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TECHNICAL MEMORANDUM

TO: Emily Schon, PE, MCES

FROM: Christopher Larson, PE

DATE: July 11, 2025

RE: Study 3 – Wastewater Reuse for Industrial and Agriculture Users
White Bear Area Comprehensive Plan

INTRODUCTION

The White Bear Lake Area is facing complex water supply challenges including groundwater use that impacts the water levels in White Bear Lake. Metropolitan Council Environmental Services (MCES) is moving forward with Comprehensive Planning, in collaboration with the White Bear Lake Area Work Group, to support regional efforts to ensure equitable access to sufficient, safe, and affordable water for communities in the White Bear Lake Area to meet current and future needs while safeguarding the sustainability of surface water and groundwater resources.

Based on 2023 legislation requirements, the White Bear Lake Work Group evaluated several main areas to address:

1) Converting water supplies that are groundwater dependent to total or partial supplies from surface water
2) Reuse water, including water discharged from contaminated wells
3) Projects designed to increase groundwater recharge
4) Other methods for reducing groundwater use.

One of the solutions that was prioritized for further investigation by the Work Group includes wastewater reuse for industrial or irrigation purposes (Item 2). This technical memorandum seeks to provide conceptual treatment requirements and siting of facilities, along with capital cost opinions and operation and maintenance cost opinions for wastewater reuse.

WASTEWATER REUSE

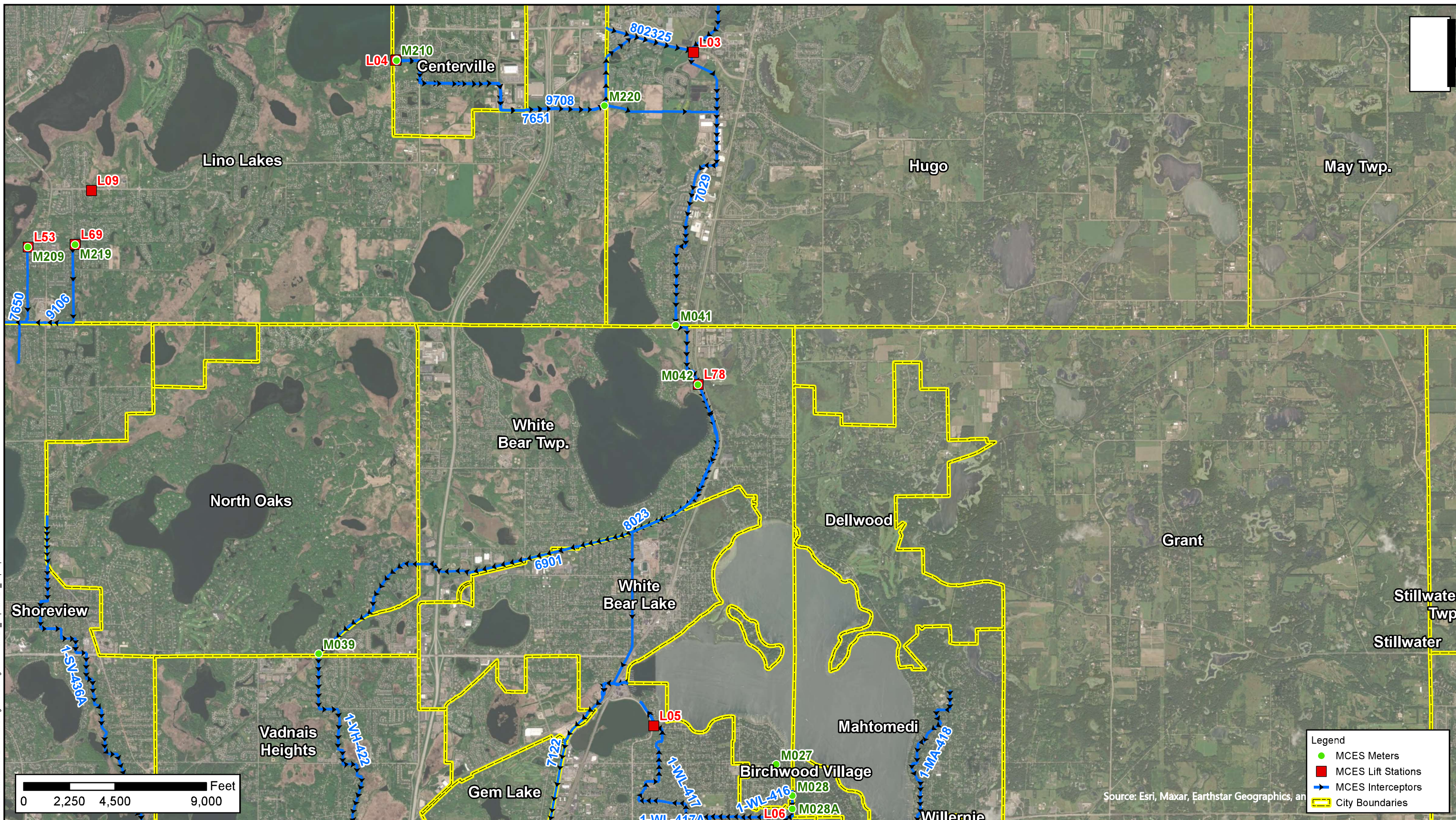
Using reclaimed wastewater could preserve groundwater resources by offsetting potable water use. One such solution in the WBL area is to utilize reclaimed water for high volume irrigation and commercial/industrial users, which would reduce the required groundwater withdrawal from the surrounding utilities. The potential for this reuse depends on three primary factors:

1) Potential volume of wastewater available for reuse
2) Potential users of reclaimed water
3) Potential net benefits to White Bear Lake surface water elevations

WASTEWATER RESOURCES IN WHITE BEAR LAKE AREA

As shown on Figure 1, the wastewater from Hugo, Forest Lake, and portions of Centerville and Lino Lakes is conveyed south in MCES interceptor 7029. Lift Station L-78, just south of the Hugo border in White Bear Township, is a relief lift station that can divert flow from Interceptor 6901 to Interceptors 8023 to 7122 if needed. The flow at Meter 041 (M041) would be available for potential wastewater reuse. The wastewater flows at M041 are shown in Table 1.

