Gogebic-Iron Wastewater Authority (GIWA)
Wastewater Treatment Facility Improvements

Michigan Clean Water State Revolving Fund Project Plan
Volume 1 – Report Body (DRAFT)

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LIST OF ABBREVIATIONS

Abbreviation	Description		Abbreviation	Description
AC	Acre		O&M	Operation and Maintenance
AMP	Asset Management Plan		OMB	US Office Of Management and Budget
ASCE	American Society of Civil Engineers		P	Phase, Φ
AWWA	American Waterworks Association		PAC	Powdered Activated Carbon
BOD	Biological Oxygen Demand		PACL	Polyaluminum hydroxychloride
BRF	Business Risk Factor		PFAS	Per- and polyfluoroalkyl substances
CAS or CI	Cast Iron Pipe		POF	Probability of Failure
CFM	Cubic Feet per Minute		POSA	Plan of Study Area
CFS	Cubic Feet Per Second		POTW	Publically Owned Treatment Works
Cl	Chlorine		PPB	Parts per Billion
CIP	Capital Improvement Plan		PPD	Pounds Per Day
CT	Contact Time		PPM	Parts Per Million
CUPPAD	Central U.P. Planning and Devel. Reg. Commission		PRV	Pressure Relief Valve
DBP	Disinfection Byproduct		PS	Pump Station
DI or DIP	Ductile Iron Pipe		PSI	Pounds Per Square Inch
DO	Dissolved Oxygen		PVC	Polyvinyl Chloride (Pipe)
DWAM	Drinking Water Asset Management		RRI	Repair, Replacement, and Improvements (Fund)
DWSRF	Michigan Drinking Water State Revolving Fund		RUS	Rural Utility Service (USDA RD)
EDU	Equivalent Dwelling Unit		SAN	Sanitary Sewer
EGLE	Mich. Dept. of Environment, Great Lakes, & Energy		SAW	Michigan Stormwater, Asset Management, And Wastewater funding
ENR	Engineering News-Record		SCADA	Supervisory Control And Data Acquisition
EPA	US Environmental Protection Agency		SCFM	Standard Cubic Feet per Minute
EPDM	Ethylene Propylene Diene Terpolymer		SF	Square Foot
EUPPDR	Eastern U.P. Planning and Devel. Reg. Commission		TSS	Total Suspended Solids
FPS	Feet per Second		STO	Storm Sewer
FSP	Fiscal Sustainability Plan		SRF	Michigan State Revolving Loan Fund
GAC	Granular Activated Carbon		SWD	Side Wall Depth
GPCD	Gallons Per Capita Per Day		TDH	Total Dynamic Head
GPD	Gallons Per Day		TRS	Trihalomethane Removal System
GPD/IN-MI	Gallons Per Day Per Inch Diameter Mile		TTHM	Total Trihalomethane
GPM	Gallons Per Minute		TWST	Treated Water Storage Tanks
HP	Horsepower		USACE	US Army Corps Of Engineers
HVAC	Heating, Ventilation, and Air Conditioning (System)		USDA RD	US Dept. Of Agriculture - Rural Development
ITA	Intent to Apply		V	Volt
MDNR	Michigan Department of Natural Resources		UV	Ultra Violet
MG	Million Gallons		VFD	Variable Frequency Drive

Abbreviation	Description		Abbreviation	Description
MGD	Million Gallons Per Day		WERF	Water Environment Research Foundation
MG/L	Milligrams Per Liter		WM	Watermain
MH	Access Manhole		WPA	Works Progress Administration (early public works construction program)
ML	Milliliter		WRC	Michigan Water Resources Commission
MPN	Most Probable Number		WS	Water Service
NEC	National Electric Code			
NEMA	National Electrical Manufacturers Association		WTP	Water Treatment Plant
NEPA	National Environmental Policy Act		WUPPDR	Western U.P. Planning and Devel. Reg. Commission
NFPA	National Fire Protection Association			
NH_3-N	Ammonia Nitrogen		WV	Water Valve
NPDES	National Pollutant Discharge Elimination System		WWTF	Wastewater Treatment Facility
NPV	Net Present Value		WWTF	Wastewater Treatment Plant
NRWA	National Rural Water Association			

SUMMARY

Project Background

This study was authorized by the Gogebic-Iron Wastewater Authority (GIWA) on October 28, 2021 with C2AE and MSA. The purpose of the Project Plan is to evaluate needs and recommend alternatives for improvements to the GIWA Wastewater Treatment Plant (WWTF) to meet the needs for the next 20 years.

GIWA owns and operates a wastewater treatment facility located on the west side of the City of Ironwood adjacent to the Montreal River which is the border between Michigan and Wisconsin. The GIWA was incorporated in 1983 to own and operate wastewater treatment facilities for the constituent communities. The GIWA treatment facility accepts wastewater flows from its member communities, namely the City of Ironwood and Charter Township of Ironwood , Michigan and the City of Hurley, Wisconsin. Each municipality owns and operates their own individual sanitary sewer collection systems. Each municipality establishes their own individual sewer rates and charges, which generates revenues to operate their own sewer collection system and to pay their share of the GIWA expense.

This SRF Project Plan is for the Gogebic-Iron Wastewater Authority WWTF only, and does not include any review or improvements to the individual municipality's sanitary sewer collection systems.

Summary of Project Need

Reliable operation of the GIWA WWTF is imperative to protect the health and safety of the communities' citizens, visitors, and the environment. The Authority has been operating and maintaining the WWTF effectively, but there are areas of escalating deterioration and obsolescence that require a larger, preventative replacement, and rehabilitation effort. The existing facility is between 31 and 39 years old with minimal rehabilitation projects completed in this time frame. A significant portion of the mechanical components of the facility are well past their useful life. Operators, consultants, and regulators have collaborated on the proposed solutions that should be implemented to provide a reliable treatment system.

Analysis of Alternatives

Alternatives analyzed in this study include No Action and Upgrade of the Existing Facility. As part of the upgrades to the existing facility, analyses of specific processes were examined:

1. Chlorine versus UV disinfection
2. Upgrade of biosolids to Class A

3. Upgrades to oxidation ditch process to improve efficiency and effectiveness and creation of anoxic zones to provide denitrification.

Selected Alternative

Upgrade of Existing Facilities is considered the preferred alternative and includes improvements to the existing WWTF. Most the improvements were outlined under the SAW Program:

- Headworks: Screw Pumps, Grit Classifier with Cyclone Unit, Septage Receiving Station
- Primary Treatment: Collector Mechanisms, Sludge Pumping, Mixing System
- Oxidation Ditch: Optimize Process and Equipment Configuration Including Aerators, Drives, Rehab Covers
- Final Treatment: RAS/WAS Pumping Improvements, Collector Mechanisms
- Chemical Building: Optimize Disinfection
- Digesters: Mixing and Pumping Improvements, Covers
- Biosolids: Class A Treatment Process
- Administrative Building: Rehab of Mechanical Systems, Sludge Handling
- Electrical: Electrical Throughout Plant, Generator

Environmental Evaluation

The anticipated environmental impacts resulting from implementation of the selected alternative are relatively minor. There is no increase in the boundaries of the WWTF, and no major changes in terms of residuals or other material effects. Full detail may be found under the section labeled "Environmental Evaluation".

Mitigation Measures

Where adverse impacts due to installation of the recommended improvements cannot be avoided, mitigation measures will be implemented. Costs for mitigation measures were considered and included where applicable in project opinions of probable cost and included in construction contract documents. A full discussion of mitigation measures can be found in detail in section "Mitigation Measures".

Public Participation

A public hearing for this CWSRF Project Plan took place on May 12, 2022. Copies of public hearing advertisement and minutes are incorporated and adopted into the final version of this Project Plan (refer to Appendix E).

PROJECT BACKGROUND

This study was authorized by the Gogebic-Iron Wastewater Authority (GIWA) on October 28, 2021 with C2AE and MSA. The purpose of the study was two-fold; first to explore financing opportunities for wastewater system improvements and second to evaluate needs and recommend alternatives for improvements to the Authority's WWTF via prioritization and financing potential. Recommended improvements will allow GIWA to meet NPDES Permit requirements and treatment needs for at least the next 20 years.

Background information on the Authority and the WWTF summarized here comes from documentation furnished by the Authority including the following:

- 2020 SAW Program
- 2018 Condition Assessment Report for Electrical Services by GEI
- 2016 GIWA Equipment Inspection & Recommendations by PERS
- 2010 SRF Project Plan by C2AE and MSA
- 2010 Wastewater Master Plan by Donohue and Associates
- 2009 Manager's Narrative History of the GIWA prepared for the Authority's NPDES Permit Application
- 2009 & 2011 Hurley Sewer Projects Summary letters by MSA Professional Services
- 2005 Sanitary Sewer System Study by Coleman Engineering
- 1991 GIWA Grit Removal & Dumping Station Record Plans by Cooper Engineering Company
- 1986 WWTF Brochure by WW Operations Services
- 1986 WWTF O&M Manual by Foth & Van Dyke
- 1983 GIWA WWTF Record Plans by Foth & Van Dyke

A portion of the general background information on the Ironwood area and Gogebic County came from the County's 2007 Recreation Plan prepared by WUPPDR Regional Planning.

Delineation of Study Area

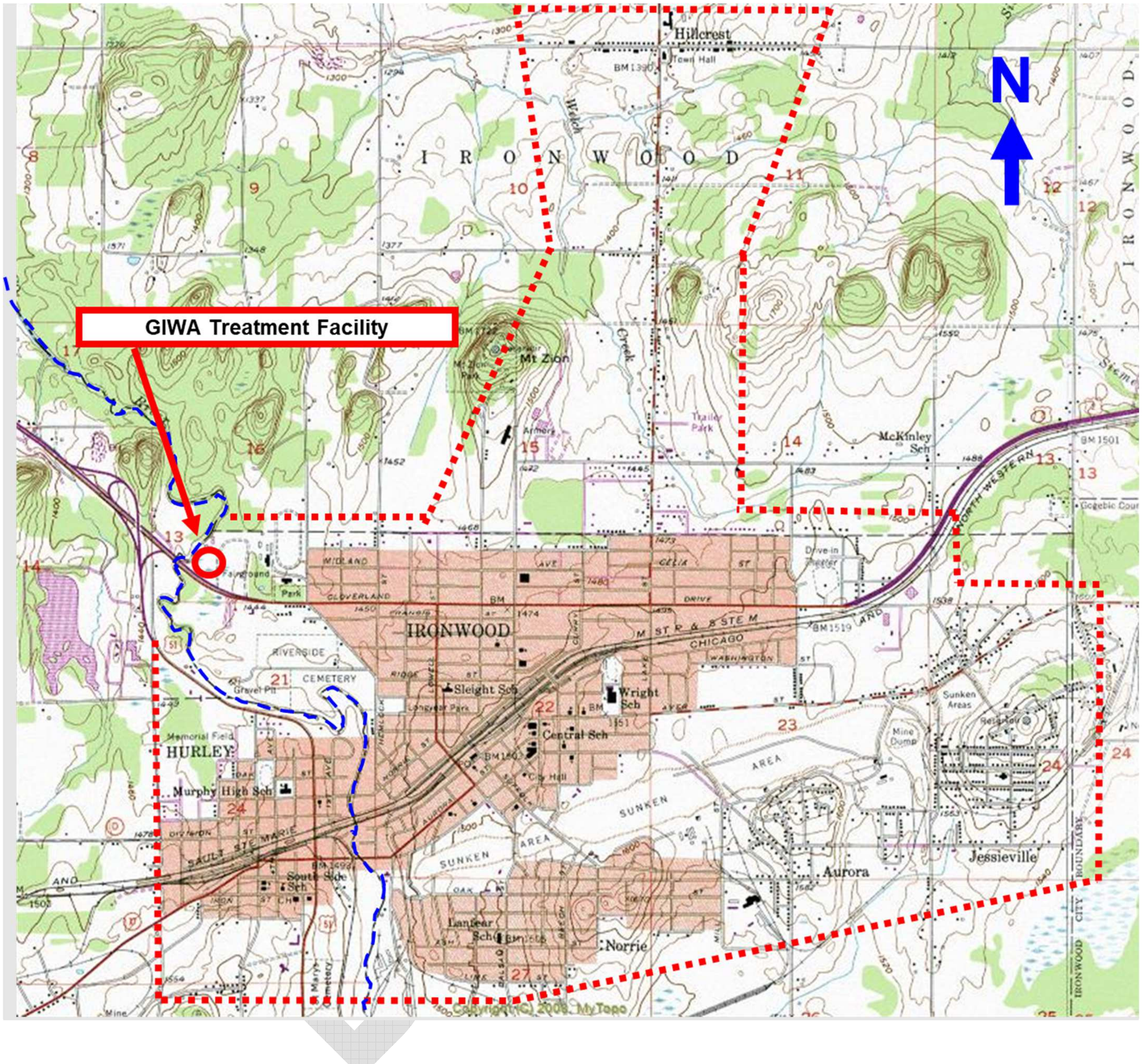
GIWA serves the City of Ironwood, MI; Charter Township of Ironwood, MI; and the City of Hurley, WI. The Authority's WWTF is located on the west side of Ironwood adjacent to the Montreal River which is the border between Michigan and Wisconsin.

