2. Repeat the sampling and pollutant analysis and submit the results of this second analysis using the Compliance Report Form within 30 days of becoming aware of the first violation.

C. Accidental Discharge

The permittee must notify the City immediately upon the occurrence of spills, including, but not limited to, accidental discharges, discharges of a non-routine, episodic nature, a non-customary batch discharge, slug loads or slug discharges, that might cause potential problems for the WWTP, or spills that might enter the public sewer. The notification must include location of discharge; date and time of discharge; type of waste and volume; and corrective actions taken. The permittee's notification of accidental releases in accordance with this section does not relieve it of other reporting requirements that arise under local, state, or federal laws.

Within 5 days following an accidental discharge, the permittee shall submit to the City a detailed written report. The report must specify:

1. Description and cause of the upset, slug load, or accidental discharge; the cause thereof; and the impact on the permittee's compliance status. The description should also include location of discharge and type, and volume of waste.

2. Duration of noncompliance, including exact dates and times of noncompliance and, if the noncompliance is continuing, the time by which compliance is reasonably expected to occur.

3. All steps taken or to be taken to reduce, eliminate, and/or prevent recurrence of such an upset, slug load, accidental discharge, or other conditions of noncompliance.

SECTION 5. COMPLIANCE SCHEDULE

No Compliance Schedule required at this time.

SECTION 6. SPECIAL CONDITIONS

As part of the terms of this permit ARTCO Winona will do the following:

1. They will discharge the barge washing wastewater through a sewer line connected to the manhole north of Riverview Drive that is near their docking area. The discharge line shall be of standard design and construction.

2. They will meter the barge washing wastewater with a metering device that will accurately measure the volume of the wastewater discharge in this application.

3. They will pretreat the barge washing wastewater by passing it through a settling chamber prior to discharge. The settling chamber will be of adequate size and design to provide adequate settling of suspended solids in the wastewater. The sludge from the settling chamber shall be disposed of in some manner other than discharge to the sanitary sewer.

4. They will pay a TSS surcharge for any wastewater that exceeds 180 mg/L and a COD surcharge for any wastewater that exceeds 210 mg/L. The surcharge shall be calculated as follows: (Conc. of pollutant over 180 or 210 mg/L) X (Mass of discharge) X (Surcharge rate) = Surcharge.

5. ARTCO will be discharging wastewater from the washing of barges that have contained dry fertilizers, road salts, grains, coal, scrap iron, limestone, magnesium oxide, and Aragonite (calcium carbonate). Before discharging wastewater generated from the cleaning of barges that have contained any other materials they will contact the City of Winona to obtain prior approval.

6. In the quarterly monitoring reports, ARTCO shall provide the following information for any sample that came from the washing of a fertilizer barge:
   a. Date sampled.
   b. Barge owner with phone number.
   c. Barge number.
   d. If available, report the name and phone number of the company that last unloaded the barge.
   e. If available, identification of the type of fertilizer, with phosphorus content, that was in the barge.
   f. Concentration of total phosphorus in the sample.
   g. Volume of wastewater discharged from washing that particular barge.

7. ARTCO uses a flammable liquid separator to treat bilge water prior to discharge to our system. The separator is of adequate design for that purpose. That separator shall be pumped at intervals that prevent pass through of oily material to our collection system.

SECTION 7. DISCHARGE PERMIT STANDARD CONDITIONS

The following Standard Conditions apply to each Wastewater Discharge Permit issued by the City.

1. Where required, the Industrial User shall provide monitoring facilities, installed and maintained at all times at the User's expense, to allow inspection, sampling, and flow measurement at locations specified in Section III of this permit. All flow measurement equipment shall be calibrated by an independent technician at least once a year or as often as is necessary to maintain accurate flow measurement. There shall be ample room in and near such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the City at all times upon presentation of suitable identification from 8:00 AM to 5:00 PM, five days per week. Authorized representatives of the City shall, under exceptional circumstances, have access upon presentation of suitable identification from 8:00 AM to 5:00 PM, seven days per week. Where required by Federal or State Regulations, such monitoring facilities shall be provided at the end of a process or unit production from which regulated toxic pollutants are discharged.

2. The User shall retain wastewater monitoring records for a period of five (5) years. During this period said records shall be available for inspection and duplication by authorized representatives of the City.

3. The Industrial User shall notify the City prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being discharged from the User's processes.

4. The User shall notify the City immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the spill reporting requirements of the City Code.

5. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the City, is not in conformance with Federal, State, or local laws, ordinances or regulations.

6. The discharge permit issued to the Industrial User by the City may be revoked when, after inspection, monitoring, or analysis, it has been determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations.

7. This permit shall be revoked due to falsification or intentional misrepresentation of data or statements pertaining to the User on the Wastewater Discharge Permit Application or any other required reporting form.

8. The terms and conditions of the permit are subject to modification by the City during the term of the permit as limitations or requirements are modified or for just cause. The User shall be informed of any proposed changes in this permit at least thirty (30) days prior to the effective date of change. Changes or additions to the permit shall include a time schedule for compliance.

9. This permit is issued to the named User for the specific operation or operations permitted and is not transferable without the approval of the City.

10. No later than fourteen (14) days following each date in the compliance schedule and the final date from compliance given by the User in the Wastewater Discharge Permit Application and included as part of this permit, the User shall submit a progress report to the City. This report must indicate whether or not the increment of progress was met on the date on which the User expects to comply with the increment of progress, the reason for delay, and what steps are being taken by the User to return to the schedule established. In no event shall more than nine (9) months elapse between such progress reports to the City.

11. The compliance dates for the increments of progress given in the compliance schedule will be revised only at the discretion of the City. Failure to meet the compliance dates without just reason for delay is in violation of the conditions of this permit.

12. According to 40 CFR 403.8(f)(2)(v), the City must evaluate, at least once every two years, whether each permitted User needs a Slug Control Plan. If the City determines that such a plan is required, the submitted plan shall meet the requirements of the above mentioned section.

13. If any person discharges sewage, industrial wastes, or other wastes into the City's sanitary sewage system contrary to the provisions of the Winona City Code Chapter 27, Federal or State Pretreatment Regulations, or any order of the City, the City Attorney may commence an action for appropriate legal and/or equitable relief, including injunctive relief.

14. Any User who has failed to comply with any provision of the Winona City Code Chapter 27, and the orders, rules, regulations, and permits issued thereunder, shall be fined not less than One Hundred Dollars ($100.00) nor more than Five Thousand Dollars ($5000.00) for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided therein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by an appropriate action against the person found to have violated Chapter 27 or the orders, rules, regulations, and permits issued thereunder.

15. The duration of this permit shall be for five (5) years unless the City, under special conditions, chooses to establish a shorter duration.

BAY STATE MILLING

WASTEWATER DISCHARGE PERMIT

Permit Expiration: 9/1/2024

Bay State Milling is a grain milling company, with flour being the primary product at the Winona facility. Bay State Milling is permitted for wastewater discharge by the City of Winona, allowing them to discharge the wastewater associated with cleaning their rail cars that had contained flour. Prior to washing these rail cars, Bay State employees dry sweep the cars to remove a majority of the remaining flour to reduce the organic matter that will be seen in their wastewater.

Due to increased volumes of flour entering the wastewater treatment plant from 2007-2009 and its ability to upset the digesters on-site, Bay State Milling was given a wastewater permit and labeled a Significant Non-Categorical Industrial User. The City has Bay State Milling on a surcharge program to collect cost for treatment of their rail car wastewater.

GENERAL WASTEWATER DISCHARGE PERMIT

SECTION 1. COMPANY INFORMATION

Bay State Milling
(Company Name)

Business Address:

Street: 55 Franklin Street

City: Winona, MN Zip Code: 55987

Location of Premise Permitted:

Street: 55 Franklin Street

City: Winona, MN Zip Code: 55987

The above named Industrial User is hereby authorized to discharge wastewater to the Winona, Minnesota, Wastewater Disposal System, subject to said Industrial User's compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date: 9/1/19

Director of Public Works 8/1/2019
Dated

City Manager 8-1-19
Dated

SECTION 2. DISCHARGE LIMITATIONS

A. **Discharge of surface waters:**

1. No person shall connect a roof, ground water or surface drain to the sanitary sewer.

2. Within 30 days after notice given by the city manager, the owner having a roof, ground water or surface water drain connected with the sewerage system shall disconnect the same. The opening in the sewerage system shall be closed in a neat and workmanlike manner.

3. The owner of a building without a yard reasonably adequate to absorb surface water on the property shall equip the building with the proper metallic leader or gutter and shall connect such leader or leaders to a storm sewer whenever there is such a sewer within 50 feet of such building.

B. **Prohibited Discharges.** No person shall deposit or discharge any pollutant which would cause the city to violate its NPDES Permit, any pollutant in concentrations exceeding State or Federal limitations, or any of the following, whichever is more stringent:

1. A waste which will physically damage the sewerage system, sewerage treatment plant or facilities connected therewith, or interfere with the treatment process standards required by the Minnesota Pollution Control Agency.

2. Any wastewater having a temperature greater than 150 degrees F or causing, individually or in combination with other wastewater, the influent at the wastewater treatment plant to have a temperature exceeding 104 degrees F or 40 degrees C.

3. Water or waste containing more than 100 parts per million by weight of fat, oil or grease.

4. Pollutants which create a fire or explosion hazard in the Wastewater Disposal System, including, but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees F or 60 degrees C using the test methods specified in 40 CFR 261.21, July 24, 1990. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.

5. Garbage, either household or commercial, that has not been shredded, so that the garbage particles are smaller than 3/8 inch in their largest dimension. Adequate water flow volume to wash such garbage through the sewers shall be provided.

6. Ashes, hair, peelings, refuse, rags, sticks, cinders, earth, mortar or concrete, feathers, glass, metal, animal or poultry solids, plastics, or any solid or viscous matter capable of causing obstruction in the flow of a sanitary sewer, or interference with the proper operation of the sewerage system.

7. Water or waste containing an acid (or), toxic (or), radioactive or poisonous substance in sufficient quantity to injure or interfere with the treatment process or cause a hazard to humans, animals or aquatic life, in the receiving waters of the of the sewerage system.

8. Waste containing suspended solids of such character and quantity that special attention or expense is required to handle such materials through the sewerage system.

9. Noxious or malodorous gas or substances capable of creating a nuisance.

10. Any wastewater having a pH less than 5.0, or higher than 11.0, or having any corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sanitary sewerage system.

11. Roof, ground or surface water, non-contact cooling water or means of introducing such water into the sewerage system.

12. Any slug load, which shall mean any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge of such volume or strength as to cause inhibition or disruption in the sanitary sewerage system. In no case shall a slug load have a flow rate or contain concentrations or quantities of pollutants that exceed for any time period longer than fifteen minutes more than five times the average twenty-four hour concentrations, quantities, or flow of the user during normal operation.

13. Any wastewater having a BOD-5 greater than 210 mg/L or having a suspended solids concentration of greater than 180 mg/L. Sewage with greater concentrations may be discharged only through a special use permit. Charges will be levied for wastewater having a strength greater than 210 mg/L BOD-5 or 180 mg/L suspended solids.

14. Any wastewater having a concentration greater than:

Zinc	6.0 mg/L
Chromium	8.0 mg/L
Cadmium	2.0 mg/L
Copper	3.5 mg/L
Lead	1.0 mg/L
Nickel	6.0 mg/L
Cyanide	1.8 mg/L
Mercury	0.04 mg/L
Silver	10.0 mg/L

15. Any wastewater having total toxic organics (TTO) exceeding 2.13 mg/l for any one day. TTO is defined in the Federal Register 40 CFR 433.11(e) of Vol. 48, No. 137/Friday July 15, 1983/Rules and Regulations as "the summation of all quantifiable values greater than 0.01 milligrams per liter in the above cited Federal Register."

16. Garbage, discarded material and grease from non-domestic sources which results from the handling, processing, storage, preparation, serving and consumption of food, when the effect of such disposal into public sewers is the avoidance of off-site solid waste disposal.

17. Waste antifreeze or coolant. This prohibition shall not apply to the small amount of antifreeze or coolant that may be in the water used to flush a heating/cooling system after the antifreeze or coolant has been drained down and captured.

C. **National Categorical Pretreatment Standards.** National categorical pretreatment standards promulgated by the U.S. Environmental Protection Agency shall be met by all Users which are subject to such standards, as they go into effect, unless the city manager has obtained approval to modify the standards from the Minnesota Pollution Control Agency. The city manager will deny any new, changed or increased discharge of wastewater which does not meet the requirements of any national categorical pretreatment standard.

SECTION 3. SELF-MONITORING REQUIREMENTS

SIGNIFICANT NONCATEGORICAL INDUSTRIAL USER

Due to the unique situation at this facility, self-monitoring **will not** be required on a routine basis. However, the user must maintain an adequate sampling site (stated below in table) so that the City can do routine compliance monitoring as needed. Bay State must have available the apparatus that is necessary to get a representative sample of the rail car washing wastewater. The city will use this site and apparatus to obtain representative samples periodically.

In lieu of routine monitoring, Bay State will follow a best management practice approach for washing the rail cars that will insure that slug loading of flour to the sewer will not occur and the City will have the information necessary to assess charges for the treatment of this wastewater. The details of this best management practice are described in detail in Section 4, part A of this permit.

Bay State Milling has been following these best management practices consistently since April of 2009.

WASTEWATER MONITORING[1]

Sampling Point	Type	Pollutants to be Analyzed
Discharge manhole within rail car washing area (towards back)	Composite*	TBOD, TSS

*Composite sample is obtained by setting sampler to run for 2 hours. This is roughly the amount of time spent washing one rail car.

1. Wastewater monitoring is performed by the City's pretreatment coordinator at least once per year for compliance purposes and for evaluating the cost of treatment.

In the event that the City determines the need for Bay State to begin self-monitoring, the City will determine a frequency for the above mentioned wastewater monitoring.

SECTION 4. SPECIAL CONDITIONS AND REPORTING

A. Special Conditions: Rail Car Cleaning BMPs

Bay State management and the City have agreed to the following terms as conditions of this permit to discharge rail car washing wastewater to the Winona sanitary sewer system. Bay State implemented the practices described below in April of 2009 and is in full compliance with the special conditions of this permit as it is being issued. As a condition of this permit Bay State must continue to practice the following:

1. Each rail car must be thoroughly dry cleaned prior to washing the car and discharging the wastewater to the sanitary sewer. The car will be considered adequately dry cleaned when there is no bulk product remaining in the car and the only flour present is that which clings to the inside surface.

2. After the car is dry cleaned, Bay State will take digital photos of all the surfaces of the inside of the car. These photos will be emailed to the Pretreatment Coordinator at ewillcox@ci.winona.mn.us within a few hours of the time they were taken. The car can be washed before the photos are sent, as long as they are sent in a timely manner.

3. Prior to beginning to wash the car, Bay State must call the Sewer Department at 457/8207 and inform the department that a car is going to be washed. If there is no answer at that number, Bay State can leave a brief message on the answering machine indicating that they are going to wash a car on a certain day at a certain time.

4. Bay State will keep a record of each car that they wash. The records shall include at least the following information:
   a. The car number.
   b. The date the car was washed.
   c. How much water was used to wash the car.

B. Quarterly Monitoring Report

A report with the data listed in Section 4, part A.4. (above) will be emailed to the City at the end of each quarter. These reports are due on or before the 20th day of the month following the end of each calendar quarter (April, July, October, January). The City will use these reports to assess charges for the treatment of the wastewater discharged in the car washing operation. The City will bill Bay State $25 for each car washed in the quarter. This money will cover the cost of treatment of said wastewater and the related administration costs. **An administrative charge of $50.00 will be assessed to the discharger for every monitoring report that is received after the due date or is submitted incomplete. This charge may be waived, at the discretion of the City, if the City determines that the report is either late or incomplete as a result of events or circumstances that are beyond the control of the discharger.**

C. Accidental Discharge

The permittee must notify the City immediately upon the occurrence of spills, including, but not limited to, accidental discharges, discharges of a non-routine, episodic nature, a non-customary batch discharge, slug loads or slug discharges, that might cause potential problems for the WWTP, or spills that might enter the public sewer. The notification must include location of discharge; date and time of discharge; type of waste and volume; and corrective actions taken. The permittee's notification of accidental releases in accordance with this section does not relieve it of other reporting requirements that arise under local, state, or federal laws.

Within 5 days following an accidental discharge, the permittee shall submit to the City a detailed written report. The report must specify:

1. Description and cause of the upset, slug load, or accidental discharge; the cause thereof; and the impact on the permittee's compliance status. The description should also include location of discharge and type, and volume of waste.

2. Duration of noncompliance, including exact dates and times of noncompliance and, if the noncompliance is continuing, the time by which compliance is reasonably expected to occur.

3. All steps taken or to be taken to reduce, eliminate, and/or prevent recurrence of such an upset, slug load, accidental discharge, or other conditions of noncompliance.

SECTION 5. COMPLIANCE SCHEDULE

Bay State Milling is in compliance with all applicable regulations and the terms of this permit at this time. Consequently, no compliance schedule is needed at this time.

SECTION 6. DISCHARGE PERMIT STANDARD CONDITIONS

The following Standard Conditions apply to each Wastewater Discharge Permit issued by the City.

1. Where required, the Industrial User shall provide monitoring facilities, installed and maintained at all times at the User's expense, to allow inspection, sampling, and flow measurement at locations specified in Section III of this permit. All flow measurement equipment shall be calibrated by an independent technician at least once a year or as often as is necessary to maintain accurate flow measurement. There shall be ample room in and near such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the City at all times upon presentation of suitable identification from 8:00 AM to 5:00 PM, five days per week. Authorized representatives of the City shall, under exceptional circumstances, have access upon presentation of suitable identification from 8:00 AM to 5:00 PM, seven days per week. Where required by Federal or State Regulations, such monitoring facilities shall be provided at the end of a process or unit production from which regulated toxic pollutants are discharged.

2. The User shall retain wastewater monitoring records for a period of five (5) years. During this period said records shall be available for inspection and duplication by authorized representatives of the City.

3. The Industrial User shall notify the City prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being discharged from the User's processes.

4. The User shall notify the City immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the spill reporting requirements of the City Code.

5. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the City, is not in conformance with Federal, State, or local laws, ordinances or regulations.

6. The discharge permit issued to the Industrial User by the City may be revoked when, after inspection, monitoring, or analysis, it has been determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations.

7. This permit shall be revoked due to falsification or intentional misrepresentation of data or statements pertaining to the User on the Wastewater Discharge Permit Application or any other required reporting form.

8. The terms and conditions of the permit are subject to modification by the City during the term of the permit as limitations or requirements are modified or for just cause. The User shall be informed of any proposed changes in this permit at least thirty (30) days prior to the effective date of change. Changes or additions to the permit shall include a time schedule for compliance.

9. This permit is issued to the named User for the specific operation or operations permitted and is not transferable without the approval of the City.

10. No later than fourteen (14) days following each date in the compliance schedule and the final date from compliance given by the User in the Wastewater Discharge Permit Application and included as part of this permit, the User shall submit a progress report to the City. This report must indicate whether or not the increment of progress was met on the date on which the User expects to comply with the increment of progress, the reason for delay, and what steps are being taken by the User to return to the schedule established. In no event shall more than nine (9) months elapse between such progress reports to the City.

11. The compliance dates for the increments of progress given in the compliance schedule will be revised only at the discretion of the City. Failure to meet the compliance dates without just reason for delay is in violation of the conditions of this permit.

12. According to 40 CFR 403.8(f)(2)(vi), the City must evaluate, at least once every permit cycle, whether each permitted User needs a Slug Control Plan. If the City determines that such a plan is required, the submitted plan shall meet the requirements of the above mentioned section.

13. If any person discharges sewage, industrial wastes, or other wastes into the City's sanitary sewage system contrary to the provisions of the Winona City Code Chapter 27, Federal or State Pretreatment Regulations, or any order of the City, the City Attorney may commence an action for appropriate legal and/or equitable relief, including injunctive relief.

14. Any User who has failed to comply with any provision of the Winona City Code Chapter 27, and the orders, rules, regulations, and permits issued thereunder, shall be fined not less than One Hundred Dollars ($100.00) nor more than Five Thousand Dollars ($5000.00) for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided therein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by an appropriate action against the person found to have violated Chapter 27 or the orders, rules, regulations, and permits issued thereunder.

15. The duration of this permit shall be for five (5) years unless the City, under special conditions, chooses to establish a shorter duration.

Malteurop

WASTEWATER DISCHARGE PERMIT

Permit No.: **MN 0030147-4**

GENERAL WASTEWATER DISCHARGE PERMIT

SECTION I

Malteurop North America Inc
(Company Name)

Corporate Address:

Street: 3830 W. Grant St.

City: Milwaukee, WI Zip Code: 53215

Location of Premise Permitted:

Street: 500 West Third Street

City: Winona, MN Zip Code: 55987

The above named Industrial User is hereby authorized to discharge wastewater to the Winona, Minnesota, Wastewater Disposal System, subject to said Industrial User's compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date: **August 21, 2018**

Director of Public Works — 8/9/18 Dated

City Manager — 8-10-18 Dated

SECTION II
DISCHARGE LIMITATIONS

A. **Discharge of surface waters:**

1. No person shall connect a roof, ground water or surface drain to the sanitary sewer.

2. Within 30 days after notice given by the city manager, the owner having a roof, ground water or surface water drain connected with the sewerage system shall disconnect the same. The opening in the sewerage system shall be closed in a neat and workmanlike manner.

3. The owner of a building without a yard reasonably adequate to absorb surface water on the property shall equip the building with the proper metallic leader or gutter and shall connect such leader or leaders to a storm sewer whenever there is such a sewer within 50 feet of such building.

B. **Prohibited Discharges.** No person shall deposit or discharge any pollutant which would cause the city to violate its NPDES Permit, any pollutant in concentrations exceeding State or Federal limitations, or any of the following, whichever is more stringent:

1. A waste which will physically damage the sewerage system, sewerage treatment plant or facilities connected therewith, or interfere with the treatment process standards required by the Minnesota Pollution Control Agency.

2. Any wastewater having a temperature greater than 150 degrees F or causing, individually or in combination with other wastewater, the influent at the wastewater treatment plant to have a temperature exceeding 104 degrees F or 40 degrees C.

3. Water or waste containing more than 100 parts per million by weight of fat, oil or grease.

4. Pollutants which create a fire or explosion hazard in the Wastewater Disposal System, including, but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees F or 60 degrees C using the test methods specified in 40 CFR 261.21, July 24, 1990. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.

5. Garbage, either household or commercial, that has not been shredded, so that the garbage particles are smaller than 3/8 inch in their largest dimension. Adequate water flow volume to wash such garbage through the sewers shall be provided.

6. Ashes, hair, peelings, refuse, rags, sticks, cinders, earth, mortar or concrete, feathers, glass, metal, animal or poultry solids, plastics, or any solid or viscous matter capable

of causing obstruction in the flow of a sanitary sewer, or interference with the proper operation of the sewerage system.

7. Water or waste containing an acid (or), toxic (or), radioactive or poisonous substance in sufficient quantity to injure or interfere with the treatment process or cause a hazard to humans, animals or aquatic life, in the receiving waters of the of the sewerage system.

8. Waste containing suspended solids of such character and quantity that special attention or expense is required to handle such materials through the sewerage system.

9. Noxious or malodorous gas or substances capable of creating a nuisance.

10. Any wastewater having a pH less than 5.0, or higher than 11.0, or having any corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sanitary sewerage system.

11. Roof, ground or surface water, non-contact cooling water or means of introducing such water into the sewerage system.

12. Any slug load, which shall mean any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge of such volume or strength as to cause inhibition or disruption in the sanitary sewerage system. In no case shall a slug load have a flow rate or contain concentrations or quantities of pollutants that exceed for any time period longer than fifteen minutes more than five times the average twenty-four hour concentrations, quantities, or flow of the user during normal operation.

*13. Any wastewater having a BOD-5 greater than 210 mg/l or having a suspended solids concentration of greater than 180 mg/l.

14. Any wastewater having a concentration greater than:

Zinc (total)	-	6.0 mg/l
Chromium (total)	-	8.0 mg/l
Cadmium (total)	-	2.0 mg/l
Copper (total)	-	3.5 mg/l
Lead (total)	-	1.0 mg/l
Nickel (total)	-	6.0 mg/l
Cyanide (total)	-	1.8 mg/l
Mercury (total)	-	0.04 mg/l
Silver (total)	-	10.0 mg/l

* The terms of part 13 above are superseded by the Special Conditions described in Section V of this permit.

15. Any wastewater having total toxic organics (TTO) exceeding 2.13 mg/l for any one day. TTO is defined in the Federal Register 40 CFR 433.11(e) of Vol. 48, No. 137/Friday July 15, 1983/Rules and Regulations as "the summation of all quantifiable values greater than 0.01 milligrams per liter in the above cited Federal Register."

16. Garbage, discarded material and grease from non-domestic sources which results from the handling, processing, storage, preparation, serving and consumption of food, when the effect of such disposal into public sewers is the avoidance of off-site solid waste disposal.

17. Waste antifreeze or coolant. This prohibition shall not apply to the small amount of antifreeze or coolant that may be in the water used to flush a heating/cooling system after the antifreeze or coolant has been drained down and captured.

C. **National Categorical Pretreatment Standards.** National categorical pretreatment standards promulgated by the U.S. Environmental Protection Agency shall be met by all Users which are subject to such standards, as they go into effect, unless the city manager has obtained approval to modify the standards from the Minnesota Pollution Control Agency. The city manager will deny any new, changed or increased discharge of wastewater which does not meet the requirements of any national categorical pretreatment standard.

SECTION III

SELF MONITORING REQUIREMENTS

SIGNIFICANT NONCATEGORICAL INDUSTRIAL USER

*Significant Noncategorical Industrial Users shall submit to the City quarterly, unless the City specifies a different frequency, a report indicating the concentration of the pollutants specified below in their effluent and the volume of their effluent for that quarter. These reports are due on or before the 20th day of the month following the end of each quarter (April, July, October, January).

These reports shall be based on sampling and analysis performed in the period covered by the report, and performed in accordance with the techniques outlined in Standard Methods. Representative samples may be taken every hour or half hour, properly refrigerated, preserved and composited in proportion to the wastewater flow or a continuous sample may be taken and mixed from which a representative 24 hour sample is taken.

SELF MONITORING SCHEDULE

SAMPLING POINT	FREQUENCY	POLLUTANTS TO BE ANALYZED
At the flume in the discharge line.	Three days per week.	TBOD
At the flume in the discharge line.	Three days per week.	TSS

* **Malteurop** is not required to submit quarterly monitoring reports to the City because the City receives the lab reports directly from the certified lab and reads the volume of the discharge weekly from the totalizer.

SECTION IV

COMPLIANCE SCHEDULE

No compliance schedule is required as a condition of this permit.

SECTION V

SPECIAL CONDITIONS

Under the terms of this discharge permit **Malteurop** is allowed to discharge up to 4000 lbs/day of Total Biochemical Oxygen Demand (TBOD) and 4000 lbs/day of Total Suspended Solids (TSS). These limits shall be considered weekly average limits. **Malteurop** is hereby permitted to discharge up to 1,750,000 gallons per day of wastewater to the City's sanitary sewer. This limit shall be considered a daily limit. The weekly average loading of TBOD and TSS will be determined by multiplying the average concentration (in mg/l) of each pollutant times the average volume of discharge (in million gallons/day) times 8.34. The average concentration for each pollutant will be determined by dividing the sum total of the values obtained from tests on samples in one week by the number of tests taken for each parameter in the same 7 day period. For the purposes of this permit, the testing week will be Sunday through Saturday. For the purpose of determining compliance with the above limits and for calculating the applicable surcharges, only data obtained by tests run at Minnesota certified labs will be acceptable.

Malteurop's charges for wastewater treatment are determined by the rates set by City ordinance for commercial and industrial wastewater. **Malteurop** will pay for any TBOD loading above 210 mg/l and any TSS loading above 180 mg/l. The TBOD and TSS surcharge rates are based on Wastewater Treatment Plant and collection system operating and maintenance costs. The surcharge rates for 2004 are $0.196 for every pound of TBOD discharged over the 210 mg/l threshold and $0.23 for every pound of TSS discharged over the 180 mg/l threshold. The surcharge rates are recalculated every year to reflect current operating and maintenance costs. The surcharges are calculated by the City and levied quarterly.

SECTION VI

DISCHARGE PERMIT STANDARD CONDITIONS

The following Standard Conditions apply to each Wastewater Discharge Permit issued by the City.