Short Elliott Hendrickson Inc., 3535 Vadnais Center Drive, St. Paul, MN 55110-3507
651.490.2000 | 800.325.2055 | 888.908.8166 fax | **sehinc.com**



Project: MCES0 182880
Print Date: 4/14/2025

User Name: losowski
Projection: NAD 1983 HARN
Adj MN Ramsey (US Feet)
Source: Esri, SEH

MCES Interceptor Map

Wastewater Reuse Concept Study
White Bear Lake Area Comprehensive Plan

Figure
1

Table 1 MCES Meter 041 - Monthly Flows (Million Gallons)					
	2021	**2022**	**2023**	**2024**	**2025**
January	74.6	74.2	76.0	82.5	86.5
February	68.9	66.1	72.0	74.7	76.0
March	84.5	79.8	85.8	80.7	88.6
April	84.1	86.4	113.7	91.6	94.3
May	84.7	91.9	90.4	100.3	95.9
June	77.2	79.6	78.7	107.2	99.6
July	74.9	76.5	77.5	91.9	--
August	72.9	76.7	77.4	99.8	--
September	69.4	72.8	74.2	84.4	--
October	71.8	73.7	81.2	82.3	--
November	70.9	72.4	78.0	83.9	--
December	74.4	76.5	83.4	88.3	--
Annual Total:	**908.3**	**926.6**	**988.3**	**1067.6**	**--**

As Table 1 indicates, the average flows at M041 ranged from 2.5 MGD in 2021 to 2.9 MGD in 2024. Based on MCES projections, the 2050 flows at M041 are estimated to be 3.7 MGD and the Ultimate flows at M041 are estimated to be 4.7 MGD.

POTENTIAL RECLAIMED WATER USERS

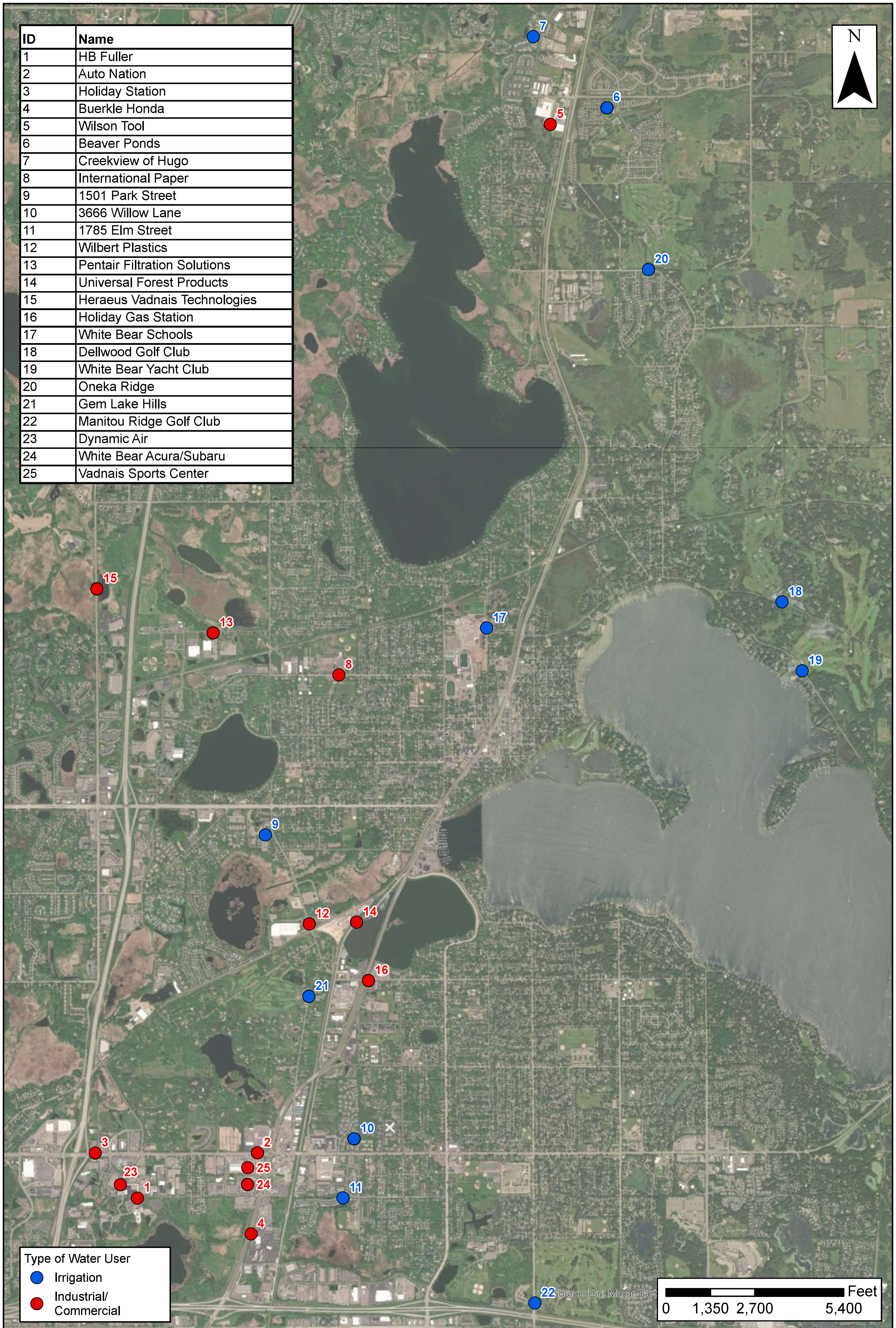
Two sources of potential reclaimed water users exist in the White Bear Lake area including large volume industrial and commercial users, and private wells that use large volumes of water. The potential wastewater reuse water customers identified are shown on Figure 2.

