Northern Moraine Wastewater Reclamation District

2024 Facility Plan Update

Final

March 2025

Continuity • Collaboration • Commitment

TROTTER and ASSOCIATES, INC.
CONSULTING ENGINEERS
St. Charles, IL • Fox Lake, IL • Lake Geneva, WI
630.587.0470 • www.trotter-inc.com

TABLE OF CONTENTS

LIST OF TABLES

TABLE **PAGE**

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LIST OF EXHIBITS

EXHIBIT **PAGE**

LIST OF FIGURES

FIGURE **PAGE**

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List of Appendices

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ADDF	average daily design flow
AOR	actual oxygen requirement
avg	average
BNR	biological nutrient removal
BOD5	5-day biochemical oxygen demand
C	Celsius
CCTV	closed-circuit television
cf	cubic feet
CIPP	cured-in-place pipe
CMAP	Chicago Metropolitan Agency for Planning
CMOM	Capacity, Management, Operation, and Maintenance
CSRP	Collection System Rehabilitation Program
DAF	design average flow
DMF	design maximum flow
DMR	discharge monitoring report
DNR	Department of Natural Resources
DO	dissolved oxygen
EcoCAT	Ecological Compliance Assessment Tool
EPA	Environmental Protection Agency
F	Fahrenheit
FeCl3	ferric chloride
FOG	Fats, oils, and grease
FPA	Facility Planning Area
FPR	Facility Plan Report
fps	feet per second
ft	feet
FVFS	Fox Valley Fire and Safety
FY	fiscal year
gal	gallons
gcd	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
GIS	Geographical Information System
HDPE	high density polyethylene
HP	horsepower
hr	hour
HSPF	Hydrological Simulation Program FORTRAN

LIST OF ABBREVIATIONS (CONTINUED)

ABBREVIATION	DESCRIPTION
IEPA	Illinois Environmental Protection Agency
I/I	infiltration and inflow
L	liter
LA	load allocation
lbs	pounds
l.f.	lineal feet
in	inch
max	maximum
MCC	motor control center
mg/L	milligrams per liter
MGD	million gallons per day
min	minimum or minute
mL	milliliter
MLSS	mixed liquor suspended solids
mm	millimeter
MOP	Manual of Practice
MOS	margin of safety
NH3-N	ammonia nitrogen
NO2	nitrite
NO3	nitrate
NPDES	National Pollutant Discharge Elimination System
NPW	non-potable water
O2	oxygen
ORP	oxygen reduction potential
OTE	oxygen transfer efficiency
P	phosphorus
PAO	phosphorus accumulating organisms
PE	population equivalent
PF	peaking factor
PHF	peak hourly flow
PSLRP	Private Sewer Lateral Rehabilitation Program
POTW	Publically Owned Treatment Works
PVC	polyvinyl chloride
PWWF	peak wet weather flow
RAS	return activated sludge
RBC	rotating biological reactor
SCADA	Supervisory Control and Data Acquisition

LIST OF ABBREVIATIONS (CONTINUED)

ABBREVIATION	DESCRIPTION
sf	square feet
SOR	standard oxygen requirement
SOUR	specific oxygen uptake rate
sq	square
SS	suspended solids
SSES	Sanitary Sewer Evaluation Study
SSO	sanitary sewer overflow
SV	seasonal variation
TDH	total dynamic head
TMDL	total maximum daily load
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
UV	ultraviolet
VFD	variable frequency drive
VSS	volatile suspended solids
WAS	waste activated sludge
WLA	waste load allocation
WQBEL	water quality based effluent limit
WWTF	wastewater treatment facility
WWTP	wastewater treatment plant
yr	year

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EXECUTIVE SUMMARY

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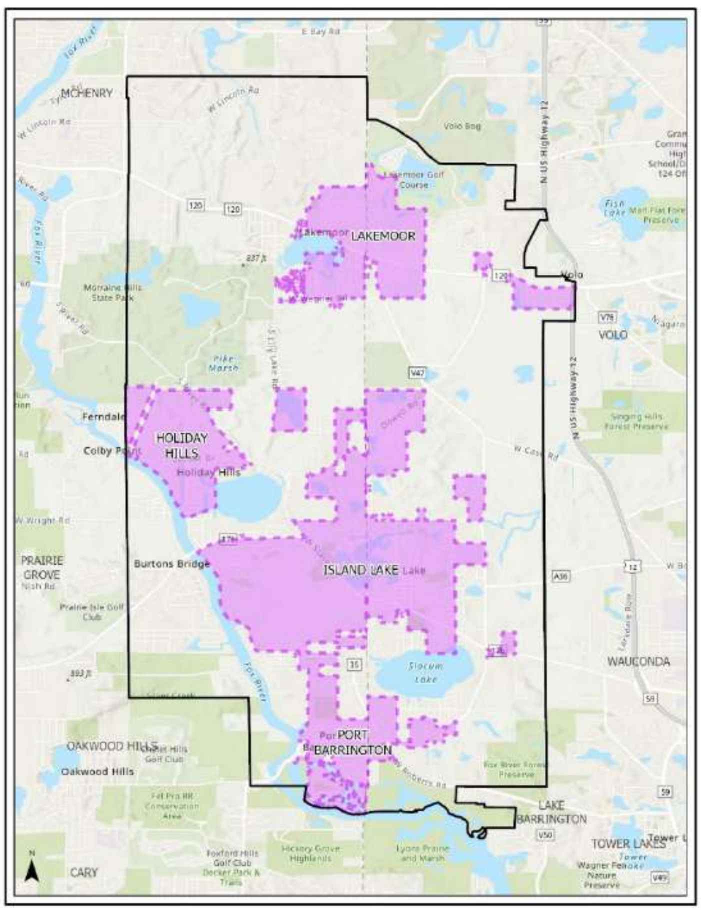
EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND

The Northern Moraine Wastewater Reclamation District serves populations in Island Lake, Port Barrington, and Lakemoor. Additionally, the District has recently completed Phase 1 of a sewer extension project to serve the community of Holiday Hills, but no residents have connected yet. Portions of the Villages of Volo and Lake Barrington are located within the District's Facility Planning Area (FPA), but do not receive wastewater service.

The District serves a facility planning area (FPA) consisting of 16,723 acres. Within the FPA boundary, an approximate 12,957 acres are incorporated into the municipalities served by the District. The District's corporate boundary includes approximately 4,327 acres incorporated into the NMWRD. The District's FPA and Corporate Boundaries are shown in Exhibit 1.

Exhibit 1: NMWRD FPA and Corporate Boundaries



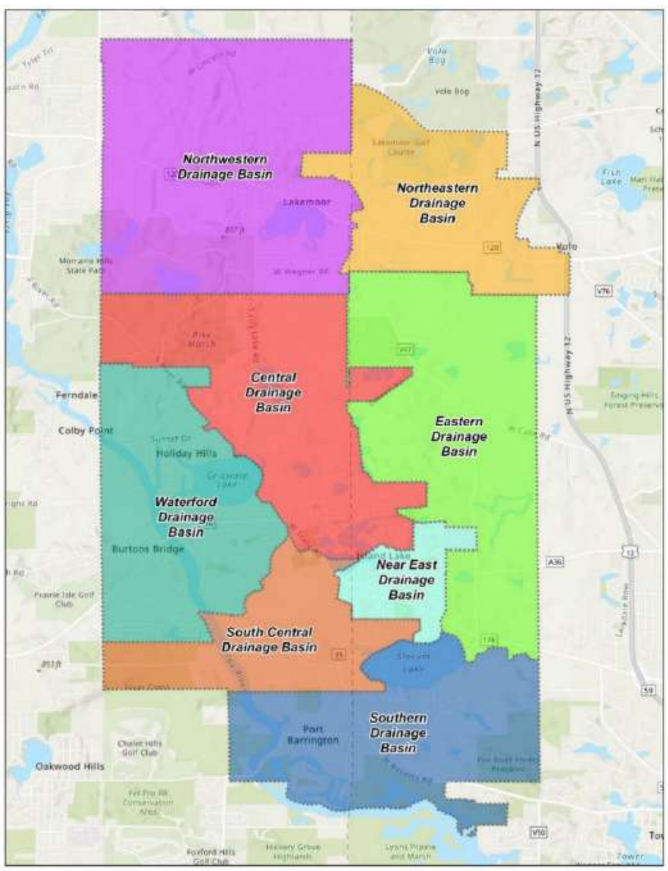
The existing NMWRD wastewater treatment plant was first constructed in 1978 and has a permitted design treatment capacity of 2.0 million gallons per day (MGD). The WWTP operates under the requirements of NPDES Permit No. IL0031933.

In 2014, the District updated its FPR to be consistent with the long-term goals established by the adopted Comprehensive Plans of the communities served by the District. The Comprehensive Plans provide direction for future development and redevelopment within the District's Corporate Boundaries, which includes the Villages of Island Lake, Lakemoor and Port Barrington, and recently includes the Village of Holiday Hills. The existing 2014 FPR is now ten years old. An update is needed to revise population and wastewater flow projections to determine impacts to the District's wastewater infrastructure.

DRAINAGE BASINS

The District's collection system is separated into eight major drainage basins: Northwestern, Northeastern, Eastern, Central, Near East, Waterford, South Central, and Southern. These drainage basins were delineated based on existing collection system sewers, lift stations, and force mains. This level of allocation allows for a focused evaluation of different areas of the collection system. The NMWRD Wastewater Drainage Basins are shown in Exhibit 2.

Exhibit 2: NMWRD Wastewater Drainage Basins



Population and Wastewater Flow Projections

Analysis of current and future wastewater production is often done on the basis of "population equivalents" or PE which provides a common basis for residential and non-residential demands to be analyzed. One PE is equivalent to the water consumed or wastewater produced by one resident, as determined by historic water usage data. The current NMWRD Service Area served 14,487 PE in 2023 and treated 1.07 MGD wastewater.

At complete development of the corporate boundaries of the Villages served by the District (future development), it is estimated that the District will serve 22,051 PE, which equates to an average daily wastewater flow of 1.83 MGD. At buildout of the District's Facility Planning Area, the District will serve 61,149 PE, which equates to an average daily wastewater flow of 5.74 MGD. Future population equivalents for both the future development and buildout categories were calculated utilizing user and parcel data provided by the District, McHenry County, and Lake County. Additionally, TAI utilized information from each Village's Comprehensive Plans.

Existing and projected population equivalents at build-out of the NMWRD FPA are summarized in Table 1.

Table 1: NMWRD Future Development and Buildout PE

Description	Future Development (Village Municipal Corp. Boundaries)	Facility Planning Area Boundary Buildout	Total Buildout PE
Existing Residential PE	12,497	-	
Future Residential Growth	5,149	29,364	
Total Residential PE at Buildout	**17,646**	**29,364**	**47,010**
Existing Commercial PE	1,990		
Future Commercial Growth	2,415	9,734	
Total Commercial PE at Buildout	**4,405**	**9,734**	**14,139**
Total Buildout PE	**22,051**	**39,098**	**61,149**

The current and projected wastewater flows and pollutant loadings per drainage basin are summarized in Table 2. The NMWRD WWTP is designed to treat an average wastewater flow of 2.0 MGD. Build-out of the District's FPA will require expansion of the WWTP's capacity.

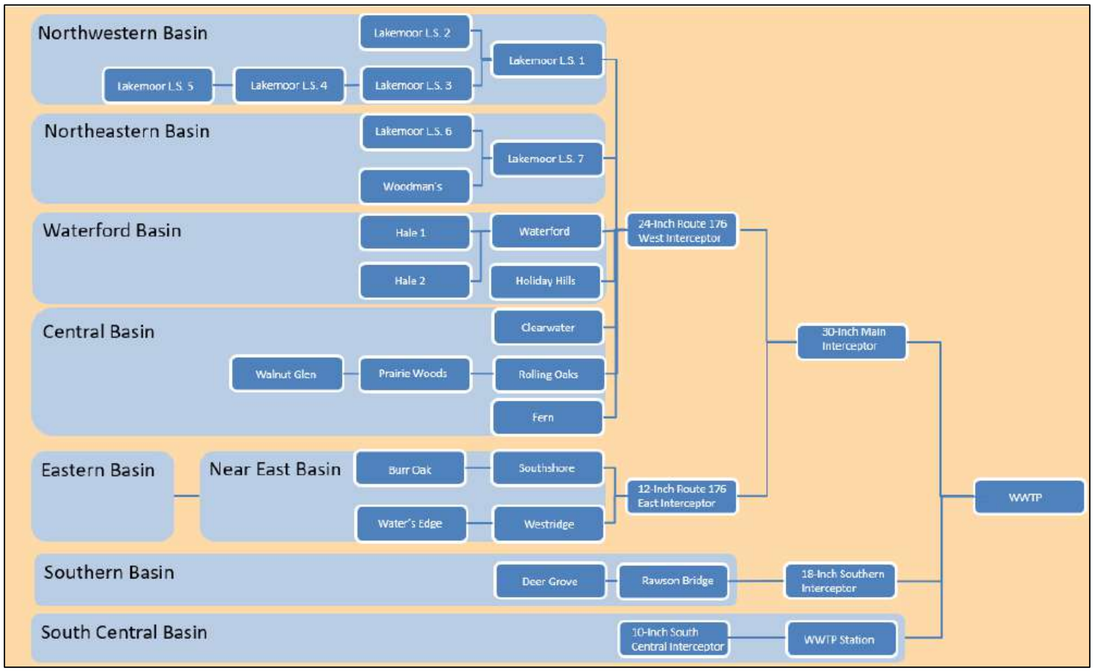
Table 2: NMWRD Projected Population and Wastewater Flows

Description	2023 Conditions		Future Development (Village Municipal Corp. Boundaries)		Build-Out Projection	
	PE	ADDF (MGD)	PE	ADDF (MGD)	PE	ADDF (MGD)
Central Drainage Basin	3,299	0.24	4,740	0.39	6,559	0.57
Eastern Drainage Basin	14	0.00	812	0.08	3,525	0.35
Near East Drainage Basin	2,214	0.16	2,916	0.23	3,078	0.25
Northeastern Drainage Basin	2,496	0.18	3,860	0.32	11,343	1.07
Northwestern Drainage Basin	1,794	0.13	2,473	0.20	13,764	1.33
South Central Drainage Basin	394	0.03	394	0.03	3,938	0.38
Southern Drainage Basin	1,231	0.09	1,819	0.15	7,790	0.75
Waterford Drainage Basin	3,045	0.22	5,036	0.42	11,151	1.04
Total	**14,487**	**1.07**	**22,051**	**1.83**	**61,149**	**5.74**
Peaking Factor		**2.79**		**2.61**		**2.18**
Peak Hourly Flow (MGD)		**2.99**		**4.77**		**12.53**

Collection System

The current and projected population equivalents in each drainage basin were used to estimate current and future peak wastewater flows in the main trunk sewers in the District's collection system. Exhibit 3 shows the collection system in schematic form.

Exhibit 3: NMWRD Collection System



Sewer Rehabilitation

The NMWRD collection system includes approximately 77 miles of sanitary sewer and force main, and 1,555 manholes. Assuming an average of $420 per foot of sanitary sewer and $10,000 per manhole for complete installation and restoration, **the total replacement cost of the sanitary sewer collection system is $186,309,000**. This replacement value includes the total replacement cost of the improvements, including surface restoration, general conditions, contingencies, and engineering.

The typical service life of collection system infrastructure is 75 years. Based on the straight-line depreciation over a 75-year life, it is estimated that the District should be budgeting $2,485,000 annually toward sanitary sewer collection system rehabilitation. However, rehabilitation can extend the design life of sewers and structures up to 50 years.

Therefore, based on the straight-line depreciation over a 125-year life, it is estimated that the District should be budgeting **$1.49 million** annually toward sanitary sewer collection system rehabilitation. It is recommended that the District continue to work toward fully funding the collection system replacement amount.

Sewer Capacity and Extensions

The collection system has capacity to convey dry weather flows without surcharging. However, additional capacity is needed to address future growth within the Northwestern and Northeastern Basins.

The Darrell Road Unsewered Facilities Project is a proposed solution to provide sanitary sewer service to future development, particularly in the Northeastern and Eastern Drainage Basins. It also provides the flexibility to reroute flow from built-out areas in the Northeastern Basin thereby off-loading the existing downstream sewers and lift stations within the Northwestern Basin. The ultimate phased solution to serve the Darrell Road Facilities Service Area was originally recommended in the 2004 Facility Plan Update. The Northeastern and Eastern Drainage Basins are directly benefited by the proposed Collection System. The Northwestern Drainage Basin is indirectly benefited by the Collection System due to off-loading tributary flow to it.

Funding and timing of the Darrell Road Unsewered Facilities has always been contingent upon development within the Eastern Basin. During compilation of the 2014 Wastewater Facility Plan Update the District acknowledged that previously anticipated development within the Eastern Basin had been postponed indefinitely. Because of that, a lesser cost alternative method, an Interim Solution, was conceived that would allow for growth to continue in the Northwestern and Northeastern Basins by constructing a completely pumped system to serve the northernmost reaches of the FPA.

The Darrell Road Unsewered Facilities Project would need to be completed prior to exhaustion of the available capacity in the Route 176 West Interceptor in the Northwestern Basin. Available capacity in the Route 176 West Interceptor sewer is 3.1 MGD, or an additional 10,500 P.E. Construction of the Darrell Road Facilities Project should be initiated when 80% of the Route 176 West Interceptor Sewer capacity is utilized, or 4.3 MGD. This equates to an additional 6,500 PE connected and tributary to the 24” interceptor.

Additionally, the District is in the process of extending sewer to the Village of Holiday Hills and the nearby subdivision of Le Villa Vaupell. Construction of phase 1 of the Holiday Hills Sewer Extension project is complete, Phase 2 construction is ongoing, and the future Phase 3 design is complete and awaiting funding.

The recommended capital improvements include construction of the Darrell Road Collection System and sewer extensions to the Village of Holiday Hills and Le Villa Vaupel beyond the current Phase 2 project.

Table 3: Probable Capital Costs – Collection System

Description	Probable Cost
Darrell Road Collection System Phase 1A - Headworks	$5,621,000
Darrell Road Collection System Phase 1B – Treatment Plant Interceptor	$6,676,000
Darrell Road Collection System Phase 2 – Force Main	$12,447,000
Darrell Road Collection System Phase 3 – Lakemoor LS#7 Upgrades	$4,494,000
Unsewered Community Sanitary Sewer Extension	$6,663,000
Probable Capital Cost	**$35,901,000**

Capacity Management, Operations and Maintenance Program (CMOM)

The District complies with Special Condition 23 of their NPDES permit, issued September 28, 2018, which requires a Capacity, Management, Operations, and Maintenance (CMOM) plan. The most recent CMOM was updated in September of 2023. The District has successfully implemented the CMOM program and has been able to identify that only 2.4 percent of all District collection system infrastructure were determined to be in “poor condition,” indicating that I/I was a problem in a small percentage of the entire collection system. This CMOM Program provides a comprehensive strategy to improve the performance of the District’s collection system and is intended to minimize Sanitary Sewer Overflows (SSO’s) through increased attention to planning and maintenance.

LIFT STATIONS

The Northern Moraine Wastewater Reclamation District owns and operates twenty-four (24) lift stations throughout the collection system which includes the Villages of Island Lake, Lakemoor, Port Barrington, and Holiday Hills. The Districts’ system of lift stations is generally in poor to fair condition. As a result of the consistent issues the District experiences with their 24 lift stations, the lift stations have required and will continue to require constant maintenance, and several lift stations will need heavy capital improvements.

The District has roughly $32,646,100 worth of lift stations and force mains. Based on a straight-line depreciation over 20 years for the equipment, 50 years for structures and 75 years for force mains, it is estimated that the District should be reinvesting around $740,700 annually toward maintaining this asset.

WASTEWATER TREATMENT PLANT

The existing wastewater treatment plant has undergone numerous rehabilitation projects in its 45 year history. The WWTP was most recently expanded to 2.0 MGD in 1998. The average daily flow to the WWTP is estimated to be 1.07 MGD, which means the plant is operating at 53% of its hydraulic capacity. The treatment process consists of influent screening, raw sewage pumping, extended aeration/biological treatment, chemical phosphorus removal, tertiary clarification, and chlorine disinfection. The waste activated sludge is aerobically digested, mechanically thickened, dewatered, and land applied as fertilizer.

The NMWRD WWTP performs at an exceptional level and complies with all NPDES permit effluent limits. However, significant recommended projects are needed in order to improve operations and rehabilitate and replace equipment at the end of its service life. These projects are listed in Table 4.

Table 4: Probable Capital Costs – Recommended Treatment Plant Improvement Projects

Project Name	Probable Cost
Darrell Road Phase 1A Headworks Project	$5,380,000
WWTF Oxidation Ditch Gate Replacement Project	$339,560
Final Clarifier No. 2 Rehabilitation	$1,092,000
UV Disinfection Project	$1,723,000
Aerobic Digester Blower Replacement	$771,600
Generator Replacement	$549,050
Laboratory Equipment Remodel	$80,000
WWTF Fleet Maintenance Garage Project	$2,506,550
Garage and Personnel Building Remodel Project	$600,000
Solar Array Project	$3,258,000
Total Probable Capital Costs	**$16,299,760**

Wastewater Treatment Plant Capacity and Regulatory Requirements

The District WWTP's capacity and ability to meet regulatory requirements received an in-depth analysis by the project team for expansion needs and nutrient removal.

Hydraulic Expansion

While the treatment facility is currently only operating at 53% of the hydraulic capacity, the District must be prepared to start to prepare to expand the treatment plant when the District permits connections up to 1.6 MGD.

The Headworks, Raw Sewage Pump Station, Oxidation Ditch, RAS/WAS Pump Station, Sludge Handling, and Sludge Storage will require expansion to accommodate additional wastewater flows. The Headworks will be expanded during the Darrell Road Phase 1A Headworks project, which will be completed prior to the Phase II Expansion project. Additionally, during the Phase II Expansion, the District will need to build a Tertiary Filter/ UV Building to add tertiary filters and UV disinfection to WWTP treatment processes. The District has developed a phased approach to expanding the treatment plant.

The District should prepare to start the engineering phase of the plant expansion as the District permits connections for up to 1.6 MGD. At that time, it is estimated that design and construction of the Phase II Expansion will be completed within five years: one year for conceptual design; one year for preliminary design, final design and permitting; and three years for construction.

The following is a summary of the Phase II Expansion scope:

- Headworks – Influent Screens (Darrell Road Phase 1A – Headworks design)
- Raw Sewage Pump Station – Additional pumping capacity and expanded wet well/new pump station
- Biological Process – Add third ring on existing oxidation ditch
- RAS/WAS Pump Station – Additional pumping capacity (new pump station)
- Secondary Clarifiers – No work required
- Tertiary Treatment – Add tertiary filters (new building)
- Disinfection – Add UV units in new Tertiary Filter Building
- Sludge Handling
    - Aerobic Digestion – no work required
    - Sludge Thickening – Install dedicated centrifuge
    - Sludge Dewatering – Install dedicated centrifuge
- Sludge Storage – Add one new barn

The probable construction cost for the expansion of the above-listed facilities is roughly $32.8 million, as summarized in Table 5.

Table 5: Total Probable Capital Costs – WWTP Phase II Expansion

Description	Phase II WWTP Expansion Cost
Construction Subtotal	$23,789,300
Contingency @20%	$4,757,900
Design Engineering @ 7.5%	$2,141,100
Construction Engineering @ 7.5%	$2,141,100
Total Probable Capital Cost	**$32,829,400**

Nutrient Removal

The District must be able to address current and long-term treatment needs and the impact of possible future regulations. The District's current NPDES permit contains effluent limits for ammonia nitrogen and phosphorus. The District recognizes the potential for future limitations on effluent concentrations of total nitrogen and more stringent limits on total phosphorus concentrations. The NMWRD WWTP currently has an effluent TP limit of 1.0 mg/L based on an annual average. The IEPA has begun issuing permits lowering the TP limit for major POTWs to 0.5 mg/L by 2030. The new recommendation for major WWTPs in the FRSG is also an effluent limit of 0.5 mg/L, which is lower than the NMWRD WWTP's existing limit.

To comply with this limit, the District currently uses Hyper+Ion for chemical removal of phosphorus. In addition, the District is optimizing its oxidation ditch for biological phosphorus removal. Also, as discussed in Section 5, the District has established the first POTW nutrient trading program in Illinois. In the case that these methods will not achieve the target concentration, the District must supplement with tertiary filters.

If a total nitrogen limit were to be imposed, the project team anticipates a total nitrogen effluent concentration limit of 8.0 mg/L. The District would not be able to meet this limit, it and would require modifications to the current operation and existing process to convert the oxidation ditch to remove total nitrogen through denitrification.

Implementation Plan

In consideration of the remaining service life of the existing facilities, priorities identified by District, operations staff, and projected growth through the District's FPA, the phased Implementation Plan for this 2024 Facility Plan Update is summarized in Table 6. The scheduling of the improvements are initial estimates employed for planning purposes.

Per Table 6, several of the recommended WWTP rehabilitation projects are scheduled to be implemented in 2025. Scheduling for the Darrell Road Collection System projects and the Phase II WWTP expansion and capacity upgrades will become known with greater certainty over time as actual development throughout the NMWRD FPA occurs.

Table 6: Phased Implementation Plan

Description	Type	Probable Capital Costs ($ millions)						
		2025	2026	2027	2028	2029	2030 to 2039	2040 to 2049
TREATMENT PLANT								
Aerobic Digester Blower Replacement	R/R	$0.77						
WWTF Oxidation Ditch Gate Replacement	R/R	$0.34						
Generator Replacement	R/R	$0.55						
Laboratory Equipment Remodel	R/R	$0.08						
Final Clarifier No. 2 Rehabilitation	R/R				$1.09			
UV Disinfection Project	R/R			$1.72				
WWTF Fleet Maintenance Garage	R/R		$2.51					
Garage and Personnel Building Remodel	R/R	$0.60						
Darrell Road Phase 1A Headworks	E				$5.38			
Solar Array Project		$3.26						
Phase 2 WWTP Expansion	E							$32.83
Annual rehabilitation / replacement		$0.0	$0.0	$0.0	$0.41	$1.50	$15.0	$15.0
COLLECTION SYSTEM								
Darrell Road Collection System Phase 1B – Treatment Plant Interceptor	E				$6.68			
Darrell Road Collection System Phase 2 – Force Main	E				$12.45			
Darrell Road Collection System Phase 3 – Lakemoor LS#7 Upgrades	E				$4.49			
Holiday Hills Sewer Extension	E				$6.63			
Annual rehabilitation / replacement		$1.49	$1.49	$1.49	$1.49	$1.49	$14.9	$14.9
LIFT STATIONS								
Annual rehabilitation / replacement		$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74
TOTAL PROBABLE CAPITAL COSTS		**$7.83**	**$2.23**	**$3.95**	**$38.95**	**$3.73**	**$33.15**	**$63.47**

Note: (1) Probable costs are presented above in 2023 dollars and do not account for future inflation.
(2) Project Type indicates Rehabilitation/Replacement (R/R) or Expansion (E).
(3) R/R Type Projects are deducted from the annual rehabilitation/replacement investment for each category.

User Rates and Project Funding

Sections 1 through 6 of this Facility Plan Update identified significant rehabilitation needs as well as capital improvements to address aging infrastructure, continued development and regulatory issues. In order to evaluate the financial impact of the recommendations outlined in this report, the project team developed recommendations to modify existing user rates and connection fees necessary to fund the improvements.

The District's proposed budget (including capital expenses) for fiscal year (FY) 2024/2025 is $17,669,003.02, including bond proceeds and grants received. The budgeted FY 2024/2025 revenues are $3,493,700. The revenues received by the District are limited by statute and generally include user fees, real estate taxes, and connection fees. Connection fees are generally applied to expansion, or extension of services for new development. User fees and taxes are the primary source of revenue responsible for sustaining operation, maintenance, and replacement costs associated with the utility.

The budgeted FY 2024/2025 Operation and Maintenance Expenses include the following three categories: Administration, Collections, and Treatment. The budgeted sewer fund expenditures are $2,614,347.

Current Debt Service includes a bond set to mature in 2030. This bond was issued in 2019. In addition, the District received a loan through the IEPA's Water Pollution Control Loan Program for a portion of Phase 1 of the Holiday Hills Sewer Extension Project. The annual debt payment budgeted for this fiscal year is roughly $752,824.

Table 7: NMWRD FY 2024/2025 Existing Debt Service

Debt	Value
General Obligation Alternate Revenue Source Refunding Bond 2019	$455,954
IEPA Loan Holiday Hills Phase 1 Principal & Interest (L17#5824)	$296,870
2024/2025 Sewer Debt Service	$752,824

Based on the proposed Implementation Plan as presented in Section 7, capital funding will need to be secured to fund the Phase II WWTP Expansion with an associated capital cost of approximately $32.83 million and Darrell Road Collection System Projects with an associated capital cost of approximately $35.9 Million.

A funding option for the District to consider is the State Revolving Fund low-interest loan program administered by the IEPA. Additional funding options for the improvements include replacement funds, revenue bonds, and grants. Grants available include WWTP Energy Efficiency grants administered by the Illinois EPA. All additional options are also supported by user fees. Within the last few years, the District has been awarded approximately $11 million in grant funds for projects at the WWTP, lift station upgrades, and for the Holliday Hills/Le Villa Vaupell Sewer Extension Project. Table 8 includes a summary of grants the District has been awarded since 2020.

Table 8: NMWRD Grants Awarded Since 2020

Year	Project Name	Grant Program Name	Amount Awarded
2020	Control Building Electrical Upgrades	IL Department of Commerce and Economic Opportunity (IL Senator Wilcox)	$ 200,000.00
2020	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 1	IEPA Unsewered Communities Construction Grant Program	$ 3,495,600.00
2021	Lakemoor LS#1 and #6 Modifications	IL Department of Commerce and Economic Opportunity (IL Representative Weber)	$ 400,000.00
2022	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 2	US Community Development Block Grant Program (CDBG) - McHenry County	$ 96,364.00
2022	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 2	Advance McHenry County - American Rescue Plan Act (ARPA)	$ 2,000,000.00
2022	WWTP Generator Replacement	USEPA Community Grant Program (US Senator Durbin)	$ 250,000.00
2022	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 2	USEPA Community Grant Program (US Congressional Representative Underwood)	$ 2,500,000.00
2023	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 2	USEPA Community Grant Program (US Congressional Representative Foster)	$ 959,752.00
2024[(1)]	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 3	USEPA Community Grant Program (US Congressional Representative Foster)	$ 1,100,000.00
Total			**$ 11,001,716.00**

(1) Selected for grant but not yet received. At the time of this report, the US Congressional Budget is not yet complete.

Estimated User Fees

The last rate study was performed in 2020, and the recommendations of that study were implemented. As part of this Facility Plan, a simple fiscal model was developed using the District's FY 2024/2025 budget, current accounts and metered usage data. The anticipated revenue, expenditures and debt service were compared over a 20-year period to better evaluate the District's financial stability over that planning period and to determine adjustments to the current user fee in order to fund the recommended projects and replacement funds.

Sewer Fund Evaluation

When the District was established, not all District customers had water meters, so it was not feasible to utilize water usage as a basis for the District's rates. Therefore, the customer base was separated into two categories, residential and non-residential, and a flat monthly user fee was applied to both types of customers. Non-residential users generally include industry, commercial and institutional users. If a non-residential customer exceeds 10,000 gallons per month, then they are subject to an additional fee per 1,000 gallons. The District has required non-residential connections to install a meter on their sanitary sewer service if the proposed use indicates that more than 10,000 gallons per month will be discharged. The District's sewer user fees as of May 1, 2024 are the following:

- $47.00 per month **per residential connection.**
- $47.00 per month **per apartment unit.**
- $47.00 per month **per non-metered, non-residential connection** who can consistently demonstrate a usage of 10,000 gallons or less per month.
- $94.00 per month **per non-metered, non-residential connection**, up to 20,000 gallons discharged per month.
- $4.70 per 1,000 gallons of metered usage for **metered, non-residential connections**, or a minimum monthly bill of $47.00.

  Note: The metered rate is only applied to non-residential accounts if discharges exceed 10,000 gallons.

The estimated sewer user fee revenue based on nonmetered users at a fixed bill of $47.00 each is $3,015,650. The metered usage data utilized for Section 2 provided an estimate of the annual metered usage and income. Total metered sewer fees are approximately $171,550. The sum of fees collected from metered and non-metered accounts totals $3,187,200.

Table 9: NMWRD FY 2024/2025 Revenues

Revenue Source	Value
Sewer User Fees	$3,187,200
Hauled Waste Income	$105,000
Other Income	$201,500
2024/2025 Revenue	$3,493,700

As stated earlier, the budgeted FY 2024/2025 operation and maintenance expenditures and debt service is $2,614,347 and $752,824, respectively. The total expenses (not including capital) are therefore $3,367,171. The District currently funds the operations and maintenance expenses and the debt service with revenue from user fees and other income. The total surplus is $126,529 (not including capital).

(User Fees & Other Income) - (O&M Expenses + Debt Service) = Surplus

$3,493,700 - ($2,614,347+ $752,824) = $126,529

In addition to operation and maintenance expenses and debt service, the District should also address replacement costs. The following table provides a breakdown of the annual operation, maintenance and replacement costs.

Table 10: NMWRD Full Cost Pricing (FY 24/25)

Expense	Annual Cost
Operation and Maintenance Expenses	$2,614,347
Collection System Replacement	$1,491,000
Lift Station Replacement	$740,700
WWTF Replacement	$1,500,000
2024/2025 Sewer Debt Service	$752,824
Total Operation, Maintenance & Replacement Cost	$7,098,871

The District's cost of providing sewer service to its residents and consumers is $7,098,871 per year. This includes operation and maintenance costs as well as replacement costs for the collection system, lift stations and WWTP.