1. Where required, the Industrial User shall provide monitoring facilities, installed and maintained at all times at the User's expense, to allow inspection, sampling, and flow measurement at locations specified in Section III of this permit. All flow measurement equipment shall be calibrated by an independent technician at least once a year or as often as is necessary to maintain accurate flow measurement. There shall be ample room in and near such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the City at all times upon presentation of suitable identification from 8:00 AM to 5:00 PM, five days per week. Authorized representatives of the City shall, under exceptional circumstances, have access upon presentation of suitable identification from 8:00 AM to 5:00 PM, seven days per week. Where required by Federal or State Regulations, such monitoring facilities shall be provided at the end of a process or unit production from which regulated toxic pollutants are discharged.

2. The User shall retain wastewater monitoring records for a period of five (5) years. During this period said records shall be available for inspection and duplication by authorized representatives of the City.

3. The Industrial User shall notify the City prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being discharged from the User's processes.

4. The User shall notify the City immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the spill reporting requirements of the City Code.

5. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the City, is not in conformance with Federal, State, or local laws, ordinances or regulations.

6. The discharge permit issued to the Industrial User by the City may be revoked when, after inspection, monitoring, or analysis, it has been determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations.

7. This permit shall be revoked due to falsification or intentional misrepresentation of data or statements pertaining to the User on the Wastewater Discharge Permit Application or any other required reporting form.

8. The terms and conditions of the permit are subject to modification by the City during the term of the permit as limitations or requirements are modified or for just cause. The User shall be informed of any proposed changes in this permit at least thirty (30) days prior to the effective date of change. Changes or additions to the permit shall include a time schedule for compliance.

9. This permit is issued to the named User for the specific operation or operations permitted and is not transferable without the approval of the City.

10. No later than fourteen (14) days following each date in the compliance schedule and the final date from compliance given by the User in the Wastewater Discharge Permit Application and included as part of this permit, the User shall submit a progress report to the City. This report must indicate whether or not the increment of progress was met on the date on which the User expects to comply with the increment of progress, the reason for delay, and what steps are being taken by the User to return to the schedule established. In no event shall more than nine (9) months elapse between such progress reports to the City.

11. The compliance dates for the increments of progress given in the compliance schedule will be revised only at the discretion of the City. Failure to meet the compliance dates without just reason for delay is in violation of the conditions of this permit.

12. According to 40 CFR 403.8(f)(2)(vi), the City must evaluate, at least once every permit cycle, whether each permitted User needs a Slug Control Plan. If the City determines that such a plan is required, the submitted plan shall meet the requirements of the above mentioned section.

13. If any person discharges sewage, industrial wastes, or other wastes into the City's sanitary sewage system contrary to the provisions of the Winona City Code Chapter 27, Federal or State Pretreatment Regulations, or any order of the City, the City Attorney may commence an action for appropriate legal and/or equitable relief, including injunctive relief.

14. Any User who has failed to comply with any provision of the Winona City Code Chapter 27, and the orders, rules, regulations, and <u>permits</u> issued thereunder, shall be fined not less than One Hundred Dollars ($100.00) nor more than Five Thousand Dollars ($5000.00) for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided therein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by an appropriate action against the person found to have violated Chapter 27 or the orders, rules, regulations, and <u>permits</u> issued thereunder.

15. The duration of this permit shall be for five (5) years unless the City, under special conditions, chooses to establish a shorter duration.

MIDWEST CO-PACK

WASTEWATER DISCHARGE PERMIT

Permit Expiration: 4/24/2022

Midwest Co-Pack is a contract manufacturer for Midwest-based food brands. The majority of the products made at this facility include gummy candy and pet vitamins (gummy material). Midwest Co-Pack is permitted for wastewater discharge by the City of Winona, allowing them to discharge their associated clean-up water from product runs. Midwest Co-Pack does not perform any major pretreatment of their wastewater, aside from the occasional neutralization of their acidic candy wastewater. Based off of their operations and the wastewater they produce, they are a Significant Noncategorical Industrial user, having high strength wastewater (TBOD, TSS, etc.). The City has Midwest Co-Pack on a surcharge program to collect cost for treatment of this high strength wastewater.

Amendments (2/28/2020):

1. Adjusted Midwest Co-Pack's maximum daily discharge of Total Suspended Solids (TSS) from 2000 lbs/day to 1500 lbs/day.

GENERAL WASTEWATER DISCHARGE PERMIT

SECTION 1. COMPANY INFORMATION

Midwest Co-Pack
(Company Name)

Business Address:

Street: 1000 West Fifth Street

City: Winona, MN Zip Code: 55987

Location of Premise Permitted:

Street: 1000 West Fifth Street

City: Winona, MN Zip Code: 55987

The above named Industrial User is hereby authorized to discharge wastewater to the Winona, Minnesota, Wastewater Disposal System, subject to said Industrial User's compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date: **2/28/20**

Director of Public Works 2/28/2020
Date

City Manager 2/28/2020
Date

SECTION 2. DISCHARGE LIMITATIONS

A. **Discharge of surface waters:**

1. No person shall connect a roof, ground water or surface drain to the sanitary sewer.

2. Within 30 days after notice given by the city manager, the owner having a roof, ground water or surface water drain connected with the sewerage system shall disconnect the same. The opening in the sewerage system shall be closed in a neat and workmanlike manner.

3. The owner of a building without a yard reasonably adequate to absorb surface water on the property shall equip the building with the proper metallic leader or gutter and shall connect such leader or leaders to a storm sewer whenever there is such a sewer within 50 feet of such building.

B. **Prohibited Discharges.** No person shall deposit or discharge any pollutant which would cause the city to violate its NPDES Permit, any pollutant in concentrations exceeding State or Federal limitations, or any of the following, whichever is more stringent:

1. A waste which will physically damage the sewerage system, sewerage treatment plant or facilities connected therewith, or interfere with the treatment process standards required by the Minnesota Pollution Control Agency.

2. Any wastewater having a temperature greater than 150 degrees F or causing, individually or in combination with other wastewater, the influent at the wastewater treatment plant to have a temperature exceeding 104 degrees F or 40 degrees C.

3. Water or waste containing more than 100 parts per million by weight of fat, oil or grease.

4. Pollutants which create a fire or explosion hazard in the Wastewater Disposal System, including, but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees F or 60 degrees C using the test methods specified in 40 CFR 261.21, July 24, 1990. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.

5. Garbage, either household or commercial, that has not been shredded, so that the garbage particles are smaller than 3/8 inch in their largest dimension. Adequate water flow volume to wash such garbage through the sewers shall be provided.

6. Ashes, hair, peelings, refuse, rags, sticks, cinders, earth, mortar or concrete, feathers, glass, metal, animal or poultry solids, plastics, or any solid or viscous matter capable of causing obstruction in the flow of a sanitary sewer, or interference with the proper operation of the sewerage system.

7. Water or waste containing an acid (or), toxic (or), radioactive or poisonous substance in sufficient quantity to injure or interfere with the treatment process or cause a hazard to humans, animals or aquatic life, in the receiving waters of the of the sewerage system.

8. Waste containing suspended solids of such character and quantity that special attention or expense is required to handle such materials through the sewerage system.

9. Noxious or malodorous gas or substances capable of creating a nuisance.

10. Any wastewater having a pH less than 5.0, or higher than 11.0, or having any corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sanitary sewerage system.

11. Roof, ground or surface water, non-contact cooling water or means of introducing such water into the sewerage system.

12. Any slug load, which shall mean any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge of such volume or strength as to cause inhibition or disruption in the sanitary sewerage system. In no case shall a slug load have a flow rate or contain concentrations or quantities of pollutants that exceed for any time period longer than fifteen minutes more than five times the average twenty-four hour concentrations, quantities, or flow of the user during normal operation.

13. Any wastewater having a BOD-5 greater than 210 mg/L or having a suspended solids concentration of greater than 180 mg/L. Sewage with greater concentrations may be discharged only through a special use permit. Charges will be levied for wastewater having a strength greater than 210 mg/L BOD-5 or 180 mg/L suspended solids.

14. Any wastewater having a concentration greater than:

Zinc	6.0 mg/L
Chromium	8.0 mg/L
Cadmium	2.0 mg/L
Copper	3.5 mg/L
Lead	1.0 mg/L
Nickel	6.0 mg/L
Cyanide	1.8 mg/L
Mercury	0.04 mg/L
Silver	10.0 mg/L

15. Any wastewater having total toxic organics (TTO) exceeding 2.13 mg/L for any one day. TTO is defined in the Federal Register 40 CFR 433.11(e) of Vol. 48, No. 137/Friday July 15, 1983/Rules and Regulations as "the summation of all quantifiable values greater than 0.01 milligrams per liter in the above cited Federal Register."

16. Garbage, discarded material and grease from non-domestic sources which results from the handling, processing, storage, preparation, serving and consumption of food, when the effect of such disposal into public sewers is the avoidance of off-site solid waste disposal.

17. Waste antifreeze or coolant. This prohibition shall not apply to the small amount of antifreeze or coolant that may be in the water used to flush a heating/cooling system after the antifreeze or coolant has been drained down and captured.

C. **National Categorical Pretreatment Standards.** National categorical pretreatment standards promulgated by the U.S. Environmental Protection Agency shall be met by all Users which are subject to such standards, as they go into effect, unless the city manager has obtained approval to modify the standards from the Minnesota Pollution Control Agency. The city manager will deny any new, changed or increased discharge of wastewater which does not meet the requirements of any national categorical pretreatment standard.

SECTION 3. SELF MONITORING REQUIREMENTS

SIGNIFICANT NONCATEGORICAL INDUSTRIAL USER

SELF MONITORING SCHEDULE

Sampling Point	Wastewater Description	Frequency	Type	Pollutants to be Analyzed
At flume in access manhole within "New Chiller Room"	Tank clean-up water from product runs	Twice a week	Composite	TBOD, TSS
At flume in access manhole within "New Chiller Room"	Tank clean-up water from product runs	Twice a week	Grab	pH[1]

[1]pH monitoring will be performed by the pretreatment coordinator during routine sample collection.

SECTION 4. REPORTING REQUIREMENTS

A. Quarterly Monitoring Reports

*Significant Noncategorical Industrial Users shall submit to the City quarterly, unless the City specifies a different frequency, a report indicating the concentration of the pollutants in their effluent (specified in Section 3. Self-Monitoring Requirements) and the volume of their effluent for that quarter. These reports are due on or before the 20th day of the month following the end of each quarter (April, July, October, January). **An administrative charge of $50.00 will be assessed to the discharger for every monitoring report that is received after the due date or is submitted incomplete. This charge may be waived, at the discretion of the City, if the City determines that the report is either late or incomplete as a result of events or circumstances that are beyond the control of the discharger.**

*Midwest Co-Pack does not have a monitoring report requirement because the City obtains that data directly from the lab.

These reports shall be based on sampling and analysis performed in the period covered by the report, and performed in accordance with the techniques outlined in Standard Methods. Representative samples may be taken every hour or half hour, properly refrigerated, preserved and composited in proportion to the wastewater flow or a continuous sample may be taken and mixed from which a representative 24 hour sample is taken.

B. Automatic Resampling

In the event that the permittee has a noncompliant analysis result as an outcome of either routine sampling by the permittee or compliance sampling done by the City, the permittee will be expected to follow the steps below:

1. Inform the Pretreatment Coordinator of the violation within 24 hours,

2. Repeat the sampling and pollutant analysis and submit the results of this second analysis using the Compliance Report Form within 30 days of becoming aware of the first violation.

C. Accidental Discharge

The permittee must notify the City immediately upon the occurrence of spills, including, but not limited to, accidental discharges, discharges of a non-routine, episodic nature, a non-customary batch discharge, slug loads or slug discharges, that might cause potential problems for the WWTP, or spills that might enter the public sewer. The notification must include location of discharge; date and time of discharge; type of waste and volume; and corrective actions taken. The permittee's notification of accidental releases in accordance with this section does not relieve it of other reporting requirements that arise under local, state, or federal laws.

Within 5 days following an accidental discharge, the permittee shall submit to the City a detailed written report. The report must specify:

1. Description and cause of the upset, slug load, or accidental discharge; the cause thereof; and the impact on the permittee's compliance status. The description should also include location of discharge and type, and volume of waste.

2. Duration of noncompliance, including exact dates and times of noncompliance and, if the noncompliance is continuing, the time by which compliance is reasonably expected to occur.

3. All steps taken or to be taken to reduce, eliminate, and/or prevent recurrence of such an upset, slug load, accidental discharge, or other conditions of noncompliance.

SECTION 5. COMPLIANCE SCHEDULE

No Compliance Schedule required at this time.

SECTION 6. SPECIAL CONDITIONS

Under the terms of this permit the maximum daily discharge of Total Biochemical Oxygen Demand (TBOD) from this facility shall not exceed 4000 lbs/day. The average daily loading for any calendar month shall not exceed 1500 lbs/day. The maximum daily discharge of Total Suspended Solids (TSS) shall not exceed 1500 lbs/day. The average TSS loading for any calendar month shall not exceed 1000 lbs/day.

The company will pay a surcharge on any sewage discharge exceeding 210 ppm TBOD and/or 180 ppm TSS. The surcharge is based on the City's Treatment Plant and collection system operating and maintenance costs. The surcharge rates for 2017 are $0.196 for every pound of TBOD discharged over the 210 ppm threshold and $0.23 for every pound of TSS discharged over the 180 ppm threshold. The surcharge rates are recalculated every year to reflect current operating and maintenance costs. The surcharge is calculated by the City and is levied quarterly.

Two or three production days after routine production of gummy materials begins, the company will sample three times a week (if there are three days of production in a given week) until 12 samples have been collected. If this data indicates major swings in loading, the once/week monitoring specified on page 6 of this permit may be increased in order to get representative data for each quarter. If the data is relatively consistent, then the company will go to the 1 day a week monitoring as shown on page 6 of this permit.

SECTION 7. DISCHARGE PERMIT STANDARD CONDITIONS

The following Standard Conditions apply to each Wastewater Discharge Permit issued by the City.

1. Where required, the Industrial User shall provide monitoring facilities, installed and maintained at all times at the User's expense, to allow inspection, sampling, and flow measurement at locations specified in Section III of this permit. All flow measurement equipment shall be calibrated by an independent technician at least once a year or as often as is necessary to maintain accurate flow measurement. There shall be ample room in and near such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the City at all times upon presentation of suitable identification from 8:00 AM to 5:00 PM, five days per week. Authorized representatives of the City shall, under exceptional circumstances, have access upon presentation of suitable identification from 8:00 AM to 5:00 PM, seven days per week. Where required by Federal or State Regulations, such monitoring facilities shall be provided at the end of a process or unit production from which regulated toxic pollutants are discharged.

2. The User shall retain wastewater monitoring records for a period of five (5) years. During this period said records shall be available for inspection and duplication by authorized representatives of the City.

3. The Industrial User shall notify the City prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being discharged from the User's processes.

4. The User shall notify the City immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the spill reporting requirements of the City Code.

5. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the City, is not in conformance with Federal, State, or local laws, ordinances or regulations.

6. The discharge permit issued to the Industrial User by the City may be revoked when, after inspection, monitoring, or analysis, it has been determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations.

7. This permit shall be revoked due to falsification or intentional misrepresentation of data or statements pertaining to the User on the Wastewater Discharge Permit Application or any other required reporting form.

8. The terms and conditions of the permit are subject to modification by the City during the term of the permit as limitations or requirements are modified or for just cause. The User shall be informed of any proposed changes in this permit at least thirty (30) days prior to the effective date of change. Changes or additions to the permit shall include a time schedule for compliance.

9. This permit is issued to the named User for the specific operation or operations permitted and is not transferable without the approval of the City.

10. No later than fourteen (14) days following each date in the compliance schedule and the final date from compliance given by the User in the Wastewater Discharge Permit Application and included as part of this permit, the User shall submit a progress report to the City. This report must indicate whether or not the increment of progress was met on the date on which the User expects to comply with the increment of progress, the reason for delay, and what steps are being taken by the User to return to the schedule established. In no event shall more than nine (9) months elapse between such progress reports to the City.

11. The compliance dates for the increments of progress given in the compliance schedule will be revised only at the discretion of the City. Failure to meet the compliance dates without just reason for delay is in violation of the conditions of this permit.

12. According to 40 CFR 403.8(f)(2)(vi), the City must evaluate, at least once every permit cycle, whether each permitted User needs a Slug Control Plan. If the City determines that such a plan is required, the submitted plan shall meet the requirements of the above mentioned section.

13. If any person discharges sewage, industrial wastes, or other wastes into the City's sanitary sewage system contrary to the provisions of the Winona City Code Chapter 27, Federal or State Pretreatment Regulations, or any order of the City, the City Attorney may commence an action for appropriate legal and/or equitable relief, including injunctive relief.

14. Any User who has failed to comply with any provision of the Winona City Code Chapter 27, and the orders, rules, regulations, and <u>permits</u> issued thereunder, shall be fined not less than One Hundred Dollars ($100.00) nor more than Five Thousand Dollars ($5000.00) for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided therein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by an appropriate action against the person found to have violated Chapter 27 or the orders, rules, regulations, and <u>permits</u> issued thereunder.

15. The duration of this permit shall be for five (5) years unless the City, under special conditions, chooses to establish a shorter duration.

PEERLESS CHAIN COMPANY

WASTEWATER DISCHARGE PERMIT

Permit Expiration: 12/11/2025

Peerless is a metal chain manufacturing company. At their Winona location, mechanical machines are used to cut and weld wire into chain of various sizes. The chain is heat treated to product specifications as well as plated for durability in its various applications. Peerless performs metal finishing operations such as electroplating and hot dip zinc coating; as a result they are considered a categorical industrial user under 40 CFR 433 – Metal Finishing. This facility discharges roughly 75,000 gallons of process wastewater per day, and has an effective pretreatment system onsite that removes a significant amount of the zinc and chromium the Winona WWTP might see from them. Their process wastewater is all routed to enter their pretreatment system so that it can be treated before entering the sewer system. The pretreatment system is designed for metal removal, primarily zinc and chromium, through pH adjustment along with polymer addition. This allows for the metals to precipitate out of the wastewater and can then be filtered and collected for solid waste pickup.

WASTEWATER DISCHARGE PERMIT

SECTION 1. COMPANY INFORMATION

Peerless Chain Company
(Company Name)

Business Address:

Street: 1416 East Sanborn Street

City: Winona, MN Zip Code: 55987

Location of Premise Permitted:

Street: 1416 East Sanborn Street

City: Winona, MN Zip Code: 55987

The above named Industrial User is hereby authorized to discharge wastewater to the Winona, Minnesota, Wastewater Disposal System, subject to said Industrial User's compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date: **12/11/2020**

Director of Public Works 12/7/20
Date

City Manager 12-7-2020
Date

SECTION 2. DISCHARGE LIMITATIONS

A. Discharge of surface waters:

1. No person shall connect a roof, ground water or surface drain to the sanitary sewer.

2. Within 30 days after notice given by the city manager, the owner having a roof, ground water or surface water drain connected with the sewerage system shall disconnect the same. The opening in the sewerage system shall be closed in a neat and workmanlike manner.

3. The owner of a building without a yard reasonably adequate to absorb surface water on the property shall equip the building with the proper metallic leader or gutter and shall connect such leader or leaders to a storm sewer whenever there is such a sewer within 50 feet of such building.

B. Prohibited Discharges. No person shall deposit or discharge any pollutant which would cause the city to violate its NPDES Permit, any pollutant in concentrations exceeding State or Federal limitations, or any of the following, whichever is more stringent:

1. A waste which will physically damage the sewerage system, sewerage treatment plant or facilities connected therewith, or interfere with the treatment process standards required by the Minnesota Pollution Control Agency.

2. Any wastewater having a temperature greater than 150 degrees F or causing, individually or in combination with other wastewater, the influent at the wastewater treatment plant to have a temperature exceeding 104 degrees F or 40 degrees C.

3. Water or waste containing more than 100 parts per million by weight of fat, oil or grease.

4. Pollutants which create a fire or explosion hazard in the Wastewater Disposal System, including, but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees F or 60 degrees C using the test methods specified in 40 CFR 261.21, July 24, 1990. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.

5. Garbage, either household or commercial, that has not been shredded, so that the garbage particles are smaller than 3/8 inch in their largest dimension. Adequate water flow volume to wash such garbage through the sewers shall be provided.

6. Ashes, hair, peelings, refuse, rags, sticks, cinders, earth, mortar or concrete, feathers, glass, metal, animal or poultry solids, plastics, or any solid or viscous matter capable of causing obstruction in the flow of a sanitary sewer, or interference with the proper operation of the sewerage system.

7. Water or waste containing an acid (or), toxic (or), radioactive or poisonous substance in sufficient quantity to injure or interfere with the treatment process or cause a hazard to humans, animals or aquatic life, in the receiving waters of the of the sewerage system.

8. Waste containing suspended solids of such character and quantity that special attention or expense is required to handle such materials through the sewerage system.

9. Noxious or malodorous gas or substances capable of creating a nuisance.

10. Any wastewater having a pH less than 5.0, or higher than 11.0, or having any corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sanitary sewerage system.

11. Roof, ground or surface water, non-contact cooling water or means of introducing such water into the sewerage system.

12. Any slug load, which shall mean any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge of such volume or strength as to cause inhibition or disruption in the sanitary sewerage system. In no case shall a slug load have a flow rate or contain concentrations or quantities of pollutants that exceed for any time period longer than fifteen minutes more than five times the average twenty-four hour concentrations, quantities, or flow of the user during normal operation.

13. Any wastewater having a BOD-5 greater than 210 mg/l or having a suspended solids concentration of greater than 180 mg/l. Sewage with greater concentrations may be discharged only through a special use permit. Charges will be levied for wastewater having a strength greater than 210 mg/L BOD-5 or 180 mg/L suspended solids.

14. Any wastewater having a concentration greater than:

Mercury	0.04	-
Cadmium	0.69	0.26
Chromium	2.77	1.71
Copper	3.38	2.07
Lead	0.69	0.43
Nickel	3.98	2.38
Zinc	2.61	1.48
Silver	0.43	0.24
Amendable Cyanide	0.86	0.32
TTO	2.13	-

*Peerless is a Metal Finisher subject to the regulations in 40 CFR 433. The limits in the table above, with the exception of the mercury limit, are taken from 40 CFR 433.15. There is no mercury limit in 40 CFR 433 so Peerless must meet the local limit for that parameter.

15. Any wastewater having total toxic organics (TTO) exceeding 2.13 mg/l for any one day. TTO is defined in the Federal Register 40 CFR 433.11(e) of Vol. 48, No. 137/Friday July 15, 1983/Rules and Regulations as "the summation of all quantifiable values greater than 0.01 milligrams per liter in the above cited Federal Register."

16. Garbage, discarded material and grease from non-domestic sources which results from the handling, processing, storage, preparation, serving and consumption of food, when the effect of such disposal into public sewers is the avoidance of off-site solid waste disposal.

17. Waste antifreeze or coolant. This prohibition shall not apply to the small amount of antifreeze or coolant that may be in the water used to flush a heating/cooling system after the antifreeze or coolant has been drained down and captured.

C. National Categorical Pretreatment Standards. National categorical pretreatment standards promulgated by the U.S. Environmental Protection Agency shall be met by all Users which are subject to such standards, as they go into effect, unless the city manager has obtained approval to modify the standards from the Minnesota Pollution Control Agency. The city manager will deny any new, changed or increased discharge of wastewater which does not meet the requirements of any national categorical pretreatment standard.

SECTION 3. SELF-MONITORING REQUIREMENTS

SIGNIFICANT CATEGORICAL INDUSTRIAL USER

SELF MONITORING SCHEDULE

Sampling Point	Wastewater Description	Frequency	Type	Pollutants to be Analyzed
Sampling manhole in Pretreatment area	All process wastewater (treated)	1/Week	Grab	pH[1]
Sampling manhole in Pretreatment area	All process wastewater (treated)	1/Week	Composite	Zinc
Sampling manhole in Pretreatment area	All process wastewater (treated)	1/Month	Composite	Total Chromium[2]
Sampling manhole in Pretreatment area	All process wastewater (treated)	1/Quarter	Composite	TTO[3]
Sampling manhole in Pretreatment area	All process wastewater (treated)	2/Year	Composite	Cd, Cu, Pb, Ni, Ag
Sampling manhole in Pretreatment area	All process wastewater (treated)	2/Year	Grab	Cyanide[4]

1. Grab samples for pH analysis are to be taken from the same wastewater sources as the composite samples that are being prepared. These samples will be analyzed by the City's Pretreatment Coordinator during the visit to pick up the weekly sample.
2. Total chromium analysis will be analyzed once a month along with that week's sample for zinc. This does not require a separate sample bottle be made up.
3. May submit certification in lieu of sampling.
4. The sample for cyanide analysis must be a grab sample and will need to be 1-liter in volume. (500 mL is preserved and 500 mL is used as a blank/control).

SECTION 4. REPORTING REQUIREMENTS

A. Quarterly Monitoring Reports

Any Industrial User subject to a categorical Pretreatment Standard, after the compliance date of such Pretreatment Standard, or, in the case of a New Source, after commencement of the discharge into the POTW, shall submit to the City quarterly, unless required more frequently by the Pretreatment Standard or the City, a report indicating the concentration of the pollutants in their effluent (specified in Section 3. Self-Monitoring Requirements) and the volume of their effluent for that quarter. These reports are due on or before the 20th day of the month following the end of each quarter (April, July, October, January). **An administrative charge of $50.00 will be assessed to the discharger for every monitoring report that is received after the due date or is submitted incomplete. This charge may be waived, at the discretion of the City, if the City determines that the report is either late or incomplete as a result of events or circumstances that are beyond the control of the discharger.**

These reports shall be based on sampling and analysis performed in the period covered by the report, and performed in accordance with the techniques outlined in Standard Methods. Representative samples may be taken every hour or half hour, properly refrigerated, preserved and composited in proportion to the wastewater flow or a continuous sample may be taken and mixed from which a representative 24 hour sample is taken.

B. Automatic Resampling

In the event that the permittee has a noncompliant analysis result as an outcome of either routine sampling by the permittee or compliance sampling done by the City, the permittee will be expected to follow the steps below:

1. Inform the Pretreatment Coordinator of the violation within 24 hours,

2. Repeat the sampling and pollutant analysis and submit the results of this second analysis using the Compliance Report Form within 30 days of becoming aware of the first violation.

C. Accidental Discharge

The permittee must notify the City immediately upon the occurrence of spills, including, but not limited to, accidental discharges, discharges of a non-routine, episodic nature, a non-customary batch discharge, slug loads or slug discharges, that might cause potential problems for the WWTP, or spills that might enter the public sewer. The notification must include location of discharge; date and time of discharge; type of waste and volume; and corrective actions taken. The permittee's notification of accidental releases in accordance with this section does not relieve it of other reporting requirements that arise under local, state, or federal laws.

Within 5 days following an accidental discharge, the permittee shall submit to the City a detailed written report. The report must specify:

1. Description and cause of the upset, slug load, or accidental discharge; the cause thereof; and the impact on the permittee's compliance status. The description should also include location of discharge and type, and volume of waste.

2. Duration of noncompliance, including exact dates and times of noncompliance and, if the noncompliance is continuing, the time by which compliance is reasonably expected to occur.

3. All steps taken or to be taken to reduce, eliminate, and/or prevent recurrence of such an upset, slug load, accidental discharge, or other conditions of noncompliance.

Provision for Waving the Requirement for Monitoring Certain Pollutants.

On 10/14/05 EPA passed amendments to the Pretreatment Rules that provide for, among other things, the waiving of monitoring requirements for certain pollutants under certain conditions. The rule states the following:

40 CFR 403.12(e)
(2) "The Control Authority may authorize the Industrial User subject to categorical Pretreatment Standards to forego sampling of a pollutant regulated by a categorical Pretreatment Standard if the Industrial User has demonstrated through sampling and other technical factors that the pollutant is neither present nor expected to be present in the Discharge, or is present only at background levels from intake water and without any increase in the pollutant due to activities of the Industrial User........."

The waiver is subject to a number of conditions that are not listed here. If this company wants to apply for such a waiver for certain pollutants, the City will fully inform the company what is required for such a waiver and make clear under what conditions the waiver will be approved.

SECTION 5. COMPLIANCE SCHEDULE

No compliance schedule is required at this time.

SECTION 6. SPECIAL CONDITIONS

None.

SECTION 7. DISCHARGE PERMIT STANDARD CONDITIONS

The following Standard Conditions apply to each Wastewater Discharge Permit issued by the City.

1. Where required, the Industrial User shall provide monitoring facilities, installed and maintained at all times at the User's expense, to allow inspection, sampling, and flow measurement at locations specified in Section III of this permit. All flow measurement equipment shall be calibrated by an independent technician at least once a year or as often as is necessary to maintain accurate flow measurement. There shall be ample room in and near such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the City at all times upon presentation of suitable identification from 8:00 AM to 5:00 PM, five days per week. Authorized representatives of the City shall, under exceptional circumstances, have access upon presentation of suitable identification from 8:00 AM to 5:00 PM, seven days per week. Where required by Federal or State Regulations, such monitoring facilities shall be provided at the end of a process or unit production from which regulated toxic pollutants are discharged.