Large Volume Water Users – Municipal

The Cities of Hugo, White Bear Township, White Bear Lake, and Vadnais Heights were contacted regarding high-volume commercial or irrigation water users. Table 2 presents the high-volume water users that were close enough to the White Bear Lake area to potentially be a wastewater reuse customer.

Large Volume Water Users – Private Wells

Private large-volume wells in the White Bear Lake Area were identified using the Minnesota Well Index. The DNR MPARS database was used to determine the annual volume of water pumped from the wells in 2023. Table 3 presents the large volume private wells in the White Bear Lake area.



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Potential Water Reuse Customers

Wastewater Reuse Concept Study

White Bear Lake Area Comprehensive Plan

Figure 2

Table 2 Potential Wastewater Reuse Users – Commercial/Industrial			
Large Water Users	**City**	**Annual Commercial/Industrial Water Use (gal)**	**Irrigation Water Use (gal)**
HB Fuller	Vadnais Heights	5,000,000	
Dyanamic Air Inc.	Vadnais Heights	3,100,000	
WB Acura Subaru	Vadnais Heights	3,000,000	
Vadnais Sports Center	Vadnais Heights	2,960,000	
Buerkle Honda	Vadnais Heights	2,300,000	
Buerkle Hyundai	Vadnais Heights	2,100,000	
Holiday Station (Co Rd E)	Vadnais Heights	1,900,000	
Wilson Tool	Hugo	5,600,000	
Beaver Ponds	Hugo		1,750,000
Creekview of Hugo	Hugo		1,300,000
International Paper	White Bear Lake	5,200,000	
1501 Park Street	White Bear Lake		4,200,000
3666 Willow Lane	White Bear Lake		3,600,000
1785 Elm Street	White Bear Lake		3,350,000
Wilbert Plastics	White Bear Twp	8,500,000	
Pentair Filtration Solutions	White Bear Twp	8,300,000	
Universal Forest Products	White Bear Twp	3,700,000	
Heraeus Vadnais Technologies	White Bear Twp	3,700,000	
Holiday Gas Station	White Bear Twp	2,800,000	
	Total:	**60,560,000**	**14,200,000**

Table 3 Potential Wastewater Reuse Users – Private Wells			
Large Water Users	**City**	**Annual Commercial/Industrial Water Use (gal)**	**Irrigation Water Use (gal)**
White Bear Schools	White Bear Lake		1,500,000
Dellwood Golf Club	Dellwood		29,000,000
White Bear Yacht Club	Dellwood		27,000,000
Oneka Ridge	Hugo		25,000,000
Gem Lake Hills	White Bear Lake		15,800,000
Manitou Ridge Golf Club	White Bear Lake		25,000,000
		Total:	**123,300,000**

Potential Wastewater Reuse Volumes

As Tables 2 indicates, the total volume of commercial/industrial wastewater reuse potential identified is 60,560,000 gallons annually or 0.17 million gallons per day (MGD). As Tables 2 and 3 indicate, the total volume of irrigation wastewater reuse potential is approximately 137,500,000 gallons annually. If the irrigation season is 120 days (May – Aug), but irrigation is only needed for 90 total days due to rain, the average day demand would be 1.53 MGD.

RAW WASTEWATER QUALITY

MCES does not monitor water quality specifically coming from the WBL area. Therefore, this evaluation assumes standard municipal strength wastewater with the following characteristics:

- Biological Oxygen Demand (BOD): 250 mg/L
- Total Suspended Solids (TSS): 250 mg/L
- Total Phosphorous: 7 mg/L
- Total Nitrogen: 40 mg/L
- Fats, Oil, Grease (FOG): 75 mg/L
- Chlorides: 500 mg/L

Based on experience in the metro area, it is expected that chlorides levels in wastewater in the NE metro will be elevated. The City of Forest Lake utilizes municipal ion exchange treatment for water softening, which discharges salt brine to the wastewater system as part of the regeneration process. In addition, most of the residents of Hugo and Centerville likely soften their water using ion exchange softeners. A chloride concentration of 500 mg/L is approximately the same chloride concentration as the wastewater coming to the MCES Empire Water Resource Recovery Facility (WRRF) which is estimated to have similar water quality.

RECLAIMED WATER USES AND WATER QUALITY REQUIREMENTS

Regulatory Guidance for Wastewater Reuse

Non-potable wastewater reuse in Minnesota is regulated by the MPCA based on type of reuse, with differing treatment requirements[1]:

- *Disinfected tertiary treatment* applies to uses with the highest degree of human contact, such as root crops, residential and public landscape irrigation, toilet flushing, snow making and cooling towers. Total coliform limit is 2.2 MPN (Most Probable Number)/100 ml (milliliters). A turbidity standard of 2 NTU (Nephelometric Turbidity Units) daily average and 10 NTU daily maximum also applies.
- *Disinfected secondary 23* treatment applies to uses with moderate risk of human contact, such as irrigating cemeteries, roadway landscaping, nursery stock and sod farms, pasture for livestock, industrial boiler feed water and similar uses. Total coliform limit is 23 MPN/100 ml.
- *Disinfected secondary 200* treatment applies to uses with little or no potential for human contact, such as spray or sprinkle irrigation of animal feed, fiber, and seed crops, Christmas trees and sod farms. Fecal coliform limit is 200 MPN/100 ml.

[1]*https://www.health.state.mn.us/communities/environment/water/docs/cwf/2018report.pdf*

Other requirements such as signage to protect public health along with monitoring and reporting also apply.

Wastewater Reuse Water Quality Goals

Treated wastewater from conventional wastewater plants such as those operated by MCES would typically meet Disinfected Secondary 200 reuse requirements without supplemental treatment. To meet wastewater reuse requirements for the lawn irrigation, the water would need to meet the Disinfected Tertiary Treatment standard.