It is imperative to include replacement costs of the sewer, lift station and treatment facility infrastructure in annual budgets to be prepared for replacement at the time of need. The District should consider investing the replacement funds into an account or back into the system on an annual basis to continue the high level of service that the District currently provides.

The District's current bond and loans are paid by the sewer operations and maintenance fund.

Future capital projects intended to replace existing infrastructure can also be applied toward the annual sewer, lift station and WWTF replacement investment. These projects include:

- Aerobic Digester Blower Replacement
- WWTF Oxidation Ditch Gate Replacement
- Generator Replacement
- Laboratory Equipment Remodel
- Final Clarifier No. 2 Rehabilitation

- UV Disinfection Project
- WWTF Fleet Maintenance Garage
- Garage and Personnel Building Remodel

The District's current shortfall is roughly $3,605,171.

(User Fees & Other Income) - Full Cost Pricing = Deficit

$3,493,700 - $7,098,871 = -$3,605,171

Model Development

From Table 10, the OM&R costs based on full cost pricing equate to $7,098,871. In order to develop a projection for the annual increase in OM&R costs, the Construction Cost Index (CCI) was applied. The CCI is a database maintained by Engineering News Record (ENR), a private enterprise which has developed and continually monitors average construction costs. An annual increase of 4% was used in the model to represent the annual increase in OM&R costs over the next 20 years.

Three scenarios were evaluated using the fiscal model:

1. Full Cost of Service – Fully Funding Asset Depreciation Amount
    a. Annual increase over 10 years
    b. One Time Increase
    c. Annual increase over 10 years with New Flat Fees for Nonresidential Metered Users
2. Full Cost of Service – Fully Funding Annual Infrastructure Reinvestment from Operating Fund
    a. Annual increase over 10 years
    b. One Time Increase
3. Partially Funding Annual Infrastructure Reinvestment
    a. Annual increase over 10 years
    b. One Time Increase

Scenario 1: Fully Funding Asset Depreciation Amount (recommended)

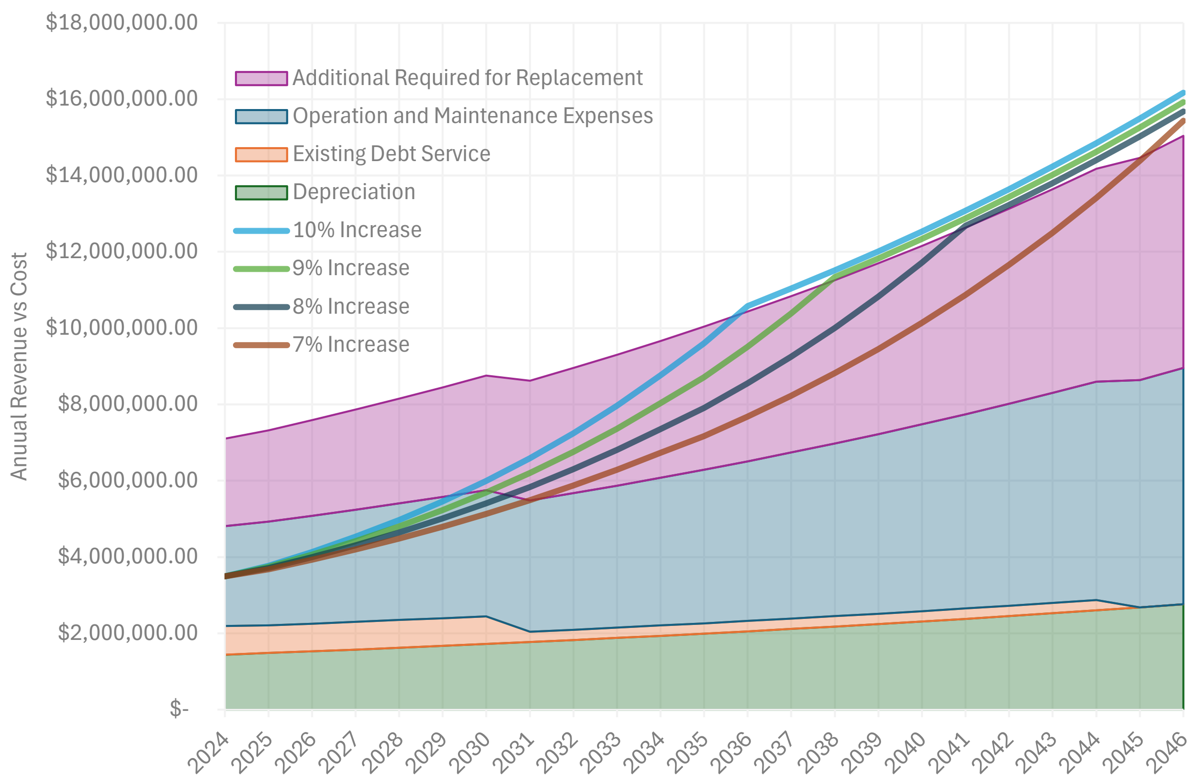
As previously stated, the revenue generated from the District's current rate structure does not fully fund the full cost of service, including operation, maintenance and replacement costs. If the District continues to utilize its current fiscal model, including increasing the sewer user rate annually by 4%, the District will have a continuously growing deficit over the entire planning period.

The District's 2024 audit evaluated that the accumulation of District's assets was depreciating at a rate of $1.44 million/year. This value was then scaled up by CCI for the following years. In Scenario 1, it was estimated that the District would be reinvesting at least the amount of depreciation into the WWTP, collection system, and lift stations throughout the planning period. However, the District does have projects planned throughout the next several years (as noted above). If the amount of these projects scheduled in a year was greater than the value of depreciation, that value was assumed for the expenses in the year.

Based on that determination, three sub-scenarios were developed:

- Scenario 1a determined that a 7% annual rate increase over 10 years is required to fully fund the District's operation, maintenance and replacement (OM&R). The flat fee in 2034 is $88.23.
- Scenario 1b showed that a 50% one-time rate increase would also fully fund the District's OM&R with 4% annually thereon to match inflation and establish a balanced budget. The flat fee in 2025 is $70.50.
- Scenario 1c coupled the 7% annual rate increase over 10 years with implementation of a new metered user base charge (described below). Currently, the District only has the option of metered use for non-residential users. The flat fee in 2034 is $88.23 and the new metered, non-residential fee includes a base charge of $31.00 and a usage rate of $8.23/1,000 gallons used. Scenario 1c was also evaluated at 8, 9, and 10% annual increases to determine if the District can fully fund OM&R sooner if higher rate increases were implemented. The following chart presents the analysis:

Figure 1: Scenario 1c Rate Increase Comparison



Based on the scenarios presented in the chart, it was determined that an 8% increase will fully fund the District's OM&R expenses in 2030, earlier than the 7% increase.

During the fiscal model review, the District evaluated moving to metered billing instead of the flat fees currently in place. This metered billing structure would apply to metered, non-residential accounts and replace the current $47.00 flat fee plus $4.70/1,000 gallons above 10,000 gallons used (Scenario 1c). Instead, the fee for metered, non-residential accounts would include a base charge plus $4.70/1,000 gallons. The base charge amount was developed to include 1) a portion of the original flat fee and 2) the cost for the District to generate a bill for a metered account.

The portion of the original flat fee included in the new base charge is $20.

The cost to the District to generate a bill for a metered user is $11. The average hourly rate of a Full-Time Equivalent employee is $48.56/hour ($101,000/yr salary / 2080 hours = $48.56/hour). The District spends 24 hours/month generating the 110 metered user bills (to read meters, generate, and mail bills). Therefore, it costs the District at least $11 to generate a metered user bill ($48.56 x 288 hours/year / 1,320 metered user bills = $10.76).

The proposed metered, non-residential rate would include the $31 base charge ($20 + $11 = $31) plus the $4.70/ 10,000 gallons usage charge. The District also will consider offering this rate to interested residential accounts, which may be appealing to low usage residential users.

The Scenario 1 computations are provided in Appendix G.

Scenario 2: Fully Funding Annual Infrastructure Reinvestment from Operating Fund

The District's cost of providing sewer service to its residents and consumers is $7,098,871 per year. This includes operation and maintenance costs as well as full replacement costs for the collection system, lift stations and WWTP at the current value.

In Scenario 2, it was estimated that the District would be reinvesting in the collection system at a rate of $1.49 million/year, the lift stations at $740,700/yr, and the WWTP at $1.5 million/yr, based on the current value of replacing the District's assets. However, the District does have projects planned throughout the next several years (as noted above). If the amount of these projects scheduled in a year was greater than the value of asset reinvestment amount, that value was assumed for the expenses in the year. This value was then scaled up by CCI for the following years.

Based on those inputs, two scenarios were developed. Scenario 2a determined that a 12% annual rate increase for 10 years was required to fully fund the District's OM&R. Alternatively, Scenario 2b showed that a 125% one-time increase would also fully fund the District's OM&R with 4% increase annually thereon to match inflation and establish a balanced budget.

The Scenario 2 computations are provided in Appendix G.

Scenario 3: Partially Funding Annual Infrastructure Reinvestment from Operating Fund

In Scenario 2, it was estimated that the District would be reinvesting in the collection system at a rate of $1.49 million/year, the lift stations at $740,700, and the WWTP at $1.5 million/yr, based on the value of replacing the District's assets. These values were increased annually at 4% based on CCI values. However, since this requires a significant cost on behalf of the District, it is unlikely the District would be fully meeting this cost to update the system every year. Also, the District has projects planned throughout the next several years (as noted above). If the amount of these projects scheduled in a year was greater than the value of asset reinvestment amount, that value was assumed for the expenses in the year.

Scenario 3 includes an alternative for partially funding the District's infrastructure from the operating fund. The partial reinvestment assumes the District will reinvest $300k annually into each category of the system: WWTP, Lift Stations, and the Collection System. This value would be increased by 4% based on CCI values.

Based on those inputs, two scenarios were developed. Scenario 3a determined that a 5% annual rate increase was required for 10 years to fully fund the District's OM&R. Alternatively, Scenario 3b showed that a 31% one-time increase would also fully fund the District's OM&R with 4% annually thereon to match inflation and establish a balanced budget.

The Scenario 3 computations are provided in Appendix G.

Sewer User Fee Recommendation

After reviewing Scenarios 1-3 with the District, it was determined Scenario 1c was the best option to meet the District's needs. Scenario 1c – Full Cost of Service – Fully Funding Asset Depreciation Amount with an annual rate increase of 8% through 2030, and a new base charge and usage fee structure for metered (residential and non-residential) users will meet the District's capital needs to fully fund depreciation. It is recommended that the District implement an 8% rate increase starting in FY26 through 2030 for the flat fee, new base charge and meter use fee. Starting in FY26, two new monthly base charges will be implemented for metered users: a $20 base charge and a Cost of Meter Use fee of $11.

The proposed District's sewer user fees as of May 1, 2025 are the following:

- $50.76 per month **per residential connection.**
- $50.76 per month **per apartment unit.**
- $50.76 per month **per non-metered, non-residential connection** who can consistently demonstrate a usage of <u>10,000 gallons or less</u> per month.
- $100.52 per month **per non-metered, non-residential connection**, <u>up to 20,000 gallons</u> discharged per month.
- $31.00 per month base charge plus $5.08 per 1,000 gallons discharged per month for **metered, non-residential connections (rate also available to metered residential connections)**
- ~~$4.70 per 1,000 gallons of metered usage for **metered, non-residential connections**, or a minimum monthly bill of $47.00.~~

Table 11 includes a comparison of the District's existing rates compared to neighboring communities. These include sewer rates, and the total monthly residential sewer bill based on average usage amounts. The tables below indicate the sewer user fees for different Sanitary Districts and municipalities within proximity to Northern Moraine Wastewater Reclamation District based on average usage (6,500 gallons per month). For comparison, low usage is characteristic of a single person and high usage is characteristic of a family.

Table 11: Regional Comparison of Monthly Sewer Bills –Average Usage (6,500 gallons/month)

Municipality/Sanitary District	Residential User Rate/1,000 gal	Fixed Charge	Fixed Charge Period	Monthly Sewer Bill
Lake in the Hills SD	$0.00	$72.00	Quarterly	$24.00
McHenry - non-metered sewer	$0.00	$71.17	Bi-monthly	$35.59
Kishwaukee WRD	$4.36	$15.25	Bi-monthly	$35.95
Cary	$5.26	$3.50	Monthly	$37.69
Round Lake Beach	$4.20	$22.00	Bi-monthly	$38.30
Elgin (FRWRD)	$6.35	$0.00	-	$41.27
Volo (Lake County PW)	$6.64	$0.00	-	$43.16
Hawthorne Woods (Lake County PW)	$6.64	$0.00	-	$43.16
Mundelein	$6.22	$6.00	Bi-monthly	$43.41
NMWRD	**$0.00**	**$47.00**	**Monthly**	**$47.00**
McHenry - metered sewer	$4.37	$37.53	Bi-monthly	$47.17
Crystal Lake	$5.92	$10.36	Monthly	$48.84
Woodstock	$6.60	$22.17	Quarterly	$50.32
Fox Lake - non-metered sewer	$1.14	$88.61	Bi-monthly	$51.72
Fox Lake - metered sewer	$3.37	$72.98	Bi-monthly	$58.40
Wauconda	$10.32		-	$67.08
Algonquin	$10.05	$5.00	Monthly	$70.33
Fox River Grove	$5.68	$88.90	Bi-monthly	$81.37
Aurora (Fox Metro WRD)	$12.28	$10.53	Monthly	$90.36

ESTIMATED CONNECTION FEES

Sewer connection fees are outlined in District Ordinance No. 08-11 and Darrell Road Special Connection Fees are outlined in District Ordinance No. 20-02. The last revision to the Sewer Connection Fee was made in 2007 likely based on recommendations made in the 2004 Facility Plan Update.

Connection fees are one-time fees intended to recover capital costs associated with expansion of the sewer and wastewater treatment infrastructure used to deliver service to new customers. Connection fees are designed such that new connections pay their proportionate share of the expansion costs, otherwise these costs would need to be funded through user charges. Ultimately, the connection fee ensures new customers who directly benefit from the service, pay for the service, rather than receive a subsidy from all other customers through user charges. The following exercise will analyze the District's existing sewer connection fee to determine if it sufficiently funds future capital projects associated with expansion of system capacity to provide the necessary collection and treatment of wastewater.

The capital projects accounted for in connection fee calculations are necessary to extend sewer service and provide treatment capacity for future development within the District's Facility Planning Area. These projects were identified in the 2004, 2014 and 2024 Facility Plans. Existing sanitary sewer infrastructure restricts the growth potential within the District's Facility Planning Area due to limited sewer conveyance and lift station pumping capacity. The District's expansion costs are associated with the WWTF Phase 2 Expansion Project and the Darrell Road Collection System Project in order to expand the plant's treatment capacity and provide adequate sewer conveyance capacity to accommodate for continued development within the region.

The current sewer connection fee is $7,574.00 per residential unit. The current connection fee generally represents $2,164.00 per population equivalent.

The existing treatment facility has sufficient capacity to treat the projected wastewater flows and pollutant loads at build-out of the incorporated areas. However, development of unincorporated properties within the Facility Planning Area will require expansion(s) of the NMWRD facility. The existing treatment facility is designed for an average flow of 2.0 MGD (20,000 population equivalents) and is designed to facilitate the subsequent expansion to 3.0 MGD (30,000 population equivalents). The WWTP Phase II Expansion scope was originally presented in the 2004 Wastewater Facility Plan, updated in the 2014 Facility Plan Update, and was updated again for this 2024 Facility Plan. The current estimated cost to expand the WWTP is $32,830,000. This will provide capacity to connect and serve an additional 10,000 PE.

The table below compares the existing and proposed connection fee per PE and per single-family dwelling. It is recommended to increase connection fees over the next 4 years in anticipation of the inflated cost. The cost of the WWTP Phase II Expansion Project in 4 years assuming a 4% annual inflation rate is $38,407,000 or $3,840 per PE. The connection fee for a single-family dwelling is calculated using 3.5 PE, or $13,443 per dwelling.

Table 12: Current and Projected Connection Fees - WWTP Expansion

Additional PE Served	10,000
WWTP Expansion Cost (2023$)	$32,830,000
WWTP Expansion Cost (2028$)	$38,407,000
Proposed Connection Fee/PE (2028)	**$3,840**
Proposed Connection Fee per Single Family Dwelling	**$13,443**
Existing Connection Fee/PE	$2,164
Existing Connection Fee per Single Family Dwelling	$7,574

Since 2004, the District has invested in planning, design and easement acquisition for construction of the Darrell Road Collection System. The Darrell Road Collection System is a multi-phased project that will offload future flow from existing sewer infrastructure and ultimately benefit all users of the system. The table below summarizes the current and potential future population equivalents (PE) at complete build-out of the District's Facility Planning Area. There is growth potential of an additional 42,765 PE at build-out conditions across the entire Facility Planning Area.

Table 13: Current and Projected Connection Fees – Sewer Expansion

Basin	Current PE	FPA Build-out PE	Additional PE
Eastern	69	5,323	5,254
Northeastern	1,912	14,587	12,675
Northwestern	1,618	7,243	5,625
Central	3,155	5,425	2,270
Near East	2,235	3,487	1,252
Waterford	3,131	6,821	3,690
South Central	378	2,085	1,707
Southern	1,197	11,489	10,292
TOTAL	**13,695**	**56,460**	**42,765**

The total estimated cost of the Darrell Road Collection System in 2024$ is $29,680,000. To determine the connection fee associated with sewer capacity expansion project, 70% of the potential additional future PE was used as a realistic expectation of the overall development to take place within the Facility Planning Area, or 29,936 PE.

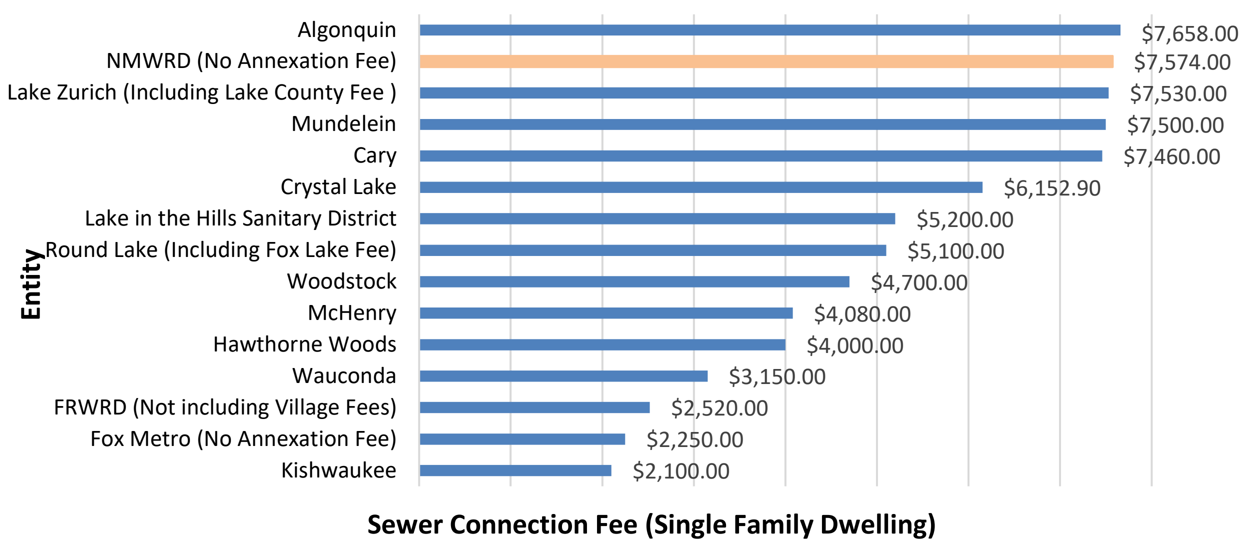
The connection fee to fully fund this proposed project is $1,159.87 per PE. Table 15 compares the existing and proposed connection fee per PE and per single-family dwelling. Similar to the connection fee associated with Expansion Project A – WWTP Phase II Expansion, it is recommended to increase connection fees over the next 4 years. The cost of the Darrell Road Collection System project in 4 years assuming a 4% annual inflation rate is $34,721,000, or $1,159.87 per PE. The connection fee for a single-family dwelling is calculated using 3.5 PE, or $4,059.56 per dwelling.

Table 14: Current and Projected Connection Fees – Sewer Expansion

Additional PE Served	29,936
Sewer Expansion Cost (2024$)	$29,680,000
Sewer Expansion Cost (2028$)	$34,721,000
Proposed Connection Fee/PE (2029)	**$1,159.87**
Proposed Connection Fee per Single Family Dwelling	**$4,059.56**
Existing Connection Fee/PE	$1,100.44
Existing Connection Fee per Single Family Dwelling	$3,851.54

A comparison of the District's connection fee to local municipalities and Sanitary Districts in the same region was performed. Fees were compared in a logical way, largely comparing the fee associated with connecting single-family dwellings to available sewer. Municipal connection fees typically have a base connection fee for either a single-family dwelling or by drinking water connection size (inches). Additional Sanitary District Fees, other municipality fees, or annexation fees may apply depending on the entity providing service. The table below indicates the sewer connection fees for different Sanitary Districts and municipalities within proximity to Northern Moraine Wastewater Reclamation District. Annexation fees, municipality fees, or municipality pass-through fees are noted where applicable.

Figure 2: Regional Comparison of Sewer Connection Fees



The Northern Moraine Wastewater Reclamation District connection fees rank reasonably compared to local municipalities and sanitary districts, especially when considering annexation fees or municipality fees not included in the total sewer connection cost.

It is recommended that the sewer connection fee combines both treatment expansion and sewer expansion fee amounts as both projects will benefit the entire system. Table 16 is a 5-year table with total recommended connection fees (with plant expansion and sewer expansion components). It is recommended that the District honor the existing connection fee for future customers in the Village of Holiday Hills and Le Villa Vaupell subdivision.

Table 15: NMWRD Separate Connection Fee Recommendations

Date	Plant expansion	Sewer expansion	TOTAL	Per PE
Existing	$7,574.00	$3,851.54	$11,425.54	$3,264.44
May-25	$9,041.06	$3,903.54	$12,944.61	$3,698.46
May-26	$10,508.13	$3,955.55	$14,463.68	$4,132.48
May-27	$11,975.19	$4,007.55	$15,982.75	$4,566.50
May-28	$13,442.26	$4,059.56	$17,501.82	$5,000.52

An alternative to the recommended connection fee increase is to maintain the current connection fee and distribute the cost of the Development Projects to all ratepayers in the user fee. The total combined cost of the Development Projects is $58,680,000. The debt service associated with a 30-year loan of this amount at 2% interest rate is approximately $216,900 per month. Distributed across the existing 5295 District customers, the additional fee is approximately $41.00 per month. Added to the existing monthly user fee of $47.00, the total monthly user fee would be $88.00 per month, an 87% increase for all ratepayers. This is not recommended; therefore, it is recommended to implement the total combined connection fee for all new connections.

SECTION 1

INTRODUCTION AND BACKGROUND

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1. INTRODUCTION AND BACKGROUND

1.1 GENERAL BACKGROUND

The Northern Moraine Wastewater Reclamation District (NMWRD) is located in northeastern Illinois, within southwestern Lake County and southeastern McHenry County. The District's office is located at 113 Timber Trail in Island Lake, approximately 50 miles northeast of downtown Chicago. The District serves populations in the Villages of Island Lake, Lakemoor, and Port Barrington. Additionally, the District has recently completed Phase 1 of a sewer extension project to serve the community of Holiday Hills, but no residents have connected yet. Portions of the Villages of Volo and Lake Barrington are located within the District's Facility Planning Area (FPA), but do not receive wastewater service.

The District owns and operates the sanitary sewer collection system for these communities and a wastewater treatment plant. The collection system consists of approximately 77 miles of sewer mains and 24 lift stations. The wastewater treatment plant is located at 420 Timber Trail in Island Lake, approximately a half of a mile south of Route 176 and under half a mile west of Roberts Road. The NMWRD FPA is comprised of approximately 16,723 acres. Within the FPA boundary, an approximate 12,957 acres are incorporated into the municipalities served by the District. The District's corporate boundary includes approximately 4,327 acres incorporated into the NMWRD.

The plant, first constructed in 1978, has a permitted design treatment capacity of 2.0 million gallons per day (MGD). The treatment facility was originally designed to treat an average flow of 1.20 MGD, but was expanded to treat 2.0 MGD flows in 1998. The plant includes influent screening, raw sewage pumping, extended aeration/biological treatment, chemical phosphorus removal, final clarification, and chlorine disinfection. The waste activated sludge is aerobically digested, mechanically thickened, dewatered, and land applied as fertilizer. The plant discharges effluent to the Fox River.

The District's National Pollutant Discharge Elimination System (NPDES) Permit (Permit No. IL0031933), as administered by the Illinois Environmental Protection Agency (IEPA), was effective on October 1, 2018, modified on October 15, 2020, and expired September 30, 2023. The NPDES permit is included as Appendix A.

1.2 STUDY PURPOSE AND SCOPE

A Facility Plan Report (FPR) is a management and planning document used to identify, evaluate, and plan required wastewater facility improvements. It provides an assessment of the collection and treatment systems' abilities to meet both current and future loads, flows and regulatory requirements and provides critical information for improvements to correct current or projected deficiencies. FPRs are required by the Illinois Environmental Protection Agency (IEPA) for any wastewater improvements that change the treatment process or expand the capacity of the wastewater treatment plant.

FPRs are typically updated every five to ten years, or when significant changes in growth or regulatory requirements have occurred or are expected. In 2014, the District updated its FPR to be consistent with the long-term goals established by the adopted Comprehensive Plans of the communities served by the District. The Comprehensive Plans provide direction for future development and redevelopment within the District's Corporate Boundaries, which includes the Villages of Island Lake, Lakemoor and Port Barrington, and recently includes the Village of Holiday Hills. The 2014 FPR also addressed the District's need to expand the existing treatment plant's capacity to accommodate future flows, which were addressed within the 2004 and 2008 Facility Plan Updates as well.

The existing 2014 FPR is now ten years old. As a result, an update to the FPR is due.

The purposes of this FPR are to:

- Evaluate the adequacy of the existing collection and treatment facilities under the current flows, loads and regulatory requirements;
- Review the maintenance history and current condition of wastewater treatment units and lift stations and identify requirement maintenance repairs/replacements;
- Estimate the additional flows and loads associated with future growth within the planning area during the 20-year planning period;
- Summarize pending and potential future environmental regulations related to wastewater conveyance and treatment;
- Determine the impacts of future flows, loads and regulatory requirements on the existing system;
- Identify and evaluate alternatives to address both current and future deficiencies;
- Identify other projects to improve system operation;
- Recommend cost effective alternatives; and
- Present costs, user fee analysis, implementation plans, cash flow projections and environmental impacts of the recommended alternatives.

SECTION 2

COMMUNITY'S NEEDS

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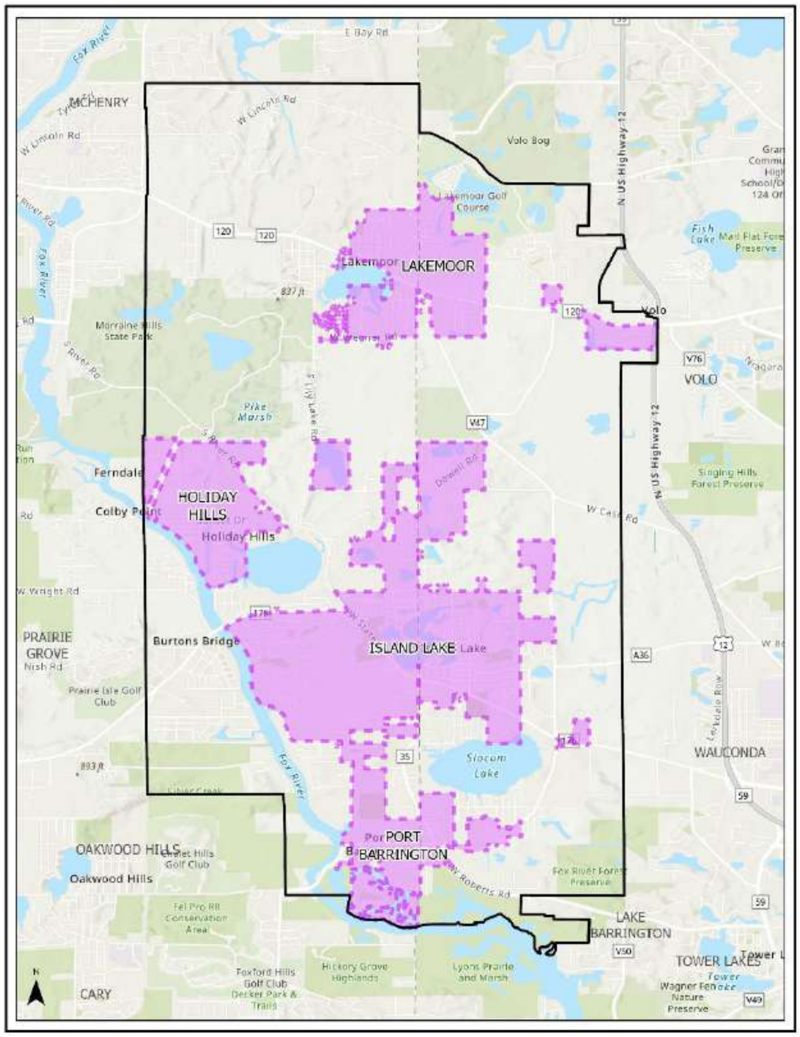
2. COMMUNITY'S NEEDS

2.1 GENERAL BACKGROUND

The Northern Moraine Wastewater Reclamation District is located in northeastern Illinois, within southwestern Lake County and southeastern McHenry County. The District serves a facility planning area (FPA) consisting of 16,723 acres. Within the FPA boundary, an approximate 12,957 acres are incorporated into the municipalities served by the District. The District's corporate boundary includes approximately 4,327 acres incorporated into the NMWRD.

The Northern Moraine Wastewater Reclamation District serves populations in Island Lake, Port Barrington, and Lakemoor. The population of these communities are 7,954, 1,568, and 6,274, respectively. Exhibit 2-1 outlines the NMWRD corporate and facility planning area boundaries. Additionally, the District has recently completed Phase 1 of a sewer extension project to serve the community of Holiday Hills, but no residents have connected yet. Therefore, Holiday Hills is considered future development for the purposes of this report. The community of Holiday Hills has a population of 618. As can be seen, sections of the Villages of Volo and Lake Barrington also lie within the extents of the Northern Moraine FPA and boundaries but do not currently receive wastewater service.

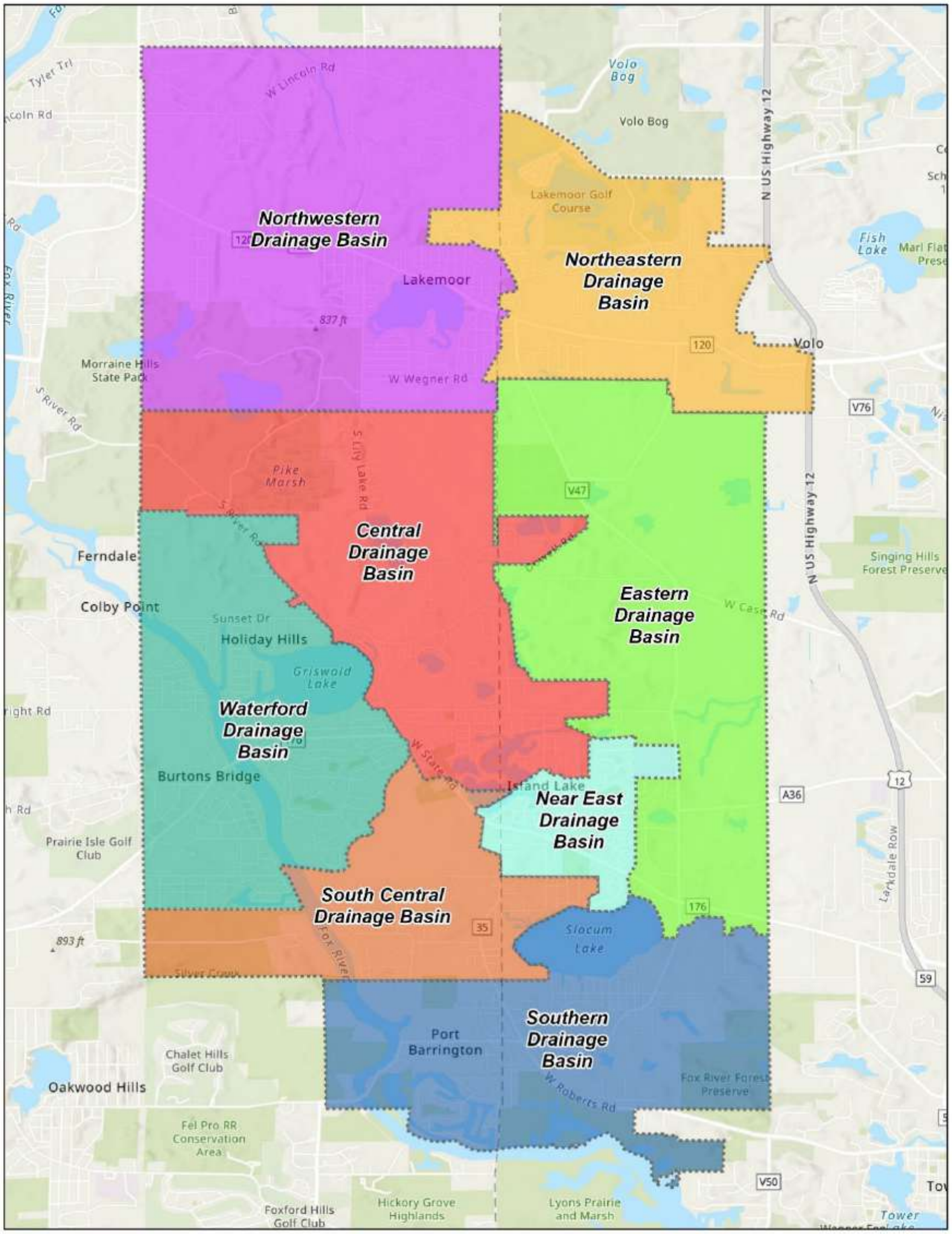
Exhibit 2-1: NMWRD FPA and Corporate Boundaries



Each community's current, future development, and build-out population equivalents (PE) were determined in order to accurately evaluate the wastewater capacity needs for the Northern Moraine Wastewater Reclamation District's collection system and WWTP.