2. The User shall retain wastewater monitoring records for a period of five (5) years. During this period said records shall be available for inspection and duplication by authorized representatives of the City.

3. The Industrial User shall notify the City prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being discharged from the User's processes.

4. The User shall notify the City immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the spill reporting requirements of the City Code.

5. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the City, is not in conformance with Federal, State, or local laws, ordinances or regulations.

6. The discharge permit issued to the Industrial User by the City may be revoked when, after inspection, monitoring, or analysis, it has been determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations.

7. This permit shall be revoked due to falsification or intentional misrepresentation of data or statements pertaining to the User on the Wastewater Discharge Permit Application or any other required reporting form.

8. The terms and conditions of the permit are subject to modification by the City during the term of the permit as limitations or requirements are modified or for just cause. The User shall be informed of any proposed changes in this permit at least thirty (30) days prior to the effective date of change. Changes or additions to the permit shall include a time schedule for compliance.

9. This permit is issued to the named User for the specific operation or operations permitted and is not transferable without the approval of the City.

10. No later than fourteen (14) days following each date in the compliance schedule and the final date from compliance given by the User in the Wastewater Discharge Permit Application and included as part of this permit, the User shall submit a progress report to the City. This report must indicate whether or not the increment of progress was met on the date on which the User expects to comply with the increment of progress, the reason for delay, and what steps are being taken by the User to return to the schedule established. In no event shall more than nine (9) months elapse between such progress reports to the City.

11. The compliance dates for the increments of progress given in the compliance schedule will be revised only at the discretion of the City. Failure to meet the compliance dates without just reason for delay is in violation of the conditions of this permit.

12. According to 40 CFR 403.8(f)(2)(v), the City must evaluate, at least once every two years, whether each permitted User needs a Slug Control Plan. If the City determines that such a plan is required, the submitted plan shall meet the requirements of the above mentioned section.

13. If any person discharges sewage, industrial wastes, or other wastes into the City's sanitary sewage system contrary to the provisions of the Winona City Code Chapter 27, Federal or State Pretreatment Regulations, or any order of the City, the City Attorney may commence an action for appropriate legal and/or equitable relief, including injunctive relief.

14. Any User who has failed to comply with any provision of the Winona City Code Chapter 27, and the orders, rules, regulations, and permits issued thereunder, shall be fined not less than One Hundred Dollars ($100.00) nor more than Five Thousand Dollars ($5000.00) for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided therein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by an appropriate action against the person found to have violated Chapter 27 or the orders, rules, regulations, and permits issued thereunder.

15. The duration of this permit shall be for five (5) years unless the City, under special conditions, chooses to establish a shorter duration.

Appendix J

Project Priority List Application

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Project Priority List (PPL)

Wastewater Application

1. Applicant name: City of Winona

Project area: Winona, MN

Town/city: Winona, MN

Population: 26,854

County: Winona

2. Contact person: Brian DeFrang

Address: 207 Lafayette Street, Winona, MN 55987

Phone: 507.457.8237 Fax:

E-mail: BDeFrang@ci.winona.mn.us

3. Project consultants/Firm name (if applicable): SEH

Contact name: Susan Danzl

Address: 3535 Vadnais Center Dr, St. Paul, MN 55110

Phone: 651.280.0884 Fax:

E-mail: sdanzl@sehinc.com

4. **Project area description:**	☒ **Sewered:**	☐ **Unsewered** (submit map of project area)
a. Number of existing households:	15,620	
b. Number of non-residential users:	1,650	

Need or problem project addresses: (Check all that apply)

- ☐ Failing on-site systems # of failing systems:
- ☐ Connection to an existing system
- ☐ Rehab of an existing facility
- ☐ Rehab collection system
- ☐ Expansion of existing treatment plant
- ☐ New treatment and/or collection system
- ☒ Advanced treatment

5. Please indicate if this project may be a Green Project Reserve (GPR) which are wastewater projects that are either categorical or non-categorical and have components or the entire project is applying to be determined GPR eligible.

The U.S. Environmental Protection Agency (EPA) provided a guidance document listing examples of projects that will qualify for Green Project Reserve dollars. Below is a list of those examples. If the proposed project matches one or more of the examples, check the box next to the example that describes the project. For more information, see *CW Green Guidance* at http://www.pca.state.mn.us/water/wastewater-financial.html.

Categorical eligible project types

☐ 1. **Water Efficiency**

- ☐ a. Installation of water meters (applies only to drinking water distribution systems – contact the Minnesota Department of Health)
- ☐ b. Retrofit or replacement of water using fixtures, fittings, equipment or appliances
- ☐ c. Efficient landscape or agricultural irrigation equipment
- ☐ d. Systems to recycle gray water
- ☐ e. Reclamation, recycling, and reuse of existing rainwater, condensate, degraded water, stormwater, and/or wastewater streams.
- ☐ f. Collection system leak detection equipment
- ☐ g. Development and initial distribution of public education materials

☒ **2. Energy Efficiency**

- ☒ a. Energy efficient retrofits and upgrades to pumps and treatment processes
- ☐ b. Leak detection equipment for treatment works
- ☐ c. Producing clean power for 212 treatment works on site (wind, solar, hydroelectric, geothermal, biogas powered combined heat and power)
- ☐ d. Pro-rata share of capital costs for offsite publicly owned clean energy facilities that provide power to a treatment works.

☐ **3. Green Infrastructure**

- ☐ a. Implementation of comprehensive street tree or urban forestry programs, including expansion of tree box sizes to manage additional stormwater and enhance tree health.
- ☐ b. Implementation of green streets (combinations of green infrastructure practices in transportation rights-of-ways), for either new development, redevelopment or retrofits
- ☐ c. Implementation of water harvesting and reuse programs or projects, where consistent with state and local laws and policies.
- ☐ d. Implementation of wet weather management systems for parking areas which include: the incremental cost of porous pavement, bioretention, trees, green roofs, and other practices that mimic natural hydrology and reduce effective imperviousness at one or more scales.
- ☐ e. Establishment and restoration of riparian buffers, floodplains, wetlands and other natural features.
- ☐ f. Downspout disconnection to remove stormwater from combined sewers and storm sewers.
- ☐ g. Comprehensive retrofit programs designed to keep wet weather out of all types of sewer systems using green infrastructure technologies and approaches.

☐ **4. Environmentally Innovative Projects**

- ☐ a. Green Infrastructure/Low Impact development stormwater projects
- ☐ b. Decentralized wastewater treatment and/or reuse projects that reduce energy consumption, recharge aquifers and reduce water withdrawals and treatment costs
- ☐ c. Projects that employ development and redevelopment practices that preserve or restore site hydrologic processes through sustainable landscaping and site design.
- ☐ d. Projects that use water balance approaches (water budgets) at the project, local or state level that preserve site, local or regional hydrology. Such an effort could pilot and show-case efforts to plan and manage in a concerted manner, surface and groundwater withdrawals, stream base flow (aquatic species protection), wetland and floodplain storage, groundwater recharge and regional or local reuse and harvesting strategies using a quantified methodology.
- ☐ e. Projects that demonstrate the energy savings and climate change implications of sustainable site design practices and the use of green infrastructure such as green roofs, increased tree canopy, reduced water consumption and potable water use due to sustainable site designs, rainwater harvesting and reuse and reductions in hard or infrastructure needed to manage stormwater and Combined Sewers Overflow (CSOs).
- ☐ f. Projects that demonstrate the differential uses of water based on the level of treatment and potential uses as a means to reducing the costs of treating all water to potable water standards.
- ☐ g. Projects that identify and quantify the benefits of using integrated water resources management approaches.

☐ **5. Non-categorical (describe)**

____

____

6. Possible solution and cost estimates (if known): ______________________________

Phosphorus Treatment and Upgrades, $20,000,000

7. Current project status: pre-planning

8. Desired construction start date, if financing is available (month/year): 8/2024

NOTE: Required attachments for unsewered area projects. A map of the project service area which has an identifiable scale, identifies all the structures with wastewater flows, and has the maximum impact zone clearly encircled.

On behalf of an eligible project as their authorized authority, I hereby submit this application for placement on the PPL:

Print Authorized
Representaive Name: Brian DeFrang

Signature: ______________________________

Title: Director of Public Works

Date: 3/5/2021

For more information, contact:

Bill Dunn, Clean Water Revolving Fund Coordinator at 651-757-2324 or bill.dunn@state.mn.us
www.pca.state.mn.us/water/wastewater-financial.html

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

PPL Wastewater Existing Facility Improvements Scoring Worksheet

Project Priority List (PPL)
Minnesota Rule Chapter 7077.0117

Doc Type: PPL Points Determination

MPCA Use Only

Project Number
Staff Engineer
Total Points
Date

Facility Information (please print)

Project name: Winona WWTF Upgrades

Applicant name (if different): City of Winona

Contact name: Brian DeFrang Title: Director of Public Works

E-mail address: BDeFrang@ci.winona.mn.us Phone: ____

Instructions: This worksheet is used to score all requests for state financial assistance for wastewater improvement projects for Minnesota Pollution Control Agency (MPCA) permitted facilities. Scoring is based on the environmental criteria contained in Minnesota Rule Chapter 7077. The result of scoring is a ranked list called the Project Priority List (PPL) from which projects will be selected for funding.

Applicants must complete their sections of the worksheet and submit it with their requests for placement on the PPL. As part of completing the worksheet, the applicant must provide sufficient documentation to support the award of points. Complete application information is located on the MPCA website at http://www.pca.state.mn.us/ppl.

Complete this form if your proposal includes improvements to wastewater collection and/or treatment facilities that have an existing National Pollutant Discharge Elimination System (NPDES) Permit or a State Disposal System (SDS) Permit.

For more information, contact: Bill Dunn, Clean Water Revolving Fund Coordinator at 651-757-2324, Fax 651-297-8324, or bill.dunn@state.mn.us.

Applicant completes questions 15-40 and 85; MPCA completes 45-80, 90-95 **Points**

[15] Existing and proposed stabilization ponds located in karst areas and SDS facilities with high ground water table [subp. 6]

15.1 Does this project replace or rehabilitate stabilization ponds located over karst areas? ☐ Yes ☒ No

15.2 Does this project replace or rehabilitate wastewater treatment facilities having a disposal site (spray irrigation, rapid infiltration, etc.) with less than three feet of vertical separation from the treated wastewater discharge point to the seasonally high ground water table or to bedrock? ☐ Yes ☒ No

If Yes to either 15.1 or 15.2, enter 20 points ☐

[20] Existing facility at or above 85% capacity [subp. 1]

Complete 20.1 *if project improves only the treatment facility or improves both the treatment facility and the collection facilities.*

20.1 Is this treatment facility at or above 85% of either its permitted hydraulic flow or organic loading capacity as determined by the last 12 month average wet weather flow (AWW) or average annual discharge, **and** will the project proposal appropriately resolve capacity issues either through expansion of treatment capacity or reduction of loadings? ☐ Yes ☒ No

Permitted hydraulic and/or organic loading capacity: ____

Actual hydraulic and/or organic loading capacity: ____

Complete 20.2 *if project improves only the collection facilities.*

20.2 Is this collection facility at or above 85% of the design peak instantaneous wet weather flow (PIWW) or provide documentation of other physical conditions, such as by-passing to show the peak flow has exceeded the design PIWW, **and** will the project proposal appropriately resolve capacity issues through expansion of collection facility capacity? ☐ Yes ☒ No

Design PIWW: ____

Documented peak flow: ____

If Yes to either 20.1 or 20.2, enter 5 points ☐

Project name: Winona WWTF Upgrades **Points**

[25] Existing age of treatment or collection facilities within the proposed project service area [subp. 2]
(*Age is determined by the construction year of all or a substantial portion of the existing facility addressed by project.)*

25.1 Last significant construction year of treatment or collection facilities, which are proposed to be repaired or replaced within the service area? ☒ Yes ☐ No

Enter Year: 1970

25.2 Are the facilities 20 years or more old? If yes, attach documentation of last significant construction year. ☒ Yes ☐ No

If Yes, enter 20 points 20

[30] Existing excessive infiltration/inflow (i/i) with proposed reduction plan [subp. 3]

30.1 Does this facility have excessive infiltration or inflow? (Minn. R. 7077.0105, subp. 12 and 13)

Calculate infiltration: _________ gallon/capita/day Greater than 120 gallon/capita/day? ☐ Yes ☒ No

Calculate inflow: _________ gallon/capita/day Greater than 275 gallon/capita/day? ☐ Yes ☒ No

30.2 Does the proposal include measures to correct excessive infiltration or inflow? ☐ Yes ☒ No

If Yes to both 30.1 and 30.2, enter 15 points

[35] Existing or proposed land (including sub-surface) discharge [subp. 4]

35.1 Does the facility currently land discharge treated wastewater effluent, will it continue to land discharge, **and** not create or contribute to known ground water nitrate levels over 10 mg/L? ☐ Yes ☒ No

35.2 Does the proposed alternative call for the consumptive use (nitrogen or volume) spray irrigation or on-land disposal systems, that are required by permit to denitrify (nitrate limit)? ☐ Yes ☒ No

If Yes to either 35.1 or 35.2, enter 20 points

[40] Existing stringent limit that exceeds secondary treatment [subp. 5]

40.1 Is the existing facility currently subject to CBOD or TSS permit limits that are more stringent than secondary treatment (25 mg/l and 30 mg/l), or has an ammonia, total nitrogen or phosphorus limit? (Minn. R. 7050.0211) Exclude facilities discharging to Class 7 waters that are subject to 15 CBOD. ☒ Yes ☐ No

If Yes, enter 10 points 10

[45] Existing effluent discharge violations *(Enforcement staff)* [subp. 7]

45.1 Is the existing facility on the Significant Noncompliance List (CFR, title 40, section 123.45, appendix A) **and** would the proposed project designed to eliminate the problem? ☐ Yes ☒ No

If Yes, enter 5 points

[50] Existing repeated facility failures *(Enforcement staff)* [subp. 8]

50.1 Has the existing treatment or collection facility experienced bypasses, overflows and/or surcharges during two or more storm events within a 12-month period when operating at less than "peak instantaneous wet weather flow" **and** is the proposed project designed to eliminate such failures? ☐ Yes ☒ No

If Yes, enter 10 points

[55] Existing discharge to outstanding resource value water (ORVW) or impaired water (*Effluent Limits Coord.)* [subp. 9]

55.1 Does the existing facility currently discharge into an ORVW or Impaired water? ☐ Yes ☐ No

If Yes, enter 5 points

55.2 If yes, does the existing facility also have existing acute/chronic effluent discharge standards violations? (see question 45.1 or subp. 7)? ☐ Yes ☐ No

If Yes to both 55.1 and 55.2, enter 5 points

55.3 If yes, does the existing facility also have existing chronic failures? (see question 50.1 or subp. 8) ☐ Yes ☐ No

If Yes to 55.1, 55.2, and 55.3, enter 5 points

[60] Existing discharge near potable water intake (*Effluent Limits Coordinator)* [subp. 10]

60.1 Is there potable water intake within 25 miles downstream of the existing facility discharge? ☐ Yes ☐ No

If Yes, enter 5 points

[65] Existing endangered or threatened species (*Effluent Limits Coordinator)* [subp. 11]

65.1 Does the receiving water downstream from the existing facility discharge support any endangered or threatened species? ☐ Yes ☐ No

If Yes, enter 5 points ☐

[70] Proposed introduction of more stringent discharge limits for an existing facility (*Effluent Limits Coordinator)* [subp. 12]
Does this existing treatment facility need to meet more intensive and/or extensive wastewater treatment standards because of:

70.1 More stringent facility discharge limits as incorporated into MPCA permit revisions? ☐ Yes ☐ No

70.2 Discontinuation of an existing permit variance? ☐ Yes ☐ No

70.3 Need to treat additional hydraulic or organic loading capacities without increasing either the permitted frozen effluent mass limit or concentration of discharges to the receiving waters? ☐ Yes ☐ No

If Yes to 70.1, 70.2 or 70.3, enter 10 points ☐

[75] Existing receiving water classification *(Effluent Limits Coordinator)* [subp. 13]

Only the most strict classification can be used, 7 points maximum

75.1 Receiving water classification is 2A ☐ Yes ☐ No

If Yes to 75.1, enter 7 points ☐

75.2 Receiving water classification is 1, 2Bd ☐ Yes ☐ No

If No to 75.1 and Yes to 75.2, enter 5 points ☐

75.3 Receiving water classification is 2B, 2C, 2D ☐ Yes ☐ No

If No to 75.1 and 75.2 and Yes to 75.3, enter 3 points ☐

75.4 Receiving water classification is 7 ☐ Yes ☐ No

If No to 75.1, 75.2 and 75.3 and Yes to 75.4, enter 1 point ☐

[80] Project facility effluent to stream impact dilution ratio *(Effluent Limits Coordinator)* [subp. 14]

*For all discharges to rivers, streams, or ditches (flowing receiving water), calculate the facility effluent low flow by averaging the influent flow reported on the monthly discharge monitoring reports (DMRs) for the three consecutive months with the lowest **influent** flow in three climatic years, April 1 to March 31.*

80.1 What is the ratio of the **influent** low flow of the facility to the 7Q10 flow of the receiving water?

Dilution Ratio* = Wastewater Treatment Facility (WWTF) Low Flow (million gallons per day [mgd]) / Receiving water low flow (mgd)

(_____ mgd/ _____ mgd = Dilution Ratio) Dilution Ratio = ☐

*For all "Dilution Ratios" greater than 1.0 or if the 7Q10 receiving water flow = 0 mgd set dilution ratio = 1.0

Note: Round up calculated value for dilution ratio to the next whole number (e.g., 8.3 = 9). 15 x dilution ratio = ☐

[85] Proposed project implements corrective measures (*Effluent Limits Coordinator)* [subp. 15]

85.1 Will the project implement corrective measure(s) for problems identified in a study, such as: ☐ Yes ☐ No

- Clean Water Partnership Project
- Impaired Water Study
- EPA-approved Watershed Restoration Action Strategy
- Equivalent (other) study, e.g., County Water Plan

Type of Study: *Attach supporting documentation and identify relevant sections.*

If Yes, enter 5 points ☐

[90] Proposed project helps meet a total maximum daily load (TMDL) for a receiving water *(Effluent Limits Coord)* [subp. 16]

90.1 Does this project contribute to the achievement of a TMDL by being designed to reduce the discharge of pollutants as required by an Agency approved TMDL implementation plan or does the project require an National Pollutant Discharge Elimination System (NPDES) Permit or State Disposal System (SDS) Permit that will require the reduced discharge of pollutants based on a TMDL? ☐ Yes ☐ No

If Yes, enter 20 points ☐

Project name: **Winona** WWTF Upgrades **Points**

[95] Propose project points reduction for new/expanded discharges into specified waters *(Effluent Limits Coord)* [subp. 17]

95.1 Does the proposed project involve a new or expanded discharge* to one or more of the following specified waters? ☐ Yes ☐ No

a) Outstanding Resource Value Waters (Minn. R. 7050.0180)

b) Impaired waters (Section 303(d) of the Clean Water Act)

c) Classification 2A, lake, or wetland that exceeds 200,000 gallons per day

* If new permit requirements include frozen effluent mass limits from the existing permit, the facility is not defined as expanding and negative points will not be assigned.

If Yes, enter minus 5 points ☐

[100] Project includes wastewater reuse

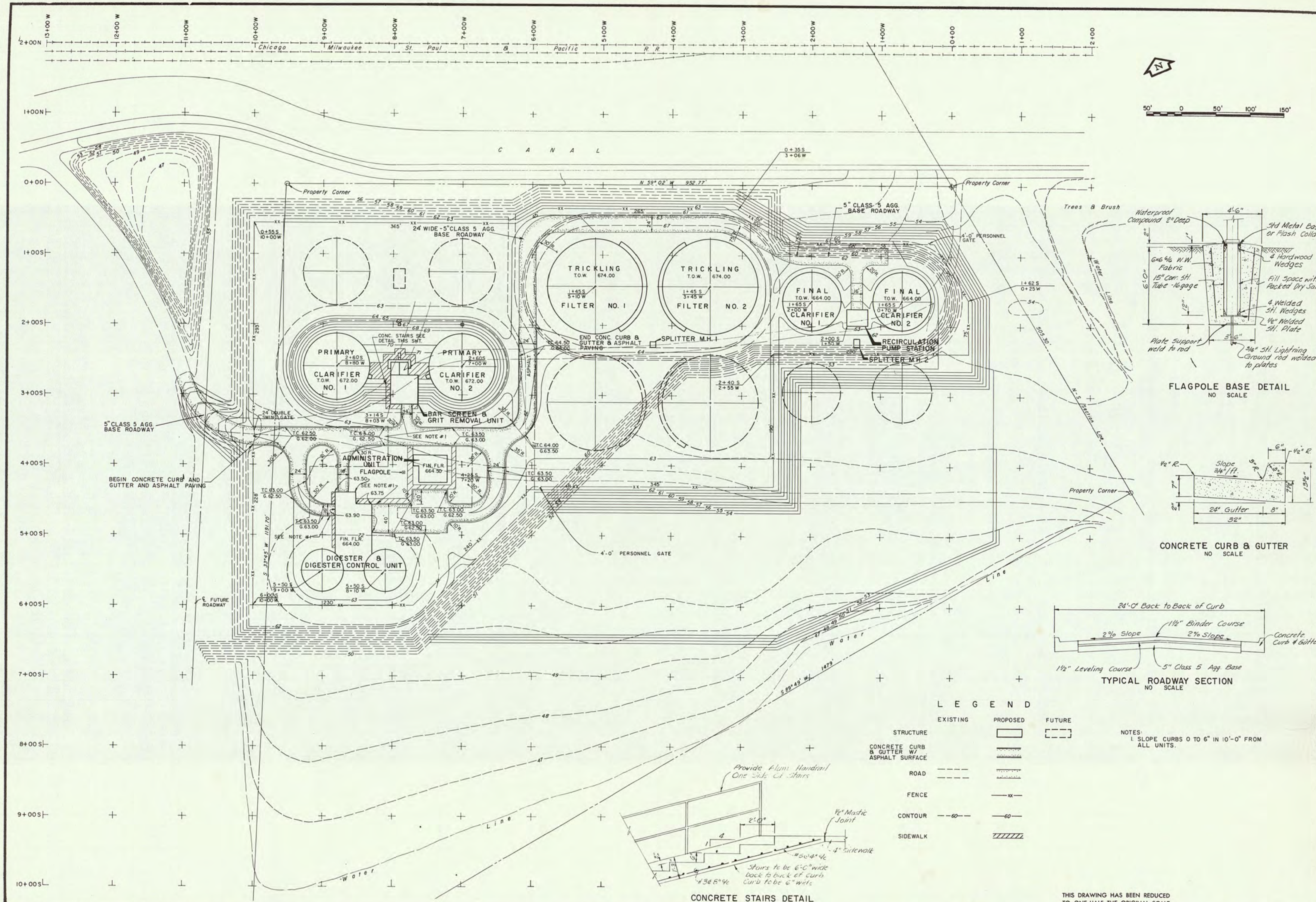
100.1 Does the project include the beneficial use of treated wastewater effluent that will reduce or replace the use of a groundwater, surface water, or potable water source? ☐ Yes ☒ No

100.2 Do the project components needed to beneficially use treated wastewater effluent account for at least 20% of the total eligible project cost? ☐ Yes ☒ No

100.3 Does the project receive points under item 35 (Minn. R. 7077.0117, subp. 4) for land discharge? ☐ Yes ☒ No

If Yes to both 100.1 and 100.2, enter 30 points ☐

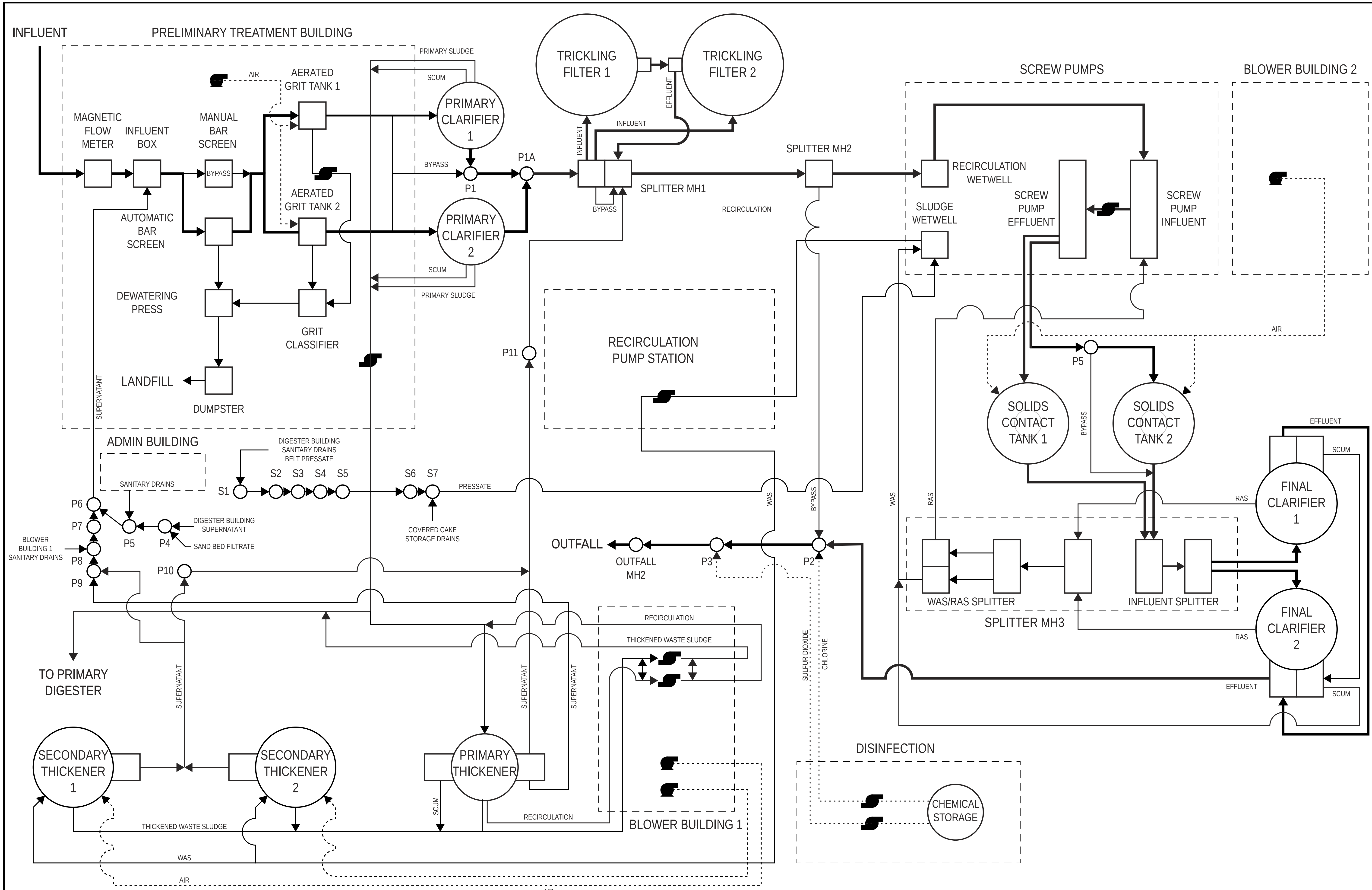
Total ☐



HENNINGSON, DURHAM & RICHARDSON	ENGINEERS · ARCHITECTS · PLANNERS · CONSULTANTS · OMAHA, NEBRASKA	DESIGNED P.J.M. / DETAILED P.A.H. / APPROVED P.R.O. / CHECKED H.L.C.	WATER POLLUTION CONTROL FACILITIES — SITE PLAN — WINONA, MINNESOTA
MACKICHAN & MADSEN	CONSULTING ENGINEERS MINNEAPOLIS, MINNESOTA	DATE / REVISIONS / BY	PART III G-1 JOB NO. 12750406A DATE: 1970