Ironwood is on the western tip of Gogebic County which is also the western tip of Michigan's Upper Peninsula. Hurley is on the opposite side of the Montreal River in Iron County, Wisconsin. The Charter Township of Ironwood lies north and east of the City of Ironwood. The treatment facility is located in the SE ¼ of the SW ¼ of Section 16, T47N, and R47W. The WWTF outfall is located in the NW ¼ of the SW ¼ of Section 16.

An area location map and service area USGS topographic map can be found as Figure 1 and Figure 2 on the following two pages. The service area outlined in Figure 2 illustrates the full collection system extents and do not encompass the entire Township and City boundaries; some septic systems still exist in these areas and are not connected to the collection system.

Figure 1. Project Location

Figure 2. Study and Service Area



Environmental Setting

Cultural and environmental letter requests and responses are contained in Appendix C.

Cultural Resources

Correspondence with the State Historic Preservation Office relative to this Project Plan can be found in Appendix C. A listing of area registered historic sites is also included. None are near the treatment facility. No long term impact is expected.

The Natural Environment

Air Quality

Project area air quality can only be described as good to excellent. The area is virtually free of large industrial or power producing facilities which can adversely affect air quality. Limited population also means limited transportation system initiated air quality impacts. Proposed improvements will have no adverse effects on air quality.

Wetlands

The WWTF is located on an upland site of the Montreal River. Wetlands do not exist on site. Isolated wetlands do exist throughout this region of the State and evaluation must be conducted to identify them when working in undisturbed areas. However, based upon a field review of the WWTF areas, all proposed work will be outside any wetland areas, and therefore the proposed project will not adversely impact existing wetlands.

Coastal Zones

There are no coastal zones within the planning area.

Floodplains

Localized floodplains exist along the shore of the Montreal River. They are generally not developed. There are no existing floodplain areas within the existing GIWA WWTF site.

Natural or Wild and Scenic Rivers

There are no nearby natural or wild and scenic rivers to the project location.

Major Surface Waters

There are several streams in the Ironwood area generally flowing from the south and southeast to the north and northwest eventually reaching Lake Superior. The larger of these are the Montreal River in Ironwood and Charter Township of Ironwood and Siemens and Welch Creeks in the Charter Township of Ironwood. The City of Ironwood utilizes municipal wells as a water source located north of the City and west of Lake Road.

The GIWA WWTF discharges to the Montreal River. The discharge location is 46° 28' 20.45971" N Latitude and 90° 11' 35.06213" W Longitude.

Recreational Facilities

The Gogebic County Forestry and Parks Commission has over 50,000 acres under its Forest Management Program Forest lands along with State and Federal Parks make up the majority of land use/cover in Gogebic County. Gogebic County Fair Grounds are located east of GIWA WWTF, however disturbance or effects from proposed project will be negligible.

Topography

A topographic map of the service areas has been included as Figure 2. Terrain typically slopes from the south and south east towards the north and northwest in the Project Site Area. Contours follow the meandering Montreal River to Lake Superior.

Geology

Ironwood lies within one of two mountainous belts in Gogebic County that in the Ironwood area consists of igneous formations that contain iron ore bodies. The proposed project will not be affected by the geological structures/formations in/around the Service Area.

Soils

USDA Natural Resource Conservation Service (NRCS) published their Soil Survey of Gogebic County in 2010. No adverse soil condition exists that would impact the project and its construction. The soil within the project area consists primarily of Gogebic silt loam (351C). Soils and geology maps and type descriptions can be found in Appendix C.

Agricultural Resources

There is no designated prime agricultural land near the WWTF.

Fauna and Flora

There are no sensitive habitats within the WWTF facility grounds where this project is located. The surrounding areas have several streams, ravines, hills, bluffs, and heavily wooded areas with the potential for sensitive habitats. Federal and State Coordinators have been given the opportunity to comment on this project.

Land Use in the Study Area

Gogebic County land area totals approximately 1,105 square miles of which 90% is forested.

Area zoning ordinances are in place and enforced. GIWA member community zoning maps can be found in Appendix A. Area development is concentrated in northern Iron County, WI and southwestern Gogebic County, MI within and around the communities of Hurley, WI and Ironwood / Bessemer / Wakefield, MI.

Existing land use patterns are expected to remain stable over this study's 20-year planning period. Land use in the study area is a mixture of residential, light industrial, recreational, forest, and some smaller farm plots. The University of Michigan 1993 Profile of Gogebic County listed the following breakdown of the County's property tax base:

Residential:	54%
Commercial	12%
Industrial:	2%
Agricultural:	1%
Other:	31%

The majority of the undeveloped land in the study area is forest. There is no significant farmland or rangeland in the area. The 1995 Gogebic County Tourism Profile, published by the Michigan State University Extension Service, lists the following land and water related highlights:

Total Acreage:	732,288 acres
National Forests:	309,777 acres

State Parks & Recreation:	9,767 acres
State Boating & Fishing:	526 acres
State Forests:	499 acres
Great Lakes Shoreline:	30 miles
Rivers and Streams:	1,200 miles
Inland Lakes:	27,253 acres

Below is breakdown of the land use in Iron County, Wisconsin from the Iron County Hazard Mitigation Plan:

Abandoned Commercial	1.81 acres
Agricultural	9,092 acres
Commercial	247 acres
Communication/Utilities	7 acres
Governmental/Institutional	167 acres
Industrial	327 acres
Open Space	3,660 acres
Parks and Recreation	53,386 acres
Residential	1,731 acres
Urban	3,557 acres
Woodlands/Other Natural Areas	571,115 acres

Population

Population in the study area is expected to stabilize. Population projections for the 20-year planning period are noted in Table 1 below. Little influx of new growth is expected in the study area other than redistribution of commercial and residential patterns. The area depends heavily on tourism.

Table 1. Population Projections

Entity	1970	1980	1990	2000	2010	2020	2030 (a)	2040 (a)
City of Ironwood, MI	8,711	7,741	6,849	6,293	5,387	5,045	5,045	5,045
Charter Township of Ironwood , MI	2,256	2,331	2,303	2,330	2,333	2,214	2,214	2,214
Hurley, WI			1,782	1,818	1,547	1,558	1,558	1,558
Gogebic County, MI	20,676	19,686	18,052	17,370	16,427	14,380	14,380	14,380

Notes: 1970 to 2020 from US Census records

(a) Assumes population stabilizing in line with local economy

Economic Characteristics

Western Gogebic County, Michigan and Iron County, Wisconsin communities had their primary economic growth during the last half of the 1800s and first half of the 1900s based primarily on timber, iron mining and related support industries. After the downturn in mining in the 1940s through 60s, the economy has become more tourist oriented utilizing the area's natural resources and especially the heavy winter snowfalls. Tourism and winter sports are now a major attraction.

The Gogebic County area's major employers and approximate number of employees follow (Gogebic Co. EDC):

- Grandview Hospital 300
- CCG Ind. (Nursing Home) 245
- Indianhead Ski Area 200
- Big Powderhorn Ski Area 175
- Jacquart Fabric Products 175
- Ironwood Plastics 160
- Ironwood Area Schools 100
- Mt. Zion Ski Area 85
- City of Ironwood 75

According to the Iron County Hazard Mitigation Plan (source: Wisconsin Department of Workforce Development, 2012), the industry in Iron County, Wisconsin has the average employments in the following sectors:

- Natural Resources and Mining 16
- Construction 119
- Manufacturing 268

• Trade, Transportation, Utilities	328
• Financial Activities	54
• Professional and Business Services	57
• Education and Health Services	365
• Leisure and Hospitality	306
• Public Administration	195
• Other Services	17

Existing Facilities

General

GIWA currently serves customers in the City of Ironwood and Charter Township of Ironwood, Michigan and the City of Hurley, Wisconsin. An outline of the service area is shown on Figure 2. Wastewater is collected via a system of gravity collector and interceptor sewers along with pump stations where dictated by terrain (see summary of sewers in Table 2 below).

Table 2. Summary of Existing Facilities

Collection System (owned by the communities)					
	Sewer			Pump Stations	
Service Area	Sizes	Length	Age	Number	Capacity
City of Ironwood	6 to 36”	48 mi	1 to 90 yr	2	100-165 gpm
Charter Township of Ironwood	6 to 12”	6 mi	1 to 90 yr	3	100-195 gpm
City of Hurley	6 to 24”	11 mi	1 to 90 yr	5	100-820 gpm

Treatment System (owned by GIWA)		
System	Item	Size / Capacity
Design Flows	Average Day	3.4 MGD
	Peak Rate	8.5 MGD
Pretreatment	Screening	15 MGD
	Aerated Grit Removal	2 @ 10 MGD each
	Vortex Grit Removal	3.4 MGD avg & 12.0 peak MGD
	Raw Sewage Pumping	3 screw pumps @ 7 MGD each
Primary Treatment	Primary Clarifiers	2 ea @ 65 ft dia & 6.6 mgd
Secondary Treatment	Oxidation Ditch	9.7 avg & 15.9 peak MGD
	Secondary Clarifiers	2 ea @ 95 ft dia & 14.2 MGD
	Disinfection	13.6 MGD firm
Solids Handling	Digesters	2 Primary @ 260,000 gal each
		1 – Sec. @ 440,000 gal
	Belt Presses	2 each with 1.5 meter belt
Other	Equalization Basins	2 ea @ 20 ft by 105 ft by 14 ft Deep 2 ea @ 15 ft by 60 ft by 11 ft Deep (588,200 gal)
	Dissolved Air Flotation Thickener (not used)	14 ft by 61 ft by 10.7 Deep
Aerated Grit Removal	Decommissioned	

History

The GIWA was incorporated in 1983 to own and operate wastewater treatment facilities for the constituent municipalities. Prior to that time the communities either operated their own smaller systems or small neighborhood and/or private facilities. The governing body is a board of trustees made up of voting representatives from each member. Membership has remained the same throughout its history with the exception of Erwin Township which dropped out in 2005, namely the City of Ironwood, Charter Township of Ironwood, and Hurley, WI.