For planning purposes, the NMWRD FPA was divided into eight distinct wastewater drainage basins, including the Central, Eastern, Near East, Northeastern, Northwestern, South Central, Southern, and Waterford Drainage Basins. The wastewater drainage basins are shown on Exhibit 2-2 on the next page.

Exhibit 2-2: NMWRD Wastewater Drainage Basins



The existing PE was accomplished by assessing the existing residential population, connection permits since the last facility plan, metered commercial wastewater flow rates, and remaining commercial users to determine the current PE. To evaluate future wastewater needs, PE values were assigned to the remaining undeveloped property and property slated for redevelopment within the District's municipal boundaries. The current, future and build-out population equivalents were established by reviewing the District's latest census numbers, and from information provided by each Village within the District regarding future development on undeveloped parcels within the District and the land use designations stipulated in their Comprehensive Plans.

2.2 Existing Population Projections and Water Demands

In order to accurately evaluate the current and future wastewater capacity needs the following information was established: the current number of users, potential population from the remaining open or unannexed land within each Village within the District (future development), and the potential population from open land within the District's FPA (buildout).

Most communities contain both residential and non-residential land uses. Analysis of current and future water usage is often done on the basis of "population equivalents," or PE, which provides a common basis for residential and non-residential demands to be analyzed. One PE is equivalent to the water consumed by one resident, as determined by historic data.

Mapping data was provided by the District for the 2014 Facility Plan that included residential parcels billed for wastewater usage. It was determined that this data would be utilized as-is for the 2024 facility plan, while including data from sewer connection permits issued since 2015 to determine 2023 PE.

The residential PE for the communities of Lakemoor and Port Barrington was calculated by taking the residential parcels multiplied by a value of PE per unit. This PE per unit value was calculated by dividing the population of each Village by total number of residential units in that Village. The District bills apartment users separately as commercial users. Therefore, the PE associated with those units were removed from the residential total since they are already counted in the commercial PE amounts. The value calculated for Lakemoor was applied to the Northeastern and Northwestern Basins, while Port Barrington's was applied to the South Central and Southern Basins. The PE per unit for 2014 was held the same for existing pre-2014 units in order to have the same initial PE with the 2014 estimates, while the 2023 population and estimates were used to account for PE since 2015.

It is recognized that all residential units are not currently served by sewer. The population associated with these units was excluded from the calculation by comparing total houses to the District's billing records for the residential parcels included from the 2014 facility plan. The number of residential units added since 2015 from connection permits are added to this total, to get the factor for 2023 PE.

For Island Lake, residential PE was calculated by utilizing the American Community Survey (ACS) 2022 population, and removing the PE associated with apartments in the Central, Eastern, Near East, and Waterford basins. To determine the PE breakdown in the Island Lake drainage basins, a ratio was utilized based on the total housing units in each basin and multiplied by the total PE for Island Lake.

Based on this analysis, the existing residential PE was calculated to be 12,497 as summarized in Table 2-1 on the next page.

Table 2-1: Residential PE Breakdown by Basin – Villages of Lakemoor and Port Barrington

Drainage Basin	Residential- Inside Corporate Boundary				
	Residential Units: 2014 FP	PE/Unit: Existing Pre-2014 Units	Residential Units since 2015	PE/Unit: Connections since 2015	2023 Residential PE
Northeastern Drainage Basin	708	2.74	53	2.51	2,073
Northwestern Drainage Basin	476	2.74	1	2.51	1,307
South Central Drainage Basin	140	2.22	0	2.37	297
Southern Drainage Basin	535	2.22	8	2.37	1,207
Total	**1,859**		**62**		**4,883**

Table 2-2: Residential PE Breakdown by Basin – Village of Island Lake

Drainage Basin	2023 Residential PE
Central Drainage Basin	3,120
Eastern Drainage Basin	0
Near East Drainage Basin	1,696
Waterford Drainage Basin	2,798
Total	**7,614**

Table 2-3: Residential PE Breakdown by Basin

Drainage Basin	2023 Residential PE
Central Drainage Basin	3,120
Eastern Drainage Basin	0
Near East Drainage Basin	1,696
Northeastern Drainage Basin	2,073
Northwestern Drainage Basin	1,307
South Central Drainage Basin	297
Southern Drainage Basin	1,207
Waterford Drainage Basin	2,798
Total	**12,497**

The commercial low-user and commercial regular PE were calculated by assuming that low-users are equivalent to one residential unit (2023 PE/unit value), and that regular commercial users are equivalent to two residential units. Therefore, the same PE/unit value that was used to calculate residential PE was again used to calculate the commercial low-user PE (122 PE). The 2023 PE/unit value per basin was doubled to calculate a total regular commercial PE (67 PE). Table 2-4 lists the commercial low-user PE by drainage basin and Table 2-5 summarizes the regular commercial PE by basin.

Table 2-4: Commercial Low-User PE Breakdown by Basin

Drainage Basin	Low User Units	PE/Unit	PE
Central Drainage Basin	0	2.51	0
Eastern Drainage Basin	0	2.51	0
Near East Drainage Basin	15	2.51	38
Northeastern Drainage Basin	1	2.51	3
Northwestern Drainage Basin	26	2.51	65
South Central Drainage Basin	6	2.32	14
Southern Drainage Basin	1	2.32	2
Waterford Drainage Basin	0	2.51	0
Total	**49**		**122**

Table 2-5: Commercial Regular PE Breakdown by Basin

Drainage Basin	Regular User Units	PE/Unit	PE
Central Drainage Basin	0	5.02	0
Eastern Drainage Basin	0	5.02	0
Near East Drainage Basin	3	5.02	15
Northeastern Drainage Basin	0	5.02	0
Northwestern Drainage Basin	8	5.02	40
South Central Drainage Basin	1	4.74	5
Southern Drainage Basin	1	4.74	5
Waterford Drainage Basin	0	5.02	0
Total	**13**		**65**

In addition, the District bills apartment buildings as commercial users per living unit for each building. For the purposes of this report, it was assumed that each apartment unit was a two- bedroom apartment and utilized 2 PE/apartment based on the Illinois Administrative Code's recommended PE/unit for apartments. The apartment units per basin were provided by the District and calculated by 2 PE/apartment. The total commercial PE for apartments is 354 PE.

Table 2-6: Commercial Apartments PE Breakdown by Basin

Drainage Basin	Total Apt Users	Total Apt Units Per Basin	PE/apt	PE
Central Drainage Basin	7	50	2	100
Eastern Drainage Basin	0	0	2	0
Near East Drainage Basin	11	120	2	240
Northeastern Drainage Basin	0	0	2	0
Northwestern Drainage Basin	0	0	2	0
South Central Drainage Basin	2	7	2	14
Southern Drainage Basin	0	0	2	0
Waterford Drainage Basin	0	0	2	0
Total	**20**	**177**		**354**

Sewer usage data was available for the metered commercial users. This data was separated by basin to get a total usage in the thousands of gallons per month in each basin. The monthly volume was then divided by 30 to compute gallons per day. Daily usage was divided by an average daily use of 70 gallons/capita/day (gcd) for metered users, to determine a contribution of 1,449 PE due to commercial metered users. Table 2-7 summarizes the commercial metered PE for each basin.

Table 2-7: Commercial Metered PE Breakdown by Basin

Drainage Basin	Metered Units	Usage (1000 gal/month)	PE
Central Drainage Basin	12	166	79
Eastern Drainage Basin	2	29	14
Near East Drainage Basin	42	473	225
Northeastern Drainage Basin	11	883	420
Northwestern Drainage Basin	15	801	382
South Central Drainage Basin	9	134	64
Southern Drainage Basin	1	37	18
Waterford Drainage Basin	3	519	247
Total	**95**	**3,043**	**1,449**

Table 2-8 summarizes the overall PE within the NMWRD corporate boundary for both residential and non-residential use resulting in a total current population equivalent of 14,487 PE within the incorporated area of the District.

Table 2-8: Total Residential and Commercial PE Breakdown by Basin

Drainage Basin	Residential PE	Commercial PE	Total PE
Central Drainage Basin	3,120	179	3,299
Eastern Drainage Basin	0	14	14
Near East Drainage Basin	1,696	518	2,214
Northeastern Drainage Basin	2,073	423	2,496
Northwestern Drainage Basin	1,307	487	1,794
South Central Drainage Basin	297	97	394
Southern Drainage Basin	1,207	25	1,231
Waterford Drainage Basin	2,798	247	3,045
Total	**12,497**	**1,990**	**14,487**

Table 2-9: Total Residential and Commercial PE Breakdown by Village

Community	Basins	Residential PE	Commercial PE	Total PE
Village of Lakemoor	NE, NW	3,380	910	4,290
Village of Island Lake	Central, E, Near E, Waterford	7,614	958	8,572
Village of Port Barrington	South Central, S	1,503	122	1,625
Total		**12,497**	**1,990**	**14,487**

The NMWRD WWTP treated an average flow of 1.07 MGD in 2022. Therefore, the wastewater received equates to 74 gcd.

Table 2-10: Current Population and Wastewater Flows (2022)

	Residential	Non-Residential	Total
Population Equivalents (PE)	12,497	1,990	14,487
Wastewater Received (MGD)	0.92	0.15	1.07
Wastewater / PE (GPD)	74	74	74

The future population projection, which is the ultimate buildout of properties within the intended service area, was developed by assigning PE values to the remaining open or unannexed land within each Village within the District (future development), and the potential population from open land within the District's FPA (buildout).

In addition, TAI utilized information from the Villages' Comprehensive Plans and Land Use requirements to determine the potential growth in the communities' growth areas. Overall, a total of 46,662 additional PE was identified at build out of the District's facility planning area. Therefore, the total PE at full build-out conditions is estimated to be 61,149 PE.

Future Population Equivalent

Total Current PE (2023)	14,487	PE
Additional PE at Build-Out of Service Area	46,662	PE
Total Build-Out PE	**61,149**	**PE**

2.3 Infiltration and Inflow

2.3.1 Infiltration

The USEPA considers an average annual infiltration rate to be excessive if the difference between the water usage and the wastewater received on a per capita basis exceeds 50 gcd. The 2023 population equivalent within the NMWRD WWTP's service area is 14,487 PE. Infiltration rate can be estimated by comparing annual water usage data with the plant influent flow rate records.

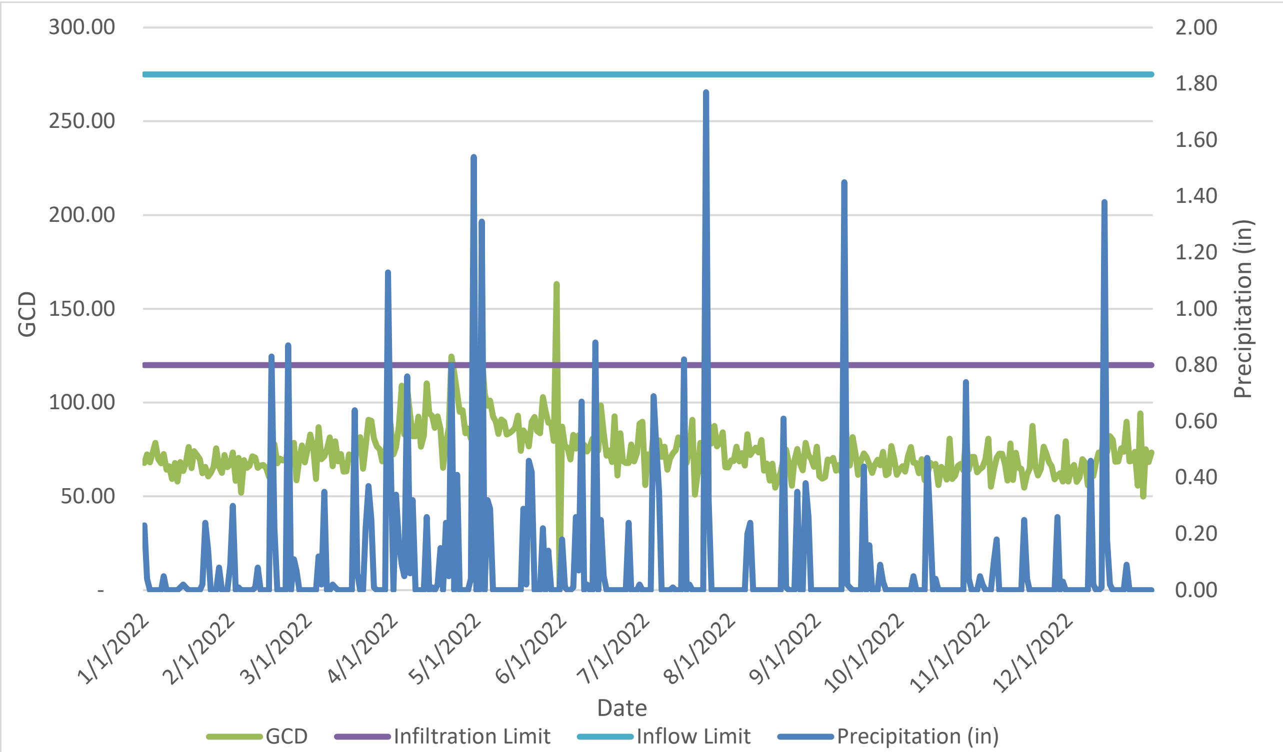
The average wastewater received per population equivalent is estimated to be approximately 70 gcd based on historical data used in the previous facility plan update. Since portions of the District are on well water, only sewer usage data and estimates from the District's connection permits were used for wastewater usage. The differential in the wastewater and water usage is unknown due to water usage data not being used. As the system ages, it is anticipated that infiltration will increase due to pipe degradation; however, at this time the system is in acceptable operating condition and the District has only minimal amounts of infiltration from USEPA's standards.

Based on the total current PE and the USEPA definition of excess infiltration (120 gcd during periods of high groundwater), the NMWRD WWTP experiences excess infiltration when flows exceed 1.74 MGD. In 2022, the total influent flow rate exceeded 1.74 MGD three times during rain events.

2.3.2 Inflow

The USEPA considers inflow rate to be excessive in separate sanitary sewer systems if the total flow, water usage plus infiltration plus inflow, exceeds 275 gcd. Based on the total current PE and the USEPA definition of excess infiltration (275 gcd during storm events where there are no basement back-ups), the NMWRD WWTP experiences excess inflow when flows exceed 3.98 MGD. During 2022, the 24-hour total influent never exceeded 3.98 MGD.

Figure 2-1: Infiltration/Inflow vs. Per Capita Influent Flow (GCD) (2022)



2.4 Influent Wastewater Flow and Loading

Table 2-11 summarizes the wastewater flow and loading received at the NMWRD WWTP between 2020 and 2022 on an annual average basis.

Table 2-11: Wastewater Flow and Loading 2020-2022

Wastewater Flows/Loads	Influent Flow (MGD)	BOD_5 (lbs./day)	Total Suspended Solids (TSS) (lbs./day)
2020	1.11	2,563	7,194
2021	1.03	1,814	3,015
2022	1.07	1,784	2,699

The NMWRD WWTP received a daily average flow of 1.07 MGD in 2022. The average influent BOD_5 and TSS during 2022 were 1,784 and 2,699 lbs./day, respectively.

However, the WWTP's influent BOD_5 and TSS data were abnormally high in 2020 compared to 2022. The reasons for this increase are likely due to a combination of the following:

- 2020 was the start of the covid-19 pandemic, with many residents working from home. Since the District's customer base is predominantly residential, it is likely that with residents staying home during that year, they would have been contributing more solids/organics than in any other year.
- The District's septage receiving program opened in late 2019. The District started adding high solids concentrations to the headworks routinely.
- The WWTP's RDS was out of service for a 2–3-month period in Q1 of 2020. During this 2–3-month period, there would have been no screening within the headworks leading to higher solids/organics in the influent samples.
- The District's wasting/decanting procedure was altered in February 2021. Historically, Operations staff had a bad procedure for wasting/decanting (i.e they decanted weekly even if they didn't need to free up capacity in digesters). If it was a bad decant with a digester that didn't settle well, then they could have been recycling large amounts of solids/organics back to the headworks on a weekly basis.

Based on an estimated PE, the average wastewater flow tributary to the WWTP is approximately 70 gpdpc. In comparison to existing flows and loadings at the NMWRD WWTP, the Illinois EPA design standards require designing based on 100 gallons/day/PE, 0.17 lbs. BOD_5/day/ PE, and 0.20 lbs. TSS/day/ PE. Table 2-12 compares the existing flows and loading to the Illinois EPA design standards. The Illinois EPA design standards are conservative when compared to the District's loading.

Table 2-12: Current Loading versus IEPA Design Loading Standards

	Total Flow (MGD)	PE	BOD_5 (lbs./day)	TSS (lbs./day)
2023 Average Loading	1.07	14,487	1,784	2,699
IEPA Design Loading Stds.	2.0	20,000	2,800	3,370

2.4.1 Environmental Regulations

The required effluent quality for the NMWRD WWTP is dictated by its National Pollutant Discharge Elimination System (NPDES) permit as established by the Illinois EPA. The Facility currently produces an effluent quality higher than is required by its NPDES permit and there are currently no violations or enforcement actions.

2.5 Future Population Projections

To accurately evaluate the District's future wastewater demands for the NMWRD Service Area, the following data was reviewed and established:

- Potential population from remaining open or unannexed land within the municipal corporate boundaries of each Village served by the District (Future Development)
- Potential population from open land within the District's FPA (Buildout)

2.5.1 General

Future population equivalents for both the future development and buildout categories were calculated utilizing user and parcel data provided by the District, McHenry County, and Lake County. Additionally, TAI utilized information from each Village's Comprehensive Plans. The Comprehensive Plans discuss the potential development within each Village, and also contains a Future Land Use Plan. The Future Land Use Plan presents, in map form, the planned land use types for undeveloped parcels within each Village currently served by the District.

In order to calculate the land available for future development, both the existing developed parcels and wetlands acreage were subtracted from the gross acreage in the drainage basin for both the municipal boundaries of each Village (future development) and open land within the District's FPA (buildout). A general use multiplier was applied to account for right-of-way, easements, open space, parks, waterways, etc. (0.80 for residential, 0.85 for commercial).

For residential land use, the net acreage was then multiplied by the housing density in units/acre based on either Village municipal zoning ordinances (future development) or County zoning ordinances (buildout). The Villages of Island Lake minimum residential lot size was utilized for development in the basins located in Island Lake. County ordinances for minimum lot size for both Lake and McHenry County were utilized for Lakemoor, Port Barrington, and other open land in the District's FPA. For Port Barrington, each county's low density minimum residential lot size was utilized for development based on the Village's zoning requirements. For Lakemoor, based on its zoning ordinance, each county's low-medium residential lot size was used. The development in Holiday Hills is based on connecting existing homes to the sewer system and future home development information provided by the Village.

In McHenry County, the minimum lot size is 0.25 acre, which equates to a maximum units/net acre value of 4, which was also utilized for basins in the Village of Lakemoor. In Lake County, the minimum lot size is 8,500 sq. ft, or 0.2 acres; however, this is limited to a maximum of 2.5 homes/acre utilized for drainage basins within the Village of Lakemoor. In Island Lake, land available to develop was estimated with a minimum residential lot size of 20,000 sq. ft, or a maximum of 2.2 units/acre. This was based on the Village's land use plan in the comprehensive plan. The McHenry County low-density residential minimum lot size of 40,000 sq. ft or 1.1 units/acre was used for development in drainage basins located in Port Barrington.

The net acreage available and value of the housing density by location was multiplied by the future population density for single family housing (3.5 PE/unit), while the net commercial acreage was multiplied by a future population density of 12 PE/unit for commercial use to determine the total PE within each drainage basin.

Each drainage basin was analyzed to establish 2023 Current, Future Development, and Buildout Population Equivalents. Table 2-13 below includes a summary of the total future PE within the Villages' Municipal Corporate Boundaries and the NMWRD FPA.

Table 2-13: NMWRD Future Development and Buildout PE

Description	Future Development (Village Municipal Corp. Boundaries)	Facility Planning Area Boundary Buildout	Total Buildout PE
Existing Residential PE	12,497	-	
Future Residential Growth	5,149	29,364	
Total Residential PE at Buildout	**17,646**	**29,364**	**47,010**
Existing Commercial PE	1,990		
Future Commercial Growth	2,415	9,734	
Total Commercial PE at Buildout	**4,405**	**9,734**	**14,139**
Total Buildout PE	**22,051**	**39,098**	**61,149**

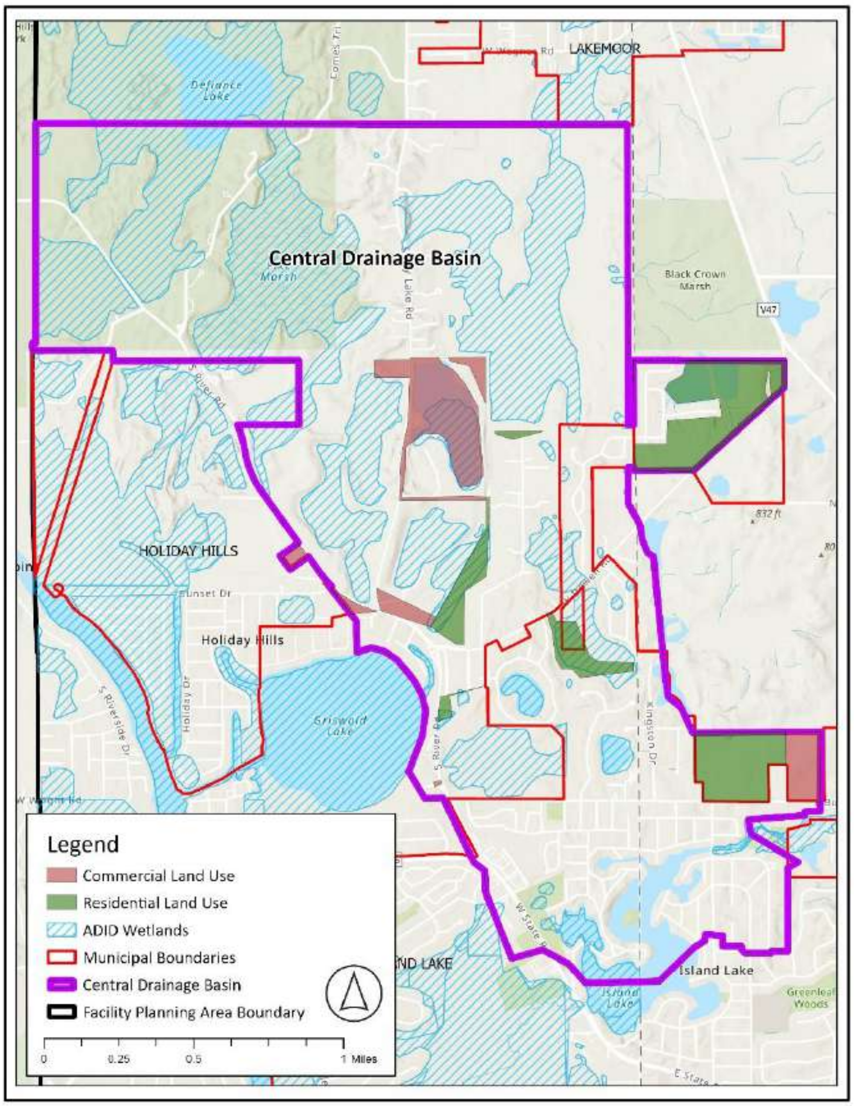
Based on Table 2-13, it is estimated that the residential population within the District is projected to increase by 5,149 PE within the Villages' Municipal Corporate Boundaries, and by another 29,364 PE within open land in the District's FPA. Additionally, it is expected that the non-residential PE (commercial, manufacturing, institutional, etc.) will increase within the Villages' Municipal Corporate Boundaries by 2,415 PE, and by another 9,734 PE within open land in the District's FPA. The total PE of the Northern Moraine FPA at buildout is 61,149 PE.

2.5.2 Central Drainage Basin

The Central Drainage Basin includes 2,495 acres and currently serves 3,299 PE. The Central Drainage Basin is served by the Walnut Glen, Prairie Woods, Rolling Oaks and Fern lift stations. The Rolling Oaks and Fern Lift Stations are tributary to the 24-inch Rt. 176 West Interceptor Sewer, which also serves the Northeastern, Northwestern, and Waterford drainage basins. Exhibit 2-3 below includes the open land available to develop within the Central Drainage Basin.

The projected future development within the Central Drainage Basin is estimated to be 1,441 PE, including 768 residential PE and 673 commercial PE. The projected additional buildout within the Central Basin is estimated to be 1,818 PE, including 1,289 residential PE and 529 commercial PE. This leads to a total of 3,260 additional PE at buildout of the Central Drainage Basin.

Exhibit 2-3: Central Drainage Basin Future Development and Buildout

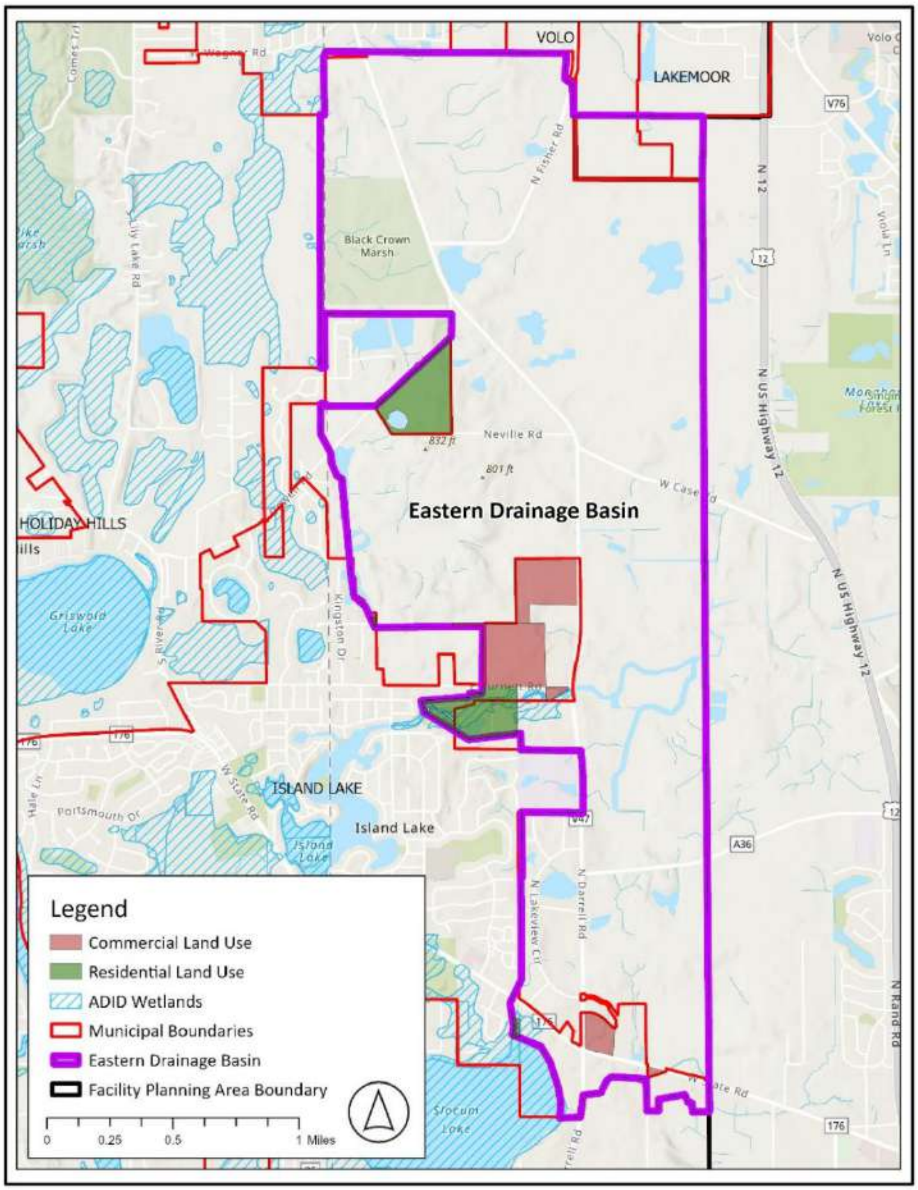


2.5.3 Eastern Drainage Basin

The Eastern Drainage Basin includes 2,871 acres and currently serves 14 PE. The Eastern Drainage Basin is not served by any of the District's lift stations and is tributary to the Near East Drainage Basin. Exhibit 2-4 below includes the open land available to develop within the Eastern Drainage Basin

The projected future development within the Eastern Drainage Basin is estimated to be 798 PE, including 202 residential PE and 596 commercial PE. The projected additional buildout within the Eastern Drainage Basin is estimated to be 2,713 PE, including 1,507 residential PE and 1,206 commercial PE. This leads to a total of 3,511 additional PE at buildout of the Eastern Drainage Basin.

Exhibit 2-4: Eastern Drainage Basin Future Development and Buildout



2.5.4 Near East Drainage Basin

The Near East Drainage Basin includes 504 acres and currently serves 2,214 PE. The Near East Drainage Basin is served by the Burr Oak, Water's Edge, South Shore, and West Ridge lift stations. The South Shore, West Ridge, and Water's Edge lift stations are tributary to the 12-inch Rt. 176 West Interceptor sewer. Exhibit 2-5 below includes the open land available to develop within the Near East Drainage Basin.

The projected future development within the Near East Drainage Basin is estimated to be 702 PE, including 702 residential PE and no commercial PE. The projected additional buildout within the Near East Drainage Basin is estimated to be 162 PE, including 150 residential PE and 11 commercial PE. This leads to a total of 864 additional PE at buildout of the Near East Drainage Basin.

Exhibit 2-5: Near East Drainage Basin Future Development and Buildout

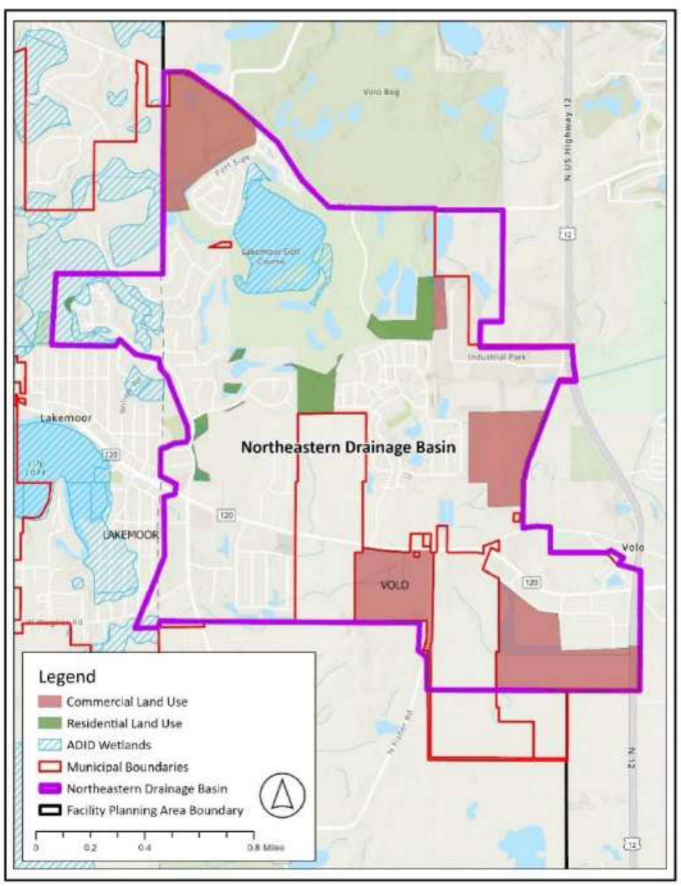
2.5.5 Northeastern Drainage Basin

The Northeastern Drainage Basin includes 1,676 acres and currently serves 2,496 PE. The Northeastern Drainage Basin is served by the Lakemoor Lift Station #6, Woodman's, and Lakemoor Lift Station #7 lift stations. Lakemoor Lift Station #7 is tributary to the 24-Inch Rt. 176 West Interceptor sewer, which also serves the Central, Northwestern, and Waterford Drainage Basins. Exhibit 2-6 below includes the open land available to develop within the Northeastern Drainage Basin.

The projected future development within the Northeastern Drainage Basin is estimated to be 1,364 PE, including 706 residential PE and 658 commercial PE. The projected additional buildout within the Northeastern Drainage Basin is estimated to be 6,115 PE, including 3,830 residential PE and 3,653 commercial PE.

The Northeastern Basin also includes development currently served by the Rockwell Utilities Inc. private collection and treatment system, which was designed for 3,210 residential PE. Since the system is located in the NMWRD FPA, the District is the Designated Management Agency (DMA). The District may be called upon to provide wastewater service to this development should the existing private system fail. The buildout of the system includes the population equivalent associated with connection of the Rockwell Utilities Inc. system at its design capacity.