Meeting the safety standards for wastewater reuse does not mean that the water is suitable for all types of reuse. The most significant barrier to reusing wastewater in the WBL area is the high level of chloride believed to be present in the wastewater stream.

Table 4 identifies chloride concentrations and its effect on crops of different chloride tolerances.[1]

Table 4
Chloride Effect on Crops

Chloride (ppm)	Effect on Crops
Below 70	Generally safe for all plants.
70-140	Sensitive plants show injury.
141-350	Moderately tolerant plants show injury.
Above 350	Can cause severe problems.

[1]T.A. Bauder et al, Irrigation Water Quality Criteria, Fact Sheet No. 0.506, Colorado State University Extension, 2014.

While process and cooling water requirements can vary based on the specific uses, chloride is particularly troublesome. High chloride concentrations can cause pitting and stress corrosion in metals. Levels over 250 mg/L begin to pose issues with cooling equipment, and concentrations over 500 mg/L are generally unsuitable for industrial cooling. This is due to the concentrating nature of their operation, which results in higher circulating water concentrations as water is evaporated. When the makeup water quality is poor, the cooling systems are more limited in their tower cycles, resulting in increased water and chemical usage.

Without a specific major user identified, the recommended water quality goal is providing reuse water with a **chloride concentration below 50 mg/L.**

TREATMENT CAPACITY

As discussed earlier, the total volume of commercial/industrial wastewater reuse potential identified is 60,560,000 gallons annually or 0.17 million gallons per day (MGD). The total volume of irrigation wastewater reuse potential is approximately 137,500,000 gallons annually. If the irrigation season is 120 days (May – Aug), but irrigation is only needed for 90 total days due to rain, the average day demand would be 1.53 MGD. For this study, a wastewater reuse facility capable of producing 2 MGD of water will be evaluated.

TREATMENT NECESSARY TO MEET WATER QUALITY GOALS

To meet the regulatory requirements for Disinfected Tertiary Treatment standard, a wastewater treatment plant would need to be constructed. For this study, the primary wastewater treatment process selected is membrane bioreactors (MBR). The effluent from a membrane bioreactor has very low turbidity and suspended solids making it more suitable for advanced treatment.

To lower the chloride concentrations and provide tertiary treatment to meet the reuse requirements, two options were considered; reverse osmosis, and ion exchanged-based advanced treatment (XBAT).

Reverse Osmosis

Reverse osmosis (RO) is a water purification process that uses a semi-permeable membrane to separate water molecules from other substances, including salts and other contaminants. Under high pressure, water is forced through the membrane, leaving behind the contaminants. This process results in purified water (permeate) that is collected for use, while the rejected contaminants are flushed away as a concentrate. Reverse osmosis is widely used for desalination and the production of high-purity water for various applications.

XBAT

XBAT is a suspended ion exchange (SIX) process followed by lime softening. The ion-exchange resin is a non-proprietary strong base anion exchange resin. The SIX process would remove anionic constituents including chloride and PFAS. Typical anion exchange resins would use sodium chloride to regenerate. In the XBAT process, bicarbonate is used for regeneration. The bicarbonate is then consumed in the lime softening process. Data presented to MCES by Carollo Engineering showed a 70% removal rate for chloride. For the assumed chloride concentration in the White Bear Lake Area wastewater, this would result in a final chloride concentration of 150 mg/L.

To mee the water quality goal of 50 mg/L of chloride, it is assumed that RO treatment would be necessary for this study.

The treatment process for this study is as follows:

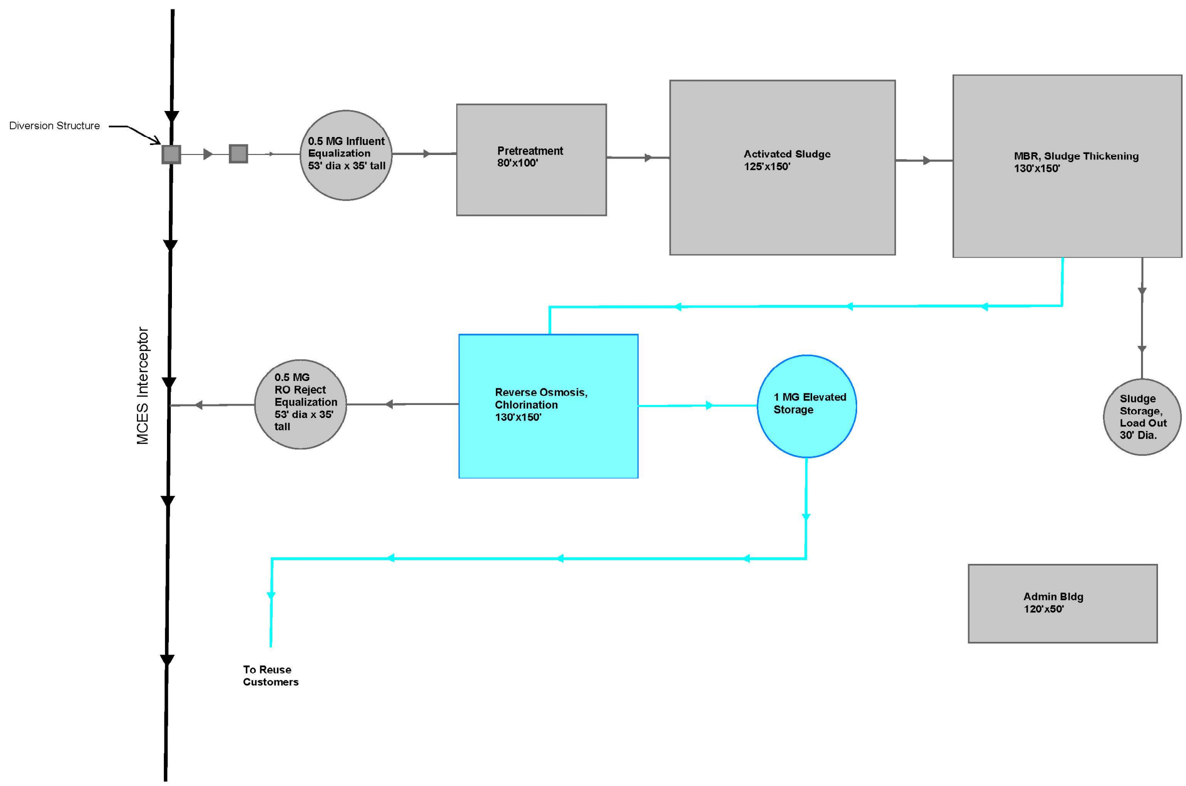
1. **Wastewater Pretreatment:** This includes screening to remove large debris, grit removal to separate heavy, inorganic solids, and grease/oil removal.
2. **Activated Sludge:** The activated sludge process is a biological treatment method where oxygen or air is introduced into a mixture of sewage and activated sludge, which is a collection of beneficial bacteria and protozoa. This process breaks down organic pollutants and nutrients in the wastewater, resulting in the formation of a sludge that can be separated and treated.
3. **MBR/Sludge Thickening**: The MBR process uses low pressure, submerged, hollow-fiber membranes to filter the water. In this process the sludge is also thickened and sent to a sludge load out tank. It is assumed that the sludge would be hauled to the MCES Metro WRRF for processing and incineration.
4. **RO**: The last step in the process is RO which is a water purification process that uses a semi-permeable membrane to separate water molecules from other substances. Because RO treatment produces pure water, the water needs to be re-mineralized to avoid being corrosive.