Construction of the current treatment facility was completed in 1986. The facility has had limited incremental improvements and minor upgrades throughout its life and is still considered to be in generally good condition. The majority of the equipment components are, however, original and reaching the end of their design useful life.

The treatment facility provides flow equalization and advanced secondary treatment utilizing oxidation ditch technology. Treatment processes include: screening/grit removal; primary clarification; oxidation ditch (activated sludge); chemical addition; secondary clarification; return and activated sludge pumping; chlorine disinfection and dechlorination followed by cascade aeration. Solids are treated through anaerobic digestion in two primary digesters followed by a secondary digester for further stabilization. Belt filter presses are used to dewater the digested sludge. The stabilized biosolids are Class B and are transported to land disposal.

Wet weather flow from the tributary communities versus WWTF capacity has been a challenge since the WWTF began operation. In 2002, the Authority received a draft Administrative Consent Order issued by EGLE to address illegal discharges due to high wet weather flows. Over the past decade, member communities have addressed this problem with sewer replacement/separation programs either recently completed or in process.

In 2010, the Authority worked with an outside consultant to prepare a Master Plan and Asset Management Plan of which facility and equipment condition and useful life were a major consideration.

The headworks facility was upgraded in 2014 under CWSRF funding. These upgrades include improvements to the raw sewage screening and grit removal processes; and construction of a septage receiving station.

In 2020, GIWA completed a Stormwater, Asset Management, and Wastewater (SAW) Program. The WWTF was reviewed via visual inspection. Results were summarized in an Asset Management Plan (AMP) and Capital Improvements Plan (CIP).

Existing Collection System

Each of the member communities owns and operates its own wastewater collection system. Sewer sizes and lengths are summarized in Table 2.

Industrial Discharges

The GIWA NPDES does not include an Industrial Pretreatment Program. No "categorical' or "significant" dischargers exist in the collection system. No industrial pretreatment systems exist.

Existing WWTF

Pretreatment is achieved by screening, raw sewage pumping, grit removal, and flow monitoring. Primary treatment utilizes two primary clarifiers where initial settlement occurs. Secondary treatment begins as flows enter the oxidation ditch. The oxidation ditch consists of a 3-channel Orbal® style basin. Activated sludge from the secondary clarifiers is returned to the oxidation ditch. Treated wastewater then feeds to the secondary clarifiers for further settling enhanced by polymer (coagulant) addition. Waste Activated Sludge (WAS) is pumped to the primary clarifiers and cosettled with primary sludge. The cosettled sludge is pumped to the anaerobic digesters for solids treatment. Water from the final clarifiers is disinfected with chlorine in the chlorine contact tanks before dechlorination and discharge to the Montreal River. Sludge is held in the primary digester then pumped to the final digester for thickening then to the belt filter presses for dewatering in route to storage and eventual land application. The existing WWTF site plan can be found in Figure 3 below.

THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK

WHITE BLACK

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GOGEBIC-IRON WASTEWATER AUTHORITY, IRONWOOD, MICHIGAN
CWSRF PROJECT PLAN

GOGEBIC, MICHIGAN

FIGURE 3.
EXISTING WASTEWATER FACILITY
SITE

REVISIONS

REV	DESCRIPTION	DATE

PROJ. #: 210433

DATE: FEBRUARY 2022

SHEET

1

PRELIMINARY SUBMITTAL

Fiscal Sustainability Plan

Through historic established practices and programming developed via the State SAW funded asset management planning, the Authority has addressed asset inventory, asset evaluation, water/energy conservation, and asset maintenance/funding.

Need for the Project

<u>Orders or Enforcement Actions</u>

The Authority does not currently have any court or enforcement order against it.

<u>Compliance with NPDES Permit</u>

The GIWA WWTF operates under compliance of a NPDES Permit. Under "Section A. Limitations and Monitoring Requirements", "8. Asset Management", the NPDES Permit requires proper maintenance and operation of the facility under compliance by replacing assets that have reached the end of their useful life. This Project Plan utilizes the current asset management plan, as developed under the SAW Project, to develop a replacement strategy for these assets that are at the end of their useful life. This section of the NPDES permit also requires rate increases to reduce the revenue gap to cover operation, maintenance, and replacement (OM&R) expenses. By making improvements to the WWTF, this will reduce overall OM&R expenses at the plant, and thus, reducing revenue gap and need for rate increases.

<u>Water Quality Problems</u>

The force behind this study and millions of dollars spent on sewer improvements by the member communities is protection of area water quality. Providing effective wastewater collection and treatment protects both the area's surface and ground waters. The GIWA facility reliably and efficiently treats the influent wastewater prior to discharge to the Montreal River. Keeping that treatment process functioning properly is the prime responsibility of the Authority. Over the past 20 years the plant has experienced violations of the fecal limit in the NPDES permit. The proposed project will replace equipment at the end of their useful life, improve treatment efficiency and eliminate fecal violations. If these projects are not undertaken, the plant functionality will be diminished, potentially resulting in detrimental impacts to water quality.

<u>Projected Needs for the Next 20 Years</u>

The Capital Improvement Plan for GIWA (developed as part of the SAW Project) currently includes wastewater projects allocated over ten-year periods starting in 2020. Service area population has been stable for some time. Increased treatment capacity is not a goal of this Project Plan, or any subsequent project. Projected needs concentrate more on the systems reliability and replacement/enhancement of existing treatment systems to protect what is there now. Over the next 20 years, project costs could increase as more components of the facility deteriorate and reach the end of their respective life cycles. Completion of the proposed project will mitigate that issue and increase the reliability and longevity of the WWTF. Further information can be found in Appendix D.

Future Environment without the Proposed Project

With population and growth within the service area stabilizing, facility capacity for generated wastewater is adequate. However, the quality of the effluent water will decrease as the infrastructure ages. The WWTF is adjacent to the Montreal River to which it discharges. The improperly or partially treated wastewater discharged to the river will have a significantly negative impact on the river. Since the infrastructure is already reaching its functional life limit, this would still be an unsafe situation for the remaining residents if nothing were to change. Factors that adversely affect existing capacity or contribute to wet weather capacity problems are the areas that must be controlled. This project will increase the efficiency of WWTF and its ability to properly treat water discharged to the environment

ANALYSIS OF ALTERNATIVES

Identification of Potential Alternatives

No Action

The No Action alternative, although saving a large initial capital investment, would result in several continuing adverse impacts on the GIWA and its customers. For the most part the GIWA facility is able to deal with the above issues without environmental degradation; however, implementation of improvements would increase reliability of the system and free resources to focus on future areas of concerns. The majority of the plant being 39 years old, a significant portion of the physical components of the facility are well past the end of their useful life. As such, no-action on a plant wide basis was not considered feasible, as no-action would result in several continuing adverse impacts on the WWTF and its customers. Included among such impacts are:

- Degradation of facilities and reduction in value of past citizen investments
- Increasing potential for NPDES permit violations (including operation out of compliance of the NPDES permit by increasing the gap of revenue to OM&R expenses and not replacing assets beyond their useful life)
- Excess energy use (inefficient motors, etc.)
- Continued fecal coliform violations
- Inefficiency of the raw sewage screw pumps (worn augers reducing hydraulic efficiency during peak flows) causing SSOs
- Increased O&M costs

Optimum Performance of Existing Facilities

Optimizing the existing facilities alone will fail to bring aboard improved technologies and will fail to correct worn out equipment and systems. Needs stemming from obsolete equipment or designs require capital improvement to be made as effective as possible. The cost and scope of work required to ensure optimal plant performance over the next 20 years and longer cannot be achieved without capital funding financed over the life of the project.

Water and Energy Efficiency

Selected equipment shall have greater energy efficiency verses original components. Equipment items will be optimized and controlled via variable frequency drives (VFD) which will improve efficiency. Electric motors will be high efficiency types. The configuration of the existing oxidation ditch aeration equipment does not allow for independent operation of aeration for each channel. Proposed improvements will allow independent operation and also include instrumentation and control that will optimize efficiency and lower energy use.

Regional Alternatives

The Gogebic Range Water Authority is a regional facility now serving the City of Ironwood, Michigan; Charter Township of Ironwood, Michigan; and City of Hurley, Wisconsin. The nearest potential new regional contributor would the City of Bessemer, which recently upgraded its facility. The Authority believes the existing regional service district cannot be expanded, and no neighboring facility can accept the large flow from the GIWA WWTF.

Principal Alternatives

Alternative 1: No Action

Not implementing a corrective measures project at this time while attempting to correct deficiencies in the system over time as maintenance budgets will allow.

Alternative 2: Improvements to Existing WWTF

Improvements to the existing WWTF were outlined under the SAW Program:

- Headworks: Screw Pumps, Grit Classifier with Cyclone Unit, Septage Receiving Station
- Primary Treatment: Collector Mechanisms, Sludge Pumping, Mixing System
- Oxidation Ditch: Optimize Configuration Including Drives, Rehab Covers
- Final Treatment: RAS/WAS Pumping Improvements, Collector Mechanisms
- Chemical Building: Optimize Disinfection
- Digesters: Pumping Improvements, Covers
- Administrative Building: Rehab of Mechanical Systems, Sludge Handling
- Electrical: Electrical Throughout Plant, Generator

ANALYSIS OF PRINCIPAL ALTERNATIVES

The Monetary Evaluation

The construction costs for the WWTF are shown in Table 3 below. Costs used in this analysis are based on previous work done at GIWA and neighboring communities as well as budgetary costs from equipment manufacturers. Costs have been adjusted based on ENR index and typical engineering and administrative fee rates. Detailed costs corresponding with Table 3 can be found in Appendix A.

Table 3. Construction Cost Estimate

Description	Estimated Cost
Headworks	$2,711,000
Primary Treatment	$632,000
Oxidation Ditch	$2,864,000
Final Treatment	$1,186,000
Digesters	$3,266,000
Chemical Building	$214,000
Disinfection	$130,000
Electrical and Controls	$3,306,000
Administration Building	$1,901,000
Class A Sludge Treatment	$2,109,000
Miscellaneous	$506,000
Total Construction	**$18,825,000**

A 20-year present worth analysis is also included in Table 4 below. GIWA is a disadvantaged community and are there by eligible for a 30-year loan/bond term. The bond schedule, operating expense, and salvage values can be found in Appendix A. O&M impacts were assumed to effect plant operations only for this analysis. The anticipated savings in operating expenses is represented in Appendix A as negative "O&M impacts." Likewise, the "no action" alternative indicates escalating expenses as utility rates increase and energy efficiency decreases.