Exhibit 2-6: Northeastern Drainage Basin Future Development and Buildout

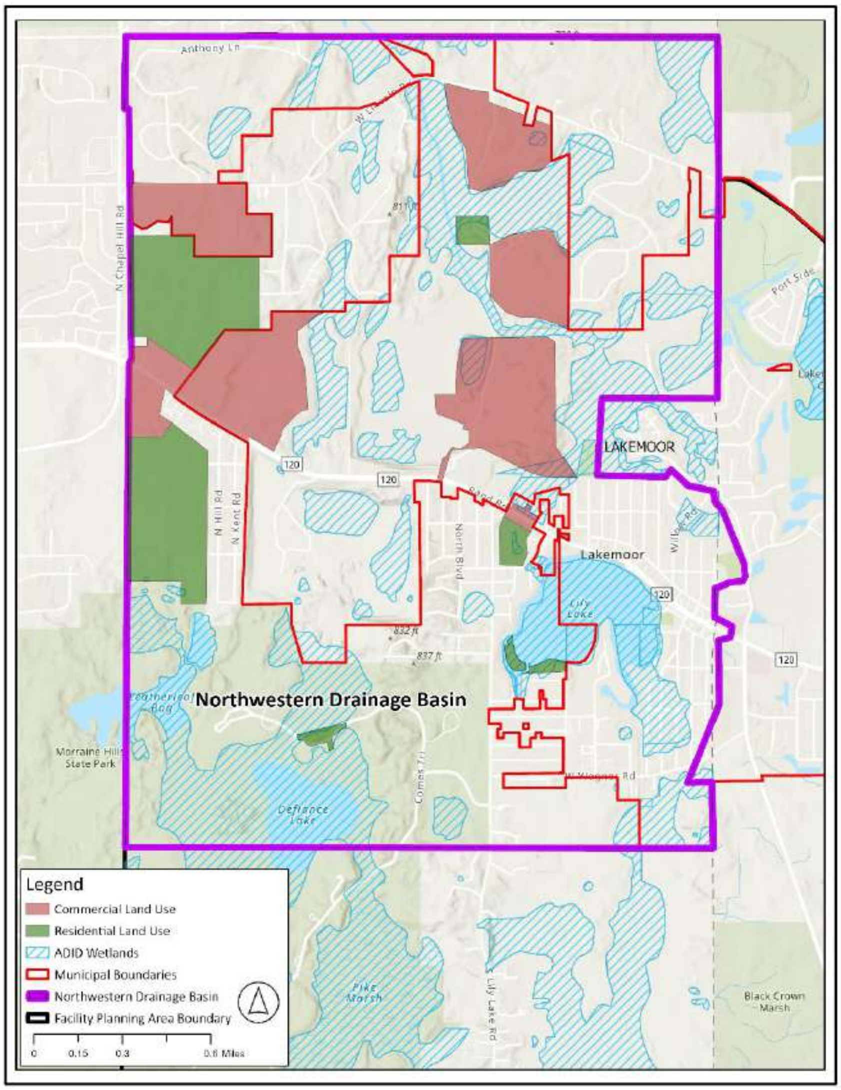


2.5.6 Northwestern Drainage Basin

The Northwestern Drainage Basin includes 3,449 acres and currently serves 1,794 PE. The Northwestern Drainage Basin is served by the Lakemoor Lift Stations #1-5. Lakemoor Lift Station #1 is tributary to the 24-inch Rt. 176 West Interceptor, which also serves the Central, Northeastern, and Waterford Drainage Basins. Exhibit 2-7 below includes the open land available to develop within the Northwestern Drainage Basin.

The projected future development within the Northwestern Drainage Basin is estimated to be 679 PE, including 360 residential PE and 319 commercial PE. The projected additional buildout within the Northwestern Drainage Basin is estimated to be 11,291 PE, including 7,429 residential PE and 3,862 commercial PE. This leads to a total of 11,970 additional PE at buildout of the Northwestern Drainage Basin.

Exhibit 2-7: Northwestern Drainage Basin Future Development and Buildout

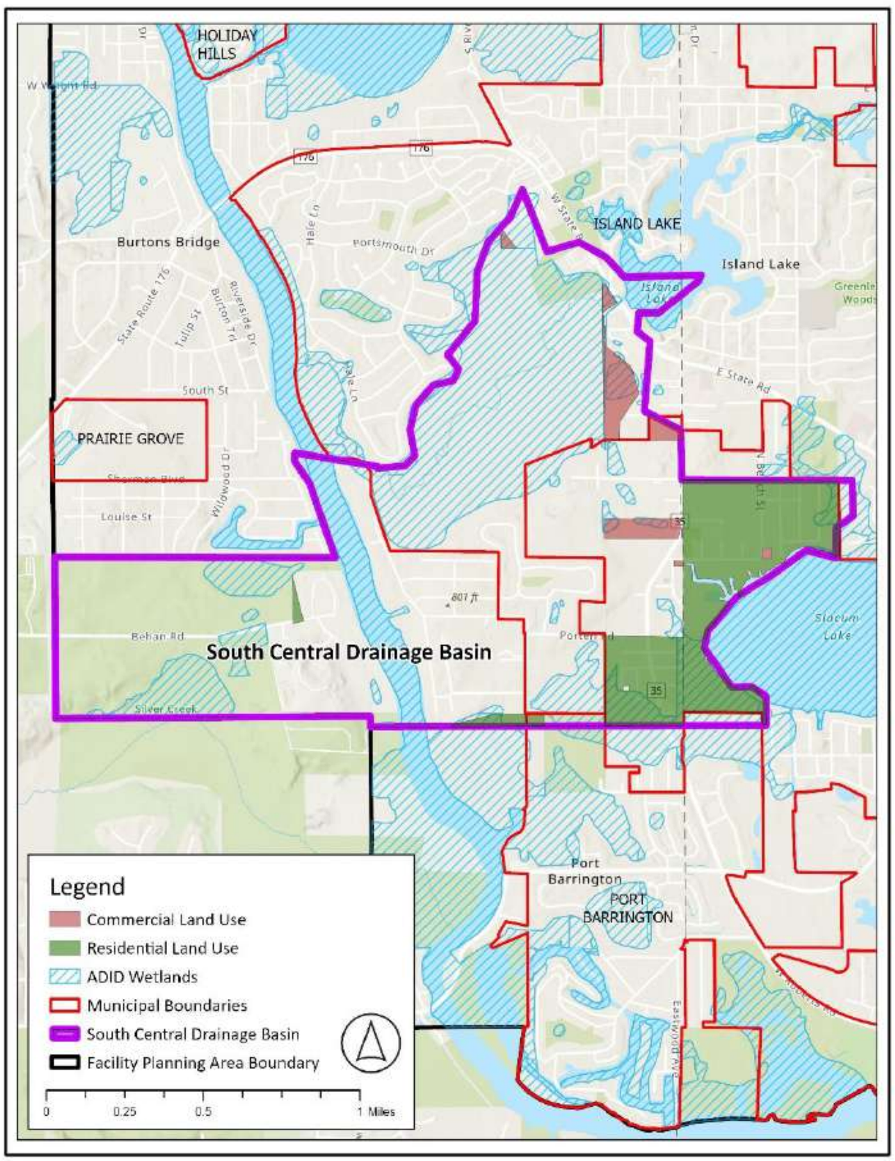


2.5.7 South Central Drainage Basin

The South Central Drainage Basin includes 1,335 acres and currently serves 394 PE. The South Central Drainage Basin is served by the 10-inch South Central Interceptor, which is tributary to the Treatment Plant lift station. Exhibit 2-8 below includes the open land available to develop within the South Central Drainage Basin.

The projected future development within the South Central Drainage Basin is estimated to be 0 PE, including no additional residential or commercial development. The projected additional buildout within the South Central Drainage Basin is estimated to be 3,544 PE, including 3,516 residential PE and 28 commercial PE. This leads to a total of 3,544 additional PE at buildout of the South Central Drainage Basin.

Exhibit 2-8: South Central Drainage Basin Future Development and Buildout

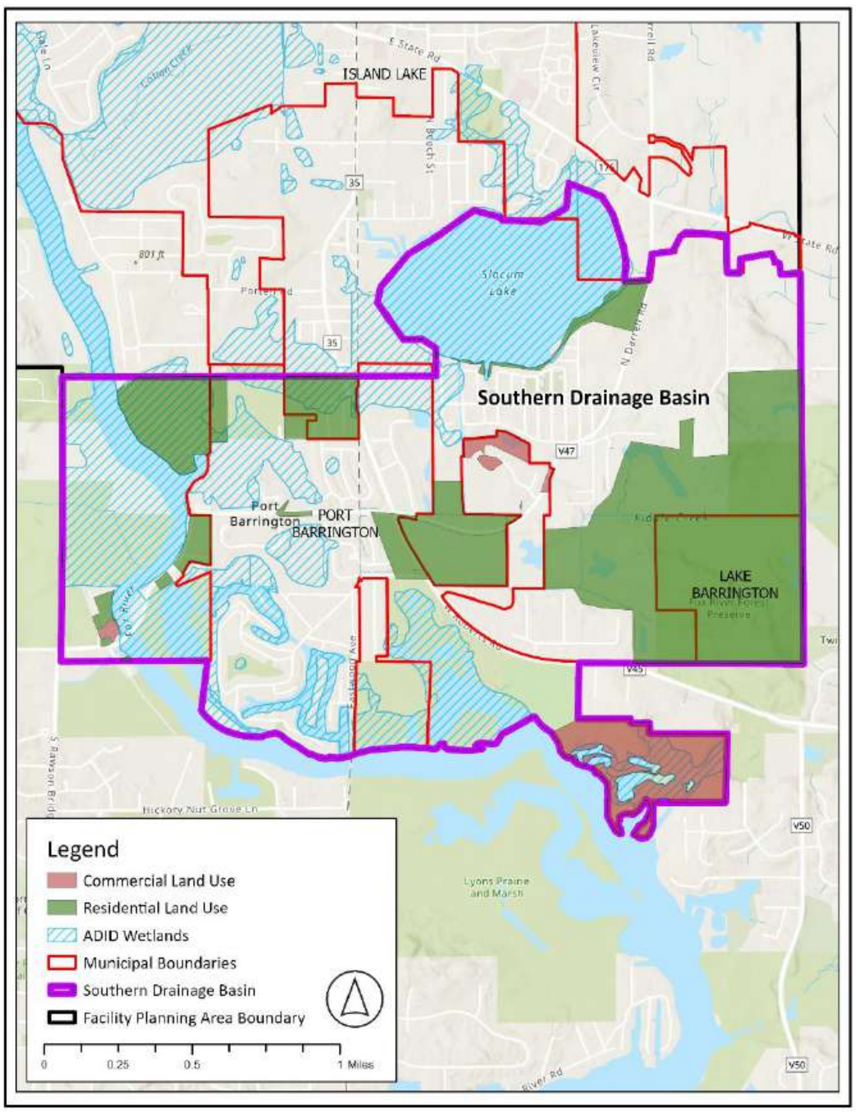


2.5.8 Southern Drainage Basin

The Southern Drainage Basin includes 2,249 acres and currently serves 1,231 PE. The Southern Drainage Basin is served by the Deer Grove and Rawson Bridge lift stations. The Rawson Bridge lift station is tributary to the 18-inch Southern Interceptor. Exhibit 2-9 below includes the open land available to develop within the Southern Drainage Basin.

The projected future development within the Southern Drainage Basin is estimated to be 588 PE, including 419 residential PE and 169 commercial PE. The projected additional buildout within the Southern Drainage Basin is estimated to be 5,971 PE, including 5,872 residential PE and 100 commercial PE. This leads to a total of 6,559 additional PE at buildout of the Southern Drainage Basin.

Exhibit 2-9: Southern Drainage Basin Future Development and Buildout

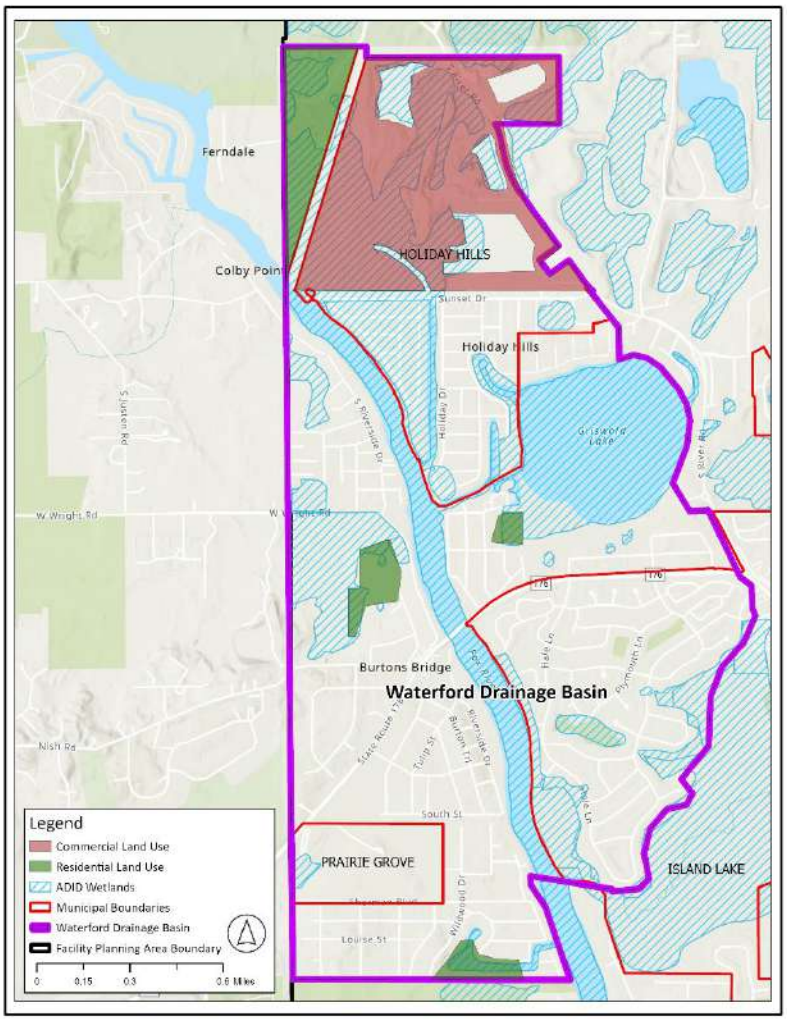


2.5.9 Waterford Drainage Basin

The Waterford Drainage Basin includes 2,145 acres and currently serves 3,045 PE. The Waterford Drainage Basin is served by the Hale 1, Hale 2, Waterford and Holiday Hills lift stations. The Waterford and Holiday Hills lift stations are tributary to the 24-Inch Rt. 176 Interceptor Sewer. Exhibit 2-10 below includes the open land available to develop within the Waterford Drainage Basin.

The projected future development within the Waterford Drainage Basin is estimated to be 1,991 PE, including 1,991 residential PE and no commercial development. The majority of this includes the existing homes within the Village of Holiday Hills that sewer has been extended to within the Phase 1 project (385 PE) and will be extended to during the Phase 2 and future phase projects. The projected additional buildout within the Waterford Drainage Basin is estimated to be 6,115 PE, including 5,771 residential PE and 344 commercial PE. A significant portion of the residential buildout number includes future homes on lots considered "buildable" in the West, East, and North sides of the Village of Holiday Hills (1,911 PE total). This leads to a total of 8,106 additional PE at buildout of the Waterford Drainage Basin.

Exhibit 2-10: Waterford Drainage Basin Future Development and Buildout



2.5.10 Summary of Population Projections

Table 2-14 includes a summary of the projected population and wastewater flows in the NMWRD Service Area within the corporate boundaries of the Villages currently served by the District (future development) and within its facility planning area boundary (buildout). The current NMWRD Service Area served 14,487 PE in 2023 and treated 1.07 MGD wastewater. By taking into account future development and buildout, the service area will eventually be increased to 61,149 PE at buildout, at an average daily flow (ADDF) of 5.74 MGD. The future wastewater flows were projected by utilizing the IEPA design criteria of a per capita flow of 100 gpd.

Table 2-14: NMWRD Projected Population and Wastewater Flows

Description	2023 Conditions		Future Development (Village Municipal Corp. Boundaries)		Build-Out Projection	
	PE	ADDF (MGD)	PE	ADDF (MGD)	PE	ADDF (MGD)
Central Drainage Basin	3,299	0.24	4,740	0.39	6,559	0.57
Eastern Drainage Basin	14	0.00	812	0.08	3,525	0.35
Near East Drainage Basin	2,214	0.16	2,916	0.23	3,078	0.25
Northeastern Drainage Basin	2,496	0.18	3,860	0.32	11,343	1.07
Northwestern Drainage Basin	1,794	0.13	2,473	0.20	13,764	1.33
South Central Drainage Basin	394	0.03	394	0.03	3,938	0.38
Southern Drainage Basin	1,231	0.09	1,819	0.15	7,790	0.75
Waterford Drainage Basin	3,045	0.22	5,036	0.42	11,151	1.04
Total	**14,487**	**1.07**	**22,051**	**1.83**	**61,149**	**5.74**
Peaking Factor		**2.79**		**2.61**		**2.18**
Peak Hourly Flow (MGD)		**2.99**		**4.77**		**12.53**

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SECTION 3

COLLECTION SYSTEM

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3. Collection System

This Section is intended to describe the current conditions, deficiencies, and maintenance issues related to the Northern Moraine Wastewater Reclamation District's (NMWRD's) wastewater collection system. It also evaluates the impact of additional flows from future development on the existing infrastructure and provides recommendations for capacity improvements and ongoing system maintenance.

This Section also includes discussion of the eight drainage basins and recommendations regarding the funding of sanitary sewer initiatives, policies, infiltration and inflow reduction, and CMOM.

3.1 General Background

The District's collection system is separated into eight major drainage basins: Northwestern, Northeastern, Eastern, Central, Near East, Waterford, South Central, and Southern. The NMWRD Wastewater Drainage Basins are found in Exhibit 3-1. Each drainage basin is tributary to one of four interceptor sewers. Exhibit 3-2 depicts the conveyance of flow to the wastewater treatment plant from the drainage basins.

Exhibit 3-1: NMWRD Wastewater Drainage Basins

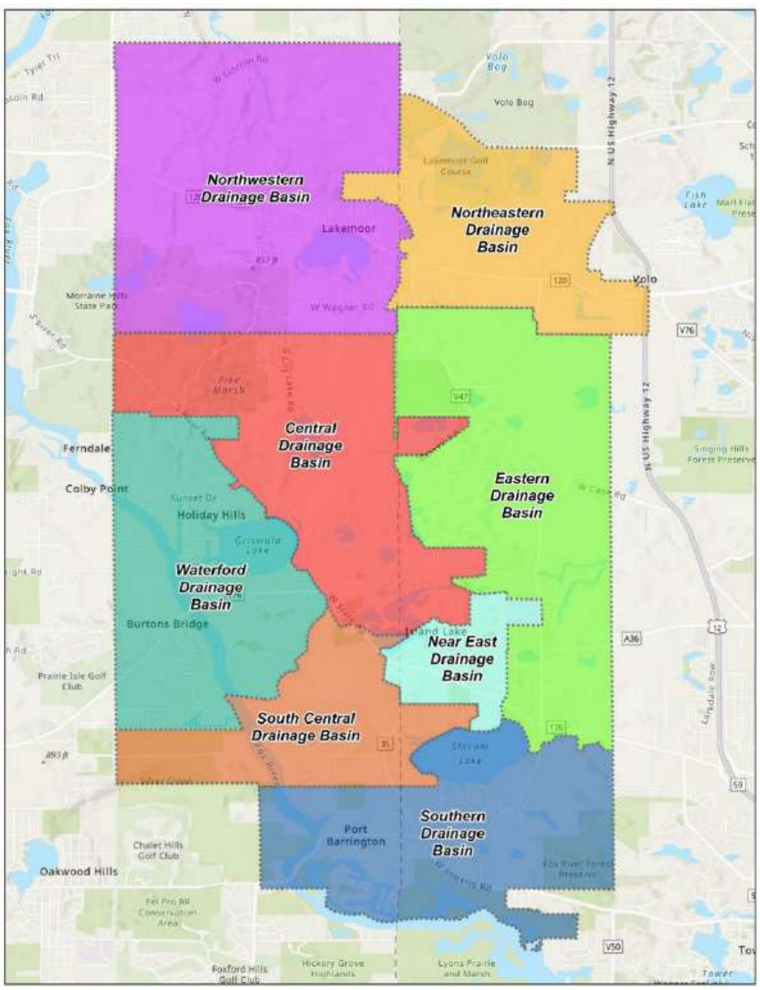
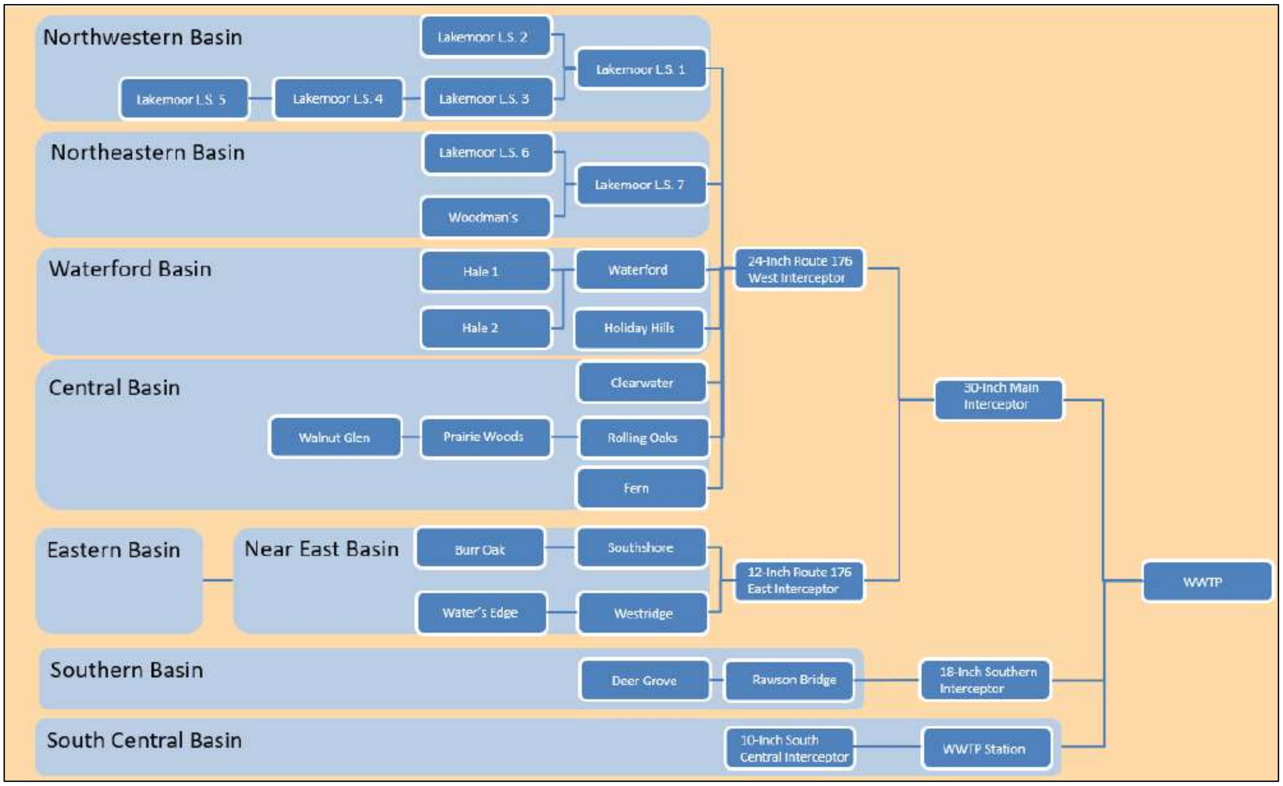


Exhibit 3-2: NMWRD Drainage Basin Schematic



The existing sanitary sewers within the District's collection system are of varying age and condition since the District has expanded the reach of the sewers over time. The older sections of the collection system are located near the WWTP and in the Village of Island Lake. These sewers were installed in the 1970s and are constructed of mostly ABS Truss pipe and PVC pipe. Due to the relatively young age of the rest of the collection system, the District does not have any vitrified clay sewer pipe. As a result, the District has not experienced the amount of root intrusion or excessive levels of I/I that are associated with vitrified clay pipe.

Many of the newer neighborhoods and subdivisions further from the treatment plant are constructed of PVC sewer pipe. The District specifies all new construction of sanitary sewer to utilize the longer lasting, watertight PVC pipe.

Infiltration and inflow can be categorized separately. Infiltration consists of groundwater entering the collection system through pipe joints, manhole joints, and structure defects such as fractures within the sewer pipe. Inflow consists of stormwater discharge into the collection system through leaking manhole covers and illegal sump/ downspout connections to the sewer pipe. Collection system maintenance is further outlined in Section 3.3 and Section 3.4.

The NMWRD collection system includes approximately 77 miles of sanitary sewer and force main, and 1,555 manholes. Assuming an average of $420 per foot of sanitary sewer and $10,000 per manhole for complete installation and restoration, it can be estimated the total replacement cost of the sanitary sewer collection system is approximately **$186,309,000**. This replacement value includes the total replacement cost of the improvements, including surface restoration, general conditions, contingencies, and engineering.

Based on a straight-line depreciation over a seventy-five-year life, it is estimated that the District should be budgeting $2,485,000 annually toward sanitary sewer collection system rehabilitation. A seventy-five year design life is typical for a sanitary district like NMWRD and assumes that the sewers and structures are not rehabilitated. As discussed later in this Section, the District performs rehabilitation after televising efforts and evaluation of sewers and structures indicate a need. Rehabilitation can extend the design life of sewers and structures up to 50 years. Therefore, based on the straight-line depreciation over a 125 year life, **it is estimated that the District should be budgeting $1,491,000 annually toward sanitary sewer collection system rehabilitation.** If the money is not used, it should be placed into a replacement account for future use.

3.2 Existing and Future Flow Contributions

The theoretical average daily design flow (ADDF) and peak wet weather flow (PWWF) were calculated for each of the Drainage Basins. Average daily design flow was determined by applying the current wastewater production rate per capita to the existing PE and adding the flow generated by future PE (which is calculated using the IEPA design standard of 100 gallons per day per PE). Peak hourly flow is calculated by multiplying the ADDF by a peaking factor. The peaking factors used for the drainage basins were calculated based on the equation below. The peaking factor describes a fictitious scenario where the inflow to the system is calculated as several times higher than the maximum possible flow. It is a failsafe against unknown amounts of I/I and illegal connections into the system.

$$\boldsymbol{Peaking\ Factor = \frac{18 + \sqrt{\frac{P.E.}{1000}}}{4 + \sqrt{\frac{P.E.}{1000}}}}$$

Table 3-1 and Table 3-2 provide a summary of the existing and projected build-out population equivalents, Average Dry Weather Flow (ADDF) and calculated Peak Hourly Flow for each drainage basin.

Table 3-1: Drainage Basin Population Equivalent (PE) and Flow (2022) – Existing Conditions

Drainage Basin	PE	ADDF (MGD)	Peaking Factor	PHF (MGD)
Northwestern	1,794	0.244	3.41	0.831
Northeastern	2,496	0.184	3.51	0.647
Waterford	3,045	0.225	3.44	0.773
Central	3,299	0.244	3.41	0.831
Eastern	14	0.001	4.40	0.005
Near East	2,214	0.164	3.55	0.581
Southern	1,231	0.091	3.74	0.340
South Central	394	0.029	4.03	0.117

Table 3-2: Drainage Basin Population Equivalent (PE) and Flow– Buildout Conditions

Drainage Basin	PE	ADDF (MGD)	Peaking Factor	PHF (MGD)
Northwestern	13,764	1.33	2.82	3.74
Northeastern	11,343	1.07	2.90	3.10
Waterford	11,151	1.04	2.91	3.01
Central	6,559	0.57	3.13	1.79
Eastern	3,525	0.35	3.38	1.19
Near East	3,077	0.25	3.43	0.86
Southern	7,790	0.75	3.06	2.29
South Central	3,938	0.38	3.35	1.28

3.3 Previous Reports

The District completed a Facility Plan Update in June 2008 for the Illinois EPA that provided a comprehensive analysis of future development and an overview of the existing collection system's capacity.

The Facility Plan Update completed in 2014 aimed to analyze the entirety of the District's Sanitary Sewer System. The report outlined existing conditions, equipment, points of future expansion, and provided recommendations for sustained, continued growth. Comprised of nine fundamental sections, the report addressed the following: project scope, the community's needs, collection system, lift stations, existing wastewater treatment plant, treatment alternatives, implementation plan, recommendations, and environmental impacts. Considerable analysis was conducted to analyze collection system, lift station, and WWTP conditions and propose areas in need of rehabilitation and improvements. This 2024 report is an update and continuation of the 2014 Facility Plan Update report. Since the 2014 Facility Plan Update Report, the District has implemented and completed six iterations of a CMOM program and report.

In recent years, TAI has completed several memos for the District on various aspects of the collection system. These topics include the Rockwell Collection System, the Holiday Hills and Le Villa Vaupell Sewer Extension Memos, Connection Fee Memos mainly pertaining to Holiday Hills and the Le Villa Vaupell Subdivision, and updated memos on the Darrell Road Interceptor Sewer. The Rockwell Collection System, Holiday Hills Sewer Extension, and Darrell Road Interceptor Sewer are all discussed within their respective Drainage Basin sections within this section of the 2024 NMWRD Facility Plan Update.

3.4 Trunk Interceptor Sewers

The NMWRD wastewater treatment plant is located in the South Central Drainage Basin. All influent wastewater flow is conveyed to the treatment facility in either of five upstream interceptor sewers.

A 30-inch main interceptor sewer that extends north from the treatment facility conveys flow from six of the eight wastewater drainage basins. A 24-inch extension of the main interceptor extends northwest along Route 176 and conveys flows generated within the Central, Northeast, Northwest, and Waterford Drainage Basins. A 12-inch extension of the main interceptor extends southeasterly along Route 176 and conveys wastewater flows generated within the Eastern and Near East Drainage Basins.

Wastewater flow from the Southern Drainage Basin is pumped north and then conveyed by gravity to the treatment facility in the downstream 18-inch interceptor.

Wastewater generated in the South Central Drainage Basin is conveyed to the treatment facility site by gravity in a 10-inch interceptor sewer, and is then pumped into the treatment facility by the Treatment Plant Lift Station.

3.4.1 Main Interceptor Sewer (30-inch)

The conveyance capacity of the 30-inch Main Interceptor sewer is measured against current and projected peak hourly flows in Table 3-3.

Table 3-3: Main Interceptor (30-inch) Capacity and Design Flows

Sewer Characteristics				Current Conditions		Projected Conditions @ Corporate Boundary Build-out		Projected Conditions @ FPA Full Build-out w/o Darrell Road Collection System		Projected Conditions @ FPA Full Build-out w/ Darrell Road Collection System	
Length (ft)	Slope (ft/lf)	Full Velocity (fps)	Full Capacity (MGD)	Current PHF (MGD)	Current Capacity Used	Projected PHF (MGD)	Projected Capacity Used	Projected PHF (MGD)	Projected Capacity Used	Projected PHF (MGD)	Projected Capacity Used
1,908	0.0018	3.59	11.38	2.70	24%	4.38	38%	10.45	92%	7.7	68%

It can be seen that the Main Interceptor currently flows at approximately one-quarter capacity. Based on individual segment characteristics, the upper reaches will eventually become slightly overloaded at full build-out. The Main Interceptor will be off-loaded in the future if the Darrell Road Collection System is constructed, because all of the flow from the Northeastern and Eastern Basins would be diverted into the proposed 42-inch interceptor sewer extending from the NMWRD treatment facility to the Water's Edge Lift Station, which would be abandoned at that time. Wastewater flows in this sewer should be monitored over time but the District should not anticipate any capacity related issues with this sewer for the foreseeable future.

3.3.2 Route 176 West Interceptor (24-inch)

The conveyance capacity of the 24-inch Route 176 West Interceptor sewer is measured against current and projected peak hourly flows in Table 3-4.

Table 3-4: Route 176 West Interceptor (24-inch) Capacity and Design Flows

Sewer Characteristics				Current Conditions		Projected Conditions @ Corporate Boundary Build-out		Projected Conditions @ FPA Full Build-out w/o Darrell Road Collection System		Projected Conditions @ FPA Full Build-out w/ Darrell Road Collection System	
Length (ft)	Slope (ft/lf)	Full Velocity (fps)	Full Capacity (MGD)	Current PHF (MGD)	Current Capacity Used	Projected PHF (MGD)	Projected Capacity Used	Projected PHF (MGD)	Projected Capacity Used	Projected PHF (MGD)	Projected Capacity Used
5,430	0.0014	2.66	5.41	2.30	43%	3.66	68%	9.32	172%	5.24	97%

The Route 176 West Interceptor is shown to have sufficient capacity for the current peak flows and projected peak flows within the District corporate boundaries. Under the projected peak flows at build-out of the FPA, the interceptor will be overloaded throughout its length, especially its upper reaches.

Similar to the Main Interceptor, this sewer would benefit from the construction of the Darrell Road Collection System. However, while implementation of the Darrell Road system will significantly reduce peak flows in the Route 176 West Interceptor, it will not completely alleviate the projected overloading of this sewer under the ultimate build-out conditions, especially in the uppermost 2,320 feet of pipe that is generally installed at minimum slope. It is estimated that the upper reaches of the 24” Interceptor are surcharged 1.25 feet. This deficiency would be relieved in the future by either extending a parallel gravity sewer to the northwest, or by extending one or both Lakemoor force mains further to the southeast and connecting to the steeper sewer segments downstream.

3.3.3 Route 176 East Interceptor (12-inch)

The conveyance capacity of the 12-inch Route 176 East Interceptor sewer is measured against current and projected peak hourly flows in Table 3-5.