Appendix K

Flow Diagrams



1 / 1 PROCESS FLOW DIAGRAM FOR WINONA

3535 VADNAIS CENTER DR
ST PAUL, MN 55110
PHONE: 651.490.2000
FAX: 888.908.8166
TOLL FREE: 800.325.2055
www.sehinc.com

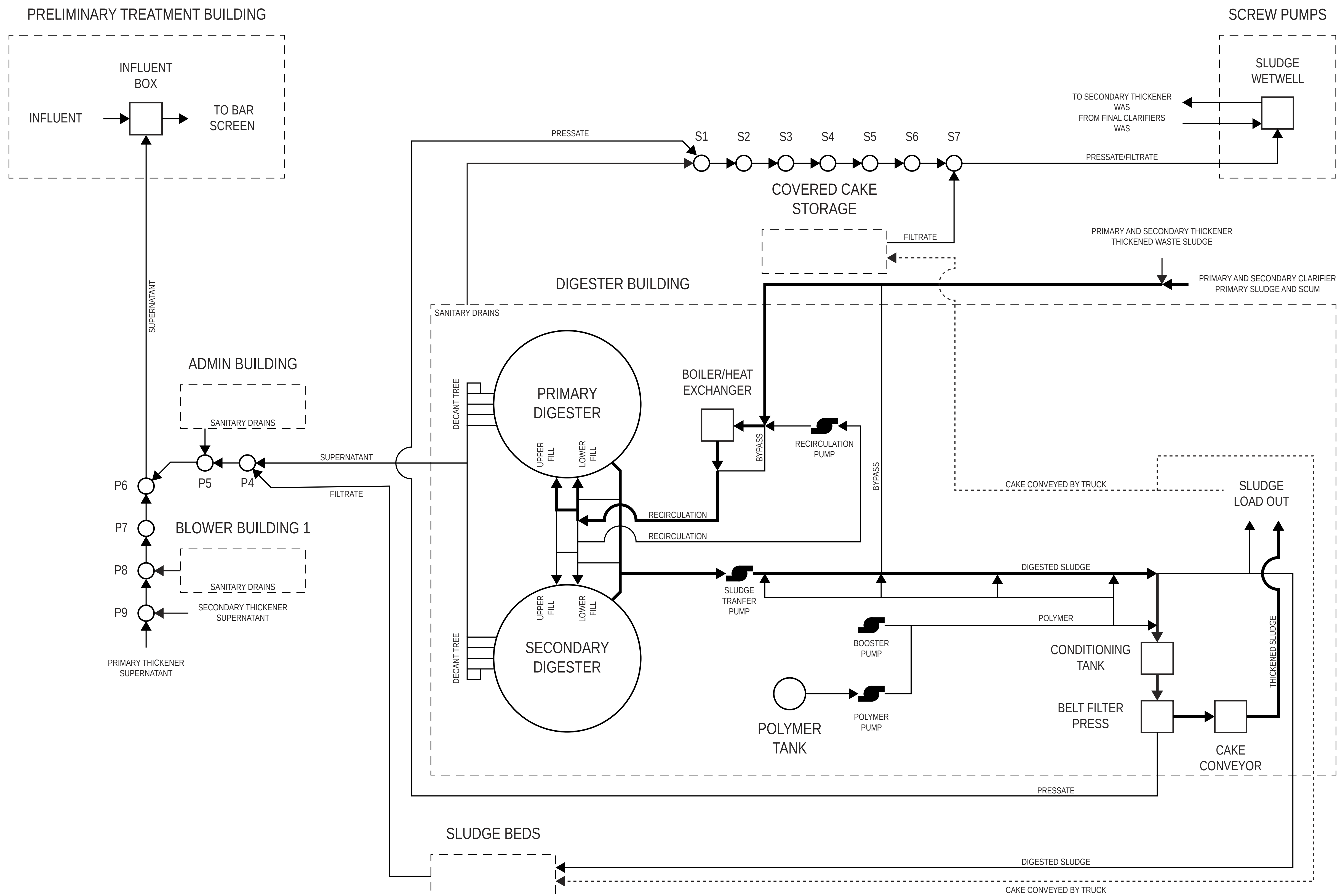
SEH

WINONA, MINNESOTA

FILE NO.
CITY PROJECT NO.
ISSUED DATE 11/20/2018

SHEET TITLE
WINONA, MN WWTF
PROCESS FLOW DIAGRAM

Figure
1



1
1
PROCESS FLOW DIAGRAM FOR WINONA

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SEH

WINONA, MINNESOTA

FILE NO.
CITY PROJECT NO.
ISSUED DATE 11/20/2018

Short Elliot Hendrickson Inc. (SEH)

SHEET TITLE
WINONA, MN WWTF
PROCESS FLOW DIAGRAM

Figure
2

Appendix L

Photos

Photo 1 Preliminary Treatment Building Mechanical Bar Screen and Dewatering Unit

Photo 2 Preliminary Treatment Building Grit Pump

Photo 3 Preliminary Treatment Building In-Plant Lift Station Pumps

Photo 4 Preliminary Treatment Building Primary Sludge Pumps

Photo 5 Preliminary Treatment Building Influent Flow Meter

Photo 6 Primary Clarifier Tank 1

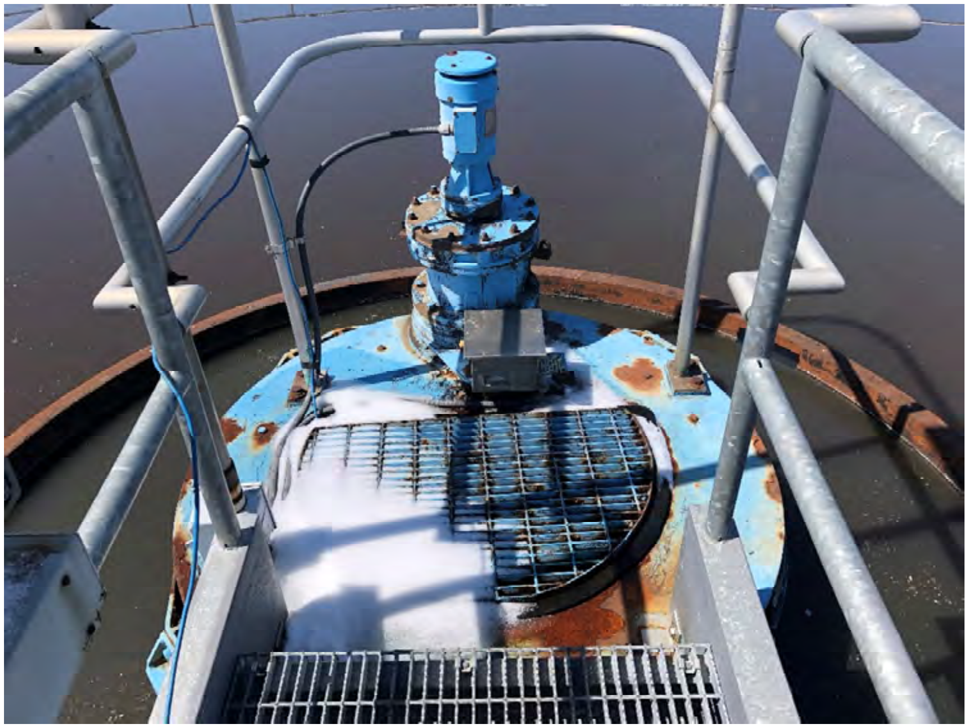


Photo 7 Primary Clarifier Tank 1 Drive

Photo 8 Trickling Filter Tank 1

Photo 9 Trickling Filter Tank 1 Media

Photo 10 Screw Pumps

Photo 11 Solids Contact Tank 1

Photo 12 Final Clarifier Tank 1

Photo 13 Primary Anaerobic Digester Cover

Photo 14 Secondary Anaerobic Digester Cover

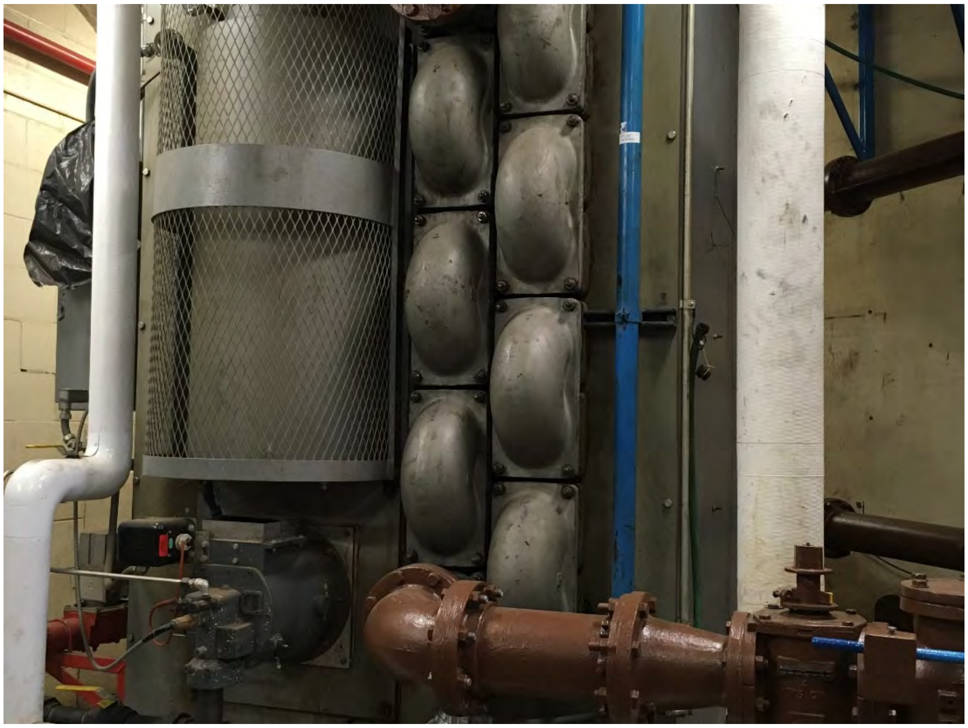


Photo 15 Combination Boiler and Heat Exchanger

Photo 16 Boiler

Photo 17 Digester Recirculation Pump and Grinder

Photo 18 Polymer Mixing Tanks No.1 and No. 2

SEH

Photo 19 Belt Filter Press

Photo 20 Dewatered Cake Conveyor

Photo 21 Wash Water Booster Pump

Photo 22 Sludge Storage Beds

Photo 23 Cake Storage Building

Photo 24 Administration Building

Appendix M

2017 Solids Preliminary Design Report

Solids Preliminary Design Report

Winona Wastewater Treatment Facility

Winona, Minnesota

WINON 145602 | January 6, 2020

Building a Better World
for All of Us®

Engineers | Architects | Planners | Scientists

January 6, 2020

RE: Winona Wastewater Treatment Facility
Solids Preliminary Design Report
Winona, Minnesota
SEH No. WINON 145602 4.00

Mr. Paul Drazkowski
City of Winona
1400 Shives Road
Winona, MN 55987

Dear Mr. Drazkowski:

Attached is the Solids Preliminary Design Report that addresses improvements to biosolids processing and biogas production for the Winona Wastewater Treatment Facility. The report has an emphasis on thickening improvements to address the poor performance of the existing thickeners. The report also addresses other facility needs, including dewatering, sludge storage, primary clarifiers, and pretreatment.

The objectives of the study were to develop a sequenced plan for implementing improvements and develop cost estimates to allow for future planning. This Report provides recommendations, technical details for the recommendations, and an approach for sequencing.

We look forward to working with you to implement the first phases of these improvements. Keep us informed of discussions with the MPCA and timing of your revised NPDES permit.

Sincerely,

Susan Danzl, PE
Project Manager
(Lic. CA, CO, MN)

dmk
s:\uz\w\winon\145602\4-prelim-dsgn-rpts\43-prelim-dsgn\solids preliminary design report_finalv2.docx

Contents

Contents (continued)

List of Tables

Contents (continued)

List of Figures

List of Appendices

Solids Preliminary Design Report

Winona Wastewater Treatment Facility

Prepared for City of Winona

1 Introduction

In 2014 the City of Winona completed a condition Evaluation Study of the City's wastewater treatment facility (WWTF) and lift stations. This report recommended that the City investigate other options for sludge thickening to address the poor performance of the existing thickeners. It also suggested improvements to the ventilation system in the digester building to comply with codes and replacement of the existing belt filter press for biosolids dewatering. These three components (thickening, digestion, and dewatering) are all interrelated, and this preliminary design report provides a comprehensive evaluation of the biosolids system to provide a clear direction and plan of implementation for the City.

1.1 Purpose

The objectives of this report are to identify the thickening process best suited for the WWTF, while considering the larger solids process train to identify other solutions that can further reduce operational costs. These considerations include producing a drier product and increasing the biogas production and utilization. This report also identifies a sequencing plan for capital planning purposes. This preliminary design report evaluates alternatives for:

- Modification and replacement of existing thickening and dewatering systems to meet current and potential future demands.
- Evaluation of increased biogas production and utilization from the anaerobic digesters including high-strength wastes, gas storage, and gas utilization.

This report also identifies planning-level costs for improvements to:

- Pretreatment to address aging equipment and fire-protection standards.
- Primary clarification to address aging equipment.
- Digestion to address heating and fire-protection standards.

1.2 Report Organization

This report is organized into the following sections:

- **Section 2: Existing Facility Description**. This section describes the existing facility and solids processing.
- **Section 3: Design Conditions**. This section develops the design criteria for the thickening and dewatering equipment evaluations, including current conditions and future design conditions with treatment for phosphorus removal.

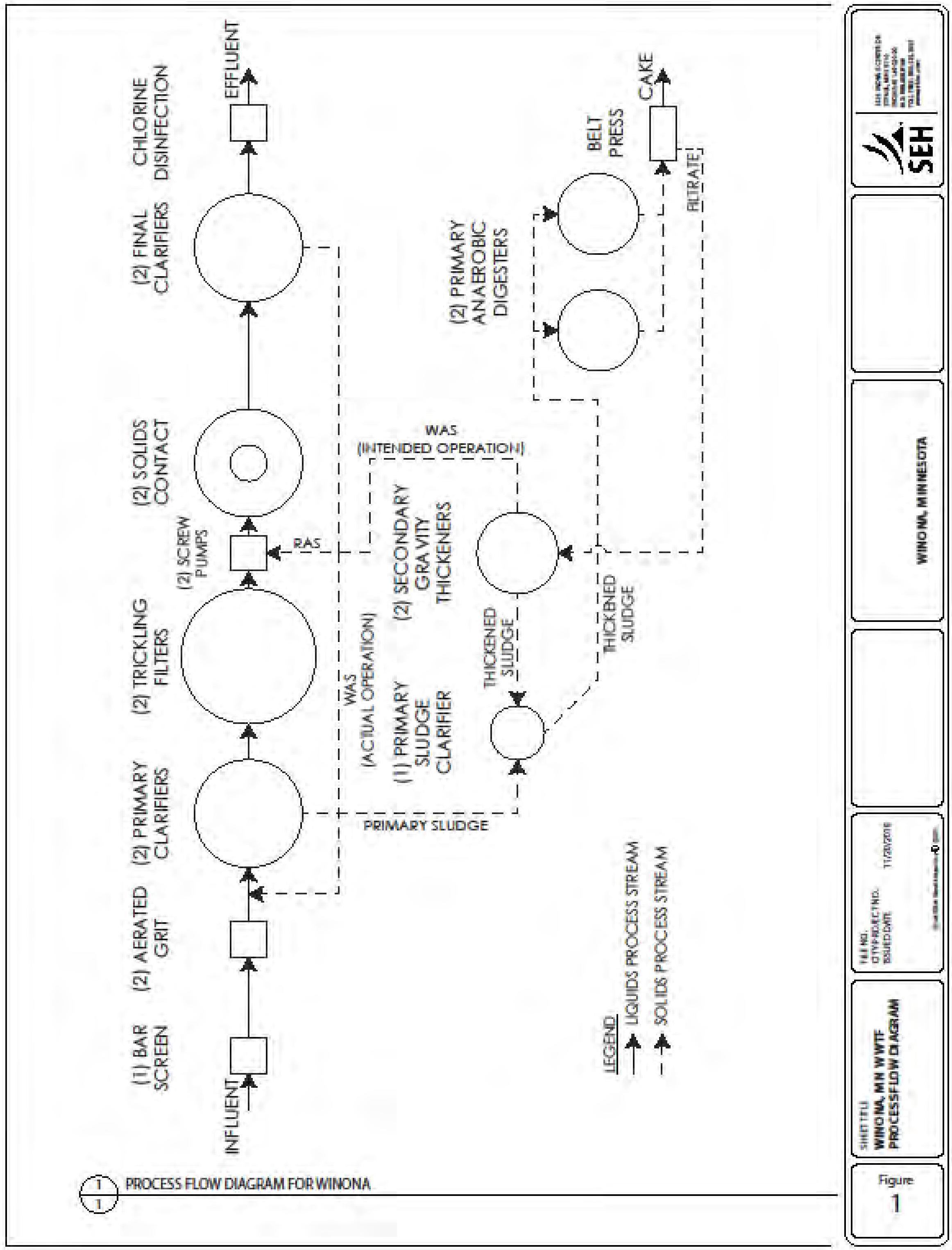
- **Section 4: Thickening**. This section describes the thickening technologies that were initially considered and the process of narrowing down to the recommended technology. It includes concept layouts for the recommended system.
- **Section 5: Dewatering**. This section describes the dewatering technologies that were initially considered and those that were evaluated in further detail. It includes concept layouts for the recommended technology.
- **Section 6: Digester Complex Improvements**. This section describes the improvements to the Digester Complex to meet the current National Fire Protection Association (NFPA) Standards. These improvements are in addition to the dewatering improvements identified in Section 5.
- **Section 7: Site Electrical Improvements**. This section addresses the facility's need for additional back-up power.
- **Section 8: Additional Gas Generation and Utilization**. This section reviews opportunities to increase the biogas production with high-strength wastes. It also covers improvements that can better utilize the additional gas produced (increased electrical generation capacity and biogas storage).
- **Section 9: Cake Storage**. This section reviews the biosolids storage capacities and improvements to increase capacity.
- **Section 10: Pretreatment Improvements**. This section describes improvement to the Pre-Treatment Building to meet the current NFPA standards.
- **Section 11: Recommendations and Phasing Plan**. This section summarizes the recommendations from Sections 4-10 into a phasing plan to assist with capital improvement planning.

2 Existing Facility Description

The WWTF was originally constructed as a trickling filter plant in 1970. In 1985, the current dewatering belt press and outside sludge storage were installed. In 1996, to increase organic capacity, two final clarifiers were converted to solids contact aeration basins and two new clarifiers and two digesters were constructed. More recently in 2015, the secondary anaerobic digester was converted to a second primary anaerobic digester. A microturbine was also installed to utilize the biogas from the digestion process. Figure 1 includes a flow diagram of the facility today. As this report is focused on the solids, below is a description of the current solids treatment:

- Primary solids are routed to a sludge clarifier, where they are thickened (along with secondary sludge) to 2.5-3.0% solids prior to digestion.
- Waste activated sludge (WAS) at about 0.5% solids from the two final clarifiers flows back to the head of the plant where it is co-settled in the primary clarifiers and then in the sludge clarifier. There are two gravity thickeners to thicken the WAS, but challenges with these units and lack of performance, resulted in co-settling WAS with primary sludge.
- The thickened solids are fed to two anaerobic digesters. The digesters are both mixed and heated, and have floating covers.
- Digested solids are dewatered with a belt filter press (BFP). The BFP produces cake that is 13% solids on average. The City had manufacturers test newer equipment, without significant improvements to percent solids.
- Biogas generated from the anaerobic digesters is used to fuel a 65kW microturbine.

Figure 1 – Process Flow Diagram for Winona WWTF



3 Design Conditions

In evaluating solids improvements, the processes must be designed to handle the current solids generated, and be scalable to handle increases in solids generated as the facility takes on increased flows/loads and complies with potential future phosphorus limits. Development of design conditions for Winona involved:

- Evaluating historical flows and loads to establish the current conditions.
- Determining a future service population and associated future flows and loads considering input from significant industrial dischargers.
- Estimating future solids production from either biological or chemical phosphorus removal.

3.1 Planning Period

The typical planning period for wastewater treatment facilities is 20 years due to the useful service life of process equipment. The future hydraulic and load capacity of the facility will be based upon whichever of the following is greater:

- Projections of flow and load to 2040, which will be considered the design year, or
- The existing permitted design capacity of the WWTF.

3.2 Service Population

The facility's service area includes the communities of Goodview and Minnesota City. The most recent population estimates for Winona, Goodview, and Minnesota City reported 2016 populations of 27,478, 4,151, and 189 respectively.

Winona is home to both Winona State University and Saint Mary's University of Minnesota, which enroll approximately 7,656 and 1,590 undergraduates respectively, which is highlighted for the high-strength waste receiving evaluation in Section 8 of this report.

The Minnesota State Demographic Center provides population estimates for Counties in the State of Minnesota. The Demographic Center predicts an 8.9% *reduction* in population for Winona County between 2016 and 2040. Winona is approximately 54% of the 2016 population of Winona County and is assumed to follow the same population growth trend.

The Winona WWTF receives flow from four categorical and three non-categorical significant industrial users (SIUs). In 2016, the seven SIUs discharged a combined 561,591 gallons per day (gpd) on average. In 2017, the combined flow decreased 20% to 446,684 gpd. For the purposes of this project, the industrial users were not surveyed for future growth. It is assumed that the industrial flow will remain consistent with 2017 flows and loads, and any potential increase would be offset by the projected population decrease.

3.3 Current Flows and Loads

Four operating years of daily monitoring reports (DMRs) (January 2015 to March 2018) were evaluated to determine current conditions, and Table 2 summarizes the applicable loads used to develop the design conditions for the solids process evaluations. These tables report the current conditions and also the design capacity for the facility.

Definitions of flow conditions used in Table 1 are as follows:

Average Dry Weather Flow (ADW): Flow that occurs during dry periods when the groundwater level is low or normal, normally apparent in winter months (December, January, and February) when there is little to no inflow.

Average Annual Flow (AA): Daily average flow during the review period of December 2015 through March 2018.

Average Wet Weather Flow (AWW): Daily average flow for the wettest 30 consecutive days or the largest volume of flow that occurred during a continuous 30-day period, expressed as a daily average (also referred to as peak month flow).

Table 1 – Flow Determination for Winona WWTF

Parameter	Current Conditions and 2040 Estimated Flows[1]	Facility Design Capacity
Average Dry Weather Flow, MGD	3.16	6.74
Average Annual Flow, MGD	3.53	8.17[4]
Average Wet Weather Flow, MGD [2]	5.97[3]	9.60

Notes:

1 With no anticipated growth, current and projected 2040 flows are the same.

2. Average wet weather flow is equal to average calendar day during May and June due to high seasonal flows to the facility while the Mississippi River is at or near flow stage.

2 5.97 MGD occurred between May 9th, 2017 and June 7th, 2018.

3 8.17 MGD average annual design flow is average of the permitted ADW and AWW design flows.

Table 2 – Load Determination for Winona WWTF

Parameter	Current Condition and 2040 Estimated Flows[1]	Calculated Per Capita Load (ppcd)	Design Capacity
Carbonaceous 5-Day Biochemical Oxygen Demand ($cBOD_5$), mg/L [2]	250		
Carbonaceous 5-Day Biochemical Oxygen Demand ($cBOD_5$), ppd	7,423 / 8,932	0.23 [3]	14,605
Total Suspended Solids (TSS), mg/L [2]	195		
Total Suspended Solids (TSS), ppd	6,364 / 10,517	0.18 [4]	13,936
Total Phosphorus (TP), mg/L	7.4 / 20.0		
Total Phosphorus (TP), ppd	218 / 398	0.007 [5]	

Notes:

1 (Average / Maximum). Maximum load is the largest mass load that occurred during a continuous 30-day period, expressed as a daily average. With no anticipated growth, current and projected 2040 loads are the same.

2 Average concentration based on DMR reported values.

3 Typical range for per capita $cBOD_5$ loading is 0.11-0.26 ppcd. (Metcalf and Eddy, 4th Edition). Ten State Standards suggests 0.17 ppcd BOD or 0.22 ppcd where garbage comminutors are used. MPCA recommends minimum design criteria of 0.17 ppcd. Does not include seasonal population in determination.

4 Typical range for per capita TSS loading is 0.13-0.33 ppcd (Metcalf and Eddy, 4th Edition). Ten State Standards suggests 0.20 ppcd or 0.25 ppcd where garbage disposals are commonly used. MPCA recommends minimum design criteria of 0.20 ppcd. Does not include seasonal population in determination.

5 Typical range for per capita TP loading is 0.006-0.010 ppcd (Metcalf and Eddy, 4th Edition). Does not include seasonal population in determination.

Average flows and loads determined from the DMR data review were compared against the service population to determine if the current per capita flow and load contributions are in line with published indices.

- The calculated historic per capita **$cBOD_5$** load of 0.23 pounds per capita per day (ppcd) is at the higher end of range for typical domestic sewage, however, this is likely a result of the industrial contributions. The current facility is designed to treat 14,605 ppd $cBOD_5$, which is greater than the current loading, so the existing design capacity will be assumed when estimating future solids totals.
- The calculated per capita **TSS** load of 0.18 ppcd is at the lower end of the range for typical domestic sewage and is lower than the recommended design factors. The current facility is designed to treat 13,936 ppd TSS, so the existing design capacity will be used when estimating future solids totals.
- The calculated per capita total **phosphorus** load is 0.007 ppcd. Metcalf and Eddy (2003) Wastewater Engineering suggest a typical design range for total phosphorus of 0.006-0.010 ppcd. The facility is not currently designed for a TP load, so the calculated per capita load of 0.007 ppcd was used to determine the design average load of 218 ppd.

3.4 Solids Projections

The facility may be upgraded to either biological phosphorus removal or chemical phosphorus precipitation in order to meet a potential future total phosphorus effluent limit of 0.7 mg/L. Alternatives were evaluated to ensure proposed solids improvements can have the capacity for future solids production resulting from chemical phosphorus precipitation, but still have the ability to turn down to both existing conditions and the moderate solids increase resulting from biological phosphorus removal.

Appendix A provides a summary of a biological phosphorus removal system, and further examines facility modifications to facilitate that system. Chemical phosphorus precipitation would involve the addition of chemical to either the aeration basins or final clarifiers in order to form floc which trap and settle phosphorus, and would not change the function of most treatment processes.

Appendix B summarizes the development of sludge production projections from primary settling, biological treatment, and chemical phosphorus removal. Quantifying these 3 sludge sources is critical to sizing the WAS thickening system as well as the dewatering system, as described in the following sections.

3.4.1 Thickening Basis of Design

The basis of design for thickening secondary solids at Winona, developed in Appendix B for the three design scenarios (current facility, projected biological phosphorus removal, and projected chemical precipitation) are summarized in Table 3.

Table 3 – Mechanical Thickener Basis of Design

Parameter	Design Value		
	Current Annual Average	Design Annual Average, Bio-P	Design Annual Average, Chem-P
Sludge Source	Waste Activated Sludge		
Average Feed Concentration	0.6%		
Design Thickened Sludge Concentration	4.0% [1]		
Minimum Solids Capture	95%		
Volatile Suspended Solids, Average	67%	77%	57%
Solids Loading, Average	3,440 ppd	6,320 ppd	8,630 ppd

Notes:

1 4.0% thickened WAS when blended with 6.0% thickened primary solids from gravity thickener, would result in approximately 5.0% solids fed to anaerobic digester.

Operationally, thickening improvements involves modifications to the thickening process train such that:

- Primary solids are gravity thickened in the existing sludge clarifier to 6.0% total solids. This performance is achieved before the WAS is co-settled with the primary solids.
- Waste activated sludge is thickened separately with a new process.

Depending on the type of mechanical thickening, the existing two secondary sludge gravity thickeners can be converted to solids holding tanks to facilitate shift operation of thickening equipment.

Table 4 provides an overview of the daily average solids production, for each of the three design scenarios. Three operating scenarios are evaluated: continuous operation, 7 hours per day 3 days per week and 7 hours per day 5 days per week. A final design feed rate and shift operation will be selected based on manufacturer's equipment capacity described later in this report.

Table 4 – Thickening Process Feed Rate Determination

Solids Scenario	Sludge Production (gpd)	Shift Operation Feed Rate at 0.6% Solids		
		Continuous Operation (gpm)	7 hr shift, 3 days/week (gpm)	7 hr shift, 5 days/week (gpm)
Current Annual Average	55,496	40	310	185
Design Annual Average for Bio-P Removal	119,100	85	665	400
Design Annual Average for Chem-P Removal	172,600	120	960	575

3.4.2 Dewatering Basis of Design

Determination for the projected solids load for dewatering is based on the minimum volatile solids destruction of 38% in the anaerobic digester. Minimum destruction provides the largest solids generation, as well as highest dewatering feed VSS fraction for a conservative design estimate.

Mechanical dewatering units receive pumped flow from the anaerobic digesters at varying flow rates based on solids generation, implementation of design scenarios, and shift operation. The basic design parameters for the mechanical dewatering process are summarized in Table 5.