Table 4. Present Worth Analysis

Item	Description	Alternative 1: No Action	Alternative 2: Upgrade Ex. Facility
1	Construction Costs	$0	$18,825,000
2	Engineering, Legal, Administration, Planning, and Contingencies	$0	$5,648,000
3	Total Capital Cost	$0	$24,473,000
4	Total Capital Cost with 3% Inflation	$0	$25,208,000
5	Annual O&M Cost Change	$0	-$27,000
6	Present Worth of O&M Costs	$0	-$555,000
7	Salvage Value	$0	$3,782,000
8	Present Worth of Salvage Value	$0	$3,977,000
9	**Total Present Worth**	**$0**	$20,676,000

Table row description for Table 4:

1. Construction costs developed by AMP and detailed in Appendix A and D.
2. Project support fees based on a percentage of construction costs; typical rate 30%. Table 12
3. Capital costs are sums of 1 and 2.
4. Inflation factor of 3% is added to the total capital cost to adjust project to 2023 bidding timeframe.
5. O&M cost change due to the project.
6. Present value of O&M costs for 20 years at -0.25% (per 2022 USDA/SRF guidance).
7. Land considered permanent, 50-year life for piping, valves, and structures, 30-year life for lining, and 20-year life for equipment.
8. Present worth of line 6 at -0.25% interest for 20 years.
9. Total of items 4 and 6 minus 7.

<u>O&M Evaluation</u>

For most of the processes there is expected to be no significant difference in operation and maintenance costs. There will be a slight reduction in energy use due to the new motors being more efficient and less maintenance required for new equipment during the first few years of operation.

For the oxidation ditch there will be a significant reduction in energy use as the proposed equipment will include less installed horsepower. In addition, the aerators in each channel will operate independently and be controlled through a signal from a dissolved oxygen sensor in each channel.

The sludge drying process will result in an overall increase in annual operation and maintenance cost as this would be an additional process to the GIWA facility. There will be an 80% reduction in sludge hauling and disposal cost but the energy, polymer and labor required to operate the dryer will result in a net increase in annual cost.

Partitioning of the Project

The long-term needs of the GIWA WWTF are discussed in this report and in SAW. GIWA intends to partition the total plant needs into numerous construction phases over the next several decades to enable improvements to be within the limited financing capability of the service district. The 20-year improvement plan is outlined in Appendix D.

The Environmental Evaluation

Correspondence related to environmental impact aspects of this project can be found in Appendix C. Table 5 below summarizes potential environmental and public health impacts of the evaluated alternatives with brief descriptions following.

Table 5. Environmental Evaluation

Category	Alternative 1: No Action	Alternative 2: Upgrade Ex. Facility
Cultural Resources:		
- Historical/Archaeological	0	0
Natural Environmental:		
- Climate	2	0
- Air Quality	1	1
- Wetlands	0	0
- Coastal Zones	0	0
- Floodplains	1	1
- Natural Wild and Scenic Rivers	0	0
- Surface Waters	2	1
- Topography	0	0
- Geology	0	0
- Soils	1	1
- Agricultural Resources	0	0
- Sensitive Habitats	0	0
- Threatened or Endangered Species	0	0
- Unique Features	0	0
Total (lower is less impact)	**7**	**4**

(0 signifies no impact, 1 represents some impact, and 2 signifies the greatest impact)

Implementability and Public Participation

The GIWA has undertaken construction projects over the past several decades. All are openly discussed at public Board meetings with user cost impacts openly discussed. The Project Plan will be advertised and displayed for citizen review for one month prior to the Public Hearing. The Authority has contracted with an engineering design consultant for assistance in the planning process and with a bond counsel for assistance in arranging project funding.

Technical and Other Considerations

<u>Infiltration and Inflow (I/I) Removal</u>

There will be no I/I removal issues resolved in this project.

<u>Structural Integrity</u>

Structural integrity of the existing pumping and treatment system is best defined in the 2020 SAW Asset Management Plan (see Appendix D). The program has identified overall condition rating (or Probability of Failure) for all WWTF assets. The condition rating can be assumed as a major contributing factor to structural integrity. Structural integrity issues will be addressed with the proposed improvements.

<u>Sludge and Residuals</u>

The proposed improvements to the digesters will not affect quality or quantity of sludge or residuals. Residual treatment alternatives (Class A biosolids processes) would improve the quality and reduce the quantity of biosolids for final disposal.

<u>Industrial Pretreatment</u>

There are currently no industrial pretreatment system or industrial wastewater concerns. It is not expected that the improvements recommended under the alternatives will have a positive or negative impact on industrial pretreatment issues.

<u>Growth Capacity</u>

It is not anticipated that there will be a need for growth capacity in the 20-year planning period.

Areas Currently Without Sewers

Developed areas within the community service districts are all currently served.

Alternative Sites and Routings

All improvements under the principal alternatives are contained on the existing site. Alternate siting did not need to be considered due to current site being adequate for projected needs.

Combined Sewer Overflows (CSO)

There are no combined sewer overflows associated with GIWA. However, there are records of SSOs at the main interceptor manhole at the WWTF during extreme wet weather events. These events are detailed in Appendix D. The proposed headworks improvements will eliminate these occurrences (replacement of the Screw Pumps to improve performance and efficiency during Peak Flows).

Contamination at the Project Site

There are no known contamination sites at the area of the proposed project.

Green Project Reserve

The proposed project does include some improvements that will allow for green infrastructure, water, and energy improvements. These improvements including reducing horsepower required for aeration and providing VFDs on aerator motors on the oxidation ditch will decrease energy usage. In addition, the proposed improvements will allow independent operation of aerators in each channel which will be automatically controlled by instrumentation and control improvements.

SELECTED ALTERNATIVE

Alternative 2 is the selected alternative because it provides the most cost effect option to provide improvements to deficiencies within the system.

Relevant Design Parameters

<u>Alternative 2: Improvements to Existing WWTF</u>

Improvements to the existing WWTF were outlined under the 2010 SRF Project Plan and 2020 SAW Program (see Appendix D). Figure 5 illustrates the proposed improvements by building. The following is a summary of proposed improvements:

Headworks (Structure 10) Improvements:

The following are proposed improvements for the headworks:

- Replacement of all three influent screw pumps at 7 MGD each
- New sampler unit (dipper style)
- New grit classifer with cyclone unit
- Upgrades to the existing HVAC system
- Replacement of four sluice gates (one 60-inch and three 48-inch)
- General concrete rehabilitation (clean and seal face, general waterproofing)
- Seasonal access to septage receiving station

Historically, the WWTP has seen occurrences of SSOs at the main interceptor manhole during extreme wet weather events (SSO documentation is provided in Appendix D). This is presumed to be a result of resistance at the sluice gates and influent screw pumps; by replacing this equipment, this would eliminate backing up in the system and prevent SSOs at the interceptor manhole. Improvements will involve demolition of existing equipment, painting, and related electrical appurtenances. PERS and Superior Engineering, LLC in 2016 also found oxidation on the screw pumps. The report also summarized that the influent sluice gate is causing a hydraulic bottleneck to the system and requires replacement to allow for better flow. Screw Pump flights have worn over the years and now cause reduced hydraulic capacity during peak events.

The septage receiving station will require a roof covering to provide all-season access. The roof will keep the station snow free; currently the station is inaccessible during winter and cannot be plowed.

NFPA 820 covers WWTFs in regards to the national fire code and describes requirements for ventilation in each specific area of a WWTF. At GIWA the headworks building houses the influent screw pump, hydrogritter, MCCs, samplers, grit pumps, and primary sludge pumps. The headworks building is enclosed and houses equipment that are considered classified areas per NFPA 820. This means that all equipment and electrical components would need to be designed to be explosion proof or the ventilation rate has to meet minimum requirements to make the space "Unclassified" per NFPA Standards. Unclassified areas do not require explosion proof equipment and construction. Replacing equipment and all electrical to bring this building up to code would be cost prohibitive as everything in the building would have to meet explosion proof requirements.

Primary Treatment (Structure 15) Improvements:

The following are proposed improvements for primary treatment:

- Demolish and replace clarifier mechanisms
- Replacement of scum mixers
- New sampler unit
- General concrete rehabilitation (seal walls, clean and coat flooring, injection of cracks, etc.)

Crane Engineering inspected the primary clarifiers in 2019 and summarized numerous deficiencies with the clarifiers including, but not limited to: leaky input shaft lip seal, improperly draining lower condensate drain, failing coating, corroded steel on influent feed, sludge scraper and skimmer arms are also corroding, scrapers on plows require replacement, and beach is also corroding. Along with re-coating equipment, Crane Engineering recommended replacing drives (including bearings, seals, and gaskets), new skimmers, and new beaches. The 2016 PERS and Superior Engineering LLC also stressed the need for rehabbing the clarifiers as soon as possible.

NFPA 820 covers WWTFs in regards to the national fire code and describes requirements for ventilation in each specific area of a WWTF. At GIWA the primary treatment building houses the clarifier drives, effluent sample pump, scum mixer, and rapid mixer. The primary tanks are enclosed and house equipment that are considered classified areas per NFPA 820. This means that all equipment and electrical components would need to be designed to be explosion proof or the ventilation rate has to meet minimum requirements to make the space "Unclassified" per NFPA Standards. Unclassified areas do not require explosion proof equipment and construction. Replacing equipment and all electrical to bring these buildings up to code would be cost prohibitive as everything in the building would have to meet explosion proof requirements.

Oxidation Ditch (Structure 20) Improvements:

The goal of the improvements to the oxidation ditch process and equipment is to provide more efficient treatment, increased operational flexibility, replace aged equipment, and to provide denitrification capabilities. Denitrification is needed to remove nitrites and nitrates that may interfere with chlorination of effluent. In addition, some structural/architectural improvements are required to alleviate moisture entering the building walls that house the rotor aerators. Proposed improvements include:

- Remove aged equipment
- Replace disc aerators with new more efficient aerators
- Replace aerator motors, shafts and covers
- Add submersible mixers to provide sufficient mixing during low aerator shaft speed
- Add instrumentation and controls to provide anoxic zones to provide denitrification
- Provide architectural improvements to prevent moisture from entering the building walls

The GIWA WWTF is under loaded regarding pollutant loading compared to the original design capacity. For the oxidation ditch this means that there is far too much aeration capacity resulting in over aeration and energy inefficiency. This also makes it difficult to reduce dissolved oxygen levels sufficiently to allow anoxic zones to develop within the basin that would allow the process to denitrify and convert nitrites and nitrates to nitrogen gas. Currently there are periods when nitrites in the wastewater absorb the chlorine added for disinfection resulting in high chlorine demand and possible effluent fecal violations. Over a period of 22 years from January 1, 2000 to January 31, 2022, GIWA recorded 20 monthly maximum effluent fecal coliform violations (exceeded 200 MPN/100ml limit) and 80 violations of the 7-day rolling average fecal coliform limit (exceeded 400 MPN/100 ml).

The current configuration of the aerator shafts and motors does not allow the aeration for the individual channels within the basin to be controlled independently from the other channels. Currently the existing aerators for the two inner channels cannot be shut-off or moderated without shutting off or adjusting the aerator speed in the outer channel. This results in over aeration and waste of energy. Figure 4 on the next page shows the proposed aeration system. Based on current maximum month loading, shown in Table 6, and new more efficient aeration equipment, the oxidation ditch can provide sufficient treatment using only the two inner channels with two aeration shafts in each channel (currently there are four shafts and four sets of aeration discs in each channel. One shaft in each channel can provide sufficient oxygen. Two shafts in each channel would provide full redundancy. Each shaft could be individually controlled through a variable frequency drive and a dissolved oxygen control loop to maximize energy efficiency.