Table 3-5: Route 176 East Interceptor (12-inch) Capacity and Design Flows

Sewer Characteristics				Current Conditions		Projected Conditions @ Corporate Boundary Build-out		Projected Conditions @ FPA Full Build-out w/o Darrell Road Collection System		Projected Conditions @ FPA Full Build-out w/ Darrell Road Collection System	
Length (ft)	Slope (ft/lf)	Full Velocity (fps)	Full Capacity (MGD)	Current PHF (MGD)	Current Capacity Used	Projected PHF (MGD)	Projected Capacity Used	Projected PHF (MGD)	Projected Capacity Used	Projected PHF (MGD)	Projected Capacity Used
2,686	0.0057	3.45	1.75	0.58	33%	1.10	63%	1.89	108%	1.18	67%

The Route 176 East Interceptor currently operates well below its full flow capacity, but is also projected to be overloaded under the projected peak hourly flows as development occurs within the Eastern and Near Eastern Drainage Basins. It is proposed that this interceptor be off-loaded by construction of the lower reaches of the Darrell Road Collection System. A slight overload is still projected in the uppermost reaches of this sewer, although this may be offset by removal of the Water’s Edge Lift Station from this drainage basin.

3.3.4 Southern Interceptor (18-inch)

The conveyance capacity of the 18-inch Southern Interceptor sewer is measured against current and projected peak hourly flows in Table 3-6.

Table 3-6: Southern Interceptor (18-inch) Capacity and Design Flows

Sewer Characteristics				Current Conditions		Projected Conditions @ Corporate Boundary Build-out		Projected Conditions @ FPA Full Build-out	
Length (ft)	Slope (ft/lf)	Full Velocity (fps)	Full Capacity (MGD)	Current PHF (MGD)	Current Capacity Used	Projected PHF (MGD)	Projected Capacity Used	Projected PHF (MGD)	Projected Capacity Used
1,483	0.0235	9.15	10.45	0.34	3%	0.99	9%	2.29	22%

The Southern Interceptor conveys flow pumped from the Southern Drainage Basin. This interceptor has more than sufficient capacity to convey both the current and future projected peak flows. Wastewater flows in this sewer should be monitored over time but the District should not anticipate any capacity related issues with this sewer for the foreseeable future.

3.3.5 South Central Interceptor (10-inch)

The conveyance capacity of the 10-inch South Central Interceptor sewer is measured against current and projected peak hourly flows in Table 3-7.

Table 3-7: South Central Interceptor (10-inch) Capacity and Design Flows

Sewer Characteristics				Current Conditions		Projected Conditions @ Corporate Boundary Build-out		Projected Conditions @ FPA Full Build-out	
Length (ft)	Slope (ft/lf)	Full Velocity (fps)	Full Capacity (MGD)	Current PHF (MGD)	Current Capacity Used	Projected PHF (MGD)	Projected Capacity Used	Projected PHF (MGD)	Projected Capacity Used
1,805	0.0038	2.50	0.88	0.12	13%	0.12	13%	1.28	145%

The 10-inch South Central Interceptor provides sufficient capacity to convey both the current and projected future peak hour flows. The District should not anticipate any capacity related issues with this sewer for the foreseeable future.

3.5 Drainage Basins

3.5.1 Central Drainage Basin

The extent of the Central Drainage Basin and the existing collection system are shown on Exhibit 3-4. The Central Basin encompasses a total of 2,495 acres, of which 749 acres are currently annexed to the Northern Moraine WRD. The Central Basin currently serves approximately 3,299 PE. Build-out within the existing District corporate boundaries could contribute an additional 1,441 PE. Complete build-out of this basin could contribute an additional 3,260 PE for an ultimate total of 6,559 PE.

Wastewater generated within the Central Drainage Basin is conveyed to the treatment facility through a 1,908 lineal foot, 30-inch interceptor sewer that runs directly north from the treatment facility. A 24-inch interceptor extends 5,430 lineal feet northwest along Route 176 and terminates at River Road. The Clearwater, Walnut Glen, Prairie Woods, Rolling Oaks, and Fern lift stations are all located within the Central Drainage Basin.

The 24-inch Route 176 West Interceptor also receives pumped flow from the Northeastern and Northwestern Drainage Basins in Lakemoor. In addition, it receives all the flow from the Waterford Drainage Basin via the Waterford and Holiday Hills Lift Stations.

Future development in the Central Basin would occur in the northern extents of the basin. It was previously planned to serve these areas through an extension of the 24-inch interceptor to the north along River Road and a proposed regional lift station located directly north of Griswold Lake. The construction of the Darrell Road Collection System described later will free capacity in the existing parallel 8-inch and 12-inch force mains on Lily Lake Road. A small, localized lift station could pump into these force mains in lieu of extending a gravity sewer.

Exhibit 3-3: Central Drainage Basin

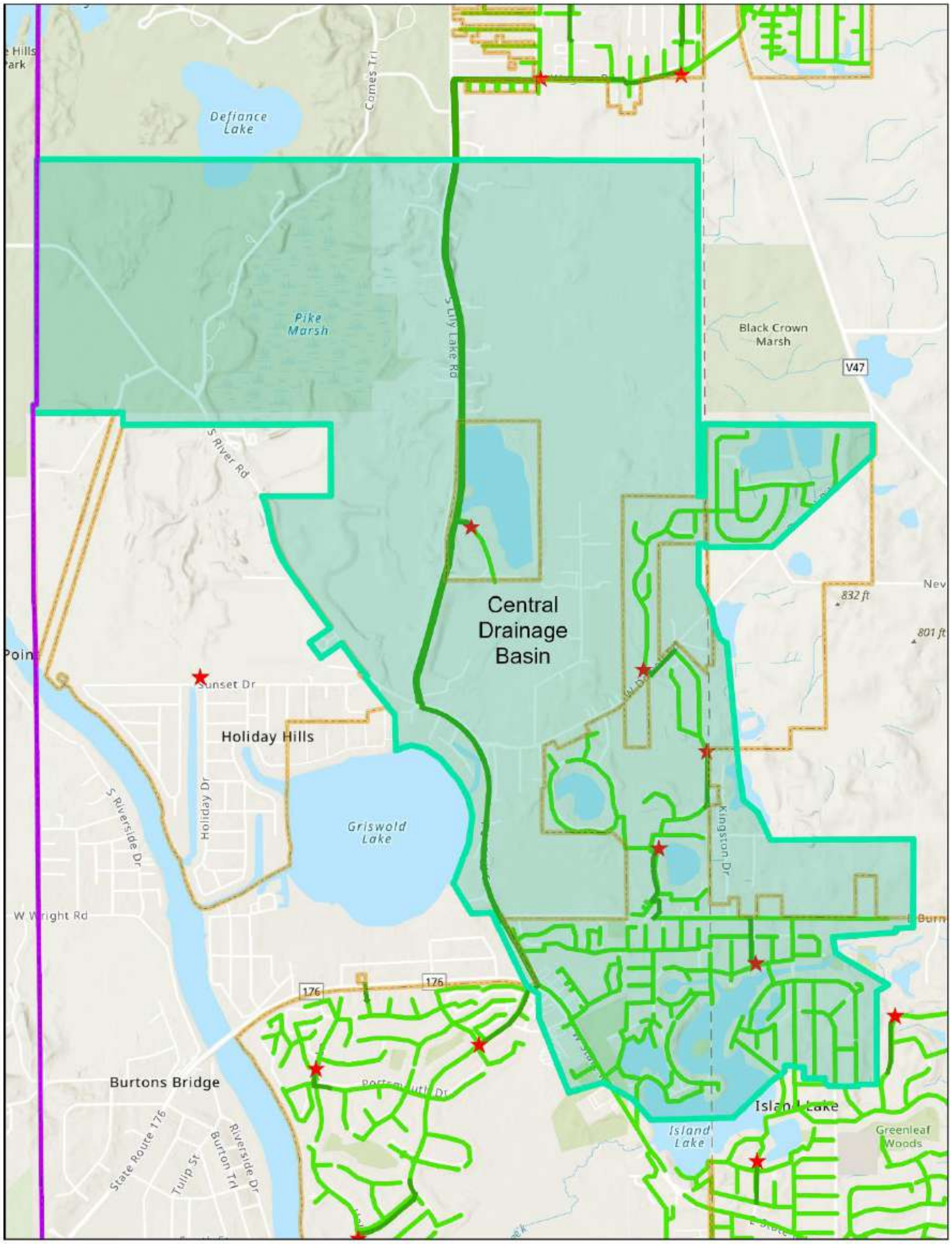


Table 3-8: Central Drainage Basin PE and Flow Conditions

2023 CONDITIONS			
Drainage Basin	**Current PE**	**ADDF (MGD)**	**PHF (MGD)**
Central Basin	3,299	0.24	0.83
BUILD-OUT CONDITIONS			
Drainage Basin	**Future PE**	**ADDF (MGD)**	**PHF (MGD)**
Central Basin	6,559	0.57	1.79

3.5.2 Eastern Drainage Basin

The Eastern Drainage Basin was delineated during construction of the first phase of the Darrell Road Interceptor Sewer from Water's Edge Drive to Route 176. This drainage basin includes the entire FPA east of Darrell Road, north of Route 176, and south of Lakemoor. The extents of the Eastern Drainage Basin and the existing collection system are shown on Exhibit 3-5. The Eastern Basin encompasses a total of 2,871 acres, of which 277 acres are currently annexed to the Northern Moraine WRD.

The District currently only serves 24 acres of commercial development in the Eastern Drainage Basin, contributing a total of 14 PE. Build-out within the existing District corporate boundaries could contribute an additional 798 PE. Complete build-out of this basin could contribute an additional 3,511 PE for an ultimate total of 3,525 PE. The Eastern Drainage Basin anticipates subdivision development north of Neville Road.

Wastewater generated in this basin is currently conveyed to the Water's Edge Lift Station located in the Near East Drainage Basin (see Section 4). Development within the Eastern Drainage Basin is limited to the available capacity of the Water's Edge Lift Station and downstream Westridge Lift Station. It should be noted that the Walnut Glen subdivision was previously in the Eastern basin. In 2006, sixty-nine (69) sewer permits were originally issued. However, only 63 lots were approved by the Village of Island Lake so six sewer permits were refunded in 2007. It should be known that the downstream lift station of Prairie Woods could only accommodate the 52 lots and that the upgrade at the lift station referenced under paragraph three of the 2008 agreement was to temporarily accommodate this subdivision until the Darrell Road Interceptor was installed, at which time the flow would be re-directed to the Darrell Road Interceptor.

Build-out of the Eastern Drainage Basin will be served primarily by the proposed Darrell Road Collection System. The conceptual design of the Darrell Road Collection System is geared towards minimizing or eliminating the need to construct several small lift stations throughout the system. With this result in mind, there would most likely be a few minor lift stations located in the lowest lying areas that straddle the Darrell Road Interceptor Sewer as it extends north through the basin. The phased implementation of the Darrell Road Collection System is discussed in detail later in this section.

Exhibit 3-4: Eastern Drainage Basin

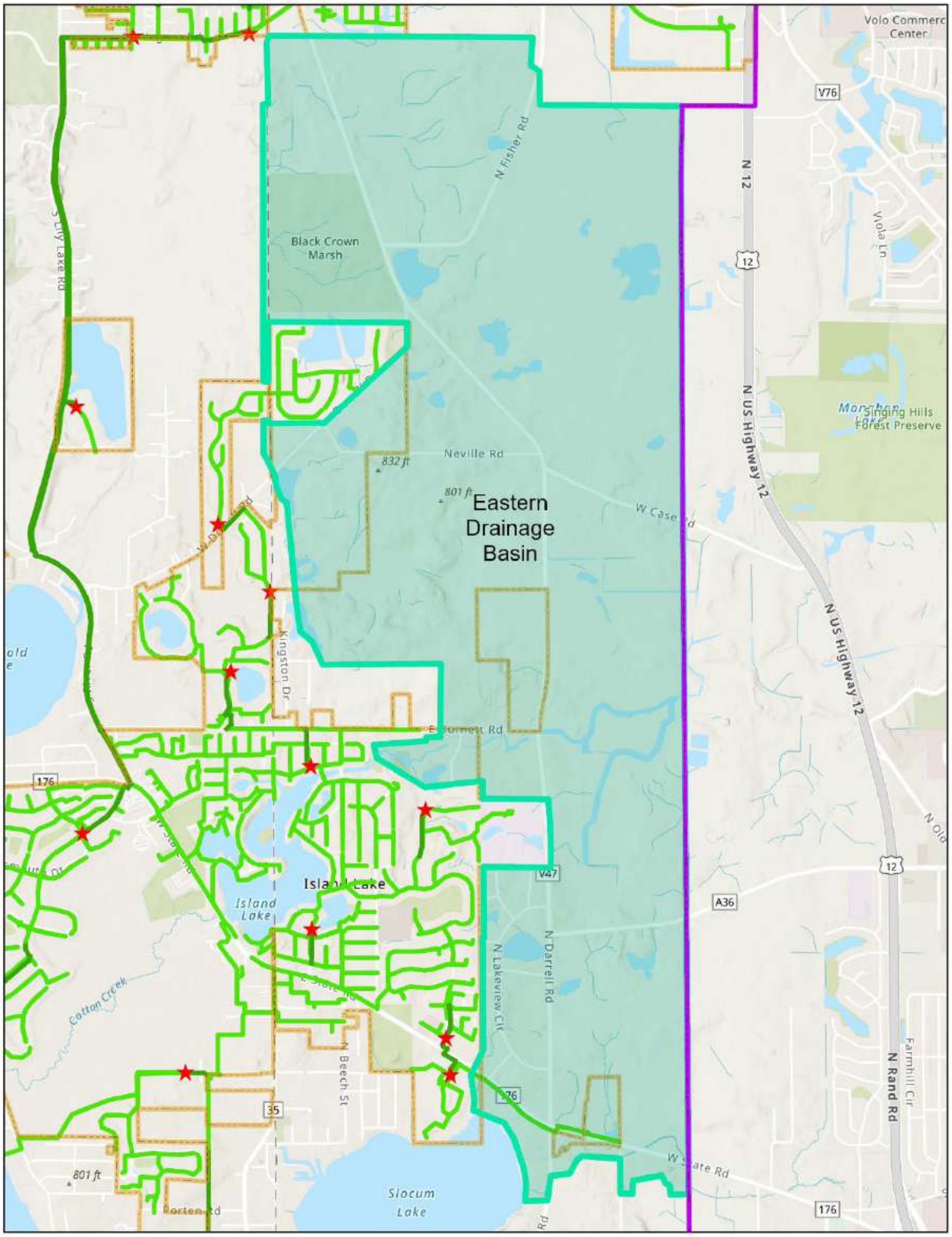


Table 3-9: Eastern Drainage Basin PE and Flow Conditions

2023 CONDITIONS			
Drainage Basin	**Current PE**	**ADDF (MGD)**	**PHF (MGD)**
Eastern Basin	14	0.001	0.005
BUILD-OUT CONDITIONS			
Drainage Basin	**Future PE**	**ADDF (MGD)**	**PHF (MGD)**
Eastern Basin	3,525	0.35	1.19

3.5.3 Near East Drainage Basin

The Near East Drainage Basin is located to the northeast of the NMWRD treatment facility. The extents of the Near East Drainage Basin and the existing collection system are shown on Exhibit 3-5. The Near East Basin encompasses a total of 504 acres, of which 277 acres are currently annexed to the Northern Moraine WRD. The basin currently contributes about 2,214 PE. Build-out within the existing District corporate boundaries could contribute an additional 702 PE. Complete build-out of this basin could contribute an additional 864 PE for an ultimate total of 3,077 PE.

This basin is served by a 12-inch gravity interceptor sewer that extends from its connection to the Main Interceptor north to and then southeast along Route 176. It was shown in the Route 176 East Interceptor 12-inch capacity and design flow table, Table 3-5. that this interceptor has sufficient capacity for the current flows and projected flows at build-out of the existing District corporate boundaries.

The projected overload conditions in the Route 176 East Interceptor are proposed to be relieved by construction of the lower reaches of the Darrell Road Collection System, specifically the Treatment Plant Interceptor as discussed later in this Section.

The Westridge, Water's Edge, Burr Oak and South Shore Lift Stations serve the Near East Drainage Basin (see Section 4).

Exhibit 3-5: Eastern Drainage Basin PE and Flow Conditions

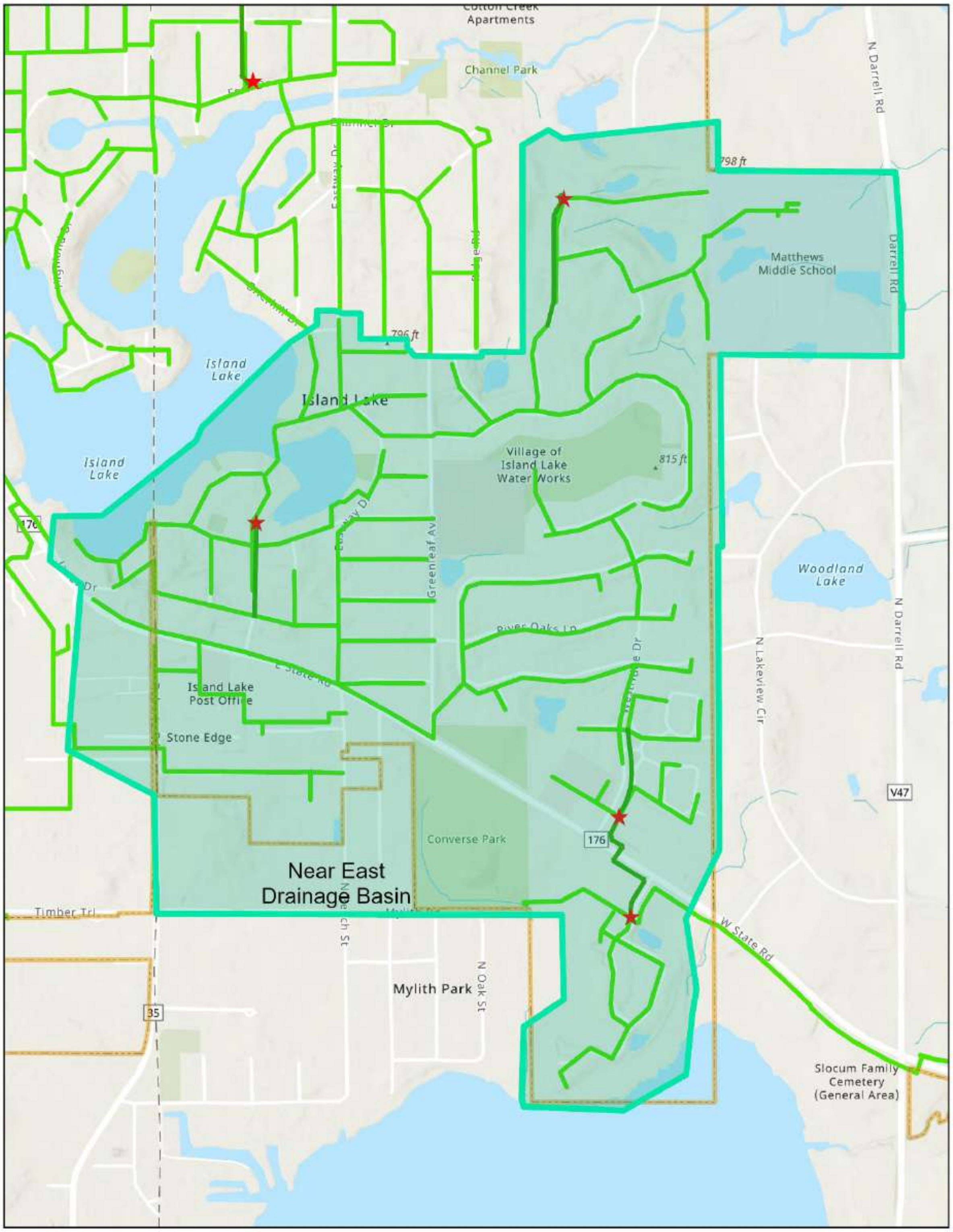


Table 3-10: Near East Drainage Basin PE and Flow Conditions

2023 CONDITIONS			
Drainage Basin	**Current PE**	**ADDF (MGD)**	**PHF (MGD)**
Near East Basin	2,214	0.164	0.581
BUILD-OUT CONDITIONS			
Drainage Basin	**Future PE**	**ADDF (MGD)**	**PHF (MGD)**
Near East Basin	3,077	0.25	0.86

3.5.4 Northeastern Drainage Basin

The Northeastern Drainage Basin includes the eastern half of the Village of Lakemoor. The extents of the Northeastern Drainage Basin and the existing collection system are shown on Exhibit 3-7. The Northeastern Basin encompasses a total of 1,676 acres, of which 525 acres are currently annexed to the Northern Moraine WRD. It currently includes 2,496 PE with the potential to connect an additional 8,847 PE, for an ultimate total of 11,343 PE. The existing collection system includes nearly 7 miles of sanitary sewers and three lift stations, Woodman's, and Lakemoor Lift Stations 6 and 7 (see Section 4).

The entire Northeastern Drainage Basin is currently tributary to Lakemoor Lift Station 7. Wastewater is pumped through a 12-inch diameter, 19,000 lineal foot force main to the 24-inch Route 176 West Interceptor. Currently, the amount of development that can occur in this drainage basin is governed by the capacity of Lakemoor Lift Station 7. Based on future PE projections, neither this lift station, nor the downstream Route 176 West Interceptor Sewer will be able to serve complete build-out of this drainage basin.

The extension of increased conveyance capacity to the Northeast Basin is proposed to include adding a third pump to Lakemoor Lift Station 7 and rerouting the force main from Lift Station 7 eastward to the uppermost reach of the proposed Darrell Road Interceptor.

Exhibit 3-6: Northeastern Drainage Basin

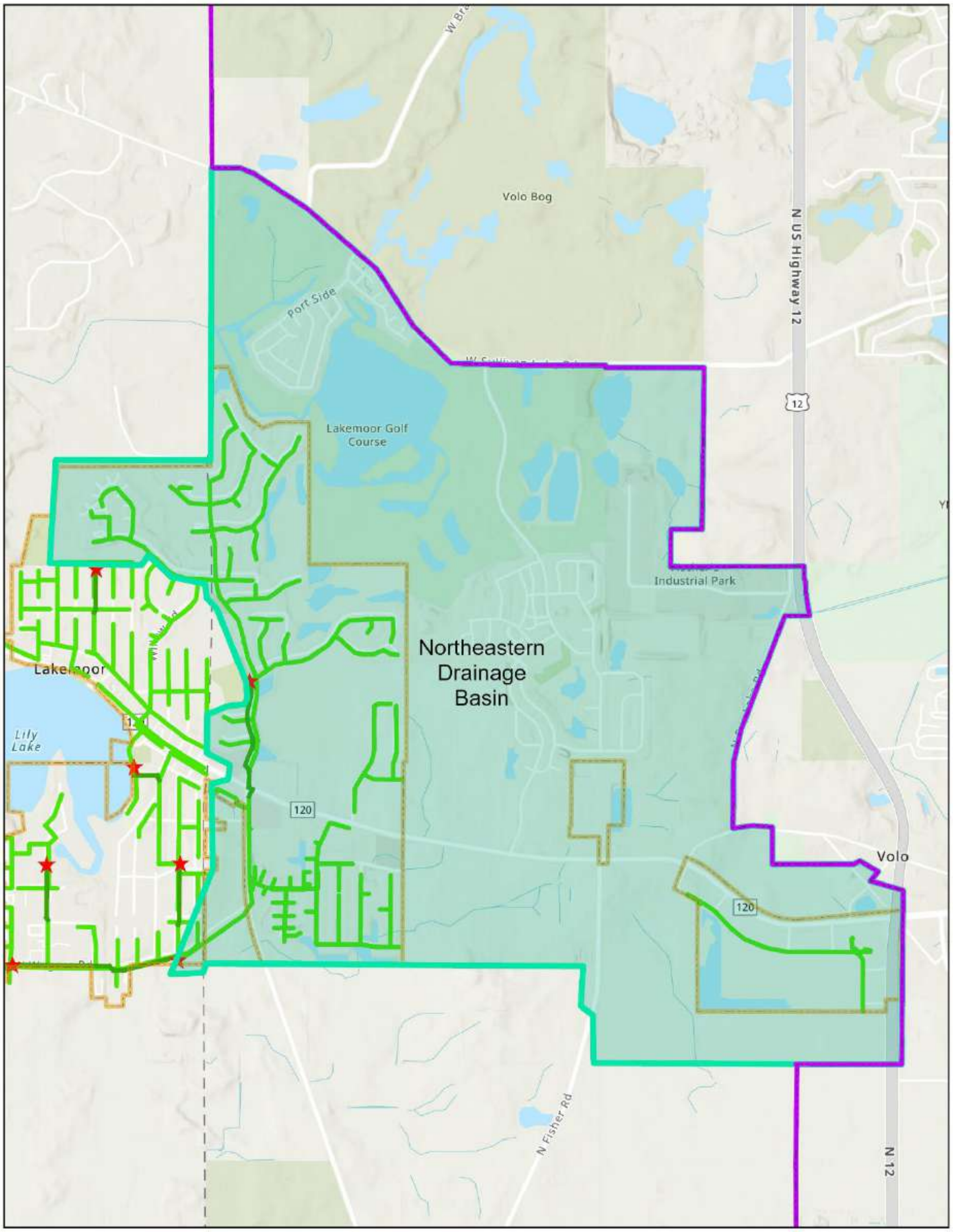


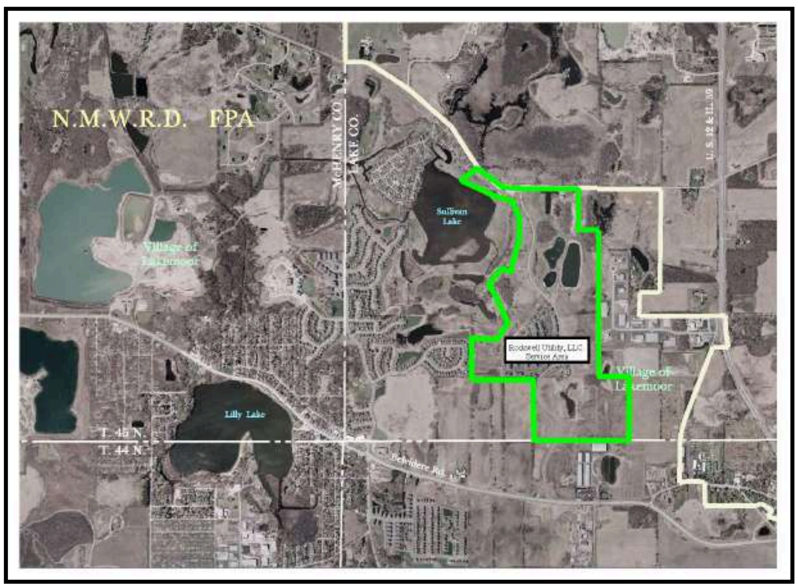
Table 3-11: Northeastern Drainage Basin PE and Flow Conditions

2023 CONDITIONS			
Drainage Basin	**Current PE**	**ADDF (MGD)**	**PHF (MGD)**
Northeastern Basin	2,496	0.184	0.647
BUILD-OUT CONDITIONS			
Drainage Basin	**Future PE**	**ADDF (MGD)**	**PHF (MGD)**
Northeastern Basin	11,343	1.07	3.10

Future Connection - Rockwell Utilities

Rockwell Utilities, LLC serves the Rockwell Place Development consisting of four neighborhoods. Exhibit 3-8 shows the Rockwell Utility service area. It is in the Northeastern Basin north of Route 120 and south of Sullivan Lake Road. Rockwell Utilities private treatment system consists of a two-cell aerated lagoon, winter storage lagoon, disinfection by chlorination and disposal by irrigation. The system is designed to serve 3,210 P.E. contributing an average flow of 321,000 gpd.

Exhibit 3-7: Rockwell Place Development Boundary



Rockwell Utilities 2018 WWTP Operating Reports indicate the Average Daily Flow is 101,851 gpd. Maximum Flow occurred in November 2018 at 263,057 gpd. Jupiter Apartments includes 496 apartments, or roughly 992 P.E. Kirk Homes has completed 91 single family homes and 138 townhomes, which equates to 802 P.E. It is therefore estimated that 1,794 P.E are currently connected to the Rockwell Utilities' system and a calculated peak flow is 0.39 MGD.

Capacity Analysis

Exhibit 3-8: Rockwell Place Proposed Connection

The following capacity analysis was performed on the District's existing infrastructure that Rockwell Utilities would be tributary to if connected. It is proposed that flow tributary to the existing Rockwell Utilities WWTP pump station (capacity to be verified) through a new force main down Sullivan Lake Boulevard and discharge to the District's 8" force main on Route 120. The 8" force main terminates at a manhole in front of the Village of Lakemoor Village Hall and a 21" sewer conveys flow to Lakemoor Lift Station #7 at the intersection of Wegner Road and Venice Road. The lift station pumps flow via a 12" force main to the 24" Route 176 West Interceptor Sewer and to the District's wastewater treatment plant.

<u>8" HDPE Rte. 120 Force Main</u>

Force Main Size:	8 inches
Current Connected Flow without Rockwell Utilities:	260 gpm
Force Main Velocity:	1.64 fps (acceptable)
Connected Flow with Rockwell Utilities:	560 gpm *
Force Main Velocity:	3.53 fps (acceptable)

** Assumes Rockwell Utilities is 300 gpm firm pumping capacity*

<u>Lakemoor Lift Station #7</u>

Firm Capacity (3-pumps):	1,000 gpm
Current Average Flow:	138 gpm *
Current Peak Flow:	497 gpm
Surplus without Rockwell Utilities:	503 gpm
Projected Average Flow with Rockwell Utilities	263 gpm
Projected Peak Flow:	881 gpm
Surplus with Rockwell Utilities:	119 gpm

<u>Rte 176 West 24" Interceptor</u>

Sewer Capacity:	4.02 MGD
Current Connected Flow without Rockwell Utilities Connection:	2.909 MGD *
Connected Flow with Rockwell Utilities Connection:	3.36 MGD

Projected Capacity Used: 84%

The above capacity analysis indicates that there is available capacity in the District's infrastructure to connect the existing sewer users within the Rockwell Development to the District's system.

Rockwell Pump Station and Sullivan Lake Force Main- Engineer's Estimate of Probable Construction Cost

The probable capital cost to construct a new 4,900 LF, 8" diameter force main from the existing Rockwell Utilities pump station to the District's 8" diameter force main on Route 120 is $2,350,000.

3.5.5 Northwestern Drainage Basin

The Northwestern Drainage Basin drains the entire west side of the Village of Lakemoor. The extents of the Northwestern Drainage Basin and the existing collection system are shown on Exhibit 3-10. The Northwestern Basin encompasses a total of 3,449 acres, of which 327 acres are currently annexed to the Northern Moraine WRD. The Northwestern Basin currently serves roughly 1,794 PE, all within the Village of Lakemoor. Complete build-out of this basin will contribute an additional 11,970 PE for an ultimate total of 13,764 PE.

The Northwestern Basin collection includes nearly 4 miles of sanitary sewers, four small lift stations (Lakemoor Lift Stations 2, 3, 4, and 5), and one major lift station (Lakemoor Lift Station 1). The entire drainage basin is tributary to Lakemoor Lift Station 1 (located near the intersection of Wegner Road and Fritzsche Road) which pumps wastewater through an 8-inch diameter, 16,500 lineal foot long force main to the 24-inch Route 176 West Interceptor.