   Approximately 20% of the water in the RO process is reject water that contains concentrated salts and contaminants. To be able to produce 2 MGD of water from the RO process, approximately 2.5 MGD of water from the wastewater treatment process is needed. It is assumed that the RO reject water can be put back into the MCES sewer.

A wastewater reuse treatment schematic is included as Figure 3. Approximate building and tank sizes is included.

REUSE FACILTY LOCATION

The wastewater reuse facilities for this study would require a minimum of 10 acres of land. It is assumed that private property would need to be purchased. To avoid showing a wastewater reuse facility on someone's private property, a general area for the facility was identified on Figure 4.



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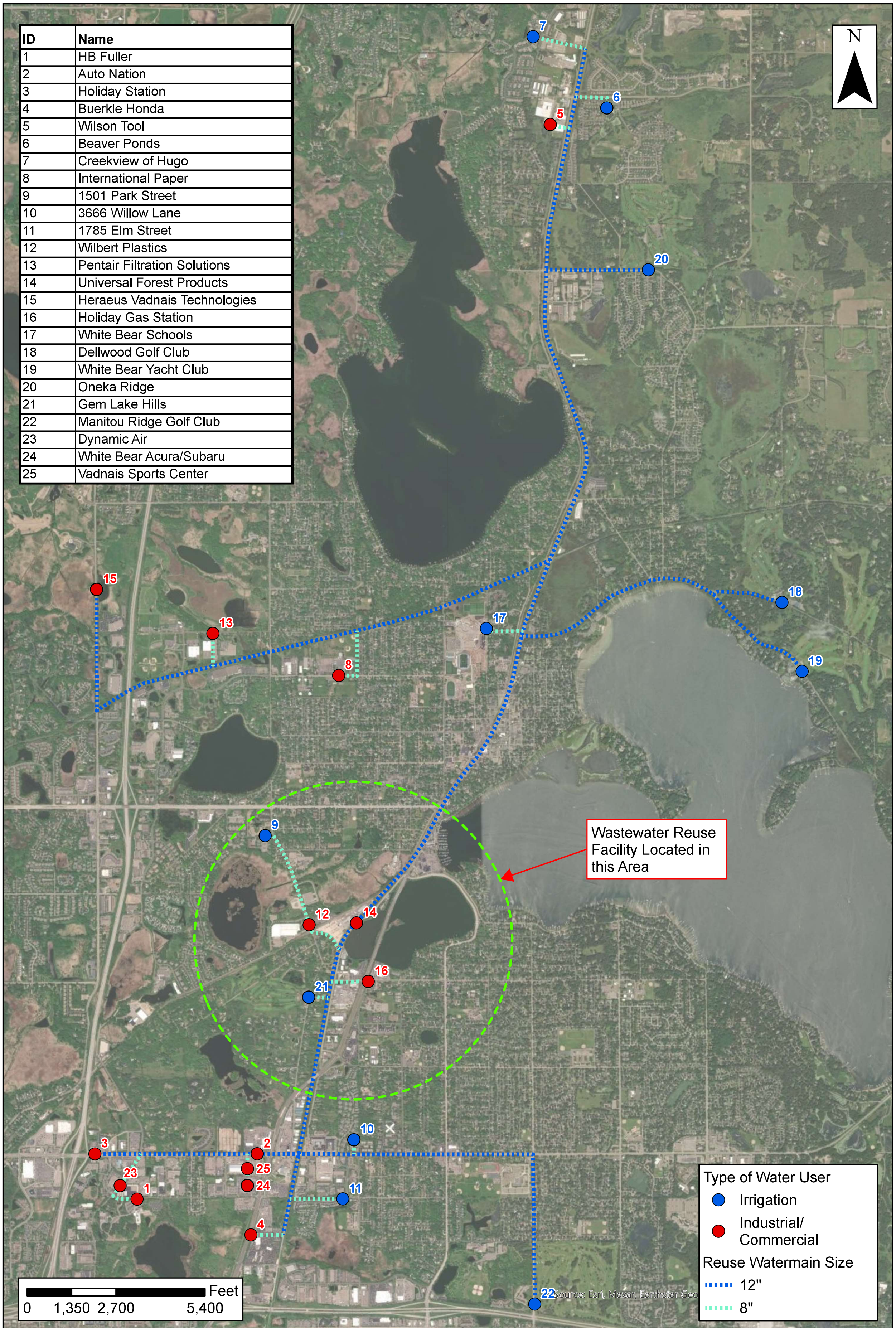
Wastewater Reuse Treatment Schematic