Table 5 – Initial Mechanical Dewatering Basis of Design

Parameter	Design Value		
	Current Annual Average	Design Annual Average, Bio-P	Design Annual Average, Chem-P
Sludge Source	Anaerobically Digested Primary and Waste Activated Sludge		
Average Feed Concentration	3.5%		
Design Thickened Sludge Concentration	13-20% (highest attainable)		
Minimum Solids Capture	95%		
Volatile Suspended Solids, Average	65%	70%	57%
Solids Loading, Average	5,160 ppd	10,400 ppd	12,380 ppd

Table 6 provides an overview of the daily average biosolids production for each design scenario and the feed rates for two shift operation scenarios. A final design feed rate and shift operation will be selected based on manufacturer's equipment capacity described later in this report.

Table 6 – Dewatering Process Feed Rate Determination

Solids Scenario	Sludge Production (gpd)	Shift Operation Feed Rate	
		7 hr shift, 3 days/week (gpm)	7 hr shift, 5 days/week (gpm)
Current Annual Average	17,300	100	60
Design Annual Average for Bio-P Removal	33,500	190	125
Design Annual Average for Chem-P Removal	41,800	240	140

4 Thickening

Technology alternatives for WAS thickening were evaluated in two phases. Initially, high-level economical and non-economical evaluations were used to narrow down from 5 technologies to 2-3 for a more detailed evaluation and site visits. The high-level evaluation was presented in a workshop with City staff.

4.1 Thickening Technologies Evaluated

Five thickening alternatives were considered: dissolved air floatation, rotary drum, gravity belt, centrifuge and disc. The following sections describe each of these technologies.

4.1.1 Dissolved Air Floatation

Dissolved air floatation (DAF) thickeners are used to separate solids in situations where the specific gravity of the solids are close to that of water, such as wastewater sludge. A recirculation flow is diverted from the DAF effluent into a saturation tank where air is dissolved into the recirculation stream. Depending on the manufacturer, this can be in a saturation vessel or specially designed centrifugal pumps. The recirculation stream is then suddenly released from pressure as it is introduced to the influent stream. The sudden release causes the dissolved gas to form micro-bubbles that attach to the solids and cause them to float to the top of the tank. A collection scraper then diverts floating solids to a beach where some additional water is able to drain by gravity prior to the solids being pushed into a collection box. A second solids collector is at the bottom of the tank to collect anything that may settle out to the bottom of the DAF tank. DAF thickeners come in either circular or rectangular configurations.

4.1.2 Rotary Drum

The rotary drum thickener combines a flocculation zone with a multi-stage separation zone. Sludge is fed to the interior of the drum and filtered through perforations or wire mesh openings in the drum. The flocculation zone creates a low shear environment where polymer is introduced with influent sludge to aid in separation. As sludge leaves the flocculator, it enters the first of multiple separation zones with gradually increasing mesh openings. Each zone is separated by a ring with adjustable weir to control detention time. A rotary drum system is totally enclosed to assist with odor control.

4.1.3 Gravity Belt

Gravity belt thickeners introduce polymer prior to the thickener to assist in separation, typical fed to upstream piping or a flocculation tank. Sludge is then distributed across the width of a filter belt where excess water can drain through the porous belt. A series of plows move and turn the sludge to assist in separation and to some extent hold back solids to increase filter solids retention time. Thickened sludge is discharged at the end of the thickeners and filtrate is collected from below the filter.

4.1.4 Centrifuge

Centrifuge thickeners introduce polymer prior to the thickener to assist in separation, typically fed in upstream piping. Sludge is then introduced into a rapidly rotating conical drum. Centrifugal force causes solids to migrate against the drum wall. A scroll rotating slightly slower than the drum moves solids towards the smaller end of the conical drum. The scroll operates in a sludge pond which is controlled by adjustable weirs at the larger end of the conical drum. Effluent overflow the weirs while solids are lifted from the pond at the smaller end of the drum and discharged. A centrifuge system is totally enclosed to assist with odor control.

4.1.5 Disc

Disc thickeners introduce polymer into a flocculation tank upstream of the disc thickener. Solids are distributed by a baffle plate onto an inclined static screen. A slow rotating arm equipped with plows divides and moves the sludge through the cloth screen. Thickened sludge is pushed from the screen and collected. Periodic backwashing is required to maintain screen permeability. A disc system is totally enclosed to assist with odor control.

4.1.6 Summary of Thickening Technologies

Table 7 summarizes the high-level economic evaluation for thickening alternatives and Table 8 compares the properties of the thickening technologies. For each alternative, the capital, maintenance, polymer and electricity costs were estimated based on data provided by manufacturers. O&M costs are compared based on a 20-year net present value.

Additional assumptions include:

- Capital and operating costs do not include yard piping, utility connections, or intermediate pumping from thickening to digesters, as these would be required across all alternatives.
- Polymer cost is based on current annual average sludge production of 8,007 ppd, $2.81 per pound active polymer, 42% fraction active polymer.
- Electrical cost is based on $0.087 per kWh.
- Facility staffing is estimated at $42.00 per operator hour.
- 20-year net present value assumes 4.0% cost increase applied yearly.
- Biosolids disposal assumes a contract cost of $0.0349 per gallon disposed.

Based on costs and non-economic factors summarized in Tables 7 and 8, the dissolved air flotation, gravity belt, and centrifuge thickening technologies were selected for further evaluation.

Table 7 – Initial Thickening Technology Cost Comparison

Expense	Dissolved Air Flotation [1]	Rotary Drum	Gravity Belt	Centrifuge	Disc
Construction and Operating Costs					
Capital	$ 1,699,000	$ 1,296,000	$ 1,530,000	$ 1,821,000	$ 1,682,000
Maintenance, $/yr	$ 1,800	$ 650	$ 690	$ 5,000	$ 630
Polymer, $/yr	$ 16,400	$ 35,900	$ 30,700	$ 8,200	$ 30,700
Electrical, $/yr	$ 3,400	$ 2,000	$ 700	$ 17,800	$ 300
20-Year Net Present Value					
Construction	$ 1,699,000	$ 1,296,000	$ 1,530,000	$ 1,821,000	$ 1,682,000
Maintenance	$ 24,000	$ 9,000	$ 9,000	$ 68,000	$ 9,000
Polymer	$ 223,000	$ 487,000	$ 418,000	$ 111,000	$ 418,000
Electrical	$ 47,000	$ 27,000	$ 9,000	$ 243,000	$ 4,000
Staffing	$ 208,000	$ 313,000	$ 729,000	$ 313,000	$ 417,000
Net Present Value	**$ 2,201,000**	**$ 2,132,000**	**$ 2,695,000**	**$ 2,556,000**	**$ 2,530,000**

Notes:

1 DAF thickener technology evaluated was a rectangular system installed in a steel tank.

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Table 8 – Summary of Thickening Alternatives

Parameter	Dissolved Air Flotation	Rotary Drum	Gravity Belt	Centrifuge	Disc
Typical Thickened Solids Concentration	3-6%	5-7%	4-13%	3-20%	6%
Typical Solids Capture Rate	90-99%	98%	>98%	95%-99%	>95%
Polymer Use	Low, and may not need polymer addition, though polymer does improve solids capture and is likely some amount will be needed when thickening to 4.0% total solids.	Moderate polymer consumption to assist in retaining solids through the gradually increasing screen opening sizes.	Moderate polymer consumption to assist in retaining solids on the filter belt which would otherwise flow off	May not require polymer for thickening depending on the hydraulic loading of the centrifuge. Polymer does improve solids capture, and it is likely that some polymer will be required to achieve 4.0% total solids (similar to DAF).	Moderate polymer consumption
Power Use	Generally energy efficient, with the most energy consumption coming from the recirculation pumps. Recirculation flow may be twice that of the feed flow through the DAF tank, and varies with the amount of solids being fed to the system.	Low energy consumption which is mainly attributed to a booster pump required for cleaning solids from the drum screen (similar to DAF)	Low energy consumption with the largest consumption mainly attributed to a booster pump required for cleaning solids from the filter belt	High compared to other technologies due to the drive motor required to rotate the drum at high speeds	Low energy consumption
Building Needs	Large footprint, unit is open requiring large air handling unit to mitigate odors/corrosion.	Small footprint, Unit is enclosed, minimizing odors and corrosion	Medium footprint, Unit is open unit is open requiring large air handling unit to mitigate odors/corrosion	Small footprint, Unit is enclosed, minimizing odors and corrosion	Small footprint, encased system. Limited feed rates are available.
Wash Water Requirements	No external water for wash down	Required for the booster pump for periodic screen cleaning	Required for the booster pump for periodic belt cleaning	Required for periodic cleaning cycles	Required
Impacts on Other Processes	Can operate 24x7, and not shift operated, which results in more consistent feed regime to the anaerobic digesters.	Require flocculation tank prior to unit.		Requires good grit removal. Ability to attain higher solids capture has benefit	Require flocculation tank prior to unit.
Process Stability	Typically requires frequent adjustments to polymer dose, air, recirculation rate, and rake speed to dial in performance	Adjustment can be made to feed rate, polymer dose, and drum speed.	Adjustment can be made to feed rate, polymer dose, belt speed and plow.	Instrumentation and control packages can automate adjustments to meet desired operation. Performance is difficult to monitor with enclosed system.	
Maintenance	Relatively low. Maintenance parts of mostly outside of tank. Drive motors are low horsepower compared to other technologies.	Relatively low. Maintenance parts of mostly outside of tank. Drive motors are low horsepower compared to other technologies.	Easy to access maintenance items	Spare parts are expensive and may have long lead times. Equipment is subject to high rotating speeds. Maintenance is typically provided by manufacturer.	Has inspection openings to facilitate observation and maintenance
Operation	Thickened solids are observable at top of floatation tank. May require periodic adjustment to saturation tank, recycle, and air if feed stock is variable.	Enclosed system, though solids may be observed by opening access cover. Flocculation time ahead of thickening unit is critical.	Performance is easily viewed, but operator is involved	Due to the high rate of rotation stopping and restarting a centrifuge may require some time to allow the centrifuge drum to finish rotation prior to restarting.	Thickened solids are observable is thickening tank. Flocculation time ahead of thickening unit is critical.

4.2 Thickener Technology Site Visits

To further narrow the selection of technologies, SEH and City staff visited the following wastewater facilities to see operational thickening units.

- Thickening Centrifuge: Kenosha Wastewater Treatment Facility - Kenosha, WI
- Dissolved Air Flotation Thickener (circular): Owatonna Wastewater Treatment Facility - Owatonna, MN
- Dissolved Air Flotation Thickener (rectangular): Mankato Water Resource Recovery Facility - Mankato, MN
- Gravity Belt Thickener: Moorhead Wastewater Treatment Facility - Moorhead, MN

After visiting the wastewater treatment facilities, centrifuge thickening was eliminated from further evaluation due to the capital expenditure and high ongoing operation and maintenance costs. In addition, the long maintenance downtime associated with major and minor rehabilitation of the centrifuge would interfere to a greater degree with plant operation and may potentially require additional storage.

Further, the site visits narrowed the DAF thickener selection to a circular unit. The circular DAF thickener was preferred over the rectangular DAF thickener based on the added benefits as described below.

Circular DAF Thickener Advantages

- ✓ Radial flow provides variable velocities which decrease as the flow approaches the weir, resulting in greater effluent clarity for multiple particle sizes.
- ✓ Circular configuration provides a greater surface area for a given footprint than rectangular configurations.
- ✓ Single drive unit for both the skimmer and scraper assemblies.
- ✓ Skimmer assemblies for circular systems have lower operation and maintenance than rectangular due to not having a chain and flight drive mechanism.

Rectangular DAF Thickener Advantages

- ✓ Rectangular DAF thickeners have a long fluid travel time for a given surface area resulting in the potential for better solids capture rates.
- ✓ DAF systems installed into steel tanks have the majority of maintenance parts serviceable from grade outside the tank.

The gravity belt thickener operates similar to the City's belt filter press and, therefore, staff have significant institutional knowledge on process performance, maintenance, and troubleshooting of this type of system.

4.3 Thickening Technology Selection

The circular DAF thickening and gravity belt thickening were evaluated in further detail. DAF thickening allows for continuous operation, while gravity belt thickening often requires periodic operator attention limiting sizing to the shift operation described previously. The mechanical thickener basis of design is summarized in Table 9 and is in addition to the initial design parameters summarized in Table 3.

Manufacturers preliminarily sized the DAF thickener as a 17-foot diameter tank, 8 feet deep for continuous operation at future solids volumes. In comparison, the shift operation for the gravity belt thickener would require two units (3 meter) for future solids conditions, each approximately 10.5 ft wide by 19 ft long.

Table 10 represents the engineer's estimate for the 20-year net present value for the thickening options described above. Capital and operating costs do not include yard piping, utility connections, or intermediate pumping from thickening to digesters, as these are necessary for both alternatives.

When focusing on these two technologies, the circular dissolved air floatation thickener has a significantly lower 20-year present worth as compared to the gravity belt thickener. The lower cost is due largely to the smaller building requirements associated with one circular DAF thickener as compared to two gravity belt thickeners, the lower anticipated polymer consumption, and reduced staffing requirements associated with the technology.

The circular dissolved air floatation thickener is the recommended thickening alternative based upon the economic comparison. It has a 20-year net present value that is $1.4 M less than the gravity belt thickener alternative. Assuming continuous operation of the gravity belt thickeners would reduce the number of units and the associated building area, bringing the cost closer to the DAF option.

Table 9 – Mechanical Thickener Basis of Design

Parameter	Design Value	
	Circular DAF Thickener	Gravity Belt Thickener
Sludge Source	Waste Activated Sludge	
Average Feed Concentration	0.6%	
Design Thickened Sludge Concentration	4.0% [1]	
Minimum Solids Capture	95%	
Current Annual Average Solids Loading	3,440 ppd	
Current Annual Average Solids Feed Rate	40 gpm (continuous)	310 gpm, 1 unit (7hr/3d)
Design Annual Average Solids Loading, Chem-P[2]	8,630 ppd	
Current Annual Average Solids Feed Rate	120 gpm (continuous)	290 gpm, 2 units (7hr/5d)
Maximum Air to Solids Ratio	0.02 lb / lb	*
Maximum Hydraulic Loading Rate	2.5 gpm per sqft	*
Belt Width	*	3.0 m
Number of Duty Units	1 duty	1 duty, 1 standby

Notes:

Manufacturer scope for DAF system includes: thickening equipment, air compressor, saturation tank, recirculation pumps, air control panel, backpressure valve, and local PLC workstation.

Manufacturer scope for gravity belt system includes: thickening equipment, polymer mixing and injection system, solids feed pumps, sludge flow meters, washwater booster pumps, and local PLC control panel.

* Parameter does not apply to process.

1 4.0% thickened WAS when blended with 6.0% thickened primary solids from gravity thickener, would result in approximately 5.0% solids fed to anaerobic digester.

2 Design Annual Average Solids Loading, Chem-P utilized as most conservative design condition for sizing of equipment

Table 10 – Thickening Technology Comparison

Expense	Dissolved Air Flotation	Gravity Belt
Construction and Operating Costs		
Capital	$ 817,000	$ 1,608,000
Maintenance, $/yr	$ 1,800	$ 700
Polymer Cost, $/yr	$ 16,400	$ 30,750
Electrical Cost, $/yr	$ 3,400	$ 700
20-Year Net Present Value		
Construction Cost	$ 817,000	$ 1,608,000
Present Worth Maintenance Cost	$ 24,000	$ 9,000
Present Worth Polymer Cost	$ 223,000	$ 418,000
Present Worth Electrical Cost	$ 47,000	$ 9,000
Staffing Cost [1]	$ 208,000	$ 729,000
Net Present Value	$ 1,319,338	$ 2,773,996

Notes:

1 Assumes dissolved air floatation thickening requires operator attention for 20% of a shift and gravity belt thickening requires operator attention 70% of a shift.

4.4 Thickening Site Selection

Modifications to the thickening treatment process include operating the primary thickener to thicken only primary clarifier solids, utilizing the current secondary thickeners as process holding tanks, and the addition of the recommended circular DAF thickener system.

The current secondary waste sludge system is capable of pumping waste activated sludge from the final clarifiers to the secondary thickeners via the existing recirculation building and series of splitter boxes. From the secondary thickeners, solids pumps in the existing blower building can pump sludge from the gravity thickeners to the primary digesters, while supernatant can be removed via decant tree.

Ideally a cost-effective modification scheme would prioritize:

- Locating the new thickening process as close to the primary digesters as feasible, as pumping thickened solids is less efficient and may contribute to increased maintenance of piping and valves in the forcemain.
- Utilizing as much existing piping as possible to minimize bypassing and excavation at the site.
- Locating new processes at sites which require the least amount of sequencing to simplify construction.
- Minimizing or eliminating pumping.

Several potential sites exist for locating a circular DAF thickener which avoid existing structures, pipes, and utilities; however, few locations are able to do so while utilizing existing piping and minimizing construction. Locating the DAF thickener southwest and between the current secondary thickeners reduces impact to treatment at the facility during construction, and maximizes reuse of site piping, pumping, and operation similarities. Figure 2 illustrates the proposed DAF thickener equipment and location.

The preliminary DAF thickener is sized for a circular tank 17 feet in diameter with 8 feet of water depth. A control building could be constructed adjacent to the DAF thickener to house ancillary equipment including:

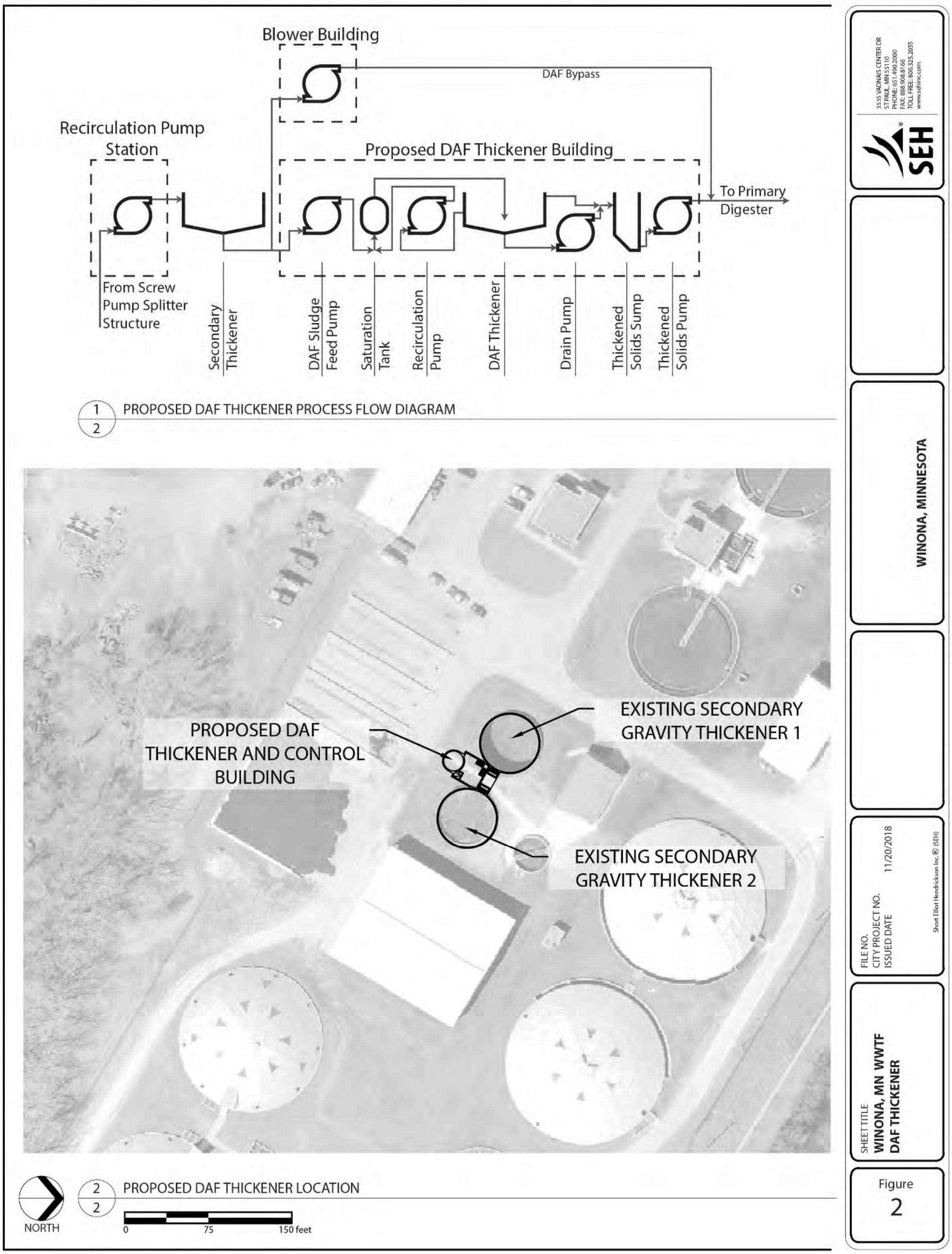
- Electrical equipment, MCCs, PLC, etc.,
- (1) Compressor and air tank,
- (1) Saturation tank,
- (1) Polymer blending system,
- (2) Solids feed pumps (preliminary size:120 gpm),
- (2) Recirculation pumps (preliminary size: 200 gpm),
- (2) Tank drain pumps (preliminary size: 120 gpm),
- (2) Thickened sludge pumps (preliminary size: 275 gpm),
- Thickened sludge sump, and
- Valves and piping.

After modifications, WAS would still be pumped from the existing pump recirculation building to the secondary thickeners, allowing flexibility to waste solids at varying rates without impacting DAF operation. From the secondary thickener tanks, new solids feed pumps located in the proposed control building would feed solids to the DAF thickener. Feed solids would be combined with recirculation flow via recirculation pumps and compressed air in the saturation tank prior to entering the DAF tank. Floatable solids overflow to a thickened sludge sump. Any solids which may settle in the DAF tank are periodically pumped to the thickened sludge sump via tank drain pumps. Solids from the thickened sludge sump are pumped to the primary digesters using new thickened sludge pumps. Thickened sludge is pumped to the existing sludge pipe between the blower building and primary digesters. The existing digester feed pumps can remain as DAF bypass pumps.

4.5 Opinion of Probable Cost for Thickening Improvements

The preliminary engineer’s opinion of probable cost for the DAF thickening improvements is $2,166,000. This cost includes the major capital cost items such as the construction of a 17-ft diameter circular DAF thickener system and control building, but it also includes ancillary items not previously included in the higher level cost comparisons of the thickening technologies. These ancillary items include an in-plant thickened solids lift station and piping. This estimate includes 20% contingency and mark-up for engineering and construction administration.

Figure 2 – Proposed DAF Thickener Location



5 Dewatering

Similar to the thickening evaluation, technology alternatives for dewatering were evaluated in two phases. Initially, high-level economical and non-economical evaluations were used to narrow down from 3 technologies to just a couple for a more detailed evaluation and site visits. The high-level evaluation was presented in a workshop with City staff.

5.1 Dewatering Technologies Evaluated

Dewatering alternatives considered include belt filter press, centrifuge, and screw press, as described below.

5.1.1 Belt Filter Press

Belt filter presses (BFP) employ two filter belts to dewater solids and three operating zones. The first zone is a gravity zone, which essentially operates as a gravity belt thickener with polymer addition to thicken solids so they do not squeeze out from later pressure zones. The second wedge zone is where a second belt sandwiches solids between the belt used in the gravity zone and the second belt to assist in pressing. In the third zone, the now sandwiched solids are fed between rollers with increasing pressure. The increasing pressure conditions solids so they are not lost in higher pressure zones. Similar to a gravity belt, solids are collected as cake at the end of the press and filtrate is collected below the press.

A variation of the BFP is a 3-belt press. This press offers the following:

- Potential to use a single unit for both thickening and dewatering by diverting solids prior to the pressure zone. However, this is challenging because the unit cannot simultaneously thicken and dewater two separate waste streams, which extends operating shifts.
- Increased hydraulic loading capacity by providing greater retention time.
- Potential for better performance due to vertical belt configuration.

5.1.2 Centrifuge

Dewatering centrifuges operate very similar to thickening centrifuges. When dewatering, the solids and hydraulic loading for a given centrifuge are reduced compared to a thickening application and the adjustable weirs are set to maintain a shallower pond depth in the drum.

5.1.3 Screw Press

A dewatering screw press introduces polymer to upstream piping or a flocculation tank. The screw press is a three-zone system installed horizontally or slightly inclined to promote drainage. The first zone, the inlet zone, has a low-pressure free-filter surface to rapidly drain excess water. Inlet pressure is maintained at various hydraulic feed rates by the feed pump. Solids are passed down the screw press by helical flights. In the dewatering zone, the distance between flights is reduced to create pressure to press solids and screen openings are reduced. Last, solids are pressed in the press zone by a counter-pressure cone. The helical flights push solids against the cone to a discharge chamber. SRT in the screw press can be adjusted by controlling the rotational speed of the helical flight screw. A screw press system is totally enclosed to assist with odor control.

5.1.4 Summary of Dewatering Technologies

Table 11 summarizes the high-level economic evaluation for dewatering alternatives and Table 12 compares the properties of the dewatering technologies. For each alternative, the capital, maintenance, polymer and electricity costs were estimated based on data provided by manufacturers. O&M costs are compared based on a 20-year net present value.

Additional assumptions include:

- Capital and operating costs do not include yard piping or utility connections, as these would be required across all alternatives.
- Polymer cost is based on current annual average sludge production of 8,007 ppd, $2.81 per pound active polymer, 42% fraction active polymer.
- Electrical cost is based on $0.087 per kWh.
- Facility staffing is estimated at $42.00 per operator hour.
- 20-year net present value assumes 4.0% cost increase applied yearly.
- Biosolids disposal assumes a contract cost of $0.0349 per gallon disposed.

Based on costs and non-economic factors summarized in Tables 11 and 12, belt filter press and centrifuge dewatering technologies were selected for further evaluation.

Table 11 – Initial Dewatering Technology Comparison

Expense	2-Belt Filter Press	Centrifuge [1] (13% solids)	Centrifuge [1] (20% solids)	Screw Press
Construction and Operating Costs				
Capital	$2,446,000 [2]	$ 1,926,000	$ 1,926,000	$ 2,912,000
Maintenance, $/yr	$ 5,400	$ 5,000	$ 5,000	$ 2,300
Polymer, $/yr	$ 77,900	$ 110,700	$ 200,800	$ 101,400
Electrical, $/yr	$ 4,000	$ 13,400	$ 13,400	$ 1,500
20-Year Net Present Value				
Construction	$ 2,446,000	$ 1,926,000	$ 1,926,000	$ 2,912,000
Maintenance	$ 73,000	$ 68,000	$ 68,000	$ 31,000
Polymer	$ 1,058,000	$ 1,504,000	$ 2,730,000	$ 1,379,000
Electrical	$ 55,000	$ 182,000	$ 182,000	$ 20,000
Staffing	$ 729,000	$ 313,000	$ 313,000	$ 521,000
Biosolids Disposal	$ 1,442,000	$ 1,442,000	$ 937,000	$ 1,442,000
Net Present Value	**$ 5,803,000**	**$ 5,435,000**	**$ 6,156,000**	**$ 6,305,000**

Notes:

1 The centrifuge technology is capable of achieving a higher cake solids than the other technologies, which reduces the biosolids disposal costs. This comes with a higher polymer cost. The 20-year net present value shows that it is more cost effective to produce 13% solids than 20% solids.

2 Cost assumes a new dewatering building as preliminary sizing appears to require 3 units.

Table 12 – Summary of Dewatering Alternatives

Parameter	Two-Belt Filter Press	Three-Belt Filter Press	Centrifuge	Screw Press
Typical Thickened Solids Concentration (at Winona)	10-14%	10-14%	10-20%	10-16%
Typical Solids Capture Rate	80 to 95%	80 to 95%	90%-99%	80 to 95%
Polymer Use	12-23 lb. active polymer per lb. dry solids	15-39 lb. active polymer per lb. dry solids	12-23 lb. active polymer per lb. dry solids	12-33 lb. active polymer per lb. dry solids
Power Use	Moderate compared to other technologies due to the multi pressure zone belt drives	Moderate compared to other technologies due to the multi pressure zone belt drives	High compared to other technologies due to the drive motor required to rotate the drum at high speeds	Low compared to other technologies due to the low rational rate of the screw.
Building Needs	Large compared to other technologies. Belt press is typically open though odor control options are available.	Large compared to other technologies. Belt press is typically open though odor control options are available.	Small footprint, Unit is enclosed, minimizing odors and corrosion	Small footprint, Unit is enclosed, minimizing odors and corrosion
Wash Water Requirements	Requires constant wash water for filter belt and wash down of entire system at end of shift.	Requires constant wash water for filter belt and wash down of entire system at end of shift.	Required for periodic cleaning cycles.	Required for periodic cleaning cycles.
Impacts on Other Processes	Forgiving with grit or rags. Relatively large volume of solids lost during process startup.	Forgiving with grit or rags. Relatively large volume of solids lost during process startup.	Requires good grit removal. Ability to attain higher solids capture has benefit	Forgiving with grit. Relatively large volume of solids lost during process startup.
Process Stability	Requires operator attention to make performance adjustments. Process is open and easy to observe performance.	Requires operator attention to make performance adjustments. Process is open and easy to observe performance.	Instrumentation and control packages can automate adjustments to meet desired operation. Performance is difficult to monitor with enclosed system.	Instrumentation and control packages can automate adjustments to meet desired operation. Performance is difficult to monitor with enclosed system.
Maintenance	There are a large number of bearings and gear boxes which require periodic services. Belts require adjustment for maximum service life.	There are a large number of bearings and gear boxes which require periodic services. Belts require adjustment for maximum service life.	Spare parts are expensive and may have long lead times. Equipment is subject to high rotating speeds. Maintenance is typically provided by manufacturer.	Wiper system is internal to system and requires periodic maintenance. Relatively few moving parts and low rpm result in low wear of parts.
Operation	Requires operator attention to ensure proper feed rate, polymer dose, and flocculation time.	Requires operator attention to ensure proper feed rate, polymer dose, and flocculation time.	Due to the high rate of rotation stopping and restarting a centrifuge may require some time to allow the centrifuge drum to finish rotation prior to restarting.	Requires operator attention to ensure proper feed rate, polymer dose, and flocculation time.