Table 6. Maximum Monthly Loading

Maximum Month Conditions	
BOD, lbs/day	1,341
TSS, lbs/day	1901
Ammonia, lbs/day	174
Volume of Two inner Channels, cu ft	163,400
Volumetric Loading, lbs BOD/1,000 cu ft	8.2

The volumetric loading rate is well below the 10 State Standards maximum of 15 lbs BOD/1,000 cu ft for the extended aeration mode of activated sludge.

Hydraulically, the two inner channels will provide 12 hours or more of detention time for influent flow rate of up to 2.44 mgd and 8-hour detention time (conventional AS) for flow rate up to 3.67 mgd. This capacity will provide treatment for the flow rates received 90% of the time at the GIWA WWTF. The outer channel has a volume of 982,000 gallons and will be used during I/I events to equalize high flow rates.

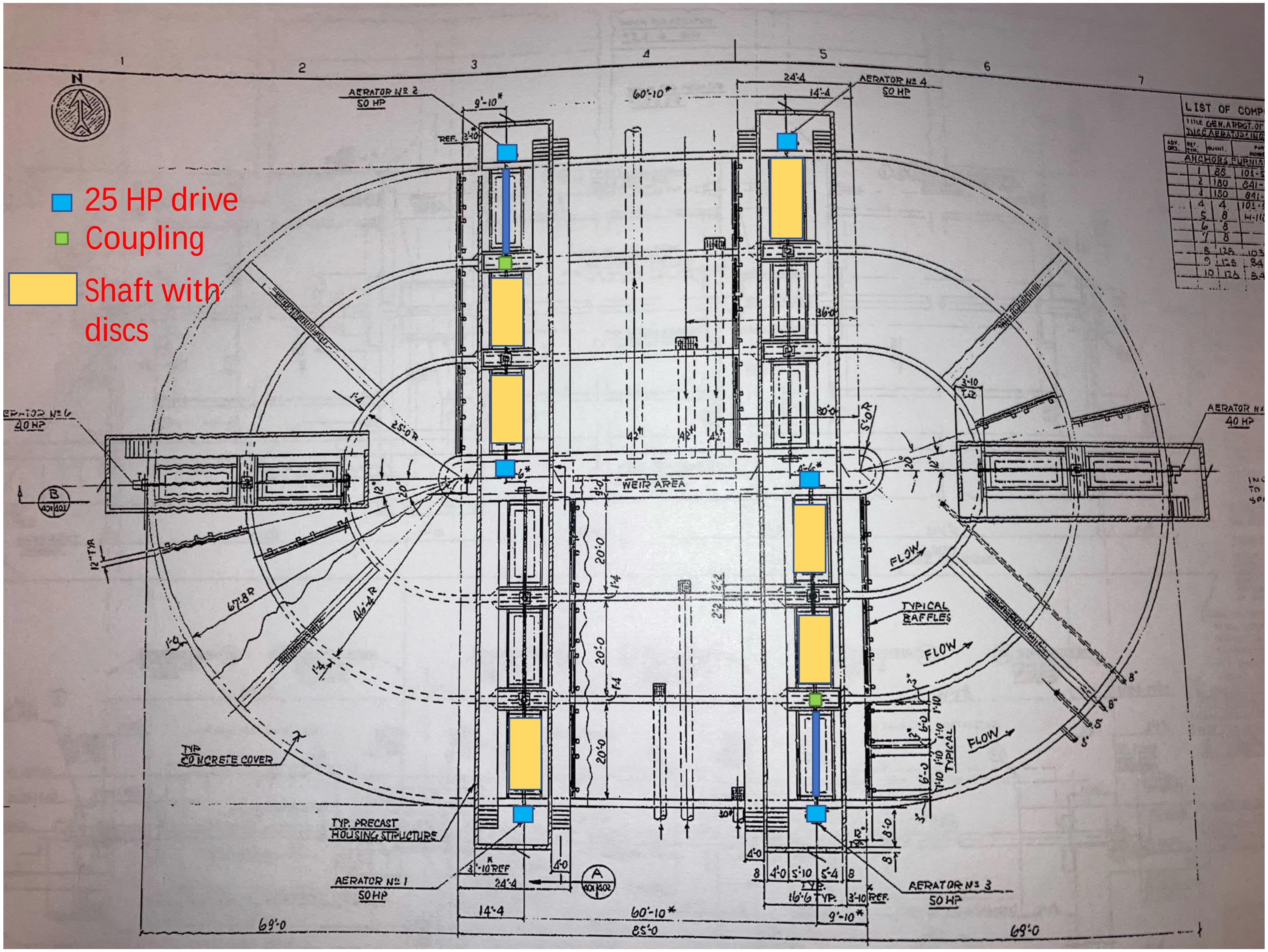


Figure 4.
Proposed Oxidation Ditch Aeration

Final Treatment (Structure 25) Improvements:

The following are proposed improvements for final treatment:

- Replacement of RAS and WAS pumps
- General valving and piping replacements
- General concrete rehabilitation (seal top of exterior walls and crack injection)

General concrete rehabilitation, painting, and replacement of valves and piping is required due to deterioration of the equipment after rain has infiltrated the building. The RAS, WAS, and groundwater pumps are original pumps from the original WWTF construction and are in need of replacement.

Chemical Building (Structure 35) Improvements:

The chemical building houses the chlorine and sulfur dioxide gas cylinders and gas feed equipment. The GIWA WWTF uses 150 lb cylinders. The lower level of the Chemical Building houses various pumps that provide functions such as tank drain, groundwater dewatering, and belt press wash water. Similar to other areas of the GIWA WWTF most of the equipment in the chemical building has passed the normal life expectancy and requires replacement. The following items are proposed to be replaced as part of the improvements:

- Chlorine Mixer
- Chlorination and Dechlorination equipment (gas feed equipment, mixers, disinfection pump, sensors)
- Effluent sampler
- Belt press wash pumps
- Dewatering pumps
- Tank drain pump
- Flushing pump
- Sewage ejector pumps
- Building HVAC equipment

Disinfection Improvements:

The improvements to the equipment in the Chemical Building will improve the efficiency of the chlorination and dechlorination system but the storage and handling of toxic gas will remain. As an alternative to chlorination, ultra-violet light (UV) disinfection could eliminate or reduce the amount of chlorine and sulfur dioxide gas needed at the GIWA WWTF. As described in the Oxidation Ditch (Structure 20) improvements, GIWA experiences periods when nitrites in the effluent interact with the chlorine and consume the free chlorine resulting in high chlorine demand and possible effluent fecal violations. If the plant could use UV disinfection the nitrites in the effluent would not interfere with the effectiveness of the chlorine. The improvements to the oxidation ditch process and equipment are expected to convert the nitrates and nitrites to nitrogen gas by implementing anoxic zones within the channels.

One major hurdle for the GIWA WWTF is the very high influent flows that occur during I/I events. The influent flow rate can increase from less than 1.5 mgd to more than 15 mgd in less than one day. Implementing a UV system with the capacity to handle peak flows would be cost prohibitive. Thus the chlorination system will need to be retained and the equipment updated due to age and efficiency. For the UV system a flow control system could be implemented, and a UV system designed for the 1.5 mgd average and 4.5 mgd peak hour would have the capacity to disinfect the flow rate received at the WWTF over 90% of the time. This could significantly reduce the volume of chlorine and sulfur dioxide needed for disinfection. A cost analysis is provided in Table 7.

Table 7. Disinfection Alternatives

Item	Description	Alternative A: Chlorination/Dechlorination	Alternative B: UV Disinfection
1	Construction Costs	$239,000	$466,000
2	Engineering, Legal, Administration, Planning, and Contingencies	$72,000	$140,000
3	Total Capital Cost	$311,000	$606,000
4	Annual O&M Cost	$5800	$14,800
5	20-Year Present Worth of O&M Costs	$113,000	$288,400
6	Salvage Value	$0	$0
7	Present Worth of Salvage Value	$0	$0
8	**Total Present Worth**	**$424,000**	**$894,400**

The cost analysis shows there would be significant additional capital and annual O&M costs if UV disinfection is implemented. In addition, the use and storage of chlorine and sulfur dioxide would not be eliminated. Adding UV disinfection equipment is not cost effective for the GIWA WWTF and would not increase safety. The improvements to the oxidation ditch aeration system will provide denitrification to reduce the nitrite and nitrate in the effluent which would alleviate high chlorine usage and effluent fecal limit violations.

Anaerobic Digester (Structure 40) Improvements:

The existing digester system works very well and meets the PSRP requirements in the EPA 503 biosolids regulations. Some of the main components such as the boilers have been replaced within the past five years and are in good working condition. The anaerobic digester system produces sufficient methane gas on a year-round basis to heat the sludge in the digesters without supplemental natural gas. Solids reduction in the digesters is over 50%. Both of these achievements show the excellent operation of the digester system. Some of the components such as the digester covers and the mixing systems are more than 35 years old and require improvement or replacement. The following are the proposed improvements to the anaerobic digester system:

- Replace the mixing pumps and nozzles for Digesters No. 1, 2, and 3
- Replace steel covers for all three digesters
- Replace aged digester gas handling components such as drip traps
- Replace in-basin sludge and digester gas piping
- Replace gas pressure relief valves on top of digester covers
- Replace belt press sludge feed pumps located in digester complex
- Replace sludge recirculation pump for Digester No. 1

Some of the equipment that is not included in the proposed project has been replaced relatively recently and does not require improvement. The digester covers are 35 years old and from the exterior appear to be intact without holes or major corrosion evident in the steel. Due to the time of year this study was completed, the covers could not be inspected during the Project Planning period. The intent is during the design phase, the integrity of the steel covers will be inspected to determine if the covers can be rehabbed and recoated instead of replacing the entire covers. There would be significant cost savings if the covers do not require complete replacement. At the time the covers are inspected, the interior concrete and interior piping can be inspected as well to determine if further rehabilitation or replacement is needed.

NFPA 820 covers wastewater treatment plants in regards to the national fire code and describes requirements for ventilation in each specific area of a wastewater plant. At GIWA the anaerobic digester building houses the boilers/heat exchangers, recirculation pumps, mixing pumps, belt press feed pumps, MCC, gas handling equipment, mixer pumps, and other equipment. The gas handling equipment is in a separate room and this appears to meet the NFPA 820 requirements. However, the rooms that house equipment that have a common wall with a digester tank are classified areas per NFPA 820. This means that all equipment and electrical components would need to be designed to be explosion proof or the ventilation rate has to meet minimum requirements to make the space "Unclassified" per NFPA Standards. Unclassified areas do not require explosion proof equipment and construction. Replacing equipment and all electrical to bring this room up to code would be cost prohibitive as everything in the room would have to meet explosion proof requirements. The record drawings indicate that the existing exhaust fans have the capacity of 10,200 cfm which is more than enough to provide six air changes per hour as required by NFPA 820 to achieve a NEC "Unclassified" rating. However, the ventilation system must run continuously to maintain the unclassified rating. If the system does not run continuously, a possible alternative is to install combustible gas detection equipment and interconnect it with the ventilation system. This alternative would have to be approved by the local fire authority. This alternative would save heating energy versus operating the ventilation system continuously.