Wastewater Reuse Concept Study
White Bear Lake Area Comprehensive Plan

Figure 3



ID	Name
1	HB Fuller
2	Auto Nation
3	Holiday Station
4	Buerkle Honda
5	Wilson Tool
6	Beaver Ponds
7	Creekview of Hugo
8	International Paper
9	1501 Park Street
10	3666 Willow Lane
11	1785 Elm Street
12	Wilbert Plastics
13	Pentair Filtration Solutions
14	Universal Forest Products
15	Heraeus Vadnais Technologies
16	Holiday Gas Station
17	White Bear Schools
18	Dellwood Golf Club
19	White Bear Yacht Club
20	Oneka Ridge
21	Gem Lake Hills
22	Manitou Ridge Golf Club
23	Dynamic Air
24	White Bear Acura/Subaru
25	Vadnais Sports Center

SEH

Project: MCES0 182880
Print Date: 4/14/2025

Map by: losowski
Projection: NAD 1983 HARN
Adj MN Ramsey (US Feet)
Source: Esri, SEH

Wastewater Reuse System Map

Wastewater Reuse Concept Study
White Bear Lake Area Comprehensive Plan

Figure 4

STORAGE

The reuse treatment process, pumping, and conveyance will require water storage at several stages in the process including raw wastewater equalization, elevated treated water storage, RO reject water equalization, and wastewater sludge storage.

Raw Water Equalization

To provide equalization ahead of treatment for consistent feed rates, it is assumed that equalization storage will be provided after the diversion structure ahead of treatment facility. For the 2 MGD reuse facility, 0.5 MG of raw water equalization would be provided.

Elevated Storage

After treatment, elevated storage is provided for consistent pressure and peaking capacity. For this study, it is assumed that 1 MG of elevated storage will be provided to meet projected maximum day water demands and provide fire protection.

RO Reject Water Equalization

In addition to raw water equalization and finished water storage, waste holding tanks will likely be required due to the high volume and high concentration of chloride in the RO reject. The RO reject will contain chloride and other constituent concentrations at levels approximately 4 times that of the raw wastewater. To ensure that RO reject water can be metered back into the MCES interceptor at a constant rate, a 0.5 MG equalization tank is shown.

DIVERSION, PUMPING AND CONVEYANCE

In addition to treatment and storage, the wastewater reuse facility will require additional infrastructure. This includes a diversion structure, low lift pumping, and reuse water conveyance. The diversion structure and low lift pumping will be sized to meet the treatment capacity. The 12" and 8" conveyance piping is sized to avoid high headloss and provide additional capacity for new future customers. The reuse water piping is shown on Figure 4.

ALTERNATIVE DEVELOPMENT

The wastewater reuse project components are summarized as follows:

- Effluent Diversion Structure
- Low Lift Pumping
- 0.5 MG Raw Wastewater Equalization
- 2.5 MGD Wastewater Reuse Treatment
    - Pretreatment
    - Activated Sludge
    - MBR/Sludge Thickening
    - RO Feed Pumps
    - 2 MG RO Membranes
    - Chemical Feed Systems
    - Sludge Holding Tank
- 1 MG Elevated Storage
- 0.5 MG RO Reject Water Equalization
- Administration Building
- 17 miles of 12" Reuse Watermain
- 2.7 miles of 8" Reuse Watermain

CONCEPT LEVEL CAPITAL COST OPINIONS

A concept level opinion of probable cost (OPC) was developed for the wastewater reuse concept. The OPC was developed using cost from vendors, previous treatment plant projects, or indexed from previous reuse studies. Due to the concept level nature of the OPC, a 40% contingency is being applied.

The OPC presented assumes the storage tanks on the reuse treatment sites are above-grade prestressed concrete tanks. Prestressed concrete tanks were assumed because they are cost effective; however, buried cast-in-place concrete tanks could also be used.

Table 5
Concept Level OPC
2 MGD Wastewater Reuse

Component	Unit	Est. Quantity	Unit Price	Cost
Effluent Diversion	LS	1	$910,000	$910,000
0.5 MG Equalization Tank	LS	1	$2,500,000	$2,500,000
2.5 MGD WRRF[1]	LS	1	$75,000,000	$75,000,000
2 MGD RO Reuse Treatment Plant	LS	1	$18,000,000	$18,000,000
1 MG Elevated Storage	LS	1	$7,000,000	$7,000,000
0.5 MG Reject Water Equalization	LS	1	$2,500,000	$2,500,000
12” Reuse Watermain	LF	91,000	$500	$45,500,000
8” Reuse Watermain	LF	14,000	$450	$8,550,000
			Subtotal	**$159,960,000**
			40% Contingency	$63,980,000
			Subtotal Construction	**$223,940,000**
			Land and Easement Acquisition	$5,000,000
			15% Engineering	$33,600,000
			15% Construction Administration	$33,600,000
			Total:	**$296,000,000**

Note: 1. WRRF construction cost based on previous projects in Minnesota on a per MGD basis, and prorated to 2025 using ENR Index.

CONCEPT LEVEL OPERATION AND MAINTENANCE COSTS

In addition to capital costs, the reuse treatment facilities would also incur annual O&M costs including labor, membrane replacement, chemicals, electricity, natural gas, and equipment repair. The concept level O&M costs are presented in Table 6.

Table 6
Concept Level Operation and Maintenance Costs
2 MGD Wastewater Reuse

Item	Annual Cost
Labor (3 FTE, licensed operators for WWRF operation and distribution system)	$450,000
Membrane Replacement (5 yr for RO and 7 yr for MBR)	$125,000
Chemicals	$150,000
Electricity	$225,000
Natural Gas	$100,000
Tower Maintenance	$50,000
Equipment Repair	$200,000
Lab Testing	$50,000
Total Annual O&M	**$1,350,000**

Note: 1. Labor, chemicals, electricity, natural gas, and equipment repair is primarily based on budget from the Detroit Lakes WWTP for 2025. Detroit Lakes operates a 2 MGD MBR WWTP.