5.2 Facility Site Visits

SEH and City of Winona staff visited the following wastewater treatment facilities to further evaluate dewatering technologies:

- Dewatering centrifuge: Kenosha Wastewater Treatment Facility - Kenosha, WI
- Two-belt filter press: Owatonna Wastewater Treatment Facility - Owatonna, MN
- Two-belt filter press: Mankato Water Resource Recovery Facility - Mankato, MN

Similar to the centrifuge thickener, dewatering centrifuges were eliminated from further consideration due to the capital costs, and maintenance downtime. With significant institutional knowledge on process performance, maintenance, and troubleshooting, the belt filter press was the identified dewatering technology for further consideration.

5.3 Dewatering Technology Selection

The facility currently operates a 2-belt filter press and is familiar with the technology. In considering the 3-belt filter press, the operating schedule required to use the units to both thicken and dewater is not practical, as both processes would need to occur simultaneously given the current operating staff. However, a 3-belt filter press dedicated to dewatering which incorporates a vertical pressure zone has the potential to provide a superior dewatered cake solids content due to the increased gravity thickening zone and the vertical configuration of the wedge zone. This configuration also places the gravity zone at ground level and does not require an elevated platform for normal operation and maintenance.

The mechanical dewatering basis of design is summarized in Table 13 and are in addition to the initial design parameters summarized in Table 5. The dewatering system is designed for shift operation.

Table 13 – Mechanical Dewatering Basis of Design

Parameter	Design Value		
	Current Annual Average	**Design Annual Average, Bio-P**	**Design Annual Average, Chem-P**
Sludge Source	Anaerobically Digested Primary and Waste Activated Sludge		
Average Feed Concentration	3.5%		
Design Thickened Sludge Concentration	13-20% (highest attainable)		
Minimum Solids Capture	95%		
Dewatering Belt Width	2.0 m		
Number of Duty Units	2 duty, current (2 duty, design)		
Volatile Suspended Solids, Average	65%	70%	57%
Solids Loading, Average	5,160 ppd	10,400 ppd	12,380 ppd

Notes:
Manufacturer scope includes: dewatering equipment, polymer mixing and injection system, solids feed pumps, sludge flow meters, washwater booster pumps, and local PLC control panel.

Given the dewatering parameters presented above, manufacturers have preliminarily sized the belt filter press as two 3-belt 2.0 meter units, each approximately 11.5 ft wide by 21.5 ft long and sized for shift operation. The belt presses are sized to operate as 2 duty units at current and future solids loading. The two duty units provide greater solids retention time to produce a drier cake; however, if one duty unit is inoperable, a single 2.0-m press can handle all solids at current and future design but with a lower final solids content in the dewatered cake. The existing sludge drying beds may also be able to take some of the load when one unit it out of service.

The 3-belt filter press is recommended because it has more capacity than a 2-belt system. A single 3-belt unit has capacity to process the entire solids flow (at a lower finished solids content) in the event one of the two duty systems is down for maintenance. If 2-belt units are to be used, three units are recommended, which would require construction of a new dewatering building as the current digester complex has space for only two 2.0 m dewatering belt presses.

5.4 Dewatering Site Selection

The existing belt filter press is located in the digester building. Space is provided for an additional belt press. One duty belt press would be sufficient for current conditions, with two duty belt presses operating under future conditions. In lieu of providing a third (redundant) unit for future conditions, redundancy can be addressed by increasing the feed rate of the remaining unit (decreased cake solids concentration), extending the operating time of the remaining unit, or using the existing drying beds.

The proposed dewatering belt press is sized for a design feed rate of 2,460 dry pounds per hour (140 gpm) with two systems operating. Each unit shall be capable of handling 100% of the design flow if one unit is out of service (at a reduced dewatered cake solid concentration). The existing digester complex is suitable for locating dewatering and ancillary equipment. Ancillary equipment for the belt press includes:

- Electrical equipment, MCCs, PLC, etc.,
- (2) Polymer blending system (preliminary size: 2,400 gph dilution water and 10 gph neat polymer, each),
- (2) Solids feed pumps (preliminary size: 300 gpm each),
- (2) Booster pump (preliminary size 100 gpm at 50 to 120 psi, each),
- (2) Hydraulic power units
- (1) Dewatered cake conveyor system (150 cuft per hour),
- Valves and piping.

Modifications to the digester complex are necessary to provide an unclassified space for the belt presses and ancillary equipment, these improvements are discussed further in Section 6.

Operation of the recommended belt filter press units would be similar to the current system. Digested solids would be pumped from the primary digesters by new solids feed pumps located in the current heat exchanger room. Due to the room classification, the new feed pumps would be rated for a Class 1 Division I Group D space. Polymer would be fed into the feed solids by a blending system. Filtrate would continue to be collected below the system and returned to the liquid treatment stream. Cake would be discharged onto a common sludge conveyor and fed to a solids truck to be taken to cake storage.

The recommended belt filter presses are similar in width, though approximately 6 feet longer than the current belt press. Accommodating new presses would require removal of the current filtrate collection basin. The new filtrate basin incorporates drain collection pans below each filtrate belt. A 22” wide grating system with channel drain surround each filter press to collect additional washwater and filtrate which splashes from the drain collection pans. The grating system is flush to the ground, which is less intrusion to operation and movement than the current concrete walls.

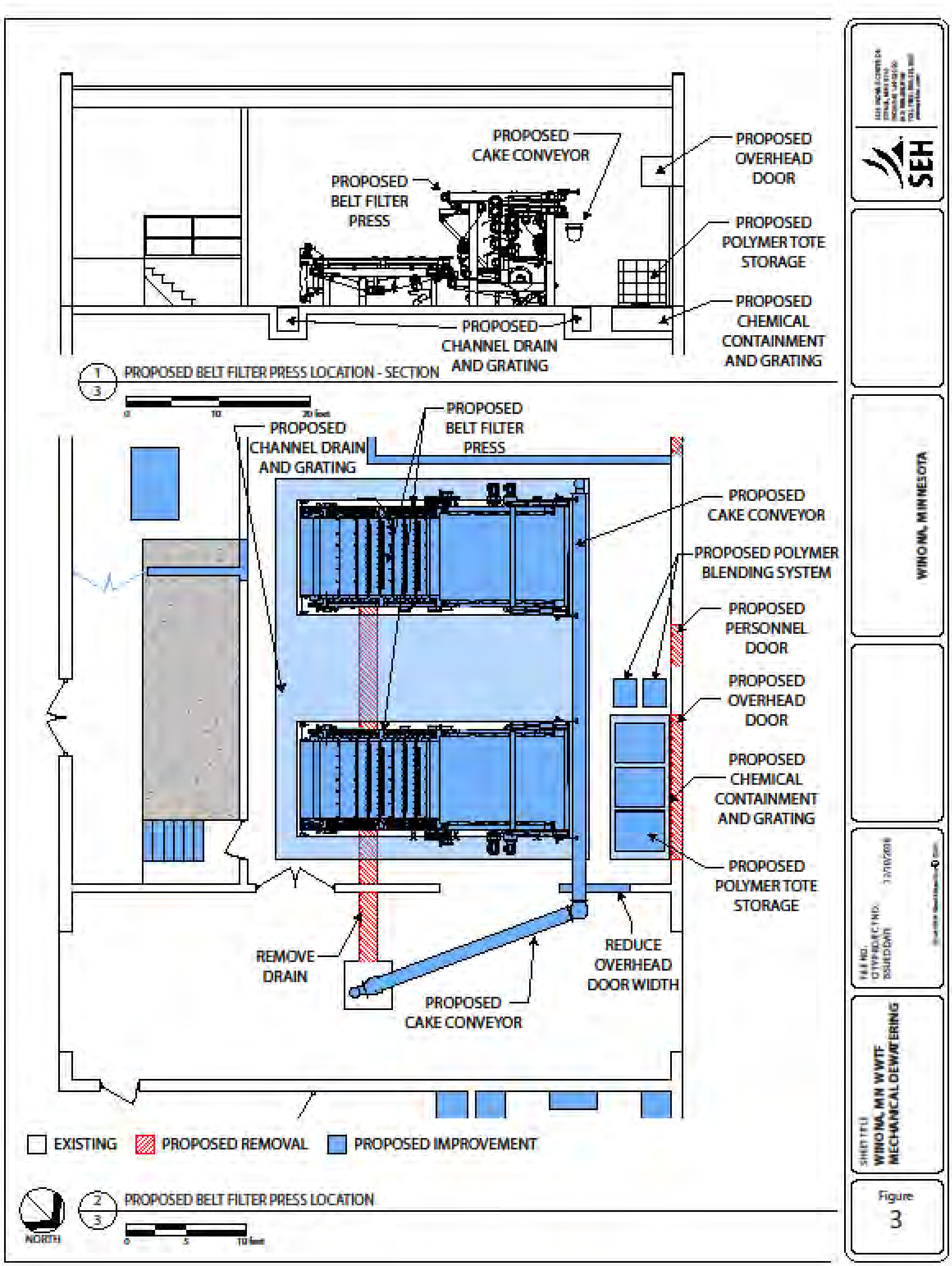
In the proposed layout, shown in Figure 3, the dewatered cake conveyor is on northwest side of the filter presses. The current 16-foot overhead door between the belt press room and garage would be replaced with a coiling door and narrowed to 10 feet to facilitate the new cake conveyor penetration. A multi-section shaftless screw conveyor is recommended as it offers a simpler drainage connection and cleaner arrangement than belt conveyors.

The greatest deviation from current operation would be the recommended replacement of the existing dry polymer feed system with a liquid polymer feed system. In general, liquid polymer provides better polymerization performance with less operator time required during batching. Liquid polymer trades smaller feed units for larger storage requirements. A polymer storage area with blending pumps is located on the northwest side of the belt filter press room. A proposed 12-foot coiling door is added to the northwest wall to allow for delivery of three 275 gallon polymer totes. The overhead door will also facilitate removal of the current belt filter press and installation of the proposed belt filter presses.

5.5 Opinion of Probable Cost for Dewatering Improvements

The preliminary engineer’s opinion of probable cost for the dewatering improvements is $3,111,000. This cost includes the major capital cost items including two 3-belt dewatering filter press systems, modifications to the digester complex for the drain system, polymer tote storage area, polymer blending systems, and controls. This estimate includes 20% contingency and mark-up for engineering and construction administration.

Figure 3 – Proposed Belt Filter Press Location



6 Digester Complex Improvements

The 2014 Evaluation Study of the WWTF and lift stations recommend improvements to the digester building to comply with electrical codes. The following sections describe the conditions and recommendations for the digester building beyond those necessary to accommodate new belt filter presses.

6.1 Existing Systems

6.1.1 Process Equipment

The existing equipment around the digester tanks are installed to meet the electrical installation requirements of a non-hazardous classified location. However, NFPA 820 specifies the areas exposed to the digester tank walls on the interior of the building be classified as Class I, Division 1 Hazardous location. To meet the requirements of this classification, any electrical power and control panels must be relocated to outside of the affected space and the process equipment and motors need to be replaced with units rated for the hazardous location.

Process equipment affected include the following:

- (1) Tube-in-tube heat exchanger and boiler combination rated for 2,125,000 BTU of thermal energy, dual fuel of biogas or natural gas, installed in 1982
- (1) dual fuel boiler using biogas or natural gas, installed in 2012
- (2) digester recirculation pumps, installed one 1970, one 1982
- (2) in-line sludge grinders, installed 1970
- (2) sludge transfer pumps, installed one 1970, one 1982

6.1.2 Mechanical

The current ventilation system intakes and exhausts air from all rooms of the digester complex. Ductwork, louvers, and vents are original to the building, with a new power ventilation system for the belt filter press room. Modification and replacement of ductwork is necessary to create a gas separation between classified and non-classified spaces.

6.1.3 Electrical

The main electrical service for the Pre-Treatment Building, Administration Building, Recirculation Pump Station, and the Digester Building originates from separate feeder breakers in the Cutler-Hammer Unitrol motor control center (MCC) located in the Digester Building. The service equipment is fed from a single utility transformer at 480Y/277-Volt, 3-phase, 4-wire.

Motors associated with the digester building are also served from the same MCC. This MCC is was installed in 1970 and is nearing 50-years of service.

General power to the facility consist of 480-Volt circuits for large equipment and 120-volt circuits for smaller utilization equipment.

Lighting throughout the facility consist of gasketed, vapor-tight 2-lamp, 4-foot, fluorescent fixtures. Fixtures are controlled using wall-mount toggle switches.

Control system is Allen-Bradley PLC-based located within a NEMA 1 wall-mounted enclosure. A door-mounted touchscreen provides interface for the operators.

6.2 Recommendations

6.2.1.1 Process

It is recommended that the floor plan be modified to separate the interior room around the digester tank walls into a separate room, accessed directly from outdoors, and rated for a Class I, Division 1 hazardous location. Equipment which can be feasibly relocated to unclassified locations should be relocated. Those which cannot be relocated should be replaced with properly rated motors and electronics. Figure 4 illustrates an alternative for segregating the digester complex to create vapor-tight separation between classified and unclassified spaces. The modifications create a Class 1/Division 2 Group D space for the current heat exchanger and pump room and gas safety room, and results in declassifying the remaining digester complex.

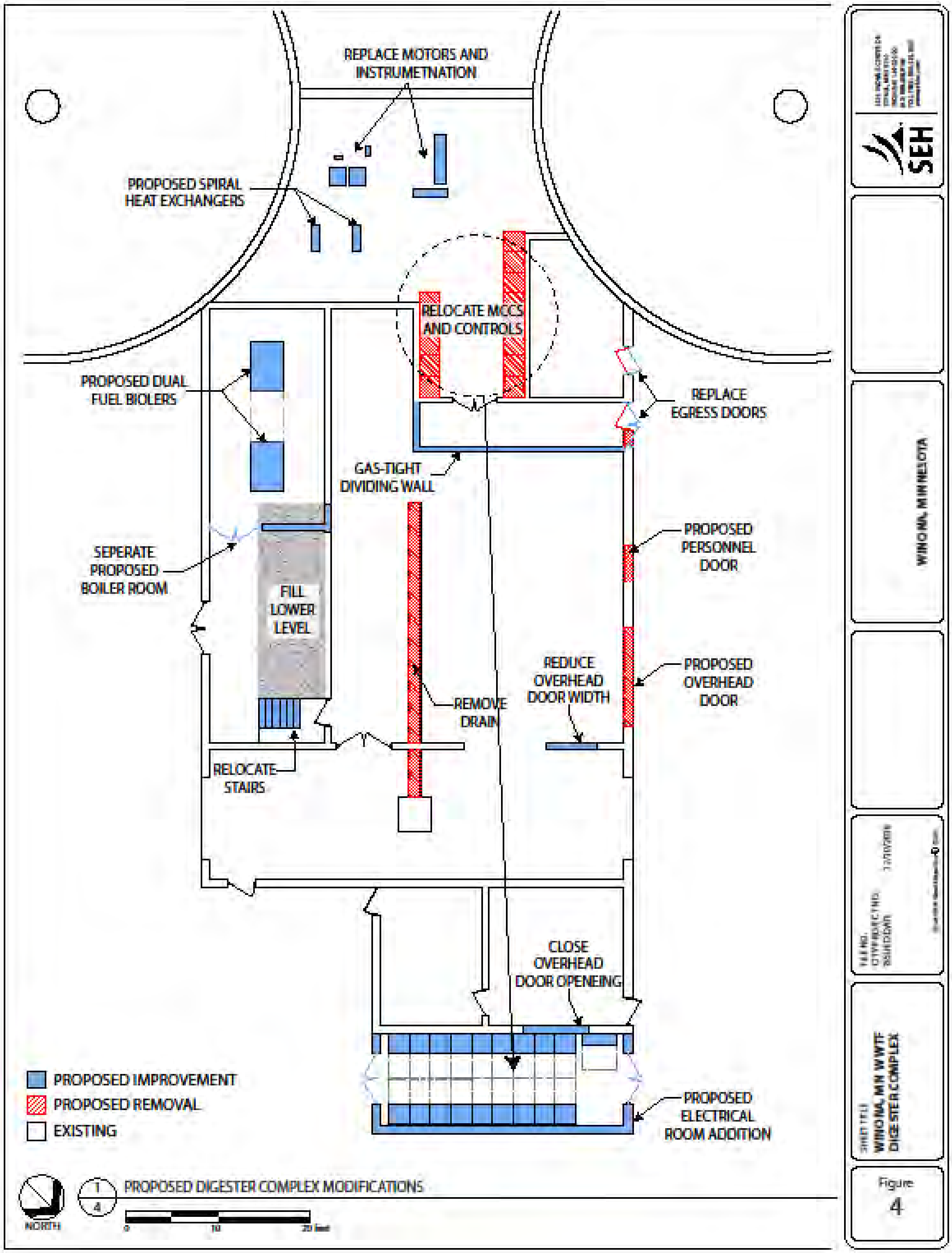
The existing combined heat exchanger and boiler is recommended to be replaced with separate units, as described below. The facility currently operates two boilers of different size. The second, smaller boiler was added as the larger boiler does not have sufficient turndown to operate with the existing microturbine.

- **Heat Exchangers**: Two new spiral heat exchangers, one per digester, can be located where the current combined unit is installed to minimize the length of large sludge recirculation piping.
- **Boilers:** The boilers would be relocated to the existing maintenance room, which is divided to reduce the HVAC demand created by the boilers and limit the length of hydronic and biogas piping. The new boiler capacity will need to be coordinated to function properly with the existing microturbine.

The remaining portion of the maintenance room, currently used for hydrating dried polymer, would become the new maintenance room. The lower level would be filled to create a more usable space. The existing access stairs would be relocated to the eastern door for access.

The existing sludge recirculation pumps, transfer pumps, and sludge grinders are recommended to be upgraded for Class 1 Division 1 group D installation. The replacement at the same location minimizes pipe replacement and simplifies construction phasing.

Figure 4 – Proposed Digester Complex Modifications



6.2.1.2 Mechanical

As indicated with process recommendation, the existing maintenance room would be modified to house the digester boilers. Modifications include blocking closed the access doors to the remainder of the building and leveling the floor to provide a single usable room. Isolation of boilers from the remainder of the complex allows for better control of heat dissipated into the building.

NFPA recommends a 10-foot envelope of classified space around biogas piping. Placing the boilers in a separate space prevents classification envelopes from overlapping into adjoining rooms. Gas boilers are inherently safe equipment as they continuously draw in air from their immediate vicinity and are suitable to operate adjacent to biogas piping. A combustion air system including ducts and fans is necessary for each boiler. Ancillary equipment for the boiler system includes new glycol pumps, expansion tanks, air separators, valves, and controls.

A dedicated ventilation and heat system is recommended to separate the heat exchanger and gas safety rooms from other spaces in the digester complex. The heat exchanger and gas safety rooms will require installation of Class 1 Division 1 Group D unit heaters, exhaust fans, and makeup air units. New stainless steel ducting and louvers are needed for the separate ventilation system. Gas monitoring instrumentation will be added in classified spaces to detect the presence of unsafe levels of combustible gases.

The existing ventilation system servicing the remainder of the digester complex (excluding the electrical room) shall have an air balance test conducted to determine if it is sufficient to deliver six air exchanges per hour. Six air exchanges allows for the declassification of spaces which contain process piping that may have the potential to leak gas into the space. For the boiler and belt press room, this includes biogas and sludge piping.

The electrical room will also require the installation of a separate HVAC system capable of maintaining a maximum room temperature of 80 degrees Fahrenheit.

6.2.1.3 Electrical

The existing main service MCC and wall-mount variable frequency drives (VFD) are recommended to be removed. A new electrical room, created in the existing chlorine storage and feeder rooms (currently used for the facility’s dual fuel boiler), can house a new main service disconnect, automatic transfer switch, switchboard, and MCC. The automatic transfer switch would connect the new electrical service to an outdoor pad-mounted generator set located in a weatherproof enclosure. The new switchboard would house breakers for the Pre-Treatment Building, Administration Building, Recirculation Pump Station, Digester Building, and digester building 480V panelboard. The MCC would contain the digester building motor starters and new VFDs.

New electrical feeders shall be routed outdoors between the digester building new switchboard and the Pre-Treatment Building, Administration Building, and Recirculation Pump Station. A new PLC control panel shall be provided in the new electrical room.

All interior motor circuits and equipment circuits shall be replaced and new circuits installed to the new electrical panels in the new electrical room.

This location also provides a separate space for electrical systems associated with process equipment. The separation reduces the potential for spillage and provides a clean, low dust environment. The smaller space reduces the volume of air which requires conditioning during warmer months.

Lighting in the room surrounding the digester tank walls shall be rated for the classified location, LED lighting. Lighting in other areas of the building will be new non-hazardous LED lighting. In general lighting shall be controlled by wall switches except for areas such as restrooms or offices which would have occupancy controls.

6.3 Opinion of Probable Cost for Digester Building Modifications and Improvements

The preliminary engineer's opinion of probable cost for modifications and improvements to the digester complex is $2,702,000. Major capital cost items include structural and architectural modifications, replacement of process equipment for Class 1 Division I Group D locations, relocation of MCCs and controls, and the replacement of dual fuel boilers and heat exchangers. The estimate includes 20% contingency and markups for engineering and construction administration. The cost excludes the dewatering equipment improvements and is the cost for building modifications to comply with NFPA requirements and equipment replacement.

7 Site Electrical Improvements

7.1 Backup Electrical Generator

A second back-up generated is recommended to supply power to the front-half of the plant.

7.2 Opinion of Probable Cost for New Back-up Generator

The preliminary engineer's opinion of probable cost for site electrical improvements is $541,000 Capital costs includes the generator set, sound attenuating all-weather enclosure, concrete base slab, and aluminum stairs and walkway to access the generator enclosure. The estimate includes 20% contingency and includes engineering and construction administration.

8 Additional Gas Generation and Utilization

Along with solids improvements, the City is interested in increasing biogas production in their anaerobic digesters by incorporating organic food waste and waste oil and grease (FOG) from local businesses and institutions. The City is interested in determining whether the increase in biogas production used for electrical generation would offset the cost of constructing a new biogas storage system and additional micro turbine generator.

8.1 Increase Gas Production - High-Strength Waste

A desktop evaluation was conducted to determine the potential volume of high strength waste from fats, oil and grease (FOG) generated in Winona, Goodview and Minnesota City. The desktop evaluations consists of identifying food service establishments (FSEs), assigning grease production categories of low, medium, high, and very high, and estimating annual FOG quantities. Table 14 summarizes this evaluation.

In addition to business sources, there are ten primary education schools along with Saint Mary's University of Minnesota and Winona State University within the region. Each of these institutions provides additional source of waste FOG based on the number of students attending. The FOG from the cafeterias associated with these institutions is estimated at 990 ppd of FOG. A total of 1,770 ppd of FOG is potentially available in the community.

Table 14 – FSE Grease Production Estimate for Businesses

Assumed Avg FOG by FSE (lb/d)	FSE Category	Number of FSEs Identified			Assumed Daily FOG lb/d	Assumed Total Annual FOG (lb/yr)
		Winona	Goodview	Minnesota City		
1.7	low	32	1	1	58	21,000
5.2	medium	20	2	0	114	42,000
9.5	high	36	1	0	352	128,000
25.6	very high	9	1	0	256	93,000
	Total	**97**	**5**	**1**	**780**	**284,000**

Notes:

FSEs categories and assumed FOG generation based on the FOG generation estimation methods and experience of Yakima, Washington and Portland, Oregon.

The additional gas generated from the FOG is estimated assuming 100% of the FOG in the community is collected and fed to the digesters.

The existing anaerobic digester capacity was evaluated to determine hydraulic and volatile solids (VS) capacity for additional FOG and food waste at current flows and loads.

- By converting the secondary digester to a primary digester in 2015, the current average day VS loading rate is 0.05 pounds volatile solids per cubic foot of digester. The typical design range is between 0.05 and 0.16 pounds volatile solids per cubic foot of digester, indicating ample volatile solids capacity.
- The hydraulic loading of the existing anaerobic digesters provides 35 days of hydraulic retention time (HRT) at average day flow. Minimum HRT for an anaerobic digester is 15 days.

Table 15 compares the anaerobic digester capacity of the existing condition to a scenario with the addition of the 1,770 ppd of FOG waste described previously.

Table 15 – Anaerobic Digester Loading

Loading Conditions	Calculated VS Loading Rate (lb VS/cuft) [a]	Calculated Digester HRT (days) [b]	Theoretical Biogas Generated (cuft/d)
Current Digester	0.050	35	41,026 [c]
Change with Waste FOG Included [d]	+0.012	-1.6	+22,739 [e]
Change per Ton of Food Waste	+0.003	-0.7	+5,346 [f]

Notes:

a. 0.040 to 0.410 lb VS per cuft of digester recommended by 10 States Standards.

b. Minimum of 15 days.

c. Assumes 80% VS fraction, 38% VS destruction, and 15 cuft of biogas produced per lb VS destroyed.

d. Corresponds to 1,770 ppd of waste FOG added.

e. Assumes 95% VS solids content of FOG, 90% VS destruction, and 15 cuft of biogas produced per lb VS destroyed.

f. Assumes 28% VS content of food waste, 74% VS destruction, and 15 cuft of biogas produced per lb VS destroyed.

To calculate the value of the FOG, the potential power generated for each loading scenario and corresponding 20-year present value of electricity offset by on-site generation is summarized in Table 16. The calculations are based on the assumptions below.

- Energy content of biogas: 600 BTU/hr
- Electrical generation efficiency for micro turbine: 25%
- Microturbine up time: 90%
- Commercial rate power purchased from utility: 0.0873 $/kWhr
- Annual power rate increase: 3.7%
- Present worth interest rate: 5.0 %

Table 16 – Net Present Value of Biogas Generated, as Electricity

Loading Conditions	Potential Power Generated (kWhr)	20 Year Present Value ($)
Current Solids	1,623	$915,637
Change with Waste FOG Included	899	+$507,493
Change per Ton of Food Waste	211	+$119,309

Utilization of waste fats, oil, and grease will require the construction of a receiving station. The purpose of the receiving station is to provide a location where trucks can unload, flow may be metered for billing, provide preliminary screening, further separate grease from water, and an in-plant lift station to pump FOG to the primary digesters. A preliminary cost estimate for a receiving station is $1,674,000. This cost is three times more than the 20-year value of the electricity generated from these high-strength wastes. For this reason, FOG receiving is not financially viable. However, this does not account for tipping frees which may be as high as $0.10/gallon or $25,000 per year.

8.2 Increase Gas Production – Pondus

Centrisys, one of the manufacturer's considered for thickening and dewatering centrifuges, has a new solids processing system called the Pondus Hydrolysis Process. This thermal-chemical process breaks down the cell walls of the microorganisms in waste activated sludge, resulting in a sludge that is more digestible in anaerobic digesters. The increased digestibility results in greater biogas production and reduced biosolids (due to increased volatile solid destruction).

A Pondus system or similar could be considered, but drivers for this are usually capacity. The technology is relatively new. It may be something to consider for the future, when there are more full-scale installations.

8.3 Improved Gas Utilization

The WWTF has a 65-kW microturbine that was installed in 2010. A 65-kW microturbine utilizes approximately 35,000 cf/d of biogas. In 2017, the facility produced an average of 41,000 cf/d. On average, the capacity of the microturbine is maximized. Increased volatile solids destruction, either through high-strength waste addition, increased wastewater solids, or improved digestion (via Pondus) will increase biogas production. Increases in biogas volumes cannot be beneficially utilized without the addition of biogas storage and/or increased cogeneration capacity.