The following section presents an evaluation of sludge treatment alternatives to produce Class A sludge. The required improvements to the digesters will depend on the alternative sludge treatment chosen. If producing Class A sludge by treating raw sludge is the most cost effective alternative then the digesters would not be needed and one digester would be converted to a sludge storage tank. The Class A sludge alternatives take into consideration the costs related to digester improvements or converting to sludge storage.

Biosolids Improvements:

In addition to upgrading the existing anaerobic digesters and the belt filter presses, technologies for producing Class A biosolids were also evaluated. GIWA wastewater treatment plant currently produces Class B biosolids in dewatered cake form, cake sludge is stored in a covered unheated structure, and then land applied to area farmlands. Class B biosolids contain more pathogens and are subject to more restrictive management practices than Class A biosolids. The restrictions create very small windows of opportunity each year for sludge hauling. Spring hauling is particularly problematic. By the time the frozen cake sludge is thawed out and ready for hauling, crops are often already planted in the field and the hauling window is closed. GIWA has cake sludge storage space to skip a year of land applying but this requires twice the effort in the same time window to land apply twice as much sludge during the second year.

GIWA's long term goal is to produce Class A biosolids with reduced volume and less restrictions in management practices. Class A technologies considered include heat drying, dehumidification, and alkaline pasteurization and are discussed in depth below:

1. *Heat Drying*

   Thermal heat drying of dewatered biosolids can be accomplished by either direct or indirect contact with a heat source to evaporate water and thus reduce the biosolids moisture content. Direct contact methods circulate heated air into a rotating or stationary chamber where the dewatered biosolids are in contact with the heated air. A typical stationary chamber direct dryer design includes the extrusion of dewatered biosolids onto a belt that circulates through the drying chamber. A typical indirect dryer design consists of a chamber containing paddles or augers to transport the biosolids through the chamber, with thermal fluid (oil) circulated within the walls of the chamber and the paddles/augers. In an indirect dryer there is virtually no air, the biosolids are in contact with the hot metal surface of the chamber and the paddles/augers, causing the water to evaporate.

Drying systems are typically operated on a batch basis for continuous 24-hour per day cycle when dewatered biosolids are available. Longer continuous cycles of dryer operation are typically more efficient since the heat up and cool down cycle times are minimized.

Drying dewatered biosolids can provide a well stabilized, Class A product with low odor potential and which has potential for multiple end uses. The thermal drying of a dewatered biosolids with 20% solids concentration, to produce a dried biosolids with (typical) 90% solids concentration, will result in approximately 80% reduction in the volume of biosolids.

The high solids concentration in dried biosolids results in the formation of dried pellets or granular particles. These dried particles have potential to create dust during subsequent handling and transportation on conveyors as the dried biosolids are delivered to bagging equipment or storage bins or into trucks for delivery to end use. Dust control is therefore an important aspect of design of the biosolids handling equipment that follows discharge from the dryer.

Thermal heat drying systems have the significant advantage of producing a product with a much smaller volume, and with less odor, as compared to alkaline stabilization.

2. *Sludge Dehumidification*

Sludge Dehumidification is another form of heat drying process. Manufacturers include Shincci-USA and SUEZ Water Technologies and Solutions. The process extracts humidity from sludge by recirculating warm dry air through the chamber extracting water from the sludge. The humid air is passed through a condenser to remove the water from the air and return it to the chamber. The air temperature for the dehumidifaction process is much lower than for typical heat dryers. However dehumidification, is currently not recognized by the USEPA as a Process to Further Reduce Pathogen (PFRP). The dehumidifier uses time-temperature relationship to meet Class A. It requires local agency’s approval.

Similar to direct drying processes the dehumidification equipment manufacturer recommends operating the equipment for extended periods to reduce energy loss during startup.

3. *Alkaline Pasteurization*

Alkaline treatment has several variations and includes the lime/heat process and the lime/acid process. The quality of the finished biosolids produced can be improved by the addition of amendments similar to those used the composting process. The "enclosed" Bioset™ process (Bioset) is chosen for preliminary evaluation because the process requires no external heat source, since all energy necessary to reach the required operating temperature is produced by chemical reactions in the enclosed reactor vessel.

In alkaline treatment, water in the dewatered biosolids reacts with the lime to produce heat and elevate the temperature in the Bioset reactor vessel. Biosolids are thus exposed to elevated temperature and elevated pH within the enclosed reactor. At high pH, ammonia is released as a gas within the biosolids. The ammonia promotes pathogen kill, so that the pathogen reduction required for Class A designation is reached at a lower temperature than is required for "open vessel" alkaline stabilization processes.

For most alkaline stabilization processes, U.S. EPA criteria require that a temperature of 70 degrees C be attained for a certain time and at an elevated pH. The Bioset process has received U.S. EPA designation as a "Process to Further Reduce Pathogens" to produce Class A biosolids at the typical process operating temperature of 55 degrees C.

The lower temperature required in the enclosed vessel design of the Bioset process means that the process requires a lower lime dosage than other alkaline stabilization processes, resulting in lower chemical (lime) costs. A lower lime dosage also means that the total volume of biosolids that must be disposed of is reduced as compared to other alkaline stabilization processes. Odors as a result of ammonia release during storage, transportation and use of the biosolids is also a concern.

The Bioset enclosed vessel reduces heat loss and minimizes dust and odor releases. Temperature sensors are used to monitor the process, which is controlled by adjusting the lime feed as necessary to maintain the required operating temperature. An ammonia scrubber bed with countercurrent water flow is used to convert ammonia gas into an ammonia-based water solution that is discharged back to the WWTF as a sidestream flow. Chemicals added to the dewatered biosolids feed pump discharge consist of either dry quicklime or dry hydrated lime, and dry sulfamic acid. A counter-rotating, intermeshing, twin-screw auger provides efficient homogenized mixing of the biosolids and the dry chemicals.

A Bioset system layout at the GIWA WWTF would require a live bottom biosolids storage bin to feed the dewatered biosolids feed pump. The pump would discharge to the Bioset reactor vessel. A dry bulk lime storage silo and dry lime feeder system would be required to dose the lime into the biosolids upstream of the reactor vessel.

Both dryers and Bioset can process sludge from the existing anaerobic digesters or raw sludge from the clarifiers and meet Class A pathogen reduction criteria. The existing anaerobic digesters require major equipment replacement. Advancing the treatment technology to a Class A facility offers an opportunity for GIWA to eliminate one process at the treatment plant.

However, there are several advantages of maintaining the existing anaerobic digesters. The undigested sludge is harder to dewater, and creates more odor potential. The digestion process significantly reduces the amount of solids to be processed in a Class A biosolid facility. As shown in Table 8 below, there were 50% volume reduction and 60% dry weight reduction achieved by GIWA's digester. There will be substantial cost savings in construction and O&M by maintaining the existing anaerobic digesters.

Table 8. Sludge Criteria

Descriptions	Unit	Current* Conditions	Design Parameter
Feed Sludge (Undigested)	Gallons	2,071,000	2,000,000
Solids Content	%	3.9	4
Annual Solids	Dry Tons	336	336
Digested Sludge	Gallons	954,000	1,000,000
Solids Content	%	3.5	3.5
Annual Solids	Dry Tons	138	140
Dewatered Sludge			
Volume	CY	802	800
Annual Solids	Dry Tons	150	150

*2019 data

Alternatives for Class A biosolids facilities include:

1. Heat Drying (Dehumidification) Digested Sludge

2. Heat Drying (Dehumidification) Raw Sludge (from clarifiers without digestion)
3. Bioset Treating Digested Sludge
4. Bioset Treating Raw Sludge (from clarifiers without digestion)

Cost Analysis for Class B and Class A Biosolids Facilities

Capital Costs Analysis

Belt filter presses are used for all biosolids alternatives due to their track record of reliability and consistency in performance. Other dewatering equipment may be considered during design phase if it is proven to be effective and more economical.

For handling undigested sludge, a liquid sludge storage tank is required. Sludge from clarifiers would be pumped into the storage tank on a regular basis, and pumped out to the dewatering facility only when the dryer or Bioset is in operation. During the down time of the Class A facility, sludge would be stored in the liquid storage tank, mixed and aerated. The tank should be covered to prevent sludge from freezing in winter. For this analysis, one of the two primary digesters could be modified to a liquid sludge storage tank. The other digesters will be left in place for emergency storage if needed. The costs for rehabilitating one digester and converting it to a liquid sludge storage is substantially less than full digester rehabilitation.

For heat drying facilities, there will be significant capital cost increases from the Class B facility, using conventional direct dryers or indirect dryers. In our past experience, they are rarely cost effective for a small facility. The recent development of sludge dehumidification has gained operators' attention due to its low capital costs and low energy consumption. The costs for constructing a heat drying facility using the sludge dehumidification process were evaluated. The results of the construction and operational cost analysis are summarized in Table 9.

Table 9. Cost Analysis for Biosolids

Description	Belt Press	Digester Rehab	Class A Facility	Construction Cost
Class B - Anaerobic Digested Cake Sludge	$1,493,600	$3,266,000		$4,759,600
Class A - Heat Drying Digested Sludge	$1,493,600	$3,266,000	$2,109,000	$6,868,600
Class A - Heat Drying Undigested Sludge	$1,493,600	$625,000	$3,513,000	$5,631,600
Class A - Bioset Treating Digested Sludge	$1,493,600	$3,266,000	$3,230,000	$7,989,600
Class A - Bioset Treating Undigested Sludge	$1,493,600	$625,000	$3,230,000	$5,348,600

Operating Costs and Present Worth Analysis

Operating costs for Class A facilities were analyzed considering costs for energy, chemicals, labor and final sludge hauling. The following assumptions were made for the dryness of sludge feeding the Class A facilities:

Heat Drying Digested Sludge:	Dewatered feed sludge at 20% solids
Heat Drying Undigested Sludge:	Dewatered feed sludge at 18% solids
Bioset Treating Digested Sludge:	Dewatered feed sludge at 20% solids
Bioset Treating Undigested Sludge:	Dewatered feed sludge at 16% solids

It should be noted that drying with dehumidifier will not be effective if the feed sludge is less than 18 to 20%. This could be a challenge for the undigested sludge.

To incorporate the annual operating costs and the total capital costs to an overall cost comparison, a present worth (PW) analysis was performed for each alternative, assuming 0.25% interest rate for 20 years. The total PW is a fund required to build a facility and have enough left over to pay for operation for the next 20 years. The results of the total PW analysis are shown in Table 10.

Table 10. Present Worth Analysis

Operating Costs and PW Analysis	Construction Cost	Operating Costs	Operating Cost PW	Total PW
Class B - Anaerobic Digested Cake Sludge	$4,759,600	$26,300	$779,400	$5,301,400
Class A - Heat Drying Digested Sludge	$6,868,600	$88,100	$1,716,600	$8,585,200
Class A - Heat Drying Undigested Sludge	$5,631,600	$133,500	$2,601,200	$8,232,800
Class A - Bioset Treating Digested Sludge	$7,989,600	$86,600	$1,687,400	$9,677,000
Class A - Bioset Treating Undigested Sludge	$5,348,600	$187,300	$3,649,400	$8,998,000

The alternative of Heat Drying (Dehumidification) Digested Sludge is included in the proposed improvements.