CAPITAL COST OFFSET

Constructing a wastewater reuse facility in the White Bear Lake area would add treatment capacity to the MCES Metropolitan service area. It would also reduce flow in downstream sewer interceptors. This has the potential to offset or reduce the cost of future MCES projects.

The MCES Metropolitan Water Resource Recovery Facility (Metro Facility) currently treats wastewater for the White Bear Lake area and upstream communities in addition to a large portion of the Twin Cities metropolitan area. The Metro Facility currently treats an average of 172 MGD and has a capacity of 251 MGD. The 2050 flow to the Metro Facility is estimated to be 189 MGD in the Metropolitan Council 2050 Water Policy Plan. There is no indication that capacity expansion will be needed at the Metro Facility in the 2050 planning period.

It is not currently known if there will be a need to expand sewer interceptor capacity in the White Bear Lake area. A sewer model is currently being developed to evaluate the interceptors from Forest Lake to the Metro Facility.

Based on the information currently available, it is not clear that adding a wastewater reuse treatment facility in the White Bear Lake area would offset future treatment or conveyance costs for MCES.

EFFECTS OF WASTEWATER REUSE ON WHITE BEAR LAKE WATER LEVELS

Wastewater reuse would have a positive effect on White Bear Lake water levels because it would be reducing withdrawals from the aquifer. However, the effect would be minor and less than 2-inches in improved lake level based on the DNR's groundwater modeling. The effect on the lake levels would be a function of which wells had reduced pumping and the respective volume reduction. The DNR has modeled various pumping reduction scenarios.

EFFECTS ON AQUIFER SUSTAINABILITY
Wastewater reuse would reduce the volume of water withdrawn from the aquifer; therefore, having a positive impact on the sustainability of the aquifer.

EFFECTS ON DRINKING WATER QUALITY
Water reuse would not change existing drinking water quality.

EFFECTS ON DRINKING WATER RESILIENCY
Water reuse would not add resiliency to the drinking water supplies of the White Bear Lake area, but it would reduce pressure on the existing water sources.

CONCLUSIONS AND RECOMMENDATIONS
Based on the results of this concept study, the following conclusions can be made regarding wastewater reuse in the White Bear Lake area:

1. Wastewater reuse requires a treatment process that has very high capital and O&M costs.

2. There are not sufficient commercial, industrial, and irrigation water reuse to warrant a 2 MGD wastewater reuse facility. The winter demand for commercial/industrial wastewater reuse is only approximately 0.17 MGD. A smaller wastewater reuse facility would be even less cost effective than a larger facility.

3. The increase to White Bear Lake water elevations was estimated to be very minor based on the DNR's groundwater modeling.

4. If this wastewater reuse concept were to be pursued, it should be combined with the aquifer injection or direct lake augmentation concepts to allow for consistent water reuse throughout the year.

The following recommendations are offered:

1. The White Bear Lake Work Group should continue to explore other more cost-effective options to ensure equitable access to sufficient, safe, and affordable water for communities in the White Bear Lake Area to meet current and future needs while safeguarding the sustainability of surface water and groundwater resources.

2. Wastewater samples should be collected from the interceptors in the White Bear Lake area and analyzed for general water quality parameters and likely contaminants.

Attachment A – Concept Level Cost Opinions

Attachment A

Concept Level Cost Opinions

Project Name:	MCES Water Reuse Evaluation
SEH Project No:	MCES 182880
Date:	July 1, 2025
Estimator:	SEH
Description:	Concept Level OPC - 2 MGD RO WTP