The existing microturbine building was designed to accommodate another 65-kW unit. In addition to the microturbine, additional controls would be necessary to tie in the new microturbine.

Another approach to improve biogas utilization is with gas storage. Storing the biogas allows gas production in excess of the microturbine capacity to be stored rather than flared. The existing floating covers provide limited gas storage. There are a two main types of gas storage:

- High-pressure spheres which are typically operated at 50-90 psi. This type of storage is more robust, providing more storage and longer-service life. But is more costly.
- Low-pressure membrane storage, either on a digester tank or remote pad-mounted. This type of storage has lower costs and operates at low pressures. It has limited storage volume, the membrane as susceptible to damage, and typically last only about 10 years.

Gas storage is often implemented at large facilities with significant biogas volumes and where the biogas can be best utilized at certain times of the day to offset electrical usage during peak rate times. Costs presented in Section 8.4 include biogas storage.

8.4 Opinion of Probable Cost for Biogas Improvements

Table 17 summarizes the preliminary engineer's opinion of probable cost for gas storage and the addition of a second microturbine.

The current microturbine power generation building was designed for the installation of a second turbine. The preliminary estimate for the microturbine assumes installation and controls.

The biogas storage structure is assumed to be a slab mounted, dual membrane gasholder. 30,000 cuft of storage was evaluated, however additional gas monitoring during design may be used to refine the storage capacity requirements. The capital estimate includes the dual-membrane system (membrane covers, fans, controls, valves, and instrumentation), concrete slab and footings, coatings for slab, gas piping to and from storage, and electrical service. The estimate includes 20% contingency and mark-ups for engineering and construction administration.

Table 17 – Preliminary Opinion of Probable Cost for Additional Gas Generation and Utilization

Scenario	Probable Capital Cost
Waste Fats, Oils, and Grease Receiving Station	$ 1,674,000
Slab-Mounted Dual Membrane Biogas Storage	$ 800,000
Microturbine	$ 146,000
Total	**$ 2,620,000**

Capital costs for additional gas generation and utilization may be compared to the 20-year present value of biogas, as electricity in Table 16. Generally, the electrical savings associated with increased biogas production do not offset the cost for the infrastructure to increase and store biogas.

9 Cake Storage

Biosolids produced at the wastewater treatment facility are disposed of through land application. 180 days of biosolids storage is required in order to store biosolids between spring and fall land application periods. The increase in biosolids production as a result of phosphorus improvements will increase the required biosolids storage volume.

The facility operates three biosolids storage facilities:

- A covered storage pad approximately 120 feet by 105 feet, which is the primary storage location. At an average storage depth of 4 feet, the existing covered storage provides 50,400 cuft of storage.
- An uncovered cake storage pad which is approximately 120 feet by 110 feet. At an average storage depth of 4 feet, the existing uncovered storage provides 52,800 cuft of storage.
- Sludge drying beds which are intended for dewatering if the belt filter press is inoperable. Previous operations have required cake storage utilizing the sludge drying beds, but is not desirable as it prevents their use for dewatering biosolids from the digester. There are four sludge drying beds which are approximately 110 feet by 36 feet each. At an average storage depth of 4 feet, the existing drying beds provide a combined 63,360 cuft of storage.

The facility currently dewaters digested biosolids to approximately 13%. The previous biosolids land applications were evaluated for 2014 through 2017 which indicate an average solids content of 15% by the time the solids are land applied.

When possible, it is preferred to utilize covered storage. Covered storage allows for passive drying of biosolids while preventing a large portion of rain and snow from re-hydrating biosolids. In addition, the sidewalls would be six feet to facilitate cake storage depths of five feet and be wide enough to allow for broadcasting biosolids. Broadcasting spreads biosolids into thin layers which passively dry more readily than piles created by dump trucks. The increased drying reduces hauling costs during land application while maintaining the same dry pounds applied per acre.

Two evaluation scenarios were used for biosolids storage:

- Only the existing covered and uncovered storage are utilized prioritizing covered storage options over uncovered storage. This frees the drying beds to continue to operate as backup dewatering for the belt press. The proposed covered storage would be approximately 125 feet by 245 ft, providing 122,500 cuft of additional storage capacity.
- The existing covered, uncovered, and drying beds are utilized prioritizing covered storage options over uncovered storage. This would potentially remove the drying beds as an option for dewatering if the belt press is inoperable. The proposed covered storage would be approximately 125 feet by 120 ft, providing 60,000 cuft of additional storage capacity.

Tables 18 and 19 summarize the projected biosolids storage demand given a variety of operating scenarios.

Table 18 – Biosolids Storage Utilization Without Using Drying Beds

	Existing solids balance	Current conditions with improvements, chem P	Design conditions with improvements, bio P	Design conditions with improvements, chem P
Storage Demand, cuft	96,565	151,087	183,514	225,161
Existing Covered Storage Utilization	Filled	Filled	Filled	Filled
Existing Uncovered Storage Utilization	Unused	Unused	Filled	Filled
Existing Drying Beds Utilization	Unused	Unused	Unused	Unused
Proposed Covered Storage Utilization (125' x 245')	38%	82%	66%	Filled

Table 19 – Biosolids Storage Utilization Using Drying Beds

Storage	Existing solids balance	Current solids balance with thickening improvements, chem P	Design solids balance with thickening improvements, bio P	Design solids balance with thickening improvements, chem P
Storage Demand, cuft	96,565	151,087	183,514	225,161
Existing Covered Storage Utilization	Filled	Filled	Filled	Filled
Existing Uncovered Storage Utilization	Unused	Filled	Filled	Filled
Existing Drying Beds Utilization	Unused	Unused	Filled	Filled
Proposed Covered Storage Utilization, (125' x 120')	77%	80%	28%	Filled

Figure 5 illustrates the size of the proposed biosolids storage facilities for each of the two evaluated scenarios with relation to the existing facility.

9.1 Opinion of Probable Cost for Cake Storage Improvements

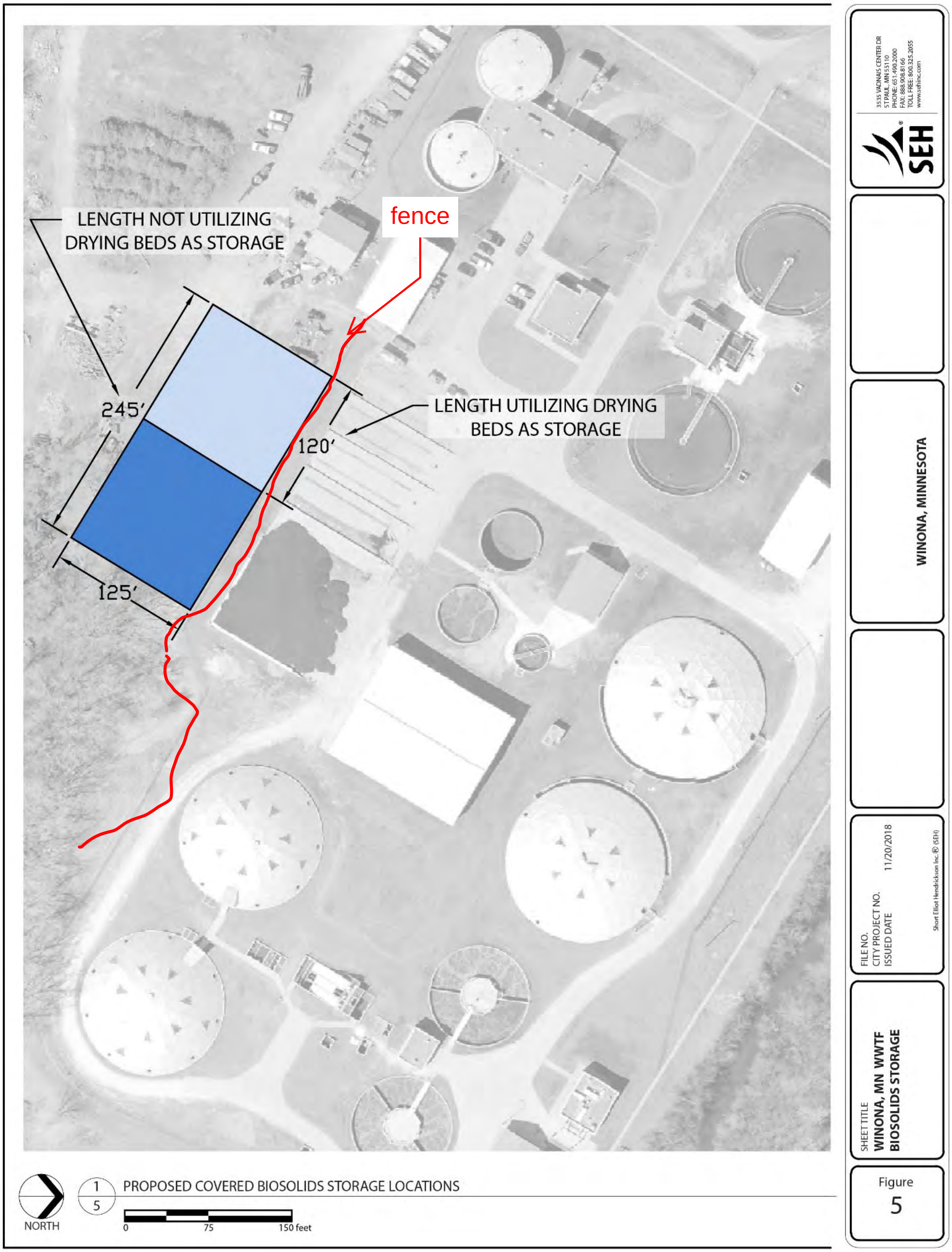
Table 20 provides a summary of the preliminary engineer's opinion of probable cost for the two biosolids storage alternatives evaluated. Each storage alternative includes a membrane cover which covers the entire storage pad, and a 25-ft driving isle through the middle of the pad with a 12-inch concrete trench drain. The storage pad structure consists of cast-in-place concrete sidewalls, 6 feet high with a flexible pavement slab. The estimate includes 20% contingency and includes mark-ups for engineering and construction administration.

Table 20 – Preliminary Opinion of Probable Cost for Biosolids Cake Storage

Scenario	Probable Capital Cost
245 foot x 125 foot covered biosolids storage	$ 1,547,000
120 foot x 125 foot covered biosolids storage	$ 847,000

The final solids content achievable by broadcasting biosolids rather than storing in windrows varies. At 13% total solids, 3,370 cubic yards of biosolids were land applied in 2017. If freeze-thaw were able to increase cake total solids to 20%, this would reduce the cake volume hauled 35% and result in 59 fewer 20 cubic yard truck loads. The savings per cubic yard hauled would contribute towards offsetting capital costs associated with cake storage improvements.

Figure 5 – Proposed Covered Biosolids Storage Location



10 Pretreatment Improvements

10.1 Process

The existing pre-treatment building was constructed in 1970. The pretreatment building includes:

- (1) automatic bar screen, installed 1970,
- (1) manual bar screen, installed 1970,
- (1) grit washer/classifier, installed 1970,
- (2) aerated grit tanks with blowers and grit pumps, installed 1970,
- (1) influent flow meter,
- (2) in-plant waste pumps, installed 1970
- (1) in-line sludge grinders, installed 1970, and
- (2) sludge pumps, installed 2016.

Pumped influent flows through the influent flow meter and to an exterior box on the upper floor of the building. Wastewater then flows by gravity through a screening channel. Screening from the automatic screen are fed to a waste trolley. Stop plates can be lowered to direct flow to either the automatic bar screen or manual screen. After screening, the influent channel splits to either aerated grit tank. Two blowers, one for each grit chamber, are installed on the upper floor. Two grit pumps are located in the sub-basement of the pre-treatment building, which pump grit to the grit washer/classifier. Grit from the classifier, as well as from the waste trolley, falls through a storage hopper into a dump truck.

The lower level of the pre-treatment building contains a sludge grinder and two sludge pumps. The sludge pumps waste primary solids and scum from the primary clarifiers to the sludge thickeners. An in-plant waste lift station is also located in the lower level which pumps decant from the primary digester and other return flows.

The facility operators report issues with the grit removal efficiency of the existing aerated grit system. The facility operators have observed a buildup of grit in the primary digesters, requiring the digester to be taken out of service for cleaning. The existing aerated grit tanks provide approximately 32,500 gallons of volume and are undersized for the facility peak flow.

10.2 Mechanical

The existing ventilation system in the pre-treatment building is original to construction and insufficient to meet NPFA 820 classification requirements, as well as recommended 10 States Standard ventilation rates.

The existing ventilation system draws outside air from above the influent box prior to the automatic bar screen. This location proves problematic as there is the potential for gas to enter the ventilation system from the influent box.

There are not combustible gas detectors installed in the pretreatment building.

10.3 Electrical

The main electrical service for the pretreatment building is fed from a 400-amp breaker located in the Digester Building MCC witch feeds a Cutler-Hammer Unitrol motor control center (MCC) located upper level of the preliminary treatment building. This MCC houses the motor starters and feeders for equipment in this building. This MCC is was installed in 1970 and is nearing 50-years of service.

General power to the facility consist of 480-Volt circuits for large equipment and 120-volt circuits for smaller utilization equipment.

Lighting throughout the facility consist of gasketed, vapor-tight 2-lamp, 4-foot, fluorescent fixtures. Fixtures are controlled using wall-mount toggle switches.

10.3.1 Summary of Recommendations

10.3.1.1 Process

It is recommended that the floor plan be modified to separate open wastewater channels and pretreatment equipment into a separate room, accessed directly from outdoors, and rated for a Class I, Division 1 hazardous location. Equipment in classified rooms which can be feasibly relocated to unclassified locations should be relocated. Those which cannot be relocated should be retrofit with properly rated motors and electronics.

The pre-treatment building may be modified such that only the automatic bar screen and grit classifier needs to conform to Class 1 Division 1 Group D requirements. Figures 6 and 7 illustrate an alternative for segregating the preliminary treatment building in order to create vapor tight separation between classified and unclassified spaces for the upper and lower floors of the building respectively. The modifications create a Class 1 Division 2 Group D space for the screening room and garage, and results in declassifying the remainder of the pre-treatment building.

The current automatic bar screen is nearly 50 years old and due for replacement. The bar screen is recommended for replacement with a washing and compacting unit. The washing and compacting unit reduces the amount of organics in screenings to reduce both the volume disposed, the amount of wastewater drained onto the floor after entering the waste trolley, and the odor generated by screenings.

The grit classifier is the same age as the automatic bar screen and is recommended for replacement. Vortex grit classifiers are relatively similar in design to the existing classifier, though new bearings, motors, and wash nozzles would improve electrical efficiency to some degree.

Replacement of the aerated grit tanks with vortex grit removal was evaluated. The advantage of vortex grit is a greater degree of grit removal over aerated systems. The improved grit removal may assist in preventing the buildup of grit in the primary digesters of the facility.

If grit found in the digesters is fine (less than 50 um), it is recommended that the City complete a grit characterization study. This study can help to assure that the grit removal technology selection and sizing is appropriate for the grit characteristics. The ideal time to complete the grit characterization study is during a peak event, when high flows wash grit accumulated in the collection system to the facility.

It is assumed a new vortex grit removal system would be located in a cast-in-place concrete tank. During the design phase of these improvements, the City may want to consider the potential reuse of the existing aerated grit tanks and further defining a peak instantaneous wet weather flow for process sizing. Figure 8 illustrates a potential layout for a vortex grit removal system which was used as a basis for determining costs presented later in this section.

10.3.1.2 Mechanical

The existing pretreatment building would be modified to create two separated classified and non-classified spaces. Modifications include blocking closed the access doors to the electrical room and creating a new access from outside the building. The existing stairwell between the ground floor and upper floor would be removed and new access to the pumps and sub-basement added. The personnel door on the ground level to access the sub-basement from the northwest will also be blocked closed. These improvements in conjunction with ventilating to declassify will create separate non-classified spaces for the pumps and instrumentation in the sub-basement and electrical room.

A ventilation and heat system shall be installed to separate the garage and screening rooms from other spaces in the Pre-treatment building. The garage and screening rooms will require installation of Class 1 Division 1 Group D unit heaters, exhaust fans, and makeup air units, and will be ventilated with 30 air exchanges upon entry. New stainless steel ducting and louvers will need to be installed for the separate ventilation system. Gas monitoring instrumentation will be added in classified spaces to detect the presence of unsafe levels of combustible gases.

The existing ventilation system servicing the remainder of the pre-treatment building shall also be replaced. The sub-basement shall have a system installed which can provide six air exchanges per hour to declassify spaces which contain process piping that may have the potential to leak gas into the space. The electrical room will also require the installation of a separate HVAC system capable of maintaining a maximum room temperature of 80 degrees Fahrenheit, as well as maintaining positive pressure to prevent the migration of gasses from the adjacent classified space. Both the sub-basement and electrical room will have new stainless steel ductwork.

Figure 6 – Proposed Pretreatment Building Modifications - Upper Floor

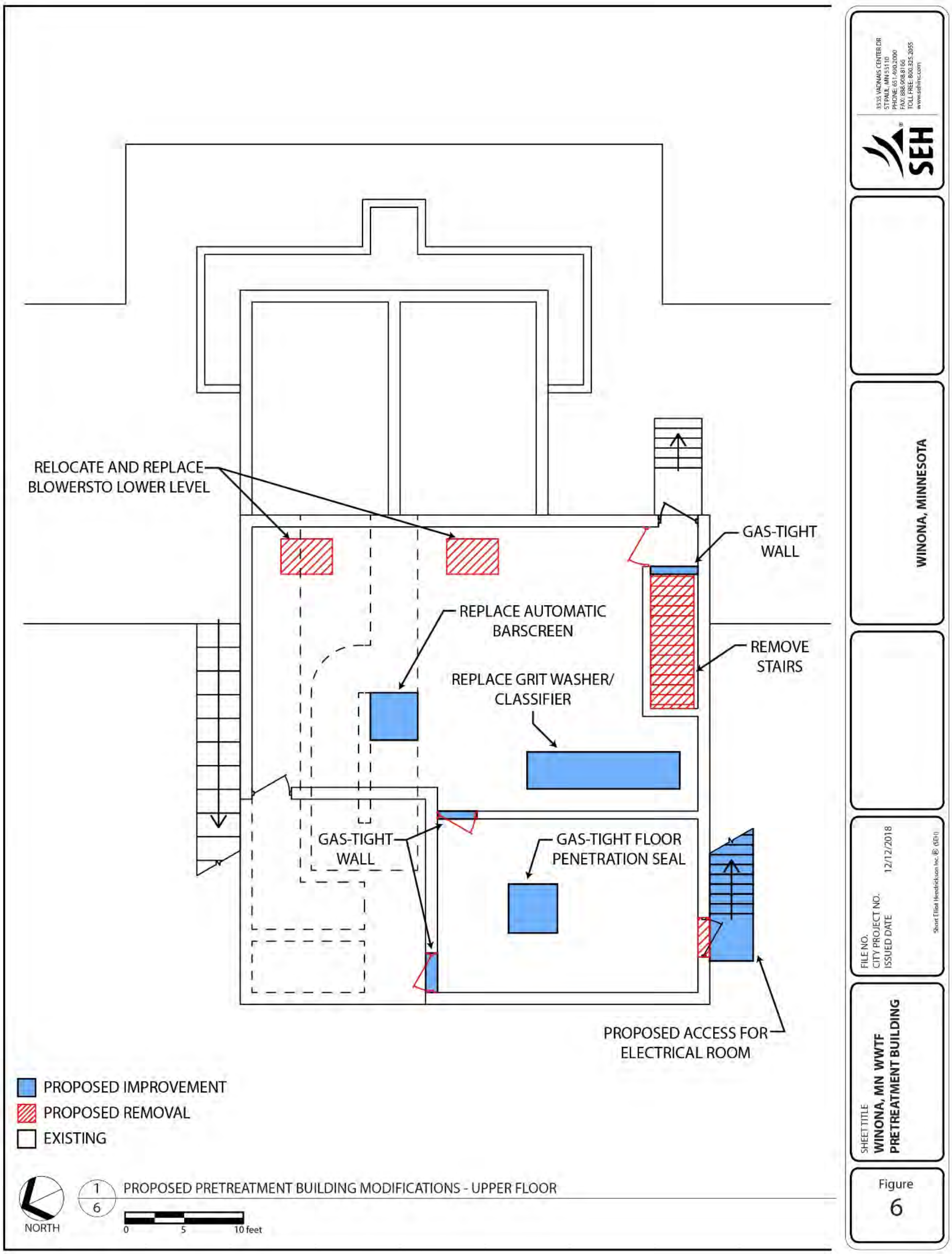
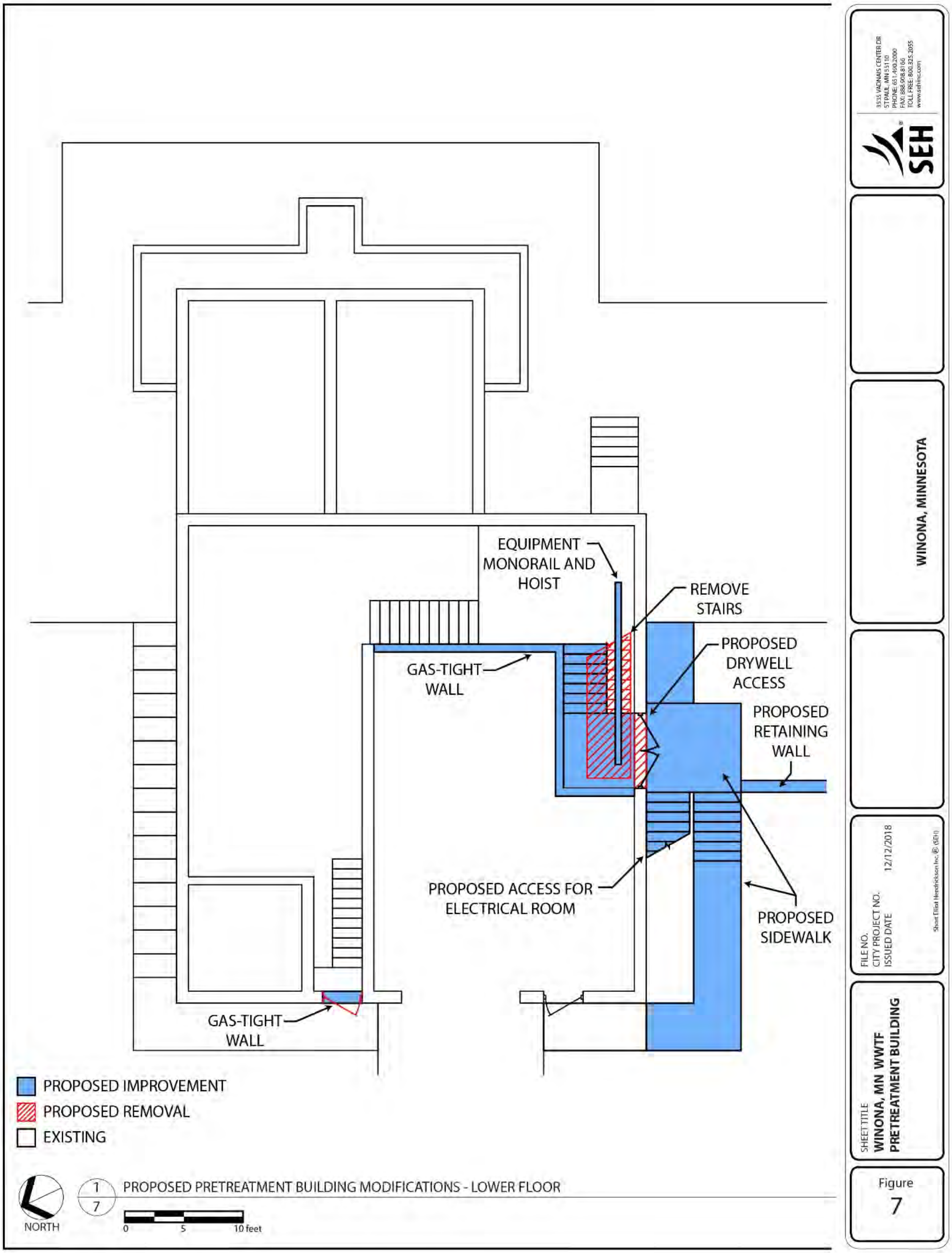
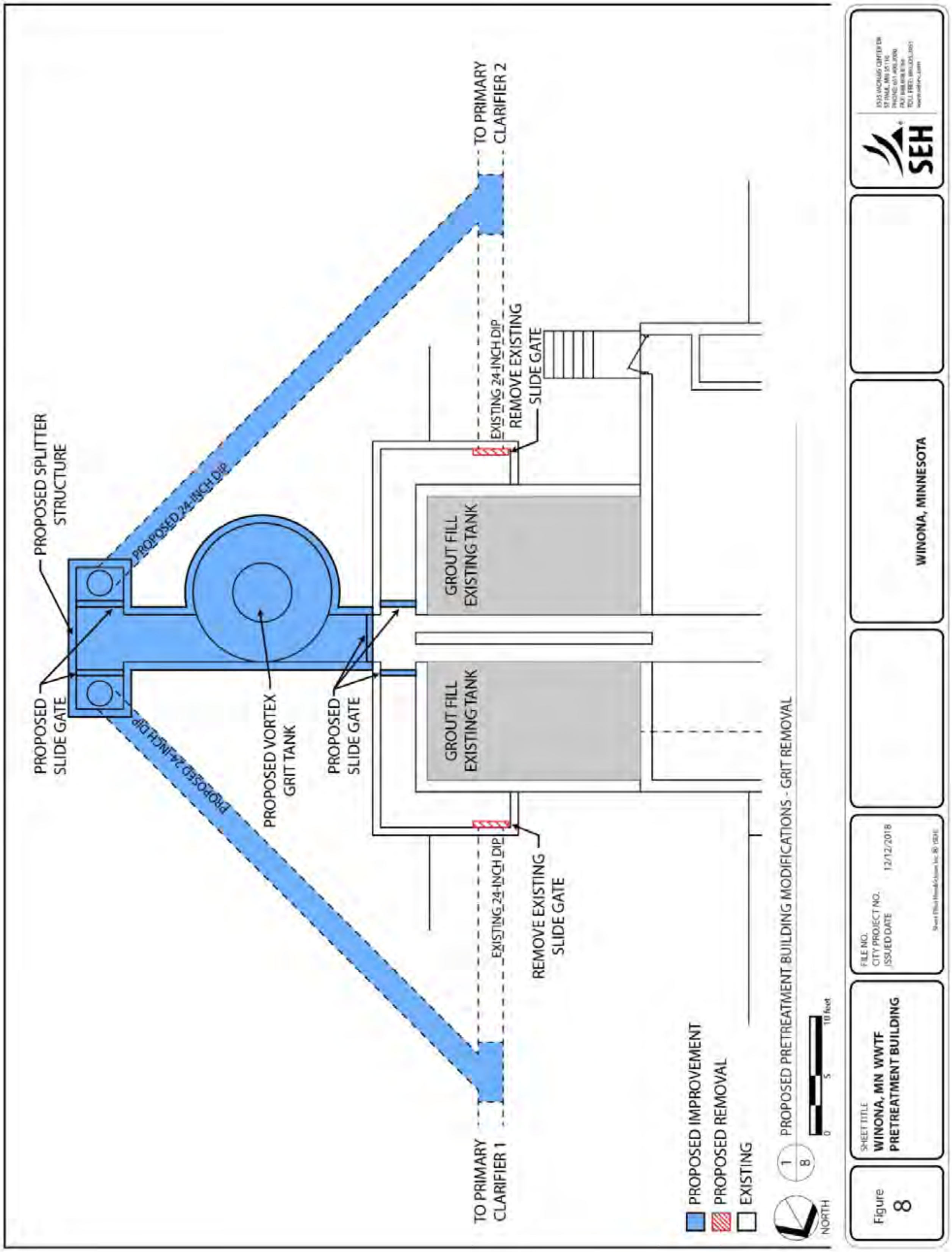


Figure 7 – Proposed Pretreatment Building Modifications - Lower Floor




TO PRIMARY CLARIFIER 2
PROPOSED SPLITTER STRUCTURE
PROPOSED 24-INCH DIP
PROPOSED SLIDE GATE
PROPOSED VORTEX GRIT TANK
PROPOSED SLIDE GATE
GROUT FILL EXISTING TANK
GROUT FILL EXISTING TANK
EXISTING 24-INCH DIP
REMOVE EXISTING SLIDE GATE
PROPOSED 24-INCH DIP
EXISTING 24-INCH DIP
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TO PRIMARY CLARIFIER 1
PROPOSED IMPROVEMENT
PROPOSED REMOVAL
EXISTING
NORTH
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8
PROPOSED PRETREATMENT BUILDING MODIFICATIONS - GRIT REMOVAL
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Figure
8
SHEET TITLE
WINONA, MN WWTF
PRETREATMENT BUILDING
FILE NO.
CITY PROJECT NO.
ISSUED DATE
12/12/2018
WINONA, MINNESOTA
SEH

10.3.1.3 Electrical

The existing screening and grit removal equipment on the upper level is installed to meet the electrical installation requirements of a non-hazardous classified location. This area is open to the lower level via the stairway, and is connected to the electrical room by doorway. It is recommended that the door to the electrical room be blocked off, and the access to the stairway from the grit removal room be blocked off with a new door leading to the outdoors from the grit removal room. A new access stairway would be required from the outdoor lower grade to a new door into the electrical room, as shown in Figures 6 and 7.