Exhibit 3-9: Northwestern Drainage Basin

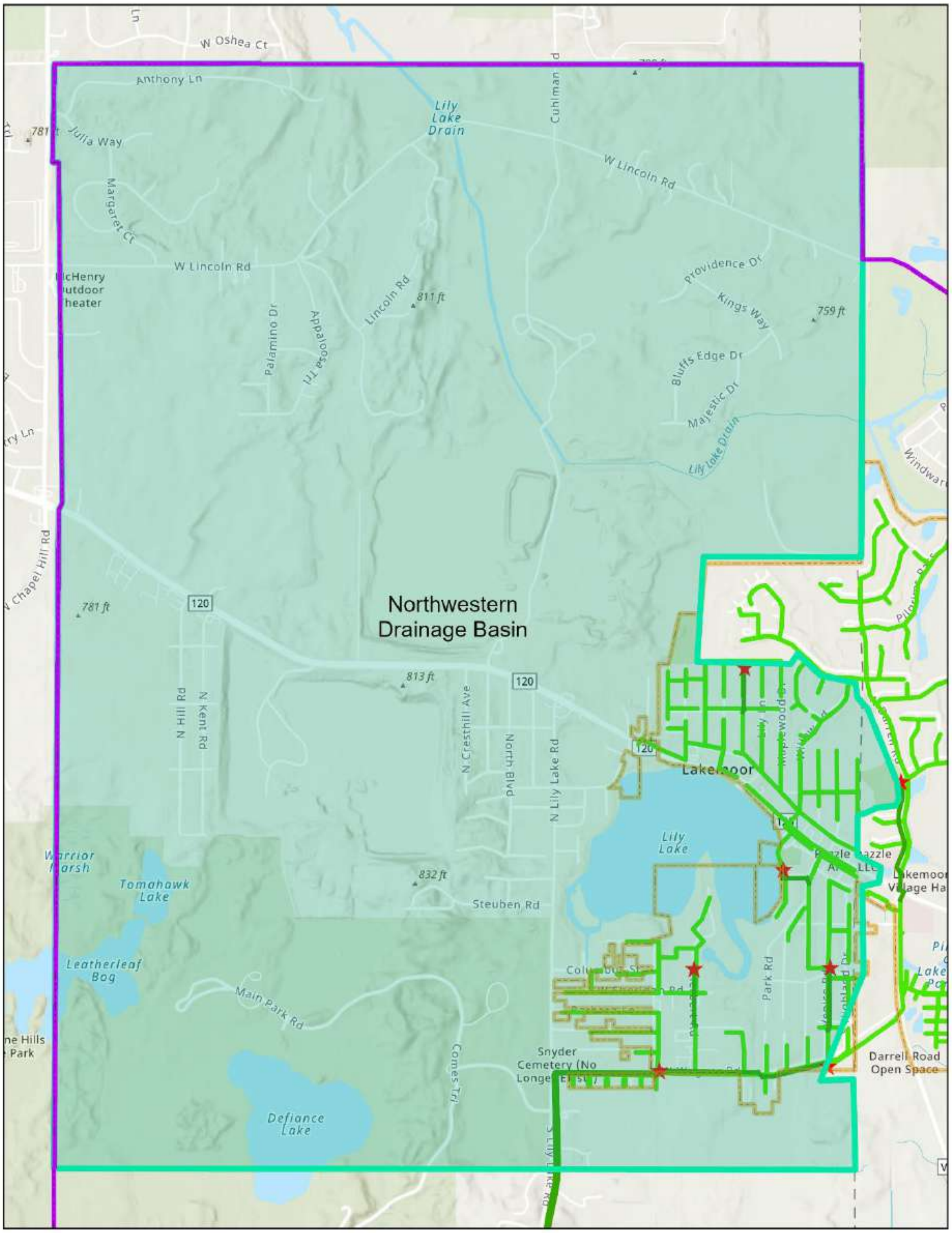
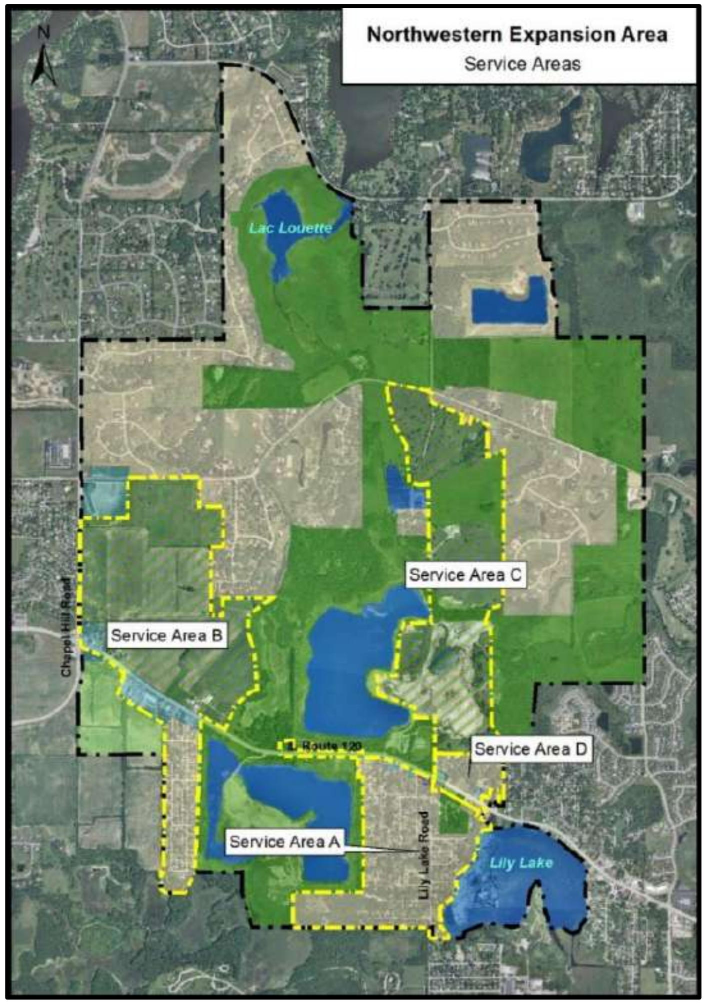


Table 3-12: Northeastern Drainage Basin PE and Flow Conditions

2023 CONDITIONS			
Drainage Basin	**Current PE**	**ADDF (MGD)**	**PHF (MGD)**
Northwestern Basin	1,794	0.133	0.480
BUILD-OUT CONDITIONS			
Drainage Basin	**Future PE**	**ADDF (MGD)**	**PHF (MGD)**
Northwestern Basin	13,764	1.33	3.74

Future Development



A more in-depth study of necessary extensions of the collection system to serve the Northwestern Expansion Area was conducted in 2012. The existing infrastructure serving the Northwestern Basin, while having some reserve capacity to accommodate additional flows, does not have the additional capacity necessary to accept the estimated flow from the proposed NW Expansion Area. Instead, it is proposed that wastewater from the NW Expansion Area be combined with flows from the Existing Northwestern Drainage Basin via the 8-inch diameter force main from Lift Station 1. The combined flows would then be routed through the 8-inch diameter force main to the Route 176 Interceptor Sewer.

Lift Stations 1 and 7 (serving the Northwestern and Northeastern Drainage Basins) are adequately sized to accommodate flows from their current drainage areas; however, the addition of the proposed tributary lift station (Lift Station A) may require replacing the pumps in the existing lift stations to overcome the head condition created by adding Lift Station A. The lift station upgrades and the corresponding cost should be taken into consideration during the design phase.

Prior to the full development of the NW Expansion Area, additional conveyance capacity will be required. This may be accomplished by diverting flows from Lift Station #7 (currently flowing to the treatment plant via a 12-inch diameter force main) to the future Darrell Road Interceptor Sewer. This may provide sufficient capacity in the existing 8-inch and 12-inch diameter force mains to accommodate flows from the fully developed NW Expansion Area as well as from the Northwestern Drainage Basin.

Exhibit 3-10: NW Expansion Area Proposed

Service Area A:

Two thousand feet of 21-inch diameter pipe will convey flow from Service Area A as well as flows from all other Service Areas to the proposed Lift Station A on Lily Lake Road and Beach Avenue. This lift station is located at the low point of this Service Area at a ground elevation of 750 feet and will pump all flows through a 3,000 lineal foot, 12-inch diameter force main to the existing 8-inch diameter force main at Lily Lake Road and Wegner Road. The northern portion of Service Area A will be served by 2,900 lineal feet of 15-inch diameter sewer and will also convey wastewater from Service Area B to the 21-inch diameter trunk sewer.

Service Area B:

Approximately 1,300 lineal feet of 8-inch diameter sewer and 1,400 lineal feet of 15-inch diameter sewer will serve Service Area B. All wastewater from Service Area B will be conveyed to Lift Station B located on Illinois Route 120 near Kent Road at low point (ground elevation = 762 feet). The wastewater will be pumped through an 8-inch diameter, 1,600 lineal foot force main. The force main will connect to the 21-inch diameter trunk sewer within Service Area A via a 15-inch diameter sewer which also serves a portion of Service Area A.

Service Area C:

The northern portion of Service Area C will be served by a small lift station (Lift Station C-1) and a 6-inch diameter, 2,600 lineal foot force main to Lift Station C-2. Lift Station C-2 and an 6-inch diameter, 3,400 lineal foot long force main will collect and convey flows from tributary Service Areas C-2 and C-3 as well as from Service Area C-1 to the 21-inch diameter trunk sewer at the intersection of Illinois Route 120 and Lily Lake Road.

Service Area D:

The smallest of the four Service Areas is Service Area D. Two (2) 1,100 lineal feet, 8-inch diameter sewers on either side of Illinois Route 120 will convey flows from existing Neighborhood Residential and Commercial properties, as well as any additional future Neighborhood Residential properties within Service Area D to the 21-inch diameter trunk sewer at Illinois Route 120 and Lily Lake Road.

3.5.6 South Central Drainage Basin

The extents of the South Central Drainage Basin and the existing collection system are shown on Exhibit 3-12. The South Central Basin encompasses a total of 1,335 acres, of which 534 acres are currently annexed to the Northern Moraine WRD.

The South Central Drainage Basin currently includes approximately 394 PE. Current development within this basin is located to the south of the NMWRD treatment facility. Development of this basin could contribute an additional 3,544 PE at build-out for an ultimate total of 3,938 PE.

This basin is tributary to a 10-inch gravity interceptor sewer that flows north 4,300 lineal feet through the center of the basin and directly to the wastewater treatment plant. This basin serves a portion of the Village of Island Lake and is bounded to the west by the Fox River and to the East by Slocum Lake. The Treatment Plant Lift Station serves all development within the South Central Basin. This station will be further examined in Section 4.

Exhibit 3-11: South Central Drainage Basin

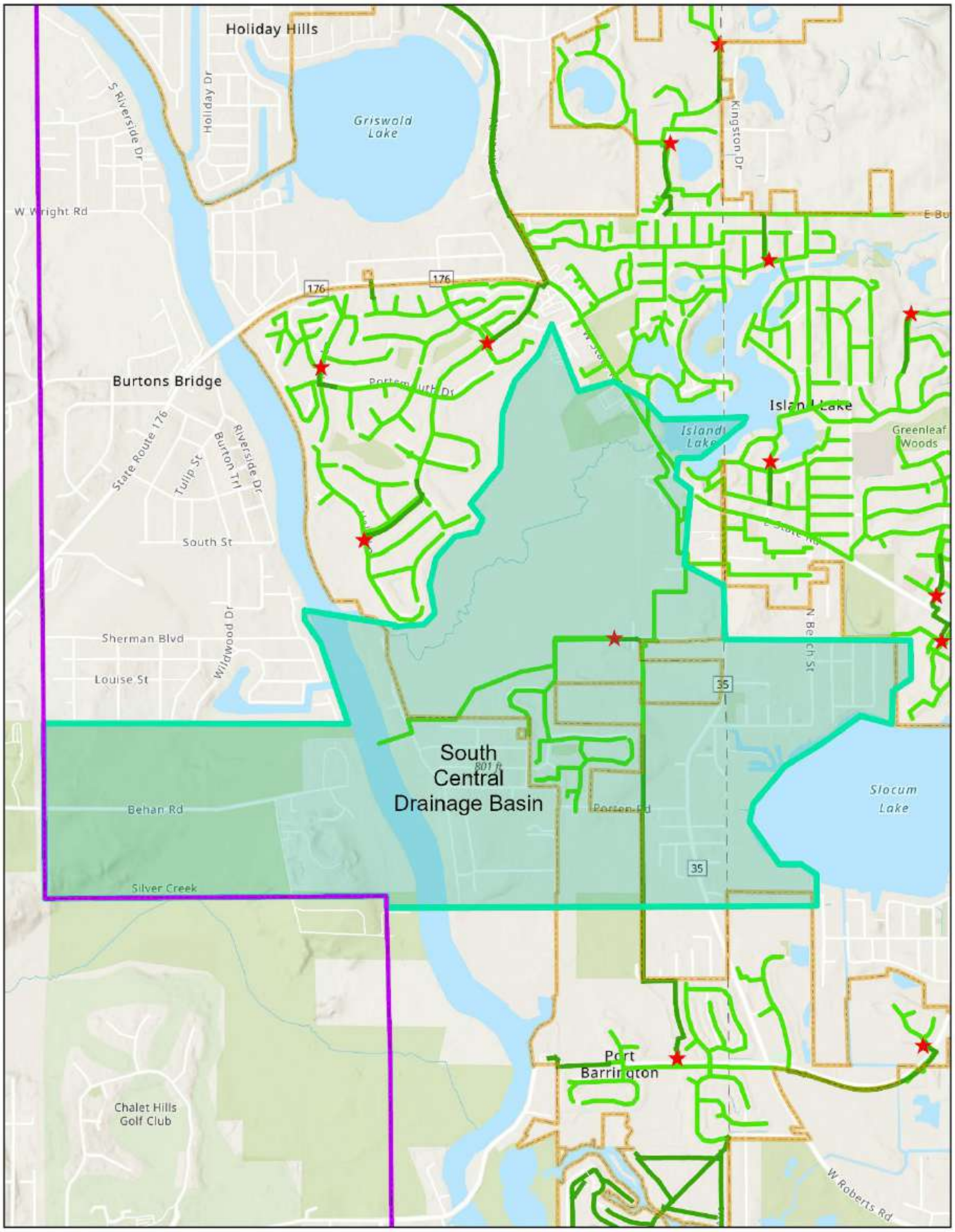


Table 3-13: South Central Drainage Basin PE and Flow Conditions

2023 CONDITIONS			
Drainage Basin	**Current PE**	**ADDF (MGD)**	**PHF (MGD)**
South Central Basin	394	0.029	0.117
BUILD-OUT CONDITIONS			
Drainage Basin	**Future PE**	**ADDF (MGD)**	**PHF (MGD)**
South Central Basin	3,938	0.38	1.28

3.5.7 Southern Drainage Basin

The Southern Drainage Basin currently encompasses areas of development in the southernmost portion of the District, including areas north of the Fox River and south of Slocum Lake. The extents of the Southern Drainage Basin and the existing collection system are shown on Exhibit 3-13.The Southern Basin encompasses a total of 2,249 acres, of which 498 acres are currently annexed to the Northern Moraine WRD.

This basin has grown to serve the Deer Grove North Subdivision in The Village of Port Barrington, which connects to District sewers via a low-pressure sewer system. The basin currently includes approximately 1,231 PE, with development having the potential to contribute an additional 6,559 PE at build-out for an ultimate total of 7,790 PE.

The Rawson Bridge Road Lift Station pumps wastewater flow from this drainage basin north through a 10-inch 5,600 lineal foot force main and includes flow pumped from the Deer Grove Lift Station. The force main from Rawson Bridge Road discharges to a 15-inch gravity sewer directly south of the treatment facility. These lift stations are discussed in Section 4.

Exhibit 3-12: Southern Drainage Basin

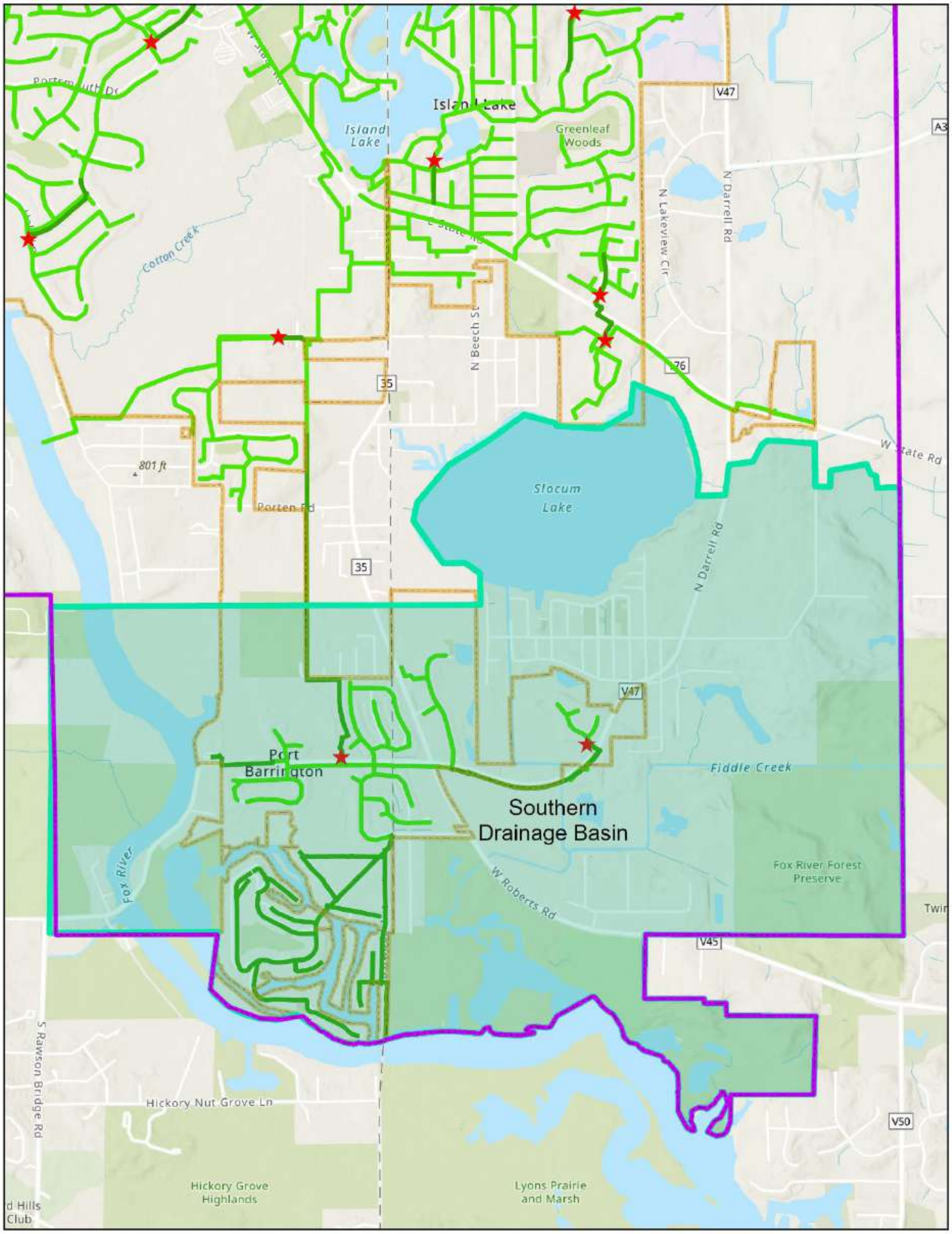


Table 3-14: Southern Drainage Basin PE and Flow Conditions

2023 CONDITIONS			
Drainage Basin	**Current PE**	**ADDF (MGD)**	**PHF (MGD)**
Southern Basin	1,231	0.091	0.340
BUILD-OUT CONDITIONS			
Drainage Basin	**Future PE**	**ADDF (MGD)**	**PHF (MGD)**
Southern Basin	7,790	0.75	2.29

3.5.8 Waterford Drainage Basin

The Waterford Drainage Basin is located northwest of the treatment facility and is bounded by the Fox River to the west and Route 176 to the north. The extents of the Waterford Drainage Basin and the existing collection system are shown on Exhibit 3-14.The basin encompasses a total of 2,145 acres, of which 957 acres are currently annexed to the Northern Moraine WRD.

The Waterford Drainage Basin currently contributes 3,045 PE. At build-out, this basin could contribute an additional 8,106 PE for an ultimate total of 11,151 PE. This includes the Village of Holiday Hills as well as residential areas located west of the Fox River in unincorporated McHenry County.

This basin currently serves a portion of the Village of Island Lake and includes Hale 1, Hale 2, Holiday Hills, and Waterford Lift Stations. The lift stations are discussed in Section 4. The Waterford Lift Station pumps wastewater the south portion of the basin through an 8-inch 1,200 lineal foot long force main to the 24-inch Route 176 Interceptor sewer. The Holiday Hills Lift Station pumps wastewater from Holiday Hills to the existing 12” force main from Lakemoor Lift Station 7.

Exhibit 3-13: Waterford Drainage Basin

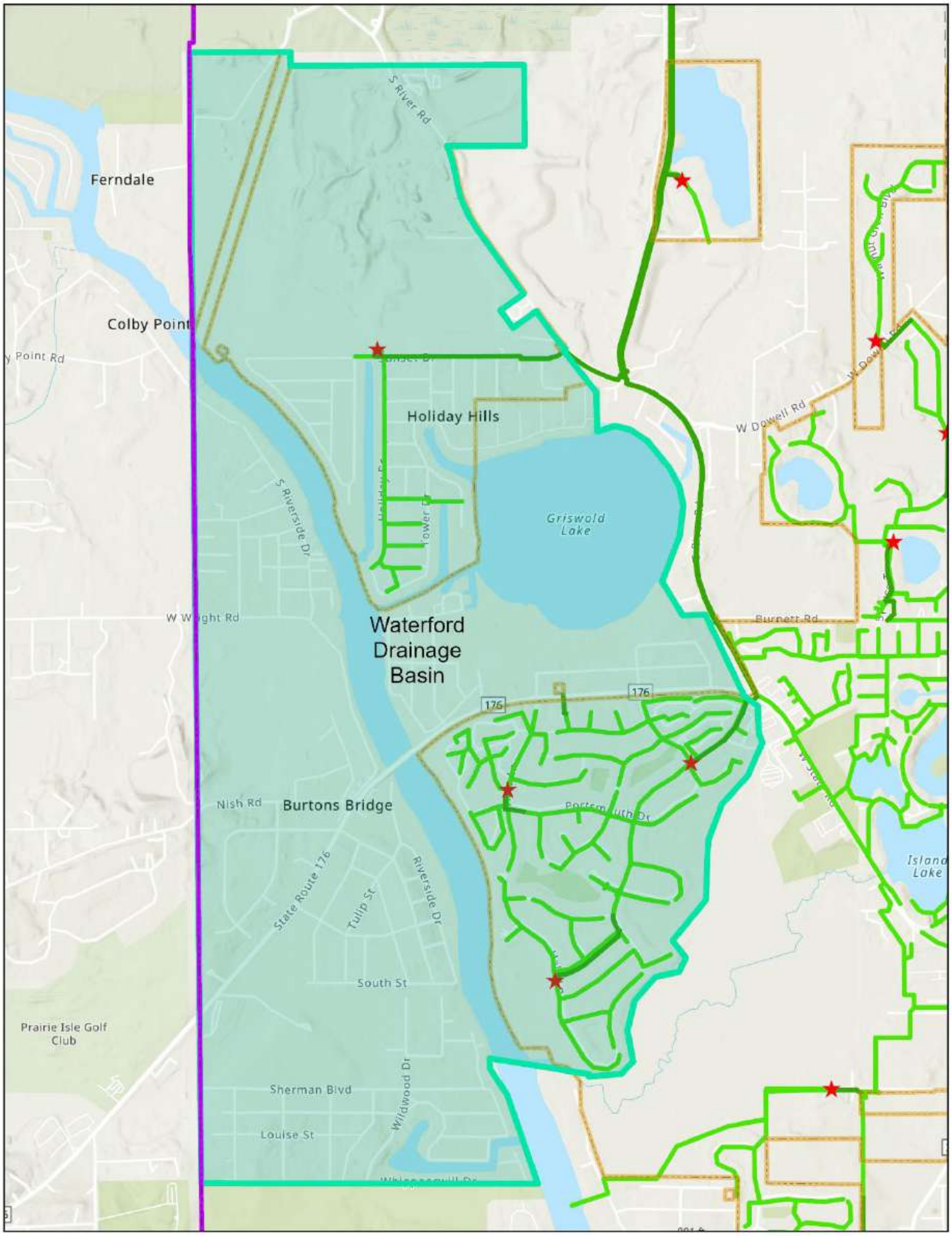


Table 3-15: Waterford Drainage Basin PE and Flow Conditions

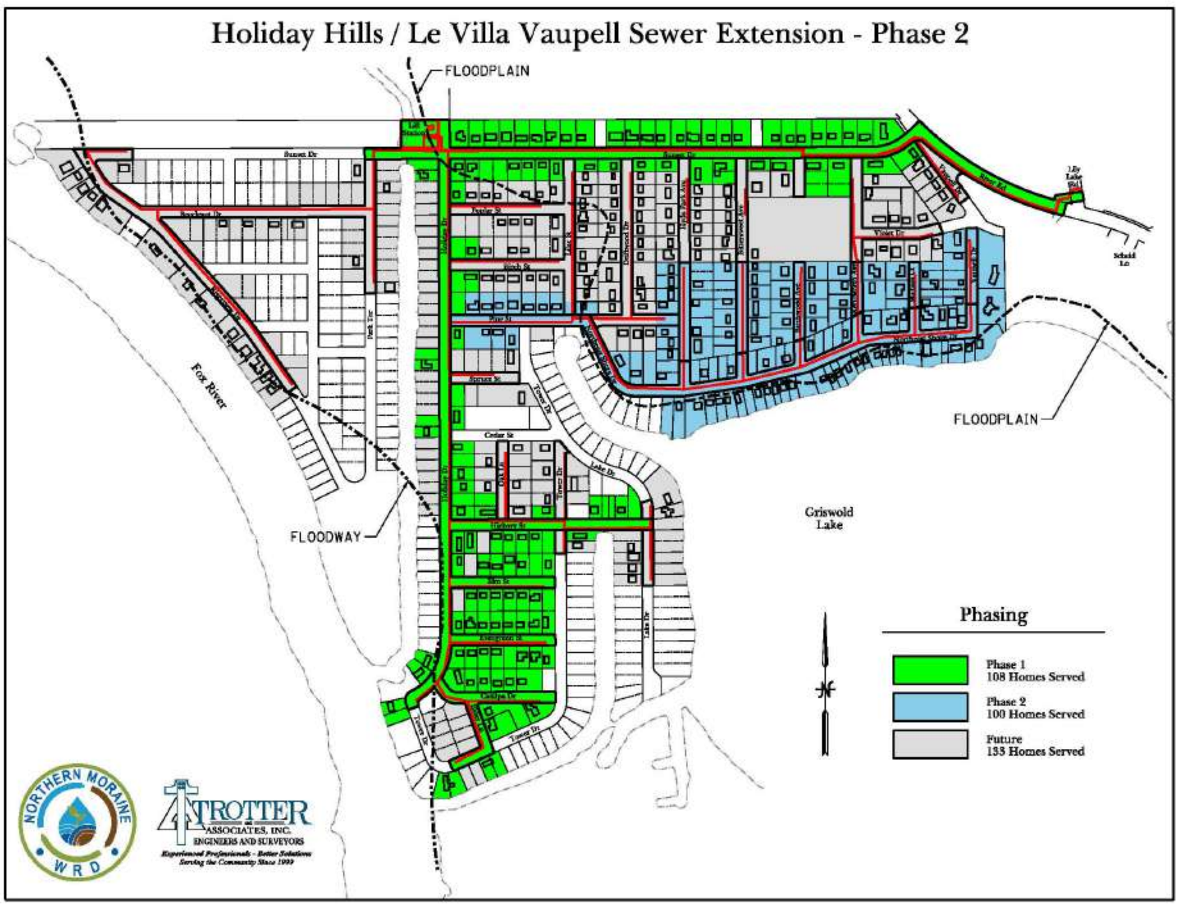
2023 CONDITIONS			
Drainage Basin	**Current PE**	**ADDF (MGD)**	**PHF (MGD)**
Waterford Basin	3,045	0.225	0.773
BUILD-OUT CONDITIONS			
Drainage Basin	**Future PE**	**ADDF (MGD)**	**PHF (MGD)**
Waterford Basin	11,151	1.04	3.01

Holiday Hills

Upon completion of all phases, the Village of Holiday Hills sewer extension project will provide sanitary sewer service to the 335 single family residences in the Village of Holiday Hills and in the Le Villa Vaupell subdivision (1,172.5 PE). Residents currently own and maintain private septic systems; however, are prone to flooding being adjacent and within the floodplain of the Fox River. Phase 1 of the multi-phase project was completed in 2023 and provides sanitary sewer access to 108 homes. Phase 2 commenced in 2024 and will provide sanitary sewer service to an additional 100 homes.

Currently, many residents experience trouble related to the overloading of their private septic system. This is more prevalent for residents whose septic systems are located in the Fox River Floodway or Floodplain or become submerged during wet weather conditions. During these events, onsite septic systems are not operational, cannot be used and can pose safety hazards and public health concerns. Residents within the project area, particularly those on small properties with critical soil conditions or are subject to flooding, will greatly benefit from the proposed sewer extension.

Exhibit 3-14: Holiday Hills Sewer



The elimination of over three hundred private septic systems located in the Fox River Floodway, Floodplain, and their tributary canals, would greatly improve the region's water quality. Data suggests that failing or overloaded septic systems along the Fox River contribute significantly more fecal coliform bacteria than sewage treatment plant discharges. The systematic removal of septic systems in the Fox River Valley is highly endorsed by the Fox River Study Group and the District. The District will incorporate all required environmental protective and mitigative measures identified by Environmental Regulating Agencies to avoid adversely impacting protected resources in the vicinity of the project, including the Cotton Creek Marsh Nature Preserve and Moraine Hills State Park.

The project includes construction of a sanitary sewer collection system (gravity and low-pressure sewer) connected to the District by existing force main located east of the Village of Holiday Hills on River Road. Residents would be disconnected from their private septic systems upon connection to the proposed sanitary sewer.

The construction cost of the remaining sewer extension beyond Phase 2 is approximately $6,663,000.

Future development north of Sunset Drive, 3 lots/acre was assumed to estimate future PE. It was also assumed that half of the existing area will be buildable. This equates to 371 future homes. The total peak flow for the area shown below will be 800 GPM and will feed to the newly constructed Holiday Hills Lift Station. The red outline in the exhibit below shows the full future development site north of Sunset Drive, and the white areas indicate wetlands that cannot be built on.

Exhibit 3-15: Future Development North of Sunset Drive of Holiday Hills

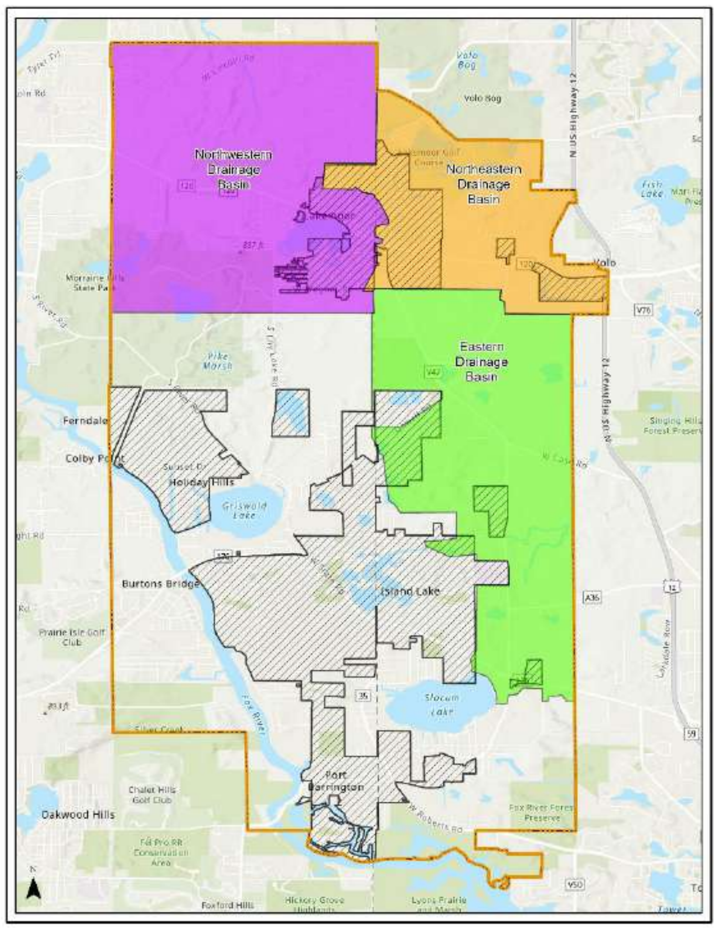
3.6 Darrell Road Interceptor Sewer

The Darrell Road Unsewered Facilities Project is a proposed solution to provide sanitary sewer service to future development, particularly in the Northeastern and Eastern Drainage Basins. It also provides the flexibility to reroute flow from built-out areas in the Northeastern Basin thereby off-loading the existing downstream sewers and lift stations within the Northwestern Basin. The ultimate phased solution to serve the Darrell Road Facilities Service Area was originally recommended in the 2004 Facility Plan Update. The Northeastern and Eastern Drainage Basins are directly benefited by the proposed Collection System. The Northwestern Drainage Basin is indirectly benefited by the Collection System due to off-loading tributary flow to it.

Funding and timing of the Darrell Road Unsewered Facilities has always been contingent upon development within the Eastern Basin. During compilation of the 2014 Wastewater Facility Plan Update the District acknowledged that previously anticipated development within the Eastern Basin had been postponed indefinitely. Because of that, a lesser cost alternative method, an Interim Solution, was conceived that would allow for growth to continue in the Northwestern and Northeastern Basins by constructing a completely pumped system to serve the northernmost reaches of the FPA.

3.6.1 Darrell Road Collection System Interim Solution

Exhibit 3-16: Darrell Road Facilities Service Area



This includes upgrades to Lakemoor Lift Station 7 and construction of a new force main from the Northeastern Basin to the intersection of Darrell Road and Route 176, as well as completion of a 42-inch Treatment Plant Interceptor from the NMWRD treatment facility to the Water's Edge Lift Station and construction of a new Headworks Facility at the NMWRD treatment plant. The District would be able to construct all other phases of the Darrell Road Facilities Ultimate Solution if and when the Eastern Basin is developed.

The Darrell Road Unsewered Facilities Project will provide sanitary sewer service to future development within the northernmost reaches of the District's Facility Planning Area, including the Village of Lakemoor, Village of Island Lake, Village of Volo, and the surrounding unincorporated County of McHenry. The District will incorporate all required environmental protective and mitigative measures identified by Environmental

Regulating Agencies to avoid adversely impacting protected resources in the vicinity of the project, including the Volo Bog State Natural Area.

The District has already constructed a section of the Darrell Road Facilities from the Water's Edge Lift Station to the intersection of Darrell Road and Route 176. A phased approach to constructing the remainder of the Darrell Road Facilities is shown in Exhibit 3-18 and described below.

Phase 1A – Headworks Facility

Phase 1A includes construction of a new Headworks Facility at the NMWRD treatment plant to accommodate the new Darrell Road Interceptor Sewer. It will be located adjacent to the existing screening channels and will include a new raw sewage wet well. The existing screening channel will remain in operation to screen septage received at the treatment plant.

Phase 1B - Treatment Plant Interceptor

Phase 1B will include roughly 4,420 lineal feet of 42-inch interceptor sewer to connect the existing 24-inch Water's Edge Interceptor to the NMWRD treatment plant and allow for the removal of the Water's Edge Lift Station. Final Design Engineering of the Treatment Plant Interceptor Sewer has been completed.