Administration Building (Structure 50) Improvements:

The Administration Building houses offices, sludge processing facilities, back-up generator, incoming electrical service panels, chemical storage for ferric chloride, garage space and workshop. The majority of the improvements proposed in the Admin Building are related to biosolids processing but improvements also include other items such as new boilers for building heating. A new standby power generator is included in the plant electrical upgrades. Existing sludge processing facilities include a dissolved air flotation thickener (DAFT), belt filter presses, polymer system, and a truck bay for hauling cake sludge. The DAFT has not been used for many years and no improvements are proposed.

The existing belt presses and polymer system are over 35 years in age and require replacement. The existing belt presses are 1.5-meter wide and are fed at a rate of 75 gpm each. New presses are more efficient and can handle the same flow rate with a smaller belt area. The proposed belt presses are 1.0 meter wide and have three belts instead of two belts. The first belt that receives the liquid sludge is independent of the two belts that squeeze the water from the sludge. The speed of the first belt can be adjusted separately from the other two belts which allows more water to freely drain from the sludge while traveling across the first belt. The two belts that pressure the sludge can operate at a slower speed thereby increasing the time the sludge is under pressure generally resulting in higher cake solids percentage than two-belt presses. The cost for a 1-meter press is about $100,000 less than a 1.5-meter press.

The existing polymer system is a dry polymer system that requires handling of large bags of granules and mixing them with water to make a batch of liquid polymer. The proposed improvements include a dry polymer system with a bulk bag handler as well as all mixers, tanks, pumps and controls required for a complete polymer system. The proposed polymer system is a dual system with two of each component to match the existing system. A liquid polymer system would cost about $150,000 less than a dry polymer system. Over the next few months, it is recommended that GIWA contact a polymer supplier and test different liquid polymers on their belt presses to determine if there is a liquid polymer that will provide similar cake results for similar cost.

A new cake sludge conveyor is included with the recommended improvements to carry cake solids from the presses to a truck, similar to current operation. The proposed belt presses discharge cake solids at a height of about ten feet and it may be possible to eliminate the conveyor if the belt presses can be configured differently in the existing space. This will be determined during the design phase of the project.

NFPA 820 requires areas where sludge is being processed such as dewatering and handling of cake sludge have ventilation of six air changes per hour to achieve an Unclassified rating for the space. At GIWA the existing ventilation system can move 8,000 cfm which is more capacity than the approximately 6,000 cfm needed to achieve 6 air changes per hour.

Additional equipment replacement includes the side stream pumps and the two waste sludge blowers that are housed in the Admin Building.

Electrical and Control Improvements:

The vast majority of the electrical system and motor control centers within the GIWA WWTF are original 1985 construction. A Condition Assessment of the electrical system was performed in 2018 by GEI Consultants. Testing included thermography and megger testing of the existing motor control centers, MCC buckets, distribution transformers, panel boards, and other electrical equipment within the WWTF. In summary, the report concluded that all components had a condition assessment of two out of five, with five being Unserviceable Condition. In addition, the report provided a Critically rating of five for each of the six MCCs, meaning the consequence of failure of any MCC would cause major disruption to the operation of the facility. Although the electrical systems are more than 35 years old, they are in proper working order and are well maintained.

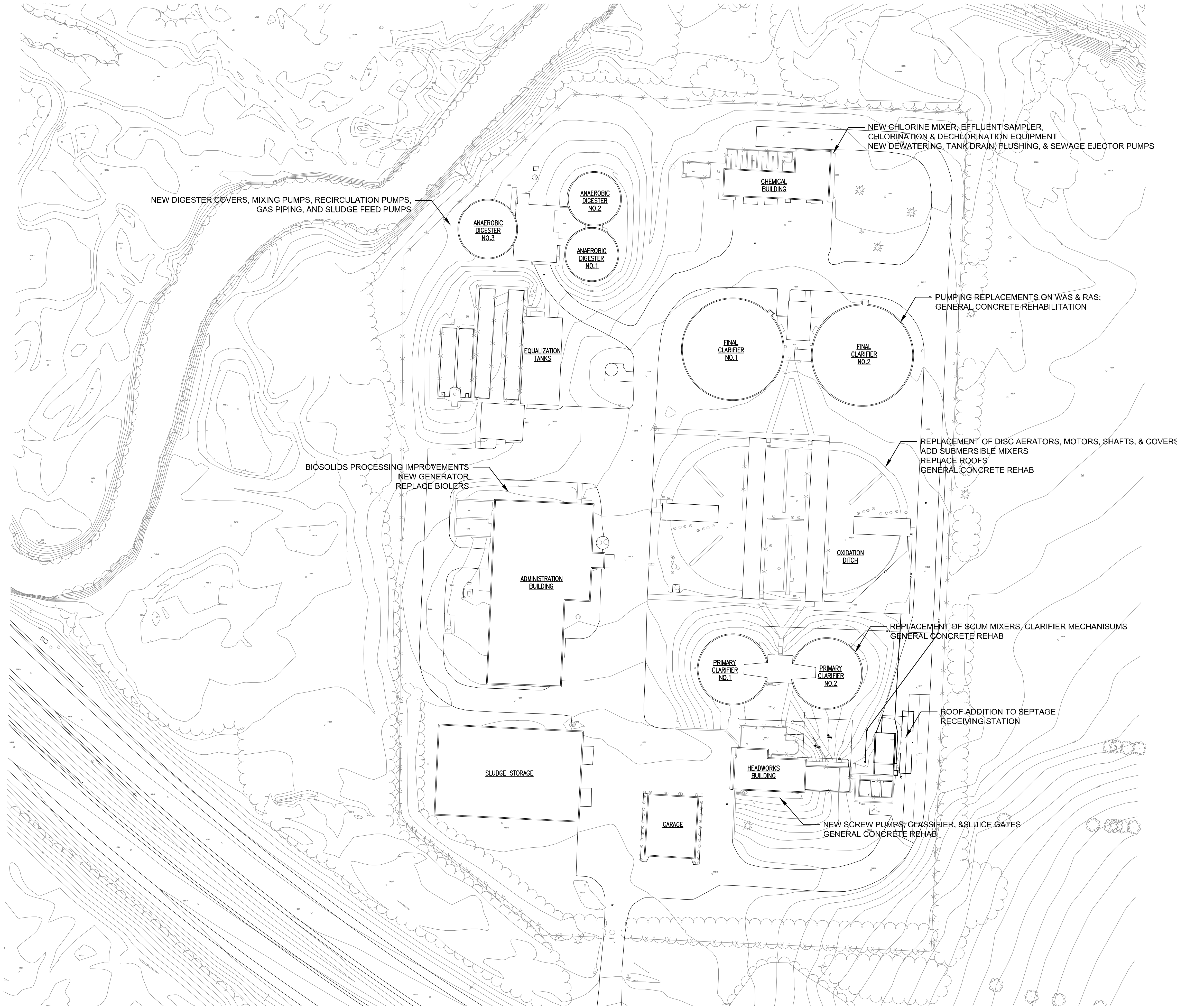
The existing system uses power factor correction capacitors in many locations which is an outdated method of correcting grid power. Variable frequency Drives (VFDs) are a more efficient and reliable method. Also, grid power is much more consistent than in 1985 resulting in less power factor variability.

As systems age, replacement components become harder to find as technology advances. New MCCs and components will provide a significant step forward in safety and reliability of the electrical systems. The recommended improvements include replacement of all MCCs, transformers, lighting panels, and main service disconnect switch. In addition, the 600 kw standby power generator and associate automatic transfer switches should be replaced.

The operational staff at the GIWA WWTF have noted that when underground electrical conduit has been exposed for repair or modification, they have found water inside the conduit. The groundwater level at the facility is relatively high and without concrete duct bank to prevent water intrusion, it is difficult to prevent this condition. According to the Plant Manager, the current central SCADA computer is up to date and the software does not require replacement. Replacement of the existing control panels throughout the facility are included in the proposed improvements. The improvements throughout the plant include some new instrumentation, such as DO sensors in the oxidation ditch, that will require SCADA programming to incorporate controls into the current system.

Miscellaneous Improvements:

Miscellaneous improvement throughout the WWTF include: painting, door replacements, and process piping, valves, and fittings throughout the site.



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IRONWOOD, MICHIGAN
GOGEBIC-IRON WASTEWATER AUTHORITY
CWSRF PROJECT PLAN
GOGEBIC, MICHIGAN

FIGURE 5.
PROPOSED WASTEWATER FACILITY IMPROVEMENTS

REVISIONS

REV	DESCRIPTION	DATE

PROJ.#: 210433
DATE: FEBRUARY 2022
SHEET
2

PRELIMINARY SUBMITTAL

THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK
WHITE BLACK
WE RECYCLE

Project Maps

The following is a summary of maps presented in this report:

- Figure 2. Study and Service Area
- Figure 3. Existing Wastewater Treatment Facility Site
- Figure 4. Proposed Aeration System
- Figure 5. Proposed Wastewater Treatment Plant Site Improvements

Full size maps can be found in Appendix F.

Controlling Factors

Planning and design will be in accordance with applicable industry standards including:

- EGLE and USACE Permitting Requirements
- OSHA and MiOSHA Requirements
- SHPO and THPO Requirements
- EGLE and Ten State Standards
- Regional Utility Standards
- NFPA 820 Standards

Special Assessment District Projects

A special assessment district is not planned nor applicable to this project.

Sensitive Features

Work will take place on treatment facility grounds and be isolated from any potential sensitive ecosystem sites.

Schedule for Design and Construction

The schedule for design and construction will follow fourth quarter funding and is presented in Table 11 below.

Table 11. Project Schedule

Item	Target
CWSRF Application Submittal	June 2022
CWSRF Acceptance	Summer 2022
Funding Commitment	September 2022

Item	Target
Start Design	September 2022
Land and Easements Acquisition	N/A
Permits	March 2023
Advertise for Bids	May 2023
Funding Closing	July 2023
Contract Award	July 2023
Construction Notice to Proceed	August 2023
Substantial Completion	October 2024
Final Completion and Initiate Operation	November 2024

Cost Summary

A brief summary of planning, design, and construction costs is included below in Table 12. No items to be included in the project are believed to be ineligible for funding under the Michigan SRF program.

Table 12. Project Cost Summary

Item	Estimated Costs
Construction	
Headwork Improvements	$2,711,000
Primary Treatment – Clarifier Mechanisms	$632,000
Oxidation Ditch Improvements	$2,864,000
Final Treatment – Clarifier Mechanisms	$1,186,000
Digester Improvements	$3,266,000
Chemical Building Improvements	$214,000
Chlorine Disinfection Improvements	$130,000
Electrical and Controls Upgrade	$3,306,000
Administration Building (Belt Press and Boilers)	$1,901,000
Class A Sludge Treatment	$2,109,000
Miscellaneous (Piping, Painting and Doorways)	$506,000
Subtotal	**$18,825,000**
Engineering, Planning, Legal, Administration and Contingencies	$5,648,000
Total Project Cost, Current Dollars	**$24,473,000**
Escalation to 2023, 3% per year	$735,000
Total Project Cost	**$25,208,000**

The proposed project does include some improvements that will allow for green infrastructure, water, and energy improvements. These improvements including replacing and reconfiguring aeration equipment, providing VFDs on aerator motors, and a dissolved oxygen control loop in the oxidation ditch will decrease energy usage. These improvements are about $903,000 applicable towards Green Project Reserve.