The process equipment and motors located in the grit removal room will also need to be replaced with units rated for the hazardous location.

The existing main service MCC shall be removed from the building. The electrical room shall be isolated from the grit removal room. The electrical room shall house a new MCC to serve the building loads.

New electrical motor branch circuits will be provided between the loads and the new MCC.

Lighting in the grit removal room shall be rated for the classified location, LED lighting. Lighting in other areas of the building will be new non-hazardous LED lighting. In general lighting shall be controlled by wall switches.

A new PLC control panel will be provided in the new electrical room.

10.4 Opinion of Probable Cost for Pretreatment Improvements

Table 21 summarizes the preliminary engineer's opinion of probable cost for preliminary treatment building improvements.

Major capital cost items to the pretreatment building include replacement of the existing automatic bar screen, addition of a washer/compactor for screenings, grit classifier, grit pumps, blowers, modifications to the pretreatment building to address NFPA 820 classifications, replacement of the existing MCCs controls. Modifications to grit removal include grout filling the existing aeration tanks, construction of a new grit vortex tank and splitter structure, grit slurry piping to the pretreatment building, and effluent piping to primary clarifiers. The estimates include 20% contingency and includes engineering and construction administration.

Table 21 – Preliminary Opinion of Probable Cost for Pre-Treatment Building Improvements

Scenario	Probable Capital Cost
Pretreatment Building Modifications for NFPA 820 and Equipment Replacement	$ 1,787,000
Grit Removal Modifications	$ 694,000
Primary Clarifiers	$ 1,220,000
Total	**$** 3,700,000

11 Summary of Recommendations

The previous sections of this report identified improvements to the several components of the facility, with an emphasis on solids processes. Improvements were identified for the several process areas totaling $23 Million. Below is a summary of these recommendations:

- New Dissolved Air Flotation (DAF) Thickener - $2,166,000 (Section 4). Install a 17-ft circular DAF near the existing thickener tanks. Prior to moving forward, work with DAF manufacturer to have solids tested to verify performance.
- New 3-belt, 2.0-m belt filter presses - $3,111,000 (Section 5). Install two 3- belt filter presses within the existing dewatering space and can accommodate future chemical sludge volumes. Consider piloting a 3-belt unit to see if performance can be improved over a 2-belt system.
- Digester Complex upgrade to replace aging equipment and address NFPA codes - $2,702,000 (Section 6). Reconfigure room layouts, replace select process equipment, new electrical and HVAC.
- New back-up electrical generator - $541,000 (Section 7). Install back-up generator in all-weather enclosure.
- Additional gas generation and utilization (Section 8):
  - High-strength waste receiving – Estimated cost for receiving station of $1,674,000 is not justified by the additional gas produced.
  - Biogas storage – Estimate cost for biogas storage of $800,000 is not justified given the gas production.
  - Install second microturbine – Estimated cost for additional microturbine is $146,000. This could be added to better utilize current and future gas production.
- Construction additional cake storage - $847,000 - $1,547,000 (Section 9). Construct covered cake storage to supplement existing storage. The cost range represents differing sizes.
- Pretreatment building improvements to replace aging equipment and address NFPA codes - $1,787,000 (Section 10). These improvements include replacing the mechanical bar screen, new washer/compactor for screening, new grit classifier, new grit pumps, new blowers and new electrical equipment. Building modifications are required to meet NPFA codes.
- New grit removal system assuming a single vortex grit removal system - $694,000 (Section 10). This system would replace the undersized aerated grit removal system. Influent grit analysis is recommended, which allows for optimum selecting and sizing of a grit removal system.
- Primary clarifier rehabilitation - $1,220,000. This would replace mechanisms and weirs and baffles.
- Phosphorus removal - $6,369,000. This is estimated assuming biological phosphorus removal (greater capital cost).

11.1 Phasing Plan

A schedule of phased improvements is presented in Table 22. Some schedule considerations include:

- Strategically implement thickening, dewatering and/or cake storage improvements when a phosphorus limit is imposed. Nearly 50% of the total sludge could be associated with chemical phosphorus removal. The Point Source Implementation Grant (PSIG) could fund 80%, up to $7 Million, for phosphorus-related costs.

- Consider prioritizing safety and reliability needs. The proposed phased improvement schedule has electrical gear replacement and back-up generation as priorities. Addressing these issues early can prevent costly emergency repairs and improve the safety at the facility.
- Consider the size/frequency of projects, recognizing that project costs will increase over time and that the identified improvements are the short-term needs. Improvements are necessary after 10 years and equipment repair and replacement will be continuous.

Table 22 – Preliminary Opinion of Probable Cost for Identified Improvements

Item		Description	Prelim. Est.	1-3 Years	3-5 Years	5-10 Years
1	**Pretreatment Building**					
		Code and Equipment upgrades	$1,787,000	$1,787,000		
		New Grit Removal System	$694,000		$694,000	
2	**Primary Treatment**					
		New Clarifier Mechanisms and Drives	$1,220,000		$1,220,000	
3	**WAS Thickenering**					
		DAFT[a]	$2,166,000		$2,166,000	
4	**Digestion & Dewatering**					
		New Electrical Building and Back-up Generator[b]	$1,547,000	$1,547,000		
		New Belt Filter Presses & Equipment Upgrades[a,b]	$4,807,000		$4,807,000	
5	**Cake Storage**					
		New Covered Cake Storage[a]	$1,547,000		$1,547,000	
6	**Cogeneration**					
		FOG Receiving Station	$1,674,000			$1,674,000
		Gas Storage	$800,000			$800,000
		Additional Microturbine	$146,000			$146,000
7	**Phosphorus Limit**					
		Biological P Treatment (assumed)[a]	$6,369,000		$6,369,000	
	TOTAL		**$22,757,000**	**$3,334,000**	**$16,803,000**	**$2,620,000**

Notes

a) Improvements could be partially funded with Point Source Implementation Grant (PSIG). Solids load will increase with phosphorus removal. If biological phosphorus removal, additional 10% solids will be generated. If chemical phosphorus removal, an additional 50% solids will be generated. PSIG funds 80% of P-related costs up to $7 million

b) Improvements are grouped to address the back-up power and electrical concerns prior to equipment replacement. Costs presented in Sections 5, 6, and 7 comprise these two items.

Appendix A

Winona Biological Phosphorus Removal Preliminary Evaluation Memorandum

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MEMORANDUM

TO: Paul Drazkowski, City of Winona

FROM: SEH, Susan Danzl and Eric Miller

DATE: June 15, 2018

RE: Winona Biological Phosphorus Removal Preliminary Evaluation
SEH No. WINON 145602 14.00

The purpose of this memorandum is to provide a preliminary determination of the tank footprint required for a biological phosphorus removal treatment process for the Winona, Minnesota wastewater treatment facility (WWTF). Although the WWTF does not currently treat for total phosphorus (TP), the facility anticipates the inclusion of a TP limit in the near future. A potential total phosphorus effluent limit of 0.7 mg/L was used for this evaluation. There are two approaches to treat for phosphorus: biological and chemical. This memorandum focuses on physical space requirements of a potential biological approach, which will be used to locate solids treatment improvements so as to not preclude future biological phosphorus treatment.

The facility operates trickling filters and solids contact tanks as secondary treatment. A proposed biological phosphorus removal process, as described further in this memo, would remove the existing trickling filters (as the carbon is required for biological phosphorus removal) and add a three-cell anaerobic selector tank ahead of a conventional activated sludge system.

Evaluation of a potential biological phosphorus removal treatment process was done in three parts:

- Evaluation of current and future facility flows and loads,
- Determination of additional tankage required for biological phosphorus removal, and
- Capacity of existing solids contact tanks to be used for biological phosphorus removal.

Evaluation of Current and Future Facility Flows and Loads

The most recent population estimate for the City of Winona was 27,478 completed in 2016. The Minnesota State Demographic Center predicts an 8.9% reduction in population for Winona County between 2016 and 2040. It is assumed that the City of Winona and the connected communities of Goodview and Minnesota City will follow the County population growth trend. With no anticipated domestic growth, this evaluation assumes the future design condition is the current permitted design flow and organic load to the facility

For comparison, current flows and loads were determined based upon records from January 2014 through March 2018, with the most current 27 months providing daily flow and load information. Table 1 summarizes applicable flows and Table 2 summarizes the applicable loads used for preliminary sizing of biological phosphorus removal treatment processes. Phosphorus is not a current design condition for Winona, therefore the existing phosphorus load was used for sizing of the biological phosphorous system. The larger value between current conditions and design capacity were used as the basis of design for sizing the biological phosphorus removal system.

Definitions of flow conditions used in Table 1 are as follows:

Average Dry Weather Flow (ADW): flow is defined as the flow that occurs during dry periods when the groundwater level is low or normal. This flow would include the normal sanitary sewer flows from homes, commercial establishments, public institutions, and any industrial facilities. This flow level normally becomes apparent in winter months (December, January, and February), when there is little to no inflow.

Average Annual Flow (AA): AA flow is measured as the daily average flow during the review period. For Winona, the current condition is based on data from January 2016 through March 2018.

Average Wet Weather Flow (AWW): Peak month flow is measured as either the daily average flow for the wettest 30 consecutive days or the largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Table 1

Flow Determination for Winona WWTF

Parameter	Current Condition	Facility Design Capacity
Average Dry Weather Flow, MGD	3.16	6.74
Average Annual Flow, MGD	3.53	8.17[3]
Average Wet Weather Flow, MGD [1]	5.97[2]	9.60

Notes:
[1] The largest maximum calendar month flow was 10.59 MGD during June, 2014.
[2] 5.97 MGD occurred between May 9th, 2017 and June 7th, 2017.
[3] 8.17 MGD average annual design flow is average of ADW and AWW design flows.

Table 2

Load Determination for Winona WWTF

Parameter	Current Condition Avg. / Max. [1]	Per Capita Load ppcd	Facility Design Capacity
Carbonaceous 5-Day Biochemical Oxygen Demand ($cBOD_5$), ppd	7,231 / 8,701	0.23 [2]	14,605
Total Phosphorus (TP), ppd	218 / 398	0.007 3	

Notes:
[1] Maximum load is the largest mass load anticipated to occur during a continuous 30-day period, expressed as a daily average.
[2] Typical range for per capita $cBOD_5$ loading is 0.11-0.26 ppcd (Metcalf and Eddy, 4th Edition), and above MPCA recommended minimum design criteria of 0.17 ppcd.
[3] Typical range for per capita TP loading is 0.006-0.010 ppcd (Metcalf and Eddy, 4th Edition).

Determination of Additional Tankage Required for Biological Phosphorus Removal

A biological phosphorus removal treatment system consists of two major components: an anaerobic selector and an aeration basin. The anaerobic selector promotes the growth of phosphate-accumulating organisms (PAOs). A three-cell anaerobic selector located ahead of secondary treatment promotes an anaerobic environment by step-feeding influent and return activated sludge. Figure 1 illustrates the anaerobic selector's cells and feed points.

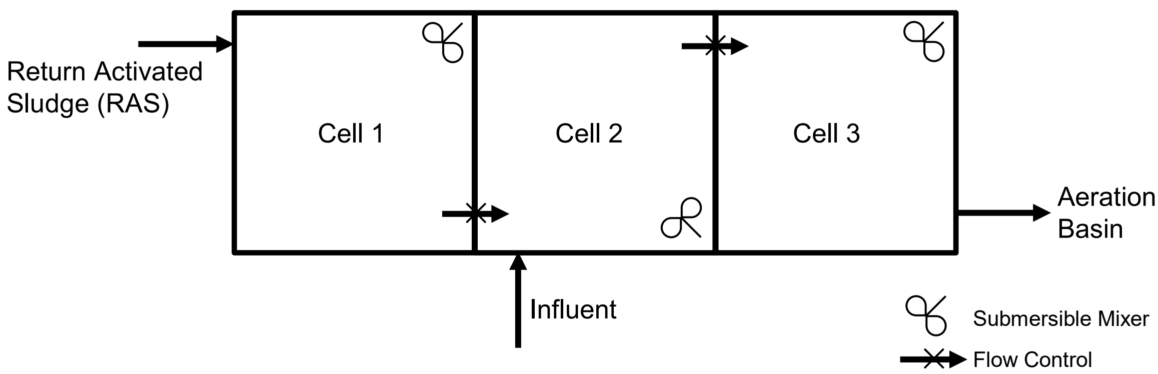

Figure 1 - Anaerobic Selector Schematic

Cell 1

Return activated sludge (RAS) is fed to Cell 1 of the anaerobic selector. This creates a semi-anoxic zone where de-nitrification occurs as carbon is consumed reducing nitrate and nitrite in the RAS stream to nitrogen gas. Ideally, internal plant recycle streams such as decant and dewatering filtrate would be fed to Cell 1 because of nitrate and nitrites in the side stream.

Cell 2

Influent, which is typically low in oxygen, is fed to Cell 2 and combined with RAS from Cell 1. Any remaining oxygen or constituent contributing to an aerobic or anoxic environment is consumed in Cell 2. Most facilities return side streams to the head of the facility and are therefore fed to Cell 2.

Cell 3

Once the combined flow enters Cell 3, a true anaerobic environment can be maintained to promote the uptake of phosphorus by PAOs.

The SRT required for biological phosphorus removal will require balancing nitrification with maintaining an appropriate MLSS in the aeration basin. Cell 1 provides an operational buffer to potential excess nitrites and nitrates as a result of partial nitrification due to sludge age.

Submersible mixers are positioned in each cell to maintain solids in suspension and prevent hydraulic short circuiting in the tanks. Submersible mixers are used as they incorporate less oxygen into the system while mixing as compared to other technologies.

This biological phosphorus removal concept assumes average day flow and load conditions. From Tables 1 and 2 this corresponds to 8.17 MGD of flow, 10,224 ppd $cBOD_5$ (70% of the influent design capacity with 30% removal in the primary clarifiers), and 218 ppd TP at annual average design flows and loads. Returned side streams, including supernatant from thickening, and filtrate from dewatering will also contribute nutrient loads to the system. The combined recycle flow for sizing the biological phosphorus removal system is potentially 140,000 gpd with all operations occurring simultaneously. Determination of this return stream volume considers:

- Dewatering producing between 13% and 20% solids, as determined with pilot testing, resulting in a theoretical filtrate flow between 63,200 gpd and 65,800 gpd at design annual average flows and loads.
- Thickening processes that would produce approximately 5.0% combined solids to be fed to the digesters and return 73,900 gpd in decant.

Selectors for this type of anaerobic/aerobic system (AO) have assumed a typical HRT between 0.5 and 1.5 hours for preliminary (Metcalf and Eddy, fourth edition). For planning, it is assumed 0.5 hours of hydraulic retention time per cell, for a total HRT of the selectors of 1.5 hours. At AA design flow, 0.5 hours of HRT requires 170,300 gallons or about 22,755 cuft of volume. It is recommended to provide at least two parallel anaerobic selectors for redundancy. With a 20-foot side water depth, each of the three cells per train are 18'-8" x 10'-2". Figure 2 illustrates the footprint required for the anaerobic selectors under these design conditions.

Suitability of Existing Wastewater Characteristics to be used for Biological Phosphorus Removal

A first approximation of the suitability for a waste stream to be used for biological phosphorus removal is the $cBOD_5$:TP ratio, with a minimum $cBOD_5$:TP ratio of 20:1 (WEF Manual of Practice No. 8) necessary to produce an effluent TP of 1 mg/L. It can be assumed that primary treatment removes approximately 30% of $cBOD_5$ from influent waste resulting in a $cBOD_5$:TP ratio of approximately 22:1 being fed to the aeration basin at design annual average flows and loads. This indicates there is potentially a suitable amount of carbon for phosphorus removal with just primary treatment, and the trickling filters would detrimentally remove too much carbon for effective biological phosphorus removal.

The aeration basin, which follows the anaerobic selector in a biological phosphorus removal process, is sized based on organic loading. Since Winona does not treat for an ammonia limit, the aeration basin would operate as a conventional activated sludge system with a design organic loading of 40 lb. $cBOD_5$ per day per 1,000 cuft of tank volume. The existing solids contact tanks have a volume of 1,157,500 cuft with a water operating elevation of 662.50 ft. The solids contact tanks, reused as-is, would not have enough volume (the organic loading rate would be 64.9 lb. $cBOD_5$ per day per 1,000 cuft of tank).

Figure 2 illustrates two potential secondary treatment scenarios, one where the existing solids contact tanks are modified and additional tank added, and the other if new aeration tanks were constructed.

Modification of Existing Tanks

The existing solids contact tanks have the potential to be reused by removing the middle block-out structure and constructing the anaerobic selectors inside each tank. A third basin would need to be constructed to provide sufficient volume for the design $cBOD_5$ load. The three basins with anaerobic selectors would provide approximately 233,900 cuft of aeration basin at an organic loading rate of 44 lb. $cBOD_5$ per day per 1,000 cuft of tank.

The most likely location for the additional aeration tank is illustrated in Figure 2, and is located east of the existing contact stabilization tanks. This location allows for a centrally located splitter structure after the screw pumps and allows the additional tank to flow by gravity to the existing final clarifiers. Without the trickling filters, there is the possibility that the screw pumps could be eliminated, depending on head conditions.

New Aeration Basins

Figure 2 also illustrates the aeration tank volume and anaerobic selectors required if new tanks are constructed in lieu of other alternatives. 10,224 ppd of $cBOD_5$ to the secondary treatment process would require 255,600 cuft of tank (about 1,912,000 gallons) for 40 lb. $cBOD_5$ per day per 1,000 cuft of tank. With an assumed side water depth of 20 feet and four parallel treatment trains, each train would be 28'-6" x 114' at a length to width ratio of 4:1.

The proposed new tankage would be located north of the existing primary clarifiers due to the footprint of the required tankage and need for the existing secondary treatment to remain operational during construction. Wastewater would flow by gravity from the primary clarifiers to the new basins and then by gravity to either the existing screw pumps or final clarifiers, depending on head conditions.

SEH recommends evaluating the biological process in greater detail during design of the biological phosphorus removal process, considerations include:

- Further qualifying suitability of Winona's wastewater characteristics with respect to soluble carbon and volatile fatty acid formation potential
- Using an alternative secondary treatment process allowing a higher organic loading, or
- Providing chemical addition to the primary clarifier to increase solids removal prior to secondary treatment.

Summary and Recommendations

Figure 2 shows two alternative site plans that could accommodate a future biological phosphorus removal scenario. SEH recommends these areas be reserved for future potential biological treatment. The intent of this memorandum is not to provide a recommendation of chemical versus biological phosphorus removal, but to ensure decisions made for solids treatment improvements do not preclude either of these alternatives.

Through this preliminary evaluation of biological phosphorus removal, it was observed that with the long SRT under current flow conditions, nitrification will limit the biological phosphorus removal treatment. Preliminary process modeling indicates that with careful control of RAS rates, the biological treatment could treat down to 1.5 mg/L TP at current conditions. To meet an anticipated limit of 0.7 mg/L, chemical phosphorus removal would be necessary to supplement the treatment.

The decision to pursue biological phosphorus removal over chemical phosphorus removal is unique to each facility and should be decided once the actual limit is known. As part of this evaluation, jar testing is recommended to determine the effectiveness and dosage of multiple chemicals available for chemical phosphorus removal. Below is a summary of some of the advantages/disadvantages of the two approaches.

Chemical Phosphorus Removal:

- Dose dependent on chemical.
- Operational costs tied to chemical costs.
- Chemical properties dictate specific materials of construction and/or storage requirements.
- Chemicals used may consume alkalinity, potentially challenging biological treatment.

Biological Phosphorus Removal:

- Reduced dependence on chemicals.
- Can lead to struvite formation within and downstream of anaerobic digesters requiring additional chemical or treatment processes (e.g. struvite harvesting) to prevent.
- Can be difficult to consistently achieve results if influent loading is variable.
- P tied up biologically can re-release in an anaerobic environment. If not addressed, this can lead to (1) struvite formation within and downstream of anaerobic digesters requiring addition chemical or treatment processes (e.g. struvite harvesting) to prevent and/or (2) high concentrations in return streams, which must be considered in the design of the biological system.
- Process generates alkalinity, which promotes denitrification.

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Appendix B

Sludge Projections

Solids Projections

1.1 Projected Primary Sludge Production

Typical primary settling removes between 50% and 70% of total suspended solids, approximately 80% of which are volatile (WEF Manual of Practice No. 8, 2018). Similarly, a fraction of the $cBOD_5$ load is also removed during primary treatment, and is typically reduced around 30%. At an assumed TSS removal efficiency of 60%, primary sludge generated at design and current solid loading would be 8,362 and 4,339 pounds per day, respectively. The facility currently co-settles their secondary waste activated sludge in the primary clarifiers, and the combined solids are thickened in existing sludge clarifier/gravity thickener to around 2.0%. The City has operated the sludge clarifier with primary solids alone and achieved greater than 6.0% percent solids after thickening.

1.2 Projected Biological Sludge Production

If biological phosphorus removal were implemented (refer to Appendix A), the sludge production would be similar in volume to a conventional activated sludge system. Sludge production design conditions were evaluated under current annual average flows and projected average wet annual flows. Assumed influent loads and flows are summarized in Table 3 for design annual average flow and Table 4 for current annual average flow. The $cBOD_5$ and TSS loading in these tables reflect the loading to the secondary treatment process, after primary settling.

Table 1 – Wastewater Parameters to Determine Solids Projections from Secondary Treatment at Design Annual Average Flow

Parameter	Influent	Effluent	Removal
$cBOD_5$ after Primary Treatment, mg/L [1]	150	10	90%
$cBOD_5$ after Primary Treatment, ppd	10,224	681	
TSS after Primary Treatment, mg/L [2]	44	10	77%
TSS after Primary Treatment, ppd	2,998	681	

Notes:

1 Assumes 30% reduction in design cBOD5 from primary treatment.

2 Assumes 60% reduction in TSS from primary treatment. Daily load based on average day concentrations from DMR reporting for May 1, 2018 through June 8, 2018.

Table 2 – Wastewater Parameters to Determine Solids Projections from Secondary Treatment at Current Annual Average Flow

Parameter	Influent	Effluent	Removal
$cBOD_5$ after Primary Treatment, mg/L [1]	175	10	94%
$cBOD_5$ after Primary Treatment, ppd	5,152	294	
TSS after Primary Treatment, mg/L [2]	78	10	87%
TSS after Primary Treatment, mg/L	2,296	294	

Notes:

1 Assumes 30% reduction in cBOD5 from primary treatment.

2 Assumes 60% reduction in TSS from primary treatment. Daily load based on average day concentrations from DMR reporting for May 1, 2018 through June 8, 2018

Process modeling was utilized to estimate the solids generated with biological phosphorus removal and a conventional activated sludge system. Appendix A provides a summary of a concept biological phosphorus removal strategy, which requires additional aeration basin capacity due to the organic loading. Table 5 summarizes the design conditions of this future potential aeration basin at both the design annual average flow and current annual average flow conditions, and the projected sludge volume generated by secondary treatment.

Table 3 – Aeration Basin Design Conditions for Sludge Production

Parameter	Design Flow	Current Flow
Hydraulic Retention Time, days	5.1	11.9
Mixed Liquor Suspended Solids (MLSS), mg/L	1,600	1,600
Organic Loading, lbs cBOD5 / 1,000 cuft	43.7	22.0
Summer Sludge Production		
Solids Retention Time, days	4.1	7.8
Food to Microorganism Ration (F:M)	0.44	0.22
Waste Activated Sludge (Organic), ppd	4,880	2,010
Waste Activated Sludge (Total), ppd	5,740	3,010
Volume of Waste Sludge as 0.5% solids, gpd	105,700	55,500

Table 5 represents summer conditions with a water temperature of 20 degrees Celsius. The larger winter projected daily sludge production was used for process design. In both current and design annual average flow scenarios, the anticipated SRT indicates the potential for nitrification to start occurring. In summer months, which correspond to higher flow scenarios for Winona, nitrification is likely to start occurring but not significantly develop in the aeration basin. In winter months, the lower organic loading causes the system to respond like single-stage nitrification. Lower flow also increases the hydraulic retention time in the anaerobic selectors of a biological phosphorus removal system allowing for greater denitrification prior to the anaerobic zone. The nitrification and denitrification result in greater sludge production. Peak sludge generation occurs under the winter design annual average flow scenario due to the reduced kinetic growth of heterotrophic bacteria at cooler water temperatures, however operationally wasting of solids is reduced to maintain a higher mixed liquor concentration in the activate sludge system.

In addition to producing more sludge, additional carbon is consumed in the anaerobic selectors. This is due to denitrification and may limit the biological phosphorus removal system performance. Due to this nitrification limitation, it can be assumed some degree of chemical precipitation is necessary during summer months and potentially during winter months to meet the 0.7 mg/L potential phosphorus limit. For this preliminary design, it was assumed that biological phosphorus removal would sufficiently reduce influent phosphorus to 1.5 mg/L and the remaining would be removed using chemical addition.

A variety of chemicals are available for the chemical precipitation of phosphorus from wastewater. Commonly used coagulants include ferric chloride, alum, and polyaluminum chloride (PaCl). As part of the design process, chemical suppliers can conduct jar tests which may indicate which coagulant best performs with Winona's wastewater characteristics. For the purpose of this preliminary design report, solids generation was calculated for both ferric chloride and alum. Table 6 summarizes the estimated required chemical addition and sludge generation for chemical phosphorus precipitation following biological phosphorous removal at design average annual flow conditions.

Table 4 – Chemical Phosphorus Polishing after Biological Phosphorus Removal at Design Annual Average Conditions and Sludge Production

Parameter	Ferric Chloride	Alum
Coagulant Solution Dose per Day, gpd	140	281
Additional Sludge Generated, ppd	585	481
Volume of Additional Sludge as 0.5% solids, gpd	14,050	11,540
Increase from Projected WAS, % [1]	10.2	8.4

Notes:

1 Increase based on 105,654 gpd solids generation at design annual average flow.

It is projected that ferric chloride will result in greater solids generation at design annual average flows when compared with alum. Chemical precipitation following biological phosphorus removal would result in about a 10.2% increase in solids if ferric chloride is used. The total solids wasted at design annual average flow for biological phosphorus removal with ferric chloride used as chemical polishing would be 6,320 ppd or 119,100 gpd at 0.6% solids.

1.3 Projected Chemical Sludge Production

Instead of using biology to uptake phosphorus, chemical alone can be the primary means of achieving a potential phosphorus limit of 0.7 mg/L. With chemical precipitation, the anaerobic selector would not be necessary, but the aeration volume is still necessary for the $cBOD_5$ removal. Since the same activated sludge system is used in either alternative, the additional sludge generated as a result of chemical addition can be added to the projected sludge volume determined as part of the biological phosphorus removal system section.

The additional sludge generated impacts the solids loading of the final clarifiers. Final clarifiers used for chemical phosphorus precipitation have lower surface overflow rate design parameters, 1,200 gpd/sqft for conventional and 900 gpd/sqft for chemical addition. Final clarifier capacity will need to be analyzed with any future modifications to the secondary treatment process.

Table 7 summarizes the estimated required chemical addition and sludge generation for chemical phosphorus precipitation at design average annual flow conditions.

Table 5 – Chemical Phosphorus Precipitation Design Annual Average Conditions and Sludge Production

Parameter	Ferric Chloride	Alum
Coagulant Solution Dose per Day, gpd	692	1,390
Additional Sludge Generated, ppd	2,900	2,400
Volume of Additional Sludge as 0.5% solids, gpd	69,500	57,100
Increase from Projected WAS, % [1]	51	38

Notes:

1 Increase based on 115,316 gpd Winter solids generation at design annual average flow.

It is projected that ferric chloride will result in greater solids generation at design annual average flows. The use of chemical precipitation would result in about a 51% increase in solids if ferric chloride is used. The combined activated sludge and chemical solids wasted under winter water conditions at design annual average flow would be 8,630 ppd or 172,600 gpd at 0.6% solids.

The additional chemical solids resulting from chemical phosphorus precipitation have essentially zero volatile fraction aside from what biological component may be encapsulated in the chemical floc. The percent volatile solids being fed to the anaerobic digester is therefore reduced from 75% to 68% as a result.

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