Phase 2 – Darrell Road Force Main

The Darrell Road Force Main includes roughly 20,500 lineal feet of 16-inch force main on Darrell Road from Lakemoor Lift Station #7 to Route 176 and Darrell Road. The proposed force main will discharge to the existing interceptor sewer on Route 176.

Phase 3 – Lift Station 7 Upgrades

Major modifications to Lift Station 7 are required to meet build-out conditions in the Northeastern Basin. Improvements to the lift station include larger pumping units, additional wet well volume, and replacement of power centers.

Exhibit 3-17: Darrell Road Interim Solution Collection

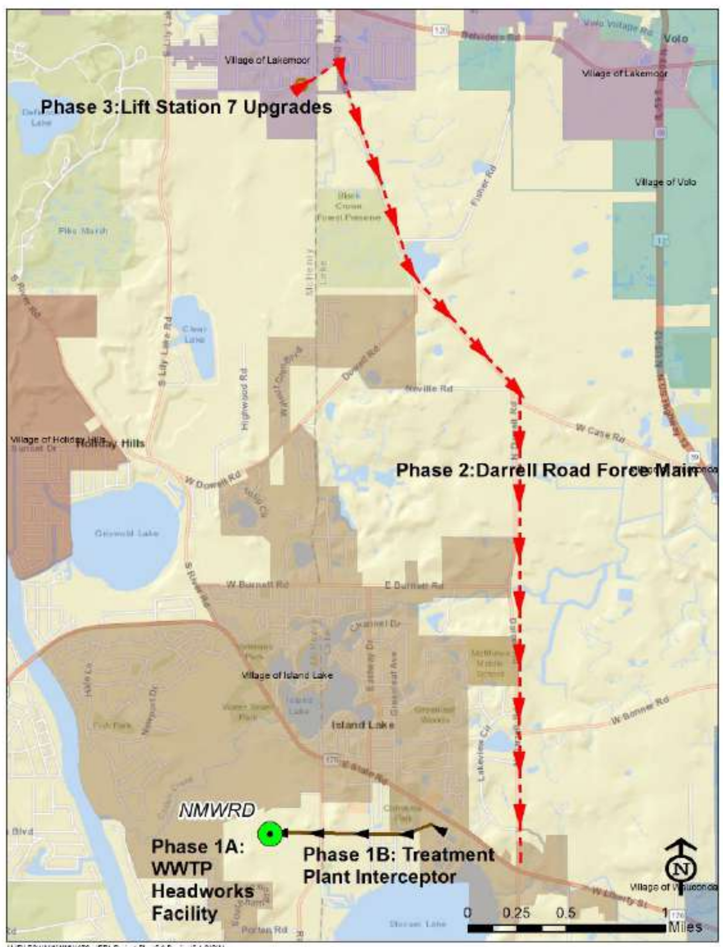
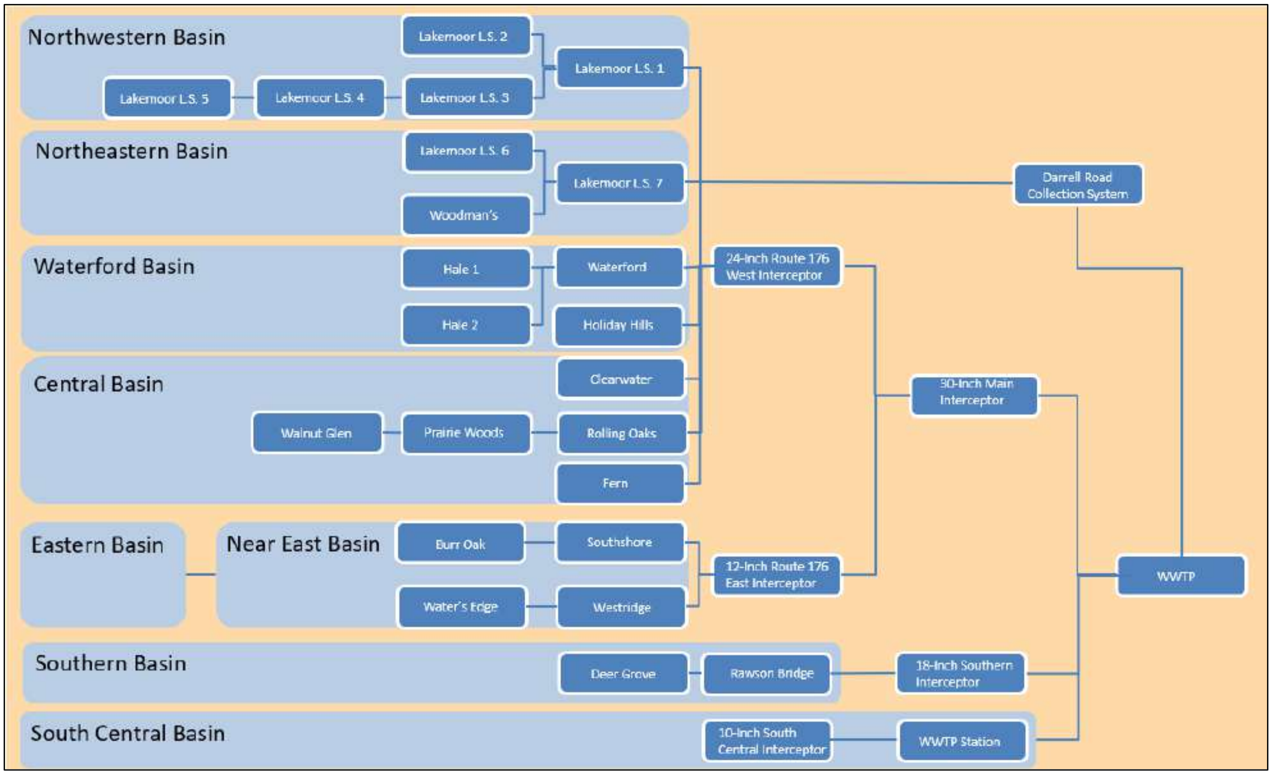


Exhibit 3-18: Darrell Road Collection System Schematic – Interim Solution



Construction Timeline

The Darrell Road Unsewered Facilities Project would need to be completed prior to exhaustion of the available capacity in the Route 176 West Interceptor in the Northwestern Basin. Available capacity in the Route 176 West Interceptor sewer is 3.1 MGD, or an additional 10,500 P.E. Construction of the Darrell Road Facilities Project should be initiated when 80% of the Route 176 West Interceptor Sewer capacity is utilized, or 4.3 MGD. This equates to an additional 6,500 PE connected and tributary to the 24" interceptor.

The District will need to monitor the lift station capacity upstream of the 24" interceptor, namely Lakemoor Lift Station 1 and 7 in the Northwestern and Northeastern Drainage Basins, respectively. Lakemoor LS 1 (duplex) has a firm capacity of 450 gpm, or approximately 1,800 PE. The estimated existing PE within the Northwestern basin is 1,794 PE. Capacity of Lakemoor LS 1 should be monitored when additional PE is connected.

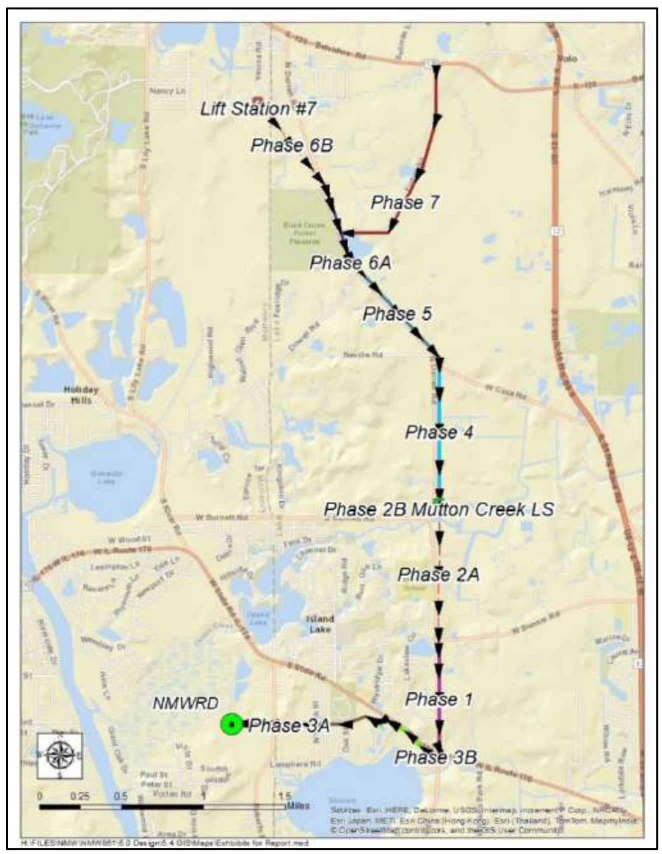
Lakemoor LS 7 is a triplex lift station with only two pumps currently installed. Lakemoor LS 7 has a firm capacity of 800 gpm, or approximately 3,400 PE. The estimated existing PE within the Northeastern basin is 2,496 PE. If the third pump is installed, the firm capacity will increase to 1,000 gpm, or approximately 4,365 PE.

The probable capital cost for the Darrell Road Unsewered Facilities Project is $29,238,000. The cost does not include any easement acquisition costs as may be necessary for the work. Detailed probable cost breakdowns of each phase are provided as Appendix ##.

Table 3-16: Probable Capital Costs - Darrell Road Collection System Interim Solution

Phase	Description	Probable Cost
1A	Headworks Facility	$5,621,000
1B	Treatment Plant Interceptor	$6,676,000
2	Darrell Road Force Main	$12,447,000
3	Lift Station 7 Upgrades	$4,494,000
TOTAL PROBABLE CAPITAL COSTS		**$29,238,000**

Exhibit 3-19: Darrell Road Ultimate Solution



3.6.2 Darrell Road Collection System Ultimate Solution

The ultimate solution phased approach to constructing the remainder of the Darrell Road Collection System is shown on Exhibit 3-20 and is described below.

Phase 1 - Darrell Road Interceptor (South)

The first phase of the Darrell Road Collection System would extend a 36-inch sanitary sewer 3,700 feet north along Darrell Road from Route 176 northeast to Bonner Road. This extension would serve Crown Properties as their land is developed. The upstream terminus manhole in this extension would be constructed to serve as the discharge manhole for the Phase 2 Mutton Creek Lift Station and force.

Phase 2A - Mutton Creek Force Main

Phase 2A of the Darrell Road Collection System would include the installation of 4,500 lineal feet of 16-inch force main from the proposed Mutton Creek Lift Station to the proposed Phase 1 interceptor at the intersection of Darrell and Bonner Roads.

Phase 2B - Mutton Creek Lift Station

Phase 2B of the Darrell Road Collection System would include the construction of the Mutton Creek Lift Station along Darrell Road near Burnett Road.

Phase 3A - Treatment Plant Interceptor

The Eastern Drainage Basin will include nearly 5,500 PE at build-out and would be served by a proposed 24-inch to 42-inch interceptor sewer that would be routed directly to the treatment facility. The District has already constructed a 2,800 lineal foot portion of this interceptor that runs along the south side of Illinois Route 176 from Water's Edge Drive to the Northeast corner of Illinois Route 176 and Darrell Road, as well as from Water's Edge Drive west to Oak Street.

Phase 3A will include roughly 4,800 lineal feet of 42-inch interceptor sewer to connect the existing 24-inch interceptor to the NMWRD treatment facility and allow for the removal of the Water's Edge Lift Station. This installation would be the catalyst for development north of Illinois Route 176 along Darrell Road.

Phase 3B - Water's Edge Interceptor Replacement

At some point in the future the District will need to increase capacity along Route 176 from Darrell Road to the Water's Edge Lift Station, either paralleling the existing 24-inch interceptor sewer or replacing it with 2,800 lineal feet of 36-inch sewer. The parallel sewer would provide additional capacity in this reach to serve all of the upstream connected areas.

Phase 4 - Darrell Road Interceptor (Central)

Phase 4 of the Darrell Road Collection System would extend a 36-inch sanitary sewer 4,700 lineal feet north along Darrell Road from the proposed Mutton Creek Lift Station north to Case Road. This extension would serve the surrounding properties along Darrell Road from Mutton Creek to Case Road, including Crown Property.

Phase 5 - Darrell Road Interceptor (North)

Phase 5 would extend a 24-inch sanitary sewer 4,000 lineal feet northwest along Darrell Road from Case Road to Dowell Road. This extension would serve the surrounding properties along Darrell Road from Case Road to Dowell Road, including the Crown Property.

Phase 6A - Darrell Road Interceptor (Far North)

Phase 6A would extend a 24-inch sanitary sewer northwest roughly 3,000 lineal feet along Darrell Road from Dowell Road to roughly 3,500 lineal feet south of Wegner Road. This sewer extension will receive the re-directed pumped flow from Lakemoor Lift Station 7.

Phase 6B - Lakemoor Lift Station 7 Force Main

Topographic constraints prevent the Phase 6A interceptor from being extended by gravity all the way into the Village of Lakemoor. Therefore, Phase 6B will include re-routing the force main from Lakemoor Lift Station 7, located at the intersection of Darrell Road and Wegner Road, to pump through a 16-inch 3,500 lineal foot long force main to discharge at a manhole located at the upstream terminus of the Phase 6A interceptor sewer. The Village's existing 24-inch interceptor sewer would then become tributary to this installation.

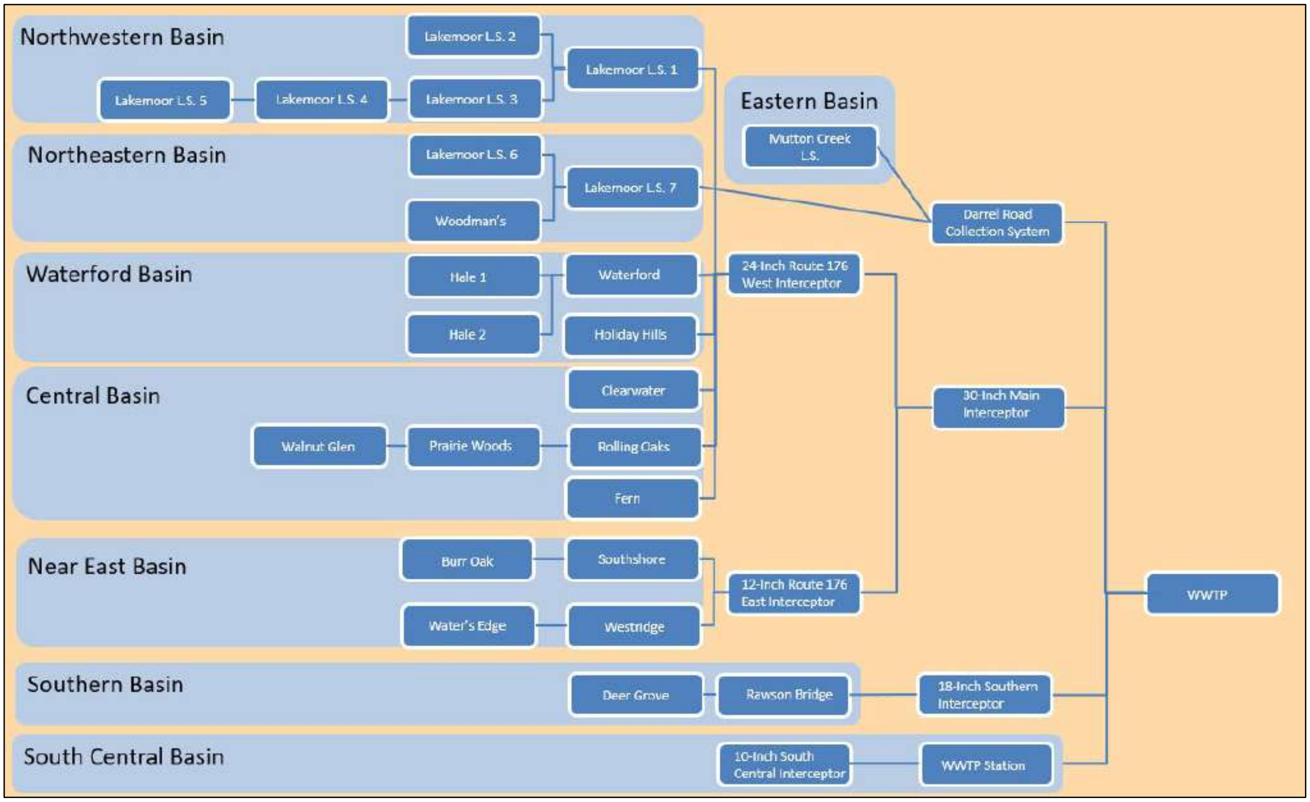
Phase 7 - Fisher Road Interceptor

Phase 7 of the Darrell Road Collection System would extend an 18-inch sanitary sewer approximately 7,500 lineal feet east and north along Fisher Road from Darrell Road to Route 120 within the Village of Lakemoor. This interceptor would serve the eastern portion of the Northeastern Drainage Basin.

Summary – Darrell Road Collection System Ultimate Solution

The construction of the Darrell Road Collection System would allow the Northeastern Basin to be removed from the 24-inch Route 176 West Interceptor, thereby freeing up capacity to support continued growth in the Waterford, Central and Northwestern Basins. It would also free capacity in the existing 12-inch Lakemoor Lift Station 7 force main on Lily Lake Road which would be sufficient to convey all projected flows resulting from development of the Northwestern Basin. This is depicted in schematic form on Exhibit 3-21.

Exhibit 3-20: Darrell Road Collection System Schematic – Ultimate Solution



The Darrell Road Collection System would allow for the future development of the Eastern and Northeastern Drainage Basins. Probable capital costs to implement each phase of the Darrell Road Collection System are summarized in Table 3-17.

Table 3-17: Probable Capital Costs - Darrell Road Collection System

Phase	Description	Probable Cost
1	Darrell Road Interceptor (South)	$ 3,538,000
2A	Mutton Creek Force Main	$ 3,152,000
2B	Mutton Creek Lift Station	$ 5,441,000
3A	Treatment Plant Interceptor	$ 8,560,000
3B	Water's Edge Interceptor Replacement	$ 3,111,000
4	Darrell Road Interceptor (Central)	$ 4,944,000
5	Darrell Road Interceptor (North)	$ 3,120,000
6A	Darrell Road Interceptor (Far North)	$ 2,598,000
6B	Lakemoor Lift Station 7 Force Main	$ 2,395,000
7	Fisher Road Interceptor	$ 5,205,000
TOTAL PROBABLE CAPITAL COSTS		**$ 42,064,000**

Because development of the Eastern Basin has been postponed, and is not anticipated to commence in the foreseeable future, the Interim Solution Collection System was developed and is recommended as a lesser cost alternative method of directly accommodating long-term growth in the Northeastern and Northwestern Basins.

3.7 Capacity, Management, Operations, and Maintenance Program (CMOM)

3.7.1 General Information

A Capacity Management, Operations, and Maintenance (CMOM) Program is a comprehensive program outlining a utility's plan for managing, providing/maintaining capacity, operations, and maintenance of its collection system and lift stations. EPA describes a CMOM as an "approach that outlines a dynamic system management framework that encourages evaluating and prioritizing efforts to identify and correct performance-limiting situations in the collection system". It defines measurable goals for system operation and maintenance, outlines the specific tasks (including frequencies) needed to achieve the goals, quantifies the resources required, and identifies the positions within the organizational structure responsible for implementing various aspects of the CMOM. CMOM programs allow utilities to document a proactive approach to maintaining their systems, instead of relying on reactive maintenance only.

The District complies with Special Condition 23 of their NPDES permit, issued September 28, 2018, which requires a Capacity, Management, Operations, and Maintenance (CMOM) plan. The most recent CMOM was updated in September of 2023. The District has successfully implemented the CMOM program and has been able to identify that only 2.4 percent of all District collection system infrastructure were determined to be in "poor condition", indicating that I/I was a problem in a small percentage of the entire collection system. The District performed smoke testing on most of the gravity mains in 2016 and concluded that the District possesses a system which has minimal potential for I/I impacts on the system.

The District previously used a televising software called PipeTech SCAN in order to allow District employees to review televising footage to determine the condition of the sewers based on NASSCO Coding Standards. In November of 2022, the District's approach to televising prompted use of an Edge AI bot due to the significant number of repairs that the Aeries camera required over previous years. Recent assessment reports are readily available to the District for review at any time. The CMOM also provides a schedule for cleaning and televising the collection system by basin through 2026.

Table 3-18: Routine Collection System Jetting and Televising Schedule

Schedule	Location
2022	Northeastern and Partial Northwestern
2023	Partial Northwestern and Central
2024	Waterford
2025	Partial Near East and Eastern
2026	Partial Neat East, Southern and South Central

The District's CMOM also indicates the approved FY 2023-2024 annual collections O&M expenses as $370,400 and indicates proposed budget expenses through FY 2028-2029. Table 13 in the CMOM outlines Asset Equipment, the capital cost of that equipment, and the targeted replacement year. The current CMOM can be found in Appendix B.

3.7.2 Capital Improvements Program

The District's Capital Projects Tracking documentation is updated on an annual basis. The District has identified several projects that will be completed as funding becomes available. Below is a summarization of the District's collection system capital projects.

Darrell Road Collection System Phase 1A - Headworks	$5,621,000
Darrell Road Collection System Phase 1B – Treatment Plant Interceptor	$6,676,000
Darrell Road Collection System Phase 2 – Force Main	$12,447,000
Darrell Road Collection System Phase 3 – Lakemoor LS #7 Upgrades	$4,494,000
Unsewered Community Sanitary Sewer Extension	$6,663,000
TOTAL	**$35,901,000**

SECTION 4

LIFT STATIONS

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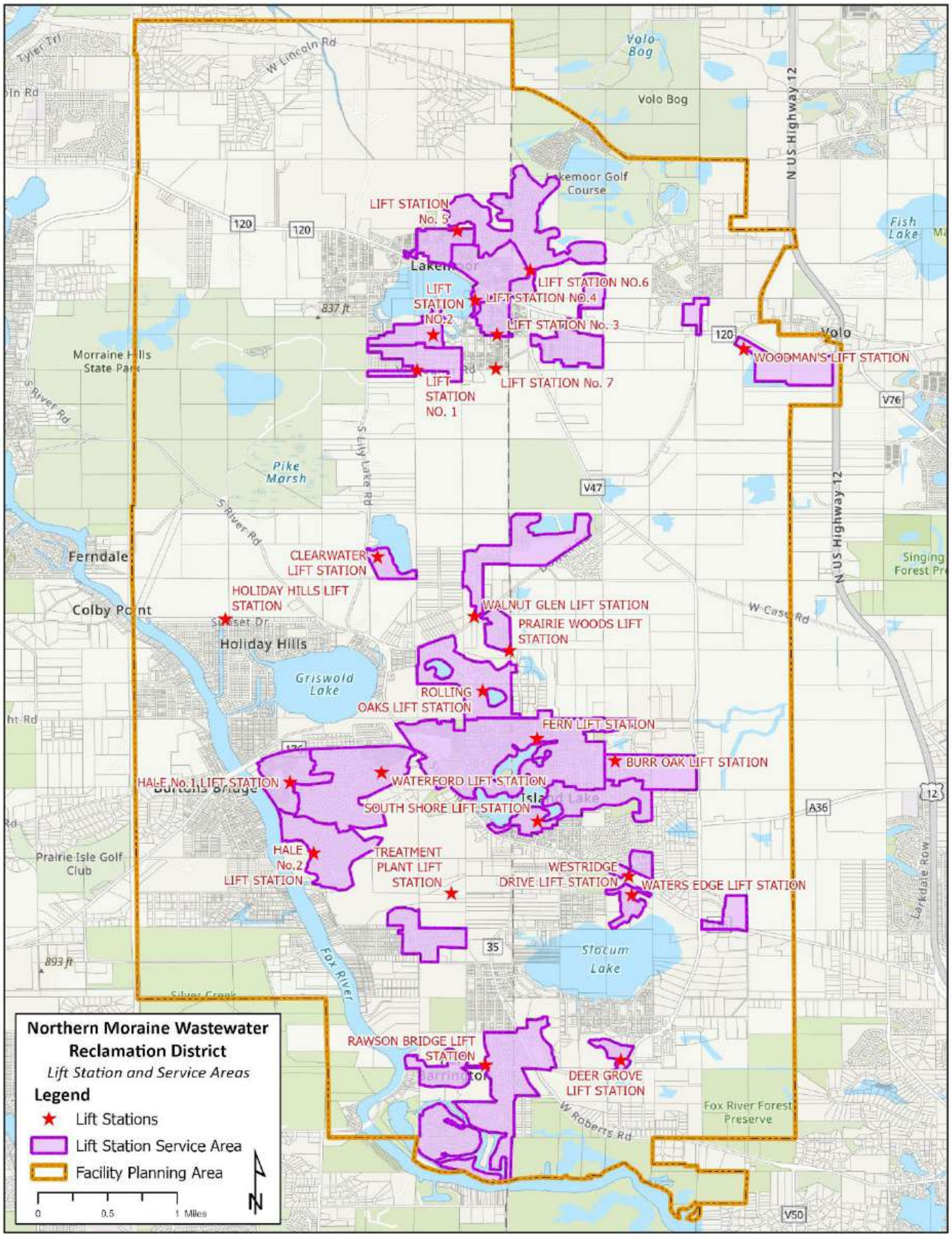
4. Lift Stations

4.1 General Background

The Northern Moraine Wastewater Reclamation District owns and operates twenty-four (24) lift stations throughout the collection system which includes the Villages of Island Lake, Lakemoor, Port Barrington, and Holiday Hills. The primary objective of a lift station is to pump flow through a force main to the downstream gravity interceptor sewer. The locations of the lift stations are shown in Exhibit 4-1. This section describes, evaluates, and provides recommendations for existing lift stations within the Districts's collection system under both current and future conditions.

Exhibit 4-1: NMWRD Lift Stations



During development of this report, TAI or the District visited each lift station, excluding three lift stations, to perform condition assessments and drawdown tests on the pumps. Three lift stations were not inspected and evaluated due to recently being built or rehabilitated: Holiday Hills, and Lakemoor Lift Stations #1 and #6. The pumps at the lift stations are adequately sized and in sufficient working condition for the tributary flow if they are performing within +/- 8% variance of their design point, as allowed by the Hydraulic Institute.

As part of this master planning effort, the existing pumps at each lift station were tested by means of drawdown tests to determine pump output. Raw data was collected and analyzed to determine whether pumps were performing at their rated design capacity and if output matched peak inflow. Recommendations for further inspection are included to determine corrective actions to be taken by the District. The available surplus or deficiency in capacity in each lift station under existing conditions are identified.

Table 4-1: Lift Station Overview

Lift Station	# Pumps	Pump Rated Capacity (gpm)[1]	Force Main Dia. (inches)	Installation Date	Last Rehab Date[1]
Lakemoor L.S. 1	2	401	8	1978	2023
Lakemoor L.S. 2	2	270	4	1978	2006
Lakemoor L.S. 3	2	270	6	1978	2006
Lakemoor L.S. 4	2	270	6	1978	2006
Lakemoor L.S. 5	2	270	4	1978	2006
Lakemoor L.S. 6	2	515	8	1997	2023
Lakemoor L.S. 7	2	800	12	1997	2018
Burr Oak	2	90	4	1999	No Major Rehab
Clearwater	2	30	2	1997	No Major Rehab
Deer Grove	2	532	8	2006	No Major Rehab
Fern	2	576	8	1978	2011
Hale 1	2	363	6	1986	No Major Rehab
Hale 2	2	238	6	1992	No Major Rehab
Holiday Hills	3	1347	10	2023	2023
Prairie Woods	2	265	6	2008	No Major Rehab
Rawson Bridge	2	740	10	1998	No Major Rehab
Rolling Oaks	2	115	6	1992	No Major Rehab
South Shore	2	235	6	1978	2011
Treatment Plant	2	225	4	1997	2009
Walnut Glen	2	284	6	2008	No Major Rehab
Waterford	2	850	8	1985	2014
Water's Edge	2	100	4	2000	No Major Rehab
Westridge	2	236	4	1994	No Major Rehab
Woodman's	2	206	6	2019	2019
[1] Based on best available data;					

This section also includes an assessment of the physical condition of each lift station based on field inspections and discussions with District operations staff. Significant improvements that cannot be addressed in-house have been broken into projects, and a recommended budget has been provided. These projects should be incorporated into the District's Capital Improvements Plan. Annual replacement and maintenance costs should be incorporated into the District's annual O&M budget.

The District's lift stations vary greatly in age and capacity. Lift stations have been constructed throughout the collection system as the District has developed in conjunction with the sewer conveyance systems in Lakemoor, Port Barrington, Island Lake, and Holidays Hills. The District should be reinvesting into lift station and force main infrastructure to maintain its reliability. Table 4-2 details the value of the pump station's equipment, structures, and force mains. The annual replacement calculation is based on straight-line depreciation of the District's approximate $32,646,100 asset over 20 years for equipment, 50 years for the structures, and 75 years for the force mains. It is recommended that the District reinvest at least $740,700 annually into its lift station and force main replacement account.

Table 4-2: Lift Station Estimated Annual Replacement Costs

Lift Station	Equipment	Structure	Force Main	Total
Lakemoor L.S. 1	$300,000	$200,000	$4,125,000	$4,625,000
Lakemoor L.S. 2	$250,000	$200,000	$86,300	$536,300
Lakemoor L.S. 3	$300,000	$200,000	$138,800	$638,800
Lakemoor L.S. 4	$250,000	$200,000	$87,000	$537,000
Lakemoor L.S. 5	$250,000	$200,000	$68,800	$518,800
Lakemoor L.S. 6	$300,000	$200,000	$431,300	$931,300
Lakemoor L.S. 7	$400,000	$300,000	$7,087,000	$7,787,000
Burr Oak	$250,000	$200,000	$116,300	$566,300
Clearwater	$250,000	$200,000	$37,500	$487,500
Deer Grove	$300,000	$900,000	$653,800	$1,853,800
Fern	$300,000	$200,000	$186,300	$686,300
Hale 1	$300,000	$200,000	$90,700	$590,700
Hale 2	$300,000	$200,000	$260,000	$760,000
Holiday Hills	$400,000	$1,200,000	$1,234,700	$2,834,700
Prairie Woods	$300,000	$200,000	$158,200	$658,200
Rawson Bridge	$300,000	$900,000	$1,865,500	$3,065,500
Rolling Oaks	$300,000	$200,000	$242,400	$742,400
South Shore	$300,000	$200,000	$118,400	$618,400
Treatment Plant	$250,000	$200,000	$50,000	$500,000
Walnut Glen	$300,000	$200,000	$106,400	$606,400
Waterford	$300,000	$200,000	$355,000	$855,000
Water's Edge	$250,000	$200,000	$121,900	$571,900
Westridge	$250,000	$200,000	$80,000	$530,000
Woodman's	$300,000	$200,000	$644,800	$1,144,800
TOTAL	**$7,000,000**	**$7,300,000**	**$18,346,100**	**$32,646,100**
Annual Replacement	**$350,000**	**$146,000**	**$244,700**	**$740,700**

4.2 Lift Station Capacity Analysis

4.2.1 Methodology

An assessment was conducted of the pumping capacity required at each lift station to meet current peak flow conditions. Historical pumping records at each lift station were reviewed to determine current flow conditions. The required capacity of each lift station was equated to the peak flow generated within that lift stations drainage basin based on an assumed peaking factor. The firm pumping capacity of each upstream lift station tributary to the drainage basin was then added to the peak flow generated within the basin to calculate the peak flow at the lift station.

4.2.2 Lift Station Capacity Analysis

The District's collection system currently includes twenty-four (24) lift stations. A schematic of lift station wastewater flow through the collection system and ultimately to the Northern Moraine WRD WWTP is shown on Exhibit 4-2.

Exhibit 4-2: Lift Station Flow Schematic

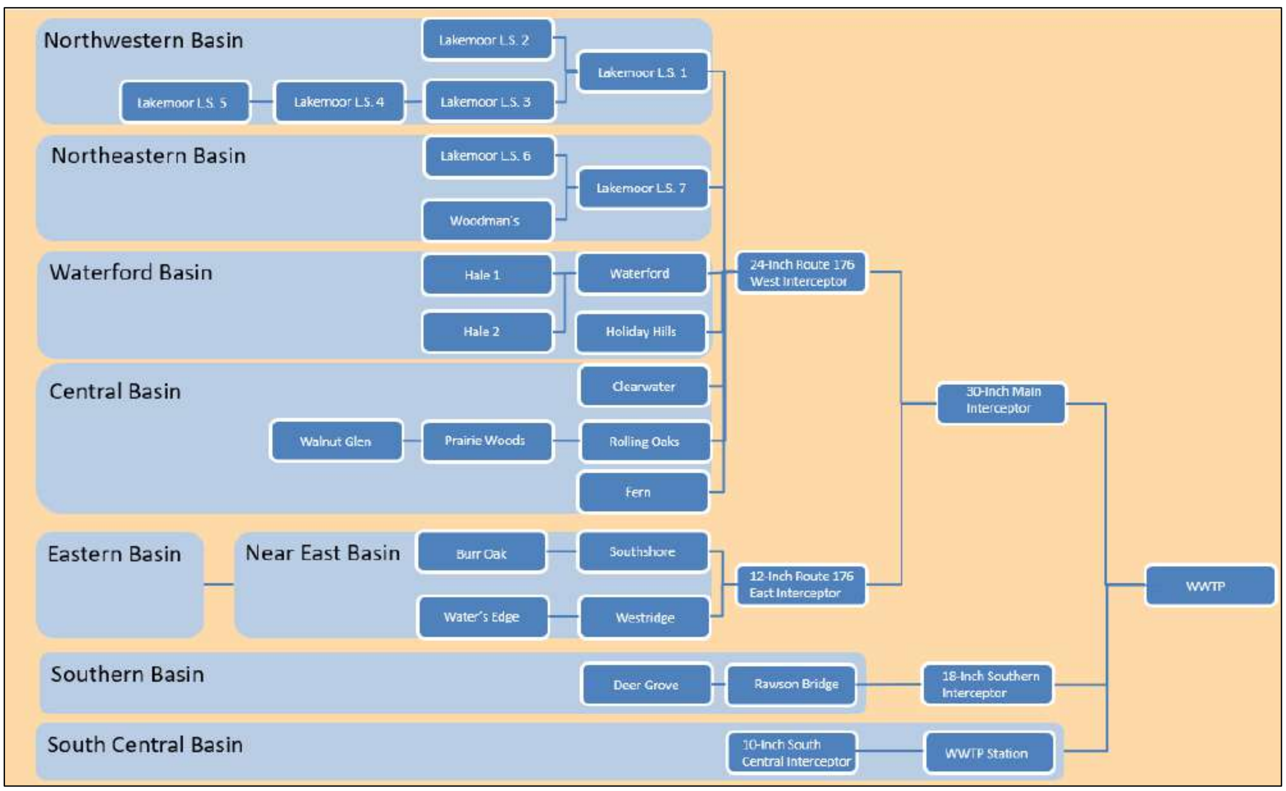


Table 4-3 summarizes the results of lift station capacity analysis under current conditions. All lift stations are designed with a surplus of pumping capacity. However, not all pumps are pumping at their designed capacity. The average daily flows were calculated using actual pumping rates determined from the drawdown testing results. The table below can also be found within Appendix D.

4.2.3 Lift Station Draw Down Testing Methodology

Lift station drawdown testing was performed to estimate each pump's current performance in comparison to the pump ratings specified at the time of design. Drawdown tests were performed in late 2023 at twenty-one (21) of twenty-four (24) District owned and operated lift stations. Three lift stations did not have drawdown testing completed due to recently being built or rehabilitated: Holiday Hills, and Lakemoor Lift Stations #1 and #6. The Holiday Hills lift station was recently built and put into service in 2023. Lakemoor Lift Stations #1 and #6 were upgraded with new pumps at the end of 2023.

The method used to run the draw down tests involved timing the wet well fill and draw (pump) cycles.

Table 4-3: Lift Station Capacity Analysis – Existing Conditions

Lift Station	2022 Run Time (Hours)	2022 Average Pumped Flow (gpd)	2022 Average Pumped Flow from Upstream Basins (gpd)	Average Daily Flow in Basin (gpd)	Peaking Factor in Basin	Peak Flow in Basin (gpm)	Firm Capacity Upstream Lift Stations (gpm)	Lift Station Peak Flow (gpm)	Current Design Firm Capacity (gpm)	Actual Pumping Rate	Surplus (Deficient) Pumping Capacity at Design Pump Capacity (gpm)	Surplus (Deficient) Pumping Capacity at Actual Pumping Rate (gpm)
Lakemoor L.S. 1	2,517	165,902	73,213	92,689	4.50	290	540	830	401	Not tested	(429)	Not Available
Lakemoor L.S. 2	200	7,181	-	7,181	4.50	22		22	270	218	248	196
Lakemoor L.S. 3	1,754	66,031	54,437	11,594	4.50	36	540	576	270	229	(306)	(347)
Lakemoor L.S. 4	1,397	54,437	41,475	12,962	4.50	41	270	311	270	237	(41)	(74)
Lakemoor L.S. 5	2,138	41,475	-	41,475	4.50	130		130	270	118	140	(12)
Lakemoor L.S. 6	2,125	179,889	-	179,889	4.50	562		562	515	Not tested	(47)	Not Available
Lakemoor L.S. 7	1,511	141,808	192,427	(50,619)	4.50	-158	721	563	800	571	237	8
Clearwater	525	11,511	-	11,511	4.50	36		36	30	133.5	(6)	98
Burr Oak	314	2,555	-	2,555	4.50	8		8	90	49.5	82	42
Deer Grove	60	5,232	-	5,232	4.50	16		16	532	532	516	516
Fern	1,673	115,245	-	115,245	4.50	360		360	576	419	216	59
Hale 1	544	26,574	-	26,574	4.50	83		83	363	297	280	214
Hale 2	1,076	38,824	-	38,824	4.50	121		121	238	219.5	117	98
Holiday Hills	N/A	N/A	-	-	4.50	0		0	1347	Not tested	1,347	Not Available
Prairie Woods	755	28,129	28,976	(847)	4.50	-3	284	281	265	226.5	(16)	(55)
Rawson Bridge	843	61,961	5,232	56,729	4.50	177	532	709	740	447	31	(262)
Rolling Oaks	2,136	39,329	28,129	11,200	4.50	35	265	300	115	112	(185)	(188)
South Shore	2,163	42,665	2,555	40,110	4.50	125	90	215	235	120	20	(95)
Treatment Plant	652	19,924	-	19,924	4.50	62		62	225	186	163	124
Walnut Glen	736	28,976	-	28,976	4.50	91		91	284	239.5	193	149
Waterford	1,697	136,653	65,398	71,255	4.50	223	601	824	850	490	26	(334)
Water's Edge	564	2,733	-	2,733	4.50	9		9	100	29.5	91	21
Westridge	559	31,392	2,733	28,659	4.50	90	100	190	236	341.5	46	152
Woodman's	424	12,538	-	12,538	4.50	39		39	206	180	167	141

The known wet well volume was utilized in computing the average flow into the wet well and average pumping rate.

The manual drawdown tests consisted of the following:

1. Measuring the average influent flow entering the wet well with the pumps in the off position unless inflow was extremely limited on small lift stations.
2. Measuring the average pumping rate of each pump by measuring the decrease in water level within the wet well using either flagging tape or a laser level.
3. Computing the overall capacity of each pump finding the difference in water level over time while each or both of the pumps were in the on position.

Pressure gauges on the discharge piping were not installed at any of the lift stations so static and dynamic pressure readings were not taken.

The second component of the assessment is to utilize the results of the drawdown test to determine where the pumps are performing in relation to rated pump capacity.

The computed pumping rate is then compared to the rated capacity of each pump as designed. Significant deviations from the rated capacity could be a result of a worn pump impeller, varying motor speed due to utility power supply, partially obstructed pump discharge or force main piping, or an improperly designed installation. Hydraulic Institute Standards allow for a deviation from rated pump unit capacity of plus or minus eight (8) percent for municipal water and wastewater service (Grade 2B).

A summary of the key findings relative to the pumping operations is presented within each lift station description below.

4.2.4 Lift Station Pump Drawdown Test Results

Pump drawdown test results are summarized in Table 4-4. Pumps at the majority of the stations were operating under the acceptable 8 percent tolerance level recommended by the Hydraulic Institute Standards. The variations from rated pump capacities are significant enough to warrant further assessment. System hydraulic computations should be conducted for each of these lift stations to determine if the pumps are properly sized. If the hydraulics do not indicate an improperly selected pump, then restricted pump output is likely attributable to either plugged pump discharge, force main piping, or pump deterioration due to age.

Additionally, the pump unit rated capacity was based off limited available information for multiple lift stations. Pump curves were not available for all lift stations and the District's master lift station spreadsheet was utilized to identify rated pump capacity.

Table 4-4: 2023 Lift Station Pump Drawdown Test Results

Lift Station	Pump 1 Rated Capacity (gpm)	Pump 1 Drawdown Test (gpm)	Tolerance from Pump Unit Rated Capacity	Pump 2 Rated Capacity (gpm)	Pump 2 Drawdown Test (gpm)	Tolerance from Pump 2 Unit Rated Capacity
Lakemoor L.S. 1	Test not completed - new pumps					
Lakemoor L.S. 2	270	233	-14%	270	203	-25%
Lakemoor L.S. 3	270	229	-15%	270	**Not in Use**	**N/A**
Lakemoor L.S. 4	270	237	-12%	270	**Not in Use**	**N/A**
Lakemoor L.S. 5	270	118	-56%	270	**Not in Use**	**N/A**
Lakemoor L.S. 6	Test not completed - new pumps					
Lakemoor L.S. 7	800	525	-34%	800	617	-23%
Burr Oak	90	132	47%	90	135	50%
Clearwater	30	41	37%	30	58	93%
Deer Grove	532	545	2%	532	519	-2%
Fern	576	470	-18%	576	368	-36%
Hale 1	363	**Not in Use**	**N/A**	363	297	-18%
Hale 2	238	228	-4%	238	211	-11%
Holiday Hills	Test not completed - new pumps					
Prairie Woods	265	231	-13%	265	222	-16%
Rawson Bridge	740	447	-40%	740	**Not in Use**	**N/A**
Rolling Oaks	115	76	-34%	115	148	29%
South Shore	235	120	-49%	235	**Not in Use**	**N/A**
Treatment Plant	**No Pump**	**N/A**	**N/A**	225	186	-17%
Walnut Glen	284	225	-21%	284	254	-11%
Waterford	850	388	-54%	850	592	-30%
Water’s Edge	100	44	-56%	100	15	-85%
Westridge	236	338	43%	236	345	46%
Woodman’s	206	**Not in Use**	**N/A**	206	180	-13%

4.3 Lift Station & Force Main Maintenance

The District completes consistent maintenance of the existing lift stations to extend the service life of each station. Since 2014, multiple maintenance projects have been completed. In 2023 the District has made significant investments in pump and generator replacement. Lakemoor Lift Station 1 and 6 were rehabilitated in 2023. Holiday Hills lift station was completed in 2023.

Future maintenance projects are recommended on an as-needed basis. Upon reaching their manufacturer recommended service life, all equipment should be replaced. Pumps typically require replacement every

20 to 25 years. Force main piping should be inspected periodically to ensure solids do not settle and are able to become suspended when pumps turn on. Grundfos pumps are the District's standard pump equipment for submersible pump replacement.

It is recommended for all lift stations that the valves and the bypass pump connection are exercised regularly to ensure functionality. Additionally, in 2024, the District has connected Lakemoor Lift Stations #1-7, Holiday Hills, and Woodman's Lift Stations to SCADA. The lift stations are being connected via cellular option but will convert to radio over the next year. It is expected that the entire collection system will be on SCADA by the end of 2025.

4.4 Lift Stations

4.4.1 Lakemoor Lift Station 1

Lakemoor Lift Station 1, originally constructed in 1978, is located in the southwest portion of the Village of Lakemoor at the corner of Wegner Road and Fritzsche Road, near 524 Wegner Road. It was constructed with Lakemoor Lift Stations 2, 3, 4 and 5 and Lakemoor's sanitary sewer system. The service area includes approximately 53 acres of mainly residential property in the Northwestern Drainage Basin and receives flow from Lakemoor Lift Stations 2, 3, 4 and 5.

Lakemoor Lift Station 1 is a duplex submersible pump system with a valve vault and meter vault. The pumps are equipped with variable frequency drives (VFD's). Utilizing VFD's allows the pumps to run at reduced flow rates at off-peak hours while maintaining capacity rates during peak hours. Variable speed pumping reduces the number of motor starts that shortens motor life and reduces the possibility of surcharging downstream sewer lines as a product of lessened pumping flow during off-peak hours.

The lift station is equipped with an on-site generator and automatic transfer switch (ATS), installed in 2014, and a submersible pressure transducer with back-up mechanical float switches. The lift station has a bypass pump connection. A control panel with PLC and radio/cell modem was upgraded in 2023. Pumped flow rate is metered with a mag meter.

Lakemoor Lift Station 1 was rehabilitated in 2023. Rehabilitation work included replacement of two electromagnetic flow meters and transmitters (Lift Station 1 and on the 12” force main from Lift Station 7), replacement of the 6-inch wet well piping with stainless steel pipe, replacement of the sump pump, replacement of two submersible pumps with base elbows and pump controllers, and electrical improvements such as the addition of a light pole and service disconnect to the exterior of the existing control panel enclosure. An Allen Bradley PLC and radio with cell modem were installed and integrated. This lift station was connected to SCADA in 2024. Soft starters were also added to the pumps in 2024.

Drawdown testing was not conducted at this lift station since the pumps are new. The District has not noted any capacity issues at Lift Station 1.

Table 4-5: Lakemoor Lift Station 1 Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Lakemoor LS 1	2023	Grundfos	20	401	8”
	2023	Grundfos	20	401	

Wastewater from the drainage basin is pumped through an 8-inch diameter, approximately 3.15-mile-long force main. The 8-inch force main runs south on Lily Lake Road past Clear Lake and down along South River Road until it discharges into sanitary manhole C8NW57 located near Route 176. Lakemoor Lift Station 1 is tributary to the NMWRD WWTP.

4.4.2 Lakemoor Lift Station 2

Lakemoor Lift Station 2 was originally constructed in 1978 and is located at 300 Herbert Road in the Village of Lakemoor. The service area includes approximately 40 acres of residential and commercially developed property in the Northwestern Drainage Basin

Wastewater is pumped through a 4-inch diameter, 690 lineal foot long force main to sanitary manhole C5NE25 located on Herbert Road, directly south of Lily Lake. Lakemoor Lift Station 2 is tributary to Lakemoor Lift Station 1.

Lakemoor Lift Station 2 is a duplex submersible pump system with a valve vault. The submersible pumps are equipped with VFD's. The lift station is equipped to accept a portable generator and is equipped with a Sensaphone alarm system and an ISCO pump station monitor for flow measurement. The station is also equipped with mechanical float switches and a bypass pump connection. This lift station was connected to SCADA in 2024.

Table 4-6: Lakemoor Lift Station 2 Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Lakemoor LS 2	2019	Grundfos	5.5	270	4"
	2019	Grundfos	5.5	270	

Table 4-7: Lakemoor Lift Station 2 Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	233	-14%
2	203	-25%

Lakemoor Lift Station 2 Performance and Deficiencies

The pump station is in good condition. A new sump pump was installed in the valve vault within the last year. Both of the wet well pumps are newer, installed in 2019.

The influent flow to lift station is low as it mostly serves a small industrial park. Lakemoor Lift Station 2 pump capacity is adequate but both pumps are operating outside of and below the 8%+/- tolerance allowance based on drawdown test results. District staff have not noted any capacity issues at Lift Station 2.

The wet well and valve vault exhibit signs of infiltration and there is significant rusting and corrosion of piping and valves. According to staff, the bypass connection in the valve vault has not been exercised recently.

Lakemoor Lift Station 2 Expansion and Upgrades

Drawings and specifications were prepared in 2019 to address the rehabilitation and upgrades needed including installation of a PLC/radio panel, replacement of the light fixture on the control panel, installation of a level transducer based pump controller, and replacement of the sump pump, two submersible pumps with associated fittings, and riser piping, as well as other electrical modifications. The District will pursue these upgrades as funding becomes available. The District has replaced the submersible pumps and the sump pump since the design was complete.

Lakemoor Lift Station 2 pumps are performing sufficiently for the level of flow at this lift station.

It is recommended that the bypass be exercised and the tolerance from the rated pump capacities be investigated for issues such as clogging or pump impellor issues. TAI also recommends the replacement of discharge piping and valves due to the general age of the lift station which was originally constructed in 1978. It is recommended that the District consider installing an on-site generator if budget allows, however at this time the portable connection is acceptable to staff.

The estimated cost for rehabilitation is $188,300.

Table 4-8: Lakemoor Lift Station 2 Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$77,400
LIFT STATION #2				$87,600
CONSTRUCTION SUB-TOTAL				**$165,000**
CONTINGENCY @ 5%				$8,300
CONSTRUCTION TOTAL				**$173,300**
BIDDING DOCUMENT PREPARATION AND BID ACTIVITIES				$15,000
TOTAL CONSTRUCTION COST				**$188,300**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
LIFT STATION #2				
Process				
Replace pump discharge piping	60	Lin. Ft.	$250	$15,000
Electrical and Controls				
Wiring, Labor	20	Lin. Ft.	$40	$800
Generator, ATS & Installation	1	Each	$43,600	$43,600
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
Pressure Transducer Level Detection	1	Each	$1,800	$1,800
Primary Element Installation	1	L.S.	$3,500	$3,500
Pump & Primary Elements Connections	1	L.S.	$3,500	$3,500
Programming	1	L.S.	$5,200	$5,200
Sitework				
Restoration	1	L.S.	$3,000	$3,000
TOTAL LIFT STATION #2				**$87,600**

4.4.3 Lakemoor Lift Station 3

Lakemoor Lift Station 3 was originally constructed in 1978 and is located in near 300 Venice Drive in the Village of Lakemoor. The service area includes approximately 28 acres of residential and commercial property in the Northwestern Drainage Basin as well as flow pumped from Lakemoor Lift Stations 4 and 5. Lift Station 3 is tributary to Lakemoor Lift Station 1.

The lift station is a duplex submersible pump system with a valve vault. The submersible pumps are equipped with VFD's. The lift station is currently equipped with an on-site generator, installed in 2009, and has a Sensaphone alarm system and an ISCO pump station monitor for flow measurement. The lift station also has mechanical float switches and a bypass pump connection. In 2024, the lift station had significant upgrades completed. The upgrades included replacement of the wet well metal piping including upper 90-degree elbows, vertical 4" piping, and base elbows for both pumps. The existing rails were reused. Additional upgrades completed include a new pump, soft starters added to the pumps, and SCADA connection for the lift station.

Wastewater is pumped through a 6-inch diameter, 750 lineal foot long force main and discharges into sanitary manhole C5NE45 located on Venice Road, directly south of Lotus Drive and block north of South Drive. Lakemoor Lift Station 3 is tributary to Lakemoor Lift Station 1.

Table 4-9: Lakemoor Lift Station 3 Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Lakemoor LS 3	2024	Grundfos	5.5	270	6"
	2022	Grundfos	5.5	270	

Table 4-10: Lakemoor Lift Station 3 Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1 (1)	229	-15%
2	N/A	N/A
(1) Drawdown Testing was completed for the lift station in 2023. This pump was replaced in 2024.		

Lakemoor Lift Station 3 Performance and Deficiencies

Drawdown testing and a condition assessment completed in December of 2023 indicated that a new sump pump has been installed in the valve vault within the last year. There is some evidence of groundwater infiltration in the wet well and the valve vault, possibly due to the lift station's proximity to a marsh or wetland area. The presence of F.O.G. in the wet well is not especially abnormal but is notable compared to the other District's pump stations. The piping, valves, and bypass connection showed significant rusting. However, this piping has since been replaced since the evaluation was completed.

Drawdown test results indicated that Lakemoor Lift Station 3 Pump 1 is operating outside of and well below the +/- 8% tolerance allowance. However, Pump 1 has been replaced since the drawdown tests were completed. In addition, Pump 2 was not operational at the time of drawdown testing and has been out of service for some time. It is recommended that both pumps be operating to provide pump redundancy and prevent lift station failure. District staff have not noted any capacity issues.

Lakemoor Lift Station 3 Expansion and Upgrades

Drawings and specifications were prepared in 2019 to address rehabilitation and upgrades needed including installation of a PLC/radio panel, installation of a level transducer-based pump controller and pressure transducer for primary pump control, addition of a service disconnect, replacement of the generator and concrete equipment pad, replacement of the valve vault sump pump, installation of a new light pole and LED light fixture, and other modifications to electrical equipment. As funding becomes available, the District will be pursuing these lift station updates. The District has replaced the valve vault sump pump and replaced the generator and pad since the design was complete.

Lakemoor Lift Station 3 will require no capacity expansion. In addition to the rehabilitation scope above that was previously designed, TAI recommends replacing the bypass pump connection and the valves with associated fittings in the valve vault due to the age of the lift station which was built in 1978. The estimated cost for rehabilitation is $203,260.

Table 4-11: Lakemoor Lift Station 3 Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$79,900
LIFT STATION #3				$99,360
CONSTRUCTION SUB-TOTAL				**$179,260**
CONTINGENCY @ 5%				$9,000
CONSTRUCTION TOTAL				**$188,260**
BIDDING DOCUMENT PREPARATION AND BID ACTIVITIES				$15,000
TOTAL CONSTRUCTION COST				**$203,260**
	Quantity	**Unit**	**Unit Cost**	**Extended Cost**
LIFT STATION #3				
Process				
Sump Pumps & Installation	1	Each	$860	$860
Pipe Paint	1	L.S.	$5,000	$5,000
Equipment Pad	1	Each	$2,600	$2,600
Plug Valve	2	Each	$3,000	$6,000
Check Valve	2	Each	$3,000	$6,000
Bypass Pump Connection	1	Each	$4,500	$4,500
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft.	$60	$6,000
Generator, ATS & Installation	1	Each	$43,600	$43,600
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
Pressure Transducer Level Detection	1	Each	$1,800	$1,800
Primary Element Installation	1	L.S.	$1,800	$1,800
Primary Elements Connections	1	L.S.	$1,800	$1,800
Programming	1	L.S.	$5,200	$5,200
Sitework				
Restoration	1	L.S.	$3,000	$3,000
TOTAL LIFT STATION #3				**$99,360**

4.4.4 Lakemoor Lift Station 4

Lakemoor Lift Station 4 was originally constructed in 1978 and is located near 100 South Lakeshore Drive, directly east of Lily Lake. The service area includes approximately 73 acres of residential and commercial property in the Northwestern Drainage Basin as well as flow pumped from Lakemoor Lift Station 5.

Lift Station 4 is a duplex submersible pump system with a valve vault. The two submersible pumps are equipped with VFD's. The lift station is equipped with a Sensaphone alarm system and an ISCO pump station monitor for flow measurement. The station is also equipped with mechanical float switches and a bypass pump connection. The lift station was connected to SCADA in 2024. Also, soft starters were added on the pumps in 2024. Additionally, a generator was installed at the lift station in 2024.

Wastewater is pumped through a 6-inch diameter, 470 lineal foot long force main and discharges into sanitary manhole C5NE69 located near the corner of Lily Lake Parkway and South Sheridan Road, directly south Route 120. Lakemoor Lift Station 4 is tributary to Lakemoor Lift Station 3.

Table 4-12: Lakemoor Lift Station 4 Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Lakemoor LS 4	2007	KJI	5.5	270	6”
	2007	KJI	5.5	270	

Table 4-13: Lakemoor Lift Station 4 Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	237	-12%
2	Non-functional	N/A

Lakemoor Lift Station 4 Performance and Deficiencies

The pump station is in fair condition. In 2023 a new sump pump was installed in the valve vault. There is evidence of groundwater infiltration in the wet well and the valve vault, potentially due to proximity to Lily Lake. The presence of F.O.G. in the wet well is not especially abnormal but there is a notable amount of floating debris and issues with ragging. The wet well piping shows significant rusting and corrosion. Valve vault work completed in 2023 replaced the valves and the bypass connection.

Drawdown test results indicate that Lakemoor Lift Station 4 Pump 1 is operating outside of and below the +/- 8% tolerance allowance. In addition, Pump 2 was inoperative at the time of drawdown testing and has been out of service for some time. This pump must be replaced immediately. It is recommended that both pumps be operating to provide pump redundancy and prevent lift station failure. District staff have not noted any capacity issues at Lift Station 4.

Lakemoor Lift Station 4 Expansion and Upgrades

Drawings and specifications were prepared in 2019 to address rehabilitation and upgrades including installation of a level transducer-based pump controller and submersible pressure transducer for primary pump control, a new PLC and radio panel, a new utility service disconnect, installation of a new light pole and LED light fixture and replacement of the valve vault sump pump. Plans also propose a new generator and concrete equipment pad, and a new service entrance rated automatic transfer switch. As funding becomes available, the District will be pursuing these lift station updates. The District has replaced the valve vault sump pump and the generator since the 2019 design was complete.

TAI recommends replacing Pump 2 immediately due to the lack of redundancy at this lift station. The lift station will require no capacity expansion.

The estimated cost for rehabilitation is $229,400.

Table 4-14: Lakemoor Lift Station 4 Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$84,400
LIFT STATION #4				$119,700
CONSTRUCTION SUB-TOTAL				**$204,100**
CONTINGENCY @ 5%				$10,300
CONSTRUCTION TOTAL				**$214,400**
BIDDING DOCUMENT PREPARATION AND BID ACTIVITIES				$15,000
TOTAL CONSTRUCTION COST				**$229,400**
	Quantity	**Unit**	**Unit Cost**	**Extended Cost**
LIFT STATION #4				
Process				
Pumps & Installation	1	Each	$9,000	$9,000
Sump Pumps & Installation	1	Each	$860	$860
Pipe Paint	1	L.S.	$5,000	$5,000
Electrical and Controls				
Conduit, Wiring, Labor	60	Lin. Ft.	$60	$3,600
ATS & Installation	1	Each	$46,900	$46,900
LED Fixture and Installation	1	Each	$3,100	$3,100
Telecommunications	1	L.S.	$4,300	$4,300
Pressure Transducer Level Detection	1	Each	$1,800	$1,800
Primary Element Installation	1	L.S.	$1,800	$1,800
Primary Elements Connections	1	L.S.	$1,800	$1,800
Programming	1	L.S.	$5,200	$5,200
Sitework				
Restoration	60	Sq. Yd.	$40	$2,400
8' Tall Chain Link Fence	86	L.F.	$350	$30,100
Double Vehicular Gate	1	L.S.	$2,600	$2,600
Single Gate	1	L.S.	$1,300	$1,300
Plants - Mission Arborvitae	22	Each	$180	$3,960
Plants - Maiden Grass, 24"	11	Each	$180	$1,980
Merrimac Stone, 3"	250	Sq. Ft.	$10	$2,500
Geotextile Fabric	250	Sq. Ft.	$2	$500
TOTAL LIFT STATION #4				**$119,700**

4.4.5 Lakemoor Lift Station 5

Lakemoor Lift Station 5 was originally constructed in 1978 and is located near 532 Santa Barbara Road, southeast of Petersen Park in the Village of Lakemoor. The service area includes approximately 37 acres of residential and commercial property in the Northwestern Drainage Basin.

The lift station is a duplex pumping system with a valve vault. The submersible pumps are equipped with VFD's. The lift station is equipped to accept a portable generator. The station also has a Sensaphone alarm system, an ISCO pump station monitor for flow measurement, and operates with a mechanical float switch pump control system. The station has a bypass pump connection. The lift station was connected to SCADA in 2024. Also, soft starters were added on the pumps in 2024.

Wastewater is pumped through a 4-inch diameter, 550 lineal foot long force main and discharges into sanitary manhole C4SE24 located near the intersection of Santa Barbara Road and North Lake Road, directly north of Morrison Park along Lily Lake. Lakemoor Lift Station 5 is tributary to Lakemoor Lift Station 4.

Table 4-15: Lakemoor Lift Station 5 Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Lakemoor LS 5	2007	KJI	5	270	4"
	2022	Grundfos	5.5	270	

Table 4-16: Lakemoor Lift Station 5 Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	118	-56%
2	Non-functional	N/A

Lakemoor Lift Station 5 Performance and Deficiencies

The pump station is in good condition. A new sump pump was installed in the valve vault in 2023. The valve vault and wet well structures exhibit signs of infiltration. District staff has noted that F.O.G concentration is high. The piping, valves, and bypass pump connection show significant rusting.

Drawdown test results indicate that Pump 1 is operating well outside of and below the +/-8% tolerance allowance. Pump 2 was inoperative at the time of drawdown testing and has been out of service for some time. It is recommended that both pumps be in operation to provide pump redundancy and prevent lift station failure. District staff have not noted any capacity issues at Lift Station 5.

Lakemoor Lift Station 5 Expansion and Upgrades

Drawings and specifications were prepared in 2019 to address rehabilitation and upgrades including modifications to electrical equipment, installation of a level transducer-based pump controller and submersible pressure transducer for primary pump control, addition of a service disconnect, replacement of the sump pump, and wet well piping. The design includes replacement of one submersible pump. As funding becomes available, the District will be pursuing these lift station updates. The District ordered a new VFD in 2023 because the lift station is currently running on a single pump.

Lakemoor Lift Station 5 requires immediate replacement of Pump 2. The lift station does not need capacity expansion. The pump should be investigated for poor operational performance. TAI also recommends the replacement of the valves and fittings in the valve vault due to the age of the lift station, which was built in 1978.The estimated cost for rehabilitation is $155,420.

Table 4-17: Lakemoor Lift Station 5 Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$71,700
LIFT STATION #5				$62,020
CONSTRUCTION SUB-TOTAL				**$133,720**
CONTINGENCY @ 5%				$6,700
CONSTRUCTION TOTAL				**$140,420**
BIDDING DOCUMENT PREPARATION AND BID ACTIVITIES				$15,000
TOTAL CONSTRUCTION COST				**$155,420**
	Quantity	**Unit**	**Unit Cost**	**Extended Cost**
LIFT STATION #5				
Process				
Pumps & Installation	1	Each	$9,000	$9,000
Pipe Paint	1	L.S.	$5,000	$5,000
Plug Valve	2	Each	$3,000	$6,000
Check Valve	2	Each	$3,000	$6,000
Bypass Pump Connection	1	Each	$4,500	$4,500
Electrical and Controls				
Conduit, Wiring, Labor	20	Lin. Ft.	$60	$1,200
LED Fixture and Installation	1	Each	$3,100	$3,100
Telecommunications	1	L.S.	$4,300	$4,300
Pressure Transducer Level Detection	1	Each	$1,800	$1,800
Pump Monitoring Module	1	Each	$1,800	$1,800
Primary Element Installation	1	L.S.	$1,800	$1,800
Pump & Primary Elements Connections	1	L.S.	$3,500	$3,500
Programming	1	L.S.	$5,200	$5,200
Sitework				
Restoration	60	Sq. Yd.	$40	$2,400
Bollards	2	Each	$1,400	$2,800
Plants - Globe Arborvitae	3	Each	$180	$540
Plants - Maiden Grass, 24"	4	Each	$180	$720
Plants - Compact Burning Bush, 4'	1	Each	$260	$260
Merrimac Stone, 3"	175	Sq. Ft.	$10	$1,750
Geotextile Fabric	175	Sq. Ft.	$2	$350
TOTAL LIFT STATION #5				**$62,020**

4.4.6 Lakemoor Lift Station 6

Lakemoor Lift Station 6, originally constructed in 1997, is located at 32250 Darrell Road, near the intersection of Wagon Trail and adjacent to Heritage Park. This installation's service area includes approximately 165 acres of residential and commercial property in the Northeastern Drainage Basin.

Wastewater from the drainage basin is pumped through a 6-inch diameter, 1,725 lineal foot long force main. The 6-inch force main runs south along Darrell Road and discharges into sanitary manhole D5NW41 on West Pondview Drive, directly south of Route 120 and the Pines of Lakemoor Ponds. Lakemoor Lift Station 6 is tributary to Lakemoor Lift Station 7.

This lift station is a steel can triplex submersible pump system with a valve vault. The District currently operates with only two submersible pumps equipped with VFD's. The lift station is equipped with an on-site generator, installed in 2018, and a pressure transducer with float back-up. The station also has a Sensaphone alarm system, a flow meter and a bypass pump connection in the valve vault. The lift station was connected to SCADA in 2024. Also, soft starters were added on the pumps in 2024.

Lakemoor Lift Station 6 was rehabilitated in 2023. Rehabilitation work included replacement of both submersible pumps, base elbow slide fittings, wet well riser piping, control panel and ATS. The 2023 rehabilitation also installed a new light pole and LED light fixture. The project scope originally included the wet well and valve vault to be coated with corrosion-resistant material, but sandblasting caused leaking in the steel structure and the District removed the scope from the project. Corrosion of the steel structures will be addressed in a future project.

Table 4-18: Lakemoor Lift Station 6 Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Lakemoor LS 6	2023	Grundfos	15	521	8”
	2023	Grundfos	18	515	

Lakemoor Lift Station 6 Performance and Deficiencies

In 2020, the District observed excessive F.O.G at Lift Station 6. This was tracked down to a nearby restaurant with a double basin grease trap instead of an ordinance required triple basin grease trap. The restaurant was required to clean the grease trap monthly, and not have any issues for 12 months. The problem appears to have been resolved since these requirements were placed on the restaurant.

The steel wet well and valve vault are showing signs of corrosion. The 2023 rehabilitation project included scope to sandblast the steel and coat it with a Sherwin Williams corrosion resistant material, Dura-Plate 6000 epoxy. During sandblasting, pinhole openings were developing in the steel and groundwater was infiltrating the structure. It was determined that the structural integrity of the below grade structures need to be addressed based on the condition of the steel so the holes were patched and the coating application was stopped. The District evaluated four rehabilitation alternatives:

1. Sprayroq SprayWall self-priming polyurethane lining system - $290,000
2. OBIC 5000 spray-applied polyurea lining system - $220,000
3. FRP pipe insert rehabilitation - $200,000
4. Monoform Plus Protective Liner System (concrete and HDPE liner) - $240,000

The District selected the Monoform Plus Liner System based on cost and providing a minimum 15-20 year service life.

4.4.7 Lakemoor Lift Station 7

Lakemoor Lift Station 7 originally constructed in 1997, is located near 127 South Drive in Lakemoor. The service area includes approximately 70 acres of mainly residential property in the Northeastern Drainage Basin. Lakemoor Lift Station 6 and Woodman's Lift Station are tributary to Lift Station 7.

Wastewater is pumped through a 12-inch diameter, approximately 3.5-mile-long force main and discharges into sanitary manhole C8NW56 to the 24-inch Route 176 West Interceptor. The capability of adding a third pump is crucial to all future flow from the Northeastern Basin which is proposed to be diverted to the future Darrell Road Collection System.

The lift station is a triplex submersible pump system with a valve vault. The District currently operates with only two submersible pumps. The lift station is equipped with an on-site generator and a Sensaphone alarm system. The station is also equipped with a level transducer for primary pump control, back-up mechanical float switches and has bypass pump connection in the valve vault. In 2