DIVISION 1 - GENERAL REQUIREMENTS	UNIT	EST. QUANTITY	UNIT PRICE	AMOUNT
CONTRACTOR MOBILIZATION, OVERHEAD, PROFIT (15%)	LUMP SUM	1	$ 2,314,180.00	$ 2,314,180.00
SUBTOTAL DIVISION 0 AND 01				*$ 2,314,180.00*
DIVISION 2 - EXISTING CONDITIONS	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
CLEARING AND GRUBBING	LUMP SUM	1	$ 60,000.00	$ 60,000.00
SUBTOTAL DIVISION 2				*$ 60,000.00*
DIVISION 3 - CONCRETE	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
CAST IN PLACE CONCRETE	CY	490	$ 1,700.00	$ 833,000.00
SUBTOTAL DIVISION 3				*$ 833,000.00*
DIVISION 4 - MASONRY	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
PRECAST STRUCTURAL CONCRETE	LUMP SUM	1	$ 1,300,000.00	$ 1,300,000.00
MASONRY	LUMP SUM	1	$ 126,000.00	$ 126,000.00
SUBTOTAL DIVISION 4				*$ 126,000.00*
DIVISION 5 - METALS	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
METAL FABRICATIONS	LUMP SUM	1	$ 250,000.00	$ 250,000.00
SUBTOTAL DIVISION 5				*$ 250,000.00*
DIVISION 7 - THERMAL & MOISTURE PROTECTION	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
THERMAL & MOISTURE PROTECTION (ROOFING, ETC.)	LUMP SUM	1	$ 610,000.00	$ 610,000.00
SUBTOTAL DIVISION 7				*$ 610,000.00*
DIVISION 8 - OPENINGS	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
DOORS AND WINDOWS	LUMP SUM	1	$ 175,000.00	$ 175,000.00
SUBTOTAL DIVISION 8				*$ 175,000.00*
DIVISION 9 - FINISHES	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
EQUIPMENT/PROCESS PIPING PAINTING	LUMP SUM	1	$ 240,000.00	$ 240,000.00
SUBTOTAL DIVISION 9				*$ 240,000.00*
DIVISION 10 - SPECIALTIES	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
SPECIALTIES	LUMP SUM	1	$ 20,000.00	$ 20,000.00
SUBTOTAL DIVISON 10				*$ 20,000.00*
DIVISION 12 - FURNISHINGS	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
LAB CASEWORK	LUMP SUM	1	$ 53,856.00	$ 53,856.00
SUBTOTAL DIVISION 12				*$ 53,856.00*
DIVISION 21 - FIRE SUPPRESSION	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
FIRE PROTECTION SYSTEM	LUMP SUM	1	$ 76,000.00	$ 76,000.00
SUBTOTAL DIVISION 21				*$ 76,000.00*
DIVISION 22 - PLUMBING	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
PLUMBING	LUMP SUM	1	$ 450,000.00	$ 450,000.00
SUBTOTAL DIVISION 22				*$ 450,000.00*
DIVISION 22 - HVAC	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
HVAC	LUMP SUM	1	$ 450,000.00	$ 450,000.00
SUBTOTAL DIVISION 23				*$ 450,000.00*
DIVISION 26 - ELECTRICAL	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
ELECTRICAL	LUMP SUM	1	$ 3,100,000.00	$ 3,100,000.00
SUBTOTAL DIVISION 26				*$ 3,100,000.00*
DIVISION 31 - EARTHWORK	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
EARTHWORK	LUMP SUM	1	$ 720,000.00	$ 720,000.00
SUBTOTAL DIVISION 31				*$ 720,000.00*
DIVISION 32 - EXTERIOR IMPROVEMENTS	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
EXTERIOR IMPROVEMENTS (PAVEMENT, FENCING, LANDSCAPING, ETC)	LUMP SUM	1	$ 280,000.00	$ 280,000.00
SUBTOTAL DIVISION 32				*$ 280,000.00*
DIVISION 33 - UTILITIES	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
UTILITIES		1	$ 620,000.00	$ 620,000.00
SUBTOTAL DIVISION 33				*$ 620,000.00*
DIVISION 40 - PROCESS INTERCONNECTIONS	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
PROCESS PIPING AND VALVES	LUMP SUM	1	$ 1,900,000.00	$ 1,875,000.00
SUBTOTAL DIVISION 40				*$ 1,875,000.00*

DIVISION 41 - MATERIALS PROCESSING & HANDLING EQUIPMENT	UNIT	EST. QUANTITY	UNIT PRICE	AMOUNT
BRIDGE CRANE	UNIT	1	$ 150,000.00	$ 150,000.00
SUBTOTAL DIVISION 41				*$ 150,000.00*
DIVISION 43 - PROCESS GAS & LIQUID HANDLING, PURIFICATION & STORAGE EQUIPMENT	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
HIGH SERVICE PUMPS	UNIT	3	$ 200,000.00	$ 600,000.00
SUBTOTAL DIVISION 43				*$ 600,000.00*
DIVISION 44 - POLLUTION & CONTROL EQUIPMENT	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
REVERSE OSMOSIS SYSTEM SKID - 500 GPM	EACH	4	$ 950,000.00	$ 3,800,000.00
MEMBRANE EQUIPMENT INSTALLATION	LUMP SUM	1	$ 570,000.00	$ 570,000.00
RO FEED PUMPS	EACH	3	$ 65,000.00	$ 195,000.00
CHEMICAL FEED SYSTEM - RO ANTISCALANT	LUMP SUM	1	$ 75,000.00	$ 75,000.00
CHEMICAL FEED SYSTEM - RO DECHLORINATION	LUMP SUM	1	$ 75,000.00	$ 75,000.00
DISINFECTION - SODIUM HYPOCHLORITE FEED SYSTEM	LUMP SUM	1	$ 100,000.00	$ 100,000.00
SODIUM HYPOCHLORITE STORAGE TANKS - FRP	LUMP SUM	1	$ 150,000.00	$ 150,000.00
SUBTOTAL DIVISION 44				*$ 4,965,000.00*
SUB TOTAL				**$ 17,970,000.00**

Project Name:	MCES Water Reuse Evaluation
SEH Project No:	MCES 182880
Date:	July 1, 2025
Estimator:	SEH
Description:	0.5 MG PRESTRESSED TANK

DIVISION 1 - GENERAL REQUIREMENTS	UNIT	EST. QUANTITY	UNIT PRICE	AMOUNT
CONTRACTOR MOBILIZATION, OVERHEAD, PROFIT (15%)	LUMP SUM	1	$ 325,500.00	$ 325,500.00
SUBTOTAL DIVISION 0 AND 01				*$ 325,500.00*
DIVISION 3 - CONCRETE	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
0.5 MG Prestressed Concrete Tank	LUMP SUM	1	$1,500,000	$1,500,000
SUBTOTAL DIVISION 3				*$1,500,000*
DIVISION 8 - OPENINGS	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
HATCHES	EA	2	$ 5,000.00	$10,000
SUBTOTAL DIVISION 8				*$ 10,000.00*
DIVISION 26 - ELECTRICAL	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
LEVEL SENSORS	EA	1	$ 20,000.00	$ 20,000.00
SUBTOTAL DIVISION 26				*$ 20,000.00*
DIVISION 31 - EARTHWORK	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
EXCAVATION AND GRADING	LUMP SUM	1	$ 290,000.00	$ 290,000.00
SUBTOTAL DIVISION 31				*$ 290,000.00*
DIVISION 33 - UTILITIES	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
SITE PIPING	LUMP SUM	1	$ 250,000.00	$ 250,000.00
SUBTOTAL DIVISION 33				*$ 250,000.00*
DIVISION 40 - PROCESS INTERCONNECTIONS	**UNIT**	**EST. QUANTITY**	**UNIT PRICE**	**AMOUNT**
PROCESS PIPING	LUMP SUM	1	$ 100,000.00	$ 100,000.00
SUBTOTAL DIVISION 40				*$ 100,000.00*
SUB TOTAL				**$ 2,495,500.00**