Authority to Implement the Selected Alternative

The Gogebic Iron Wastewater Authority was established in 1983 as a Legal Corporation in the State of Michigan under Public Act 233. The Gogebic-Iron Wastewater Authority has successfully implemented facility improvements projects over the past two decades including most recently, construction of the existing aerated grit facility. The Authority has shown it has the legal, institutional, technical, financial and managerial resources, along with its consultants, to accomplish implementation of the recommended alternatives.

User Costs

This report has recommended improvements and suggested a phasing of improvements to reduce the short term effects on user rates on the three communities. Potential rate increases for the Community customers, assuming a no grant scenario, are outlined in Table 13. Because GIWA is a disadvantaged community, they are eligible for a 30-year loan/bond term. Detailed costs are shown in Appendix A. Estimated costs to users are approximate only and are averaged across the three communities; a rate methodology during the design phase will calculate costs after expiration of current loan, total allocated principal forgiveness for this project, and percentage of ownership/EDUs across the three communities.

Table 13. User Costs

Description	Year 1
CWSRF Loan Amount	$25,208,000
Anticipated Interest Rate	2.125%
Term	30
Annual Debt Service	$1,144,973
Monthly Debt Service	$95,414
Estimated System REUs	4,525
User Rate Impact / REUs / month	$21.09

Disadvantaged Community

A "Disadvantaged Community Status Determination Worksheet" is included with the final Project Plan submittal (see Appendix B). According to guidelines, GIWA does qualify as a disadvantaged community considering their current and projected debt service, median household income, and user rates.

Useful Life

Remaining Useful Life of all wastewater assets is available in the SAW Asset Management Plan (see Appendix D).

For new capital improvements including those under the proposed SRF project the total useful lives are as listed below based on methodology for salvage value computation.

- Building: 40 years
- Underground facilities including piping and foundations: 50 years (100 years expected based on performance of existing systems)
- Short-lived equipment: 20 years (30 to 40 years expected based on performance of existing equipment)

ENVIRONMENTAL EVALUATION

Summary

The anticipated environmental impacts resulting from implementation of the selected alternative can include beneficial and detrimental, short and long term, and irreversible or irretrievable impacts. A summary comparison of impacts, both with and without (no action) the selected alternative, was presented previously in this report in Table 5. The following is a discussion of the expected environmental impacts for the recommended plan.

Beneficial or Adverse

Construction activities under the proposed plan will occur on an existing developed site. This allows localizing many of the construction related adverse impacts and the mitigation measures necessary to minimize those impacts. No cross country construction is planned. Construction related jobs would be generated and local contractors would have an equal opportunity to bid on the work. Local suppliers of piping or building materials and equipment would also benefit.

Noise and dust would be generated during construction. Spoil from excavation will require approved disposal and erosion control mitigation. The aesthetics for the immediate area of the construction would be temporarily affected until restoration is complete.

Construction of the improvements will help insure long term reliability and efficiency of the utility system within the study area.

No significant impacts are anticipated on other cultural or environmentally sensitive resources. Copies of environmental review correspondence can be found in Appendix C.

Short and Long Term

<u>Trade-offs</u>

The short-term adverse impacts associated with construction activities would be minimal in comparison to the long term continued benefits to the area through improved infrastructure. Short term positive impacts due to construction (such as temporary increases in employment and material purchases) have no offsetting detrimental long-term impacts.

Limiting Future Options

The recommended projects should have no adverse impacts regarding the limiting choice of future options. Improving wastewater treatment reliability should in fact improve on the number of options available to the study area.

Future Land and Water

The project segments are not expected to have adverse effects relative to limiting the range of future land and water use options.

Long Term Risks

There are no known long-term risks to public health or safety due to the recommended project. The project will enhance the environmental quality and improve public health and safety.

Irreversible and Irretrievable

Fossil fuels, labor, construction materials and wear on equipment would be committed during construction. Financial resources of GIWA and member communities and the State of Michigan would also be committed.

ANAYLSIS OF IMPACTS

Direct Impacts

General

Correspondence, maps, lists, etc. relative to each of the items below can be found in Appendix E.

Historical and Cultural

Construction of the GIWA improvements is not anticipated to have any adverse effect on historical, archaeological, geological or recreational areas. All construction will take place in GIWA property.

Water Quality

Neither surface water nor groundwater quality is expected to be adversely affected by the project. Mitigation measures to control construction run-off will be required by the contract documents.

Air Quality

Long term air quality should not be impacted either beneficially or adversely by the recommended projects. Construction related dust will be minimized through contract enforcement of mitigation measures such as watering.

Natural Settings and Sensitive Ecosystems

Correspondence regarding possible project impact on natural settings and sensitive ecosystems with appropriate State and Federal agencies can be found in Appendix C. The project should have no impact on endangered species, significant plant communities, natural features, or prime and unique agricultural land. Mitigation measures will be coordinated with EGLE during the design process and permits will be needed in these areas. No crossings of creeks or rivers are planned under the recommended project.

Consumption of Materials

Materials consumption during construction and later operation of the recommended improvements could not be considered significant or excessive. Fuel for operating construction equipment and various piping materials would be the primary materials consumed.

Human, Social and Economic Impacts

The project segments will create short term economic benefits in areas of construction employment and materials supply. No relocation of residents or businesses is expected to result from the project. Long term human, social and economic impacts will be positive through increased efficiency, reliability and capacity in area infrastructure.

Construction Operational Impacts

Construction activity impacts will be short term as previously noted and are not expected to be unusual for underground utility or building construction. Implementing the improvements will reduce overall system operation and maintenance efforts due to replacement of outdated equipment and installation of newer, more reliable equipment.

Indirect Impacts

Land Development

The project segments will take place in GIWA property and should not induce changes in rate, density or type of land development nor associated transportation routes.

Land Use

The project is not expected to change current land use patterns.

Air and Water Quality

Air and water quality changes stemming from primary and secondary development are expected to be temporary and minor to non-existent.

Secondary Growth

Secondary growth is also not expected to be spurred by the other than that affected by any well run and maintained utility system.

Cultural Impacts

Impacts generated by the recommended improvements on cultural, human, social and economic resources can only be considered beneficial in the long term. Continued efficient and reliable operation of the area's utility system(s) contributes to a stable infrastructure promoting public health and safety.

Resource Consumption

No additional or increased resource consumption will occur due to these projects other than the construction related issues previously noted.

Aesthetics

The projects will produce no overall permanent damage to existing area aesthetics. Minor construction destruction will be more than offset by improved roads resulting from project restoration efforts.

Cumulative Impacts

No additional development incentive is expected to be created other than what occurs by default with improvements to a utility system.

MITIGATION MEASURES

General

Where adverse impacts due to installation of the recommended improvements cannot be avoided, mitigation measures will be implemented. Costs for mitigation measures were considered and included where applicable in project opinions of probable cost. Mitigation measures needed during construction will be included in construction contract documents.

Short Term Impacts

Traffic

Any traffic disruptions that occur (such as equipment deliveries or construction-related traffic) will be organized and controlled to minimize disruption of local, transient and emergency traffic. All needed barriers and signing or flagging will be in conformance with applicable City, County and MDOT standards.

Safety

All work shall comply with Federal, State and local laws governing activities, safeguards, devices and protective equipment. Minimum requirements are defined by the U.S. Department of Labor and the Michigan Occupational Safety and Health Act.

Dust and Noise

Construction dust and noise will be required to be kept to a minimum. No on-site burning will be allowed.

Erosion

Soil Erosion and Sedimentation Control permits will be required for the project. Site specific mitigation measures will be addressed during design and included in the construction contract documents.

Restoration

Damaged roadway, curbing, driveway and sidewalk surfaces will be restored to equal or better condition in accordance with best modern practices. Undeveloped areas will be restored with topsoil, fertilizer, mulch and seed or sod as needed.

Utilities

Disruption of utilities during construction will be kept to the minimum necessary to allow new installations. Repairs will be made in a timely manner.

Valuable Features

Implementation of the selected alternatives is not expected to significantly impact more extensive or valuable existing features such as mature vegetation. Areas of expected underground construction are open plant grounds.

Long Term Impacts

Construction Spoils

Disposal of construction spoils in wetlands, floodplains, shorelines or other sensitive areas will be prohibited. It is anticipated that spoils disposal areas and methods will need to be permitted.

Contaminated Soil

Contaminated soil and/or construction dewatering discharge will be planned and budgeted for with methods covered under project construction specifications.

Wetlands

The project segments will not infringe on any designated wetland areas.

Stream Crossings

No stream crossings are anticipated under the proposed work.

Siting

Work will be confined to the WWTF grounds. The use of buffer zones is not really an option nor needed.

Operational Impacts

Long term operational issues will not be adversely changed by the projects; rather, operations should be enhanced through new more reliable equipment installations.

Indirect Impacts

Planning and Zoning

Long range planning by the GIWA identified the project segments evaluated in this report and all take place within the facilities property and would have no effect on planning and zoning in the community.

Other Ordinances

Local ordinances are in place regarding minimum building construction and operation standards and site erosion control. Wetlands, floodplains, and other sensitive habitats are protected by State laws and permitting procedures.

Land Requirements

None needed for the recommended alternatives.

Staging of Construction

Staging will not be necessary other than that needed to minimize operational impact on the treatment facility.

Construction Problems

Construction problems anticipated include groundwater control and areas of inferior structural/pipe bedding and backfill soil material. These are normal occurrences with construction in the Gogebic County area and prior planning/design will create a situation where these problems will pose no significant difficulties for qualified contractors.

Socio-economic and Environmental Justice Issues

Costs and less tangible impacts such as construction traffic would have no disproportionate impact any area group. Impacts are spread evenly amongst community collection system users.

Transportation Issues

Any traffic disruptions that occur (such as equipment deliveries or construction related traffic) will be organized and controlled to minimize disruption of local, transient and emergency traffic. All needed barriers and signing will be in conformance with applicable MDOT standards. Disruption is expected to be minor and localized to the entrance to the GIWA facility.

Noise

Construction dust and noise will be kept to a minimum via construction contract requirements.

PUBLIC PARTICIPATION

Public Meetings on Project Alternatives

GIWA's WWTF needs and generic potential fixes have been openly noted at several Authority meetings over the past decade.

The Formal Public Hearing

A public hearing was held in-person at the City of Ironwood City Hall on the information presented in this report was held during a special Authority meeting on May 12, 2022. A written transcript is included in Appendix E.

Public Hearing Advertisement

An advertisement was placed in the __________ 30 days prior to the Public Hearing on April 8, 2022 and again the following week, advertising the formal public hearing. Simultaneously to the advertisement publication, copies of the project plan were made available to the public at the WWTF. Appendix E has the advertisement copies.

Public Hearing Transcript

A full transcript of the public hearing is available in Appendix E.

Public Hearing Comments

Comments are summarized in Appendix E with a full transcript.

Comments Received and Answered

No written comments were received prior to the Public Hearing.

Adoption of the Project Plan

Agency and/or Owner preliminary review comments were incorporated into the final version of this Project Plan. The plan was adopted by the Authority on May 12, 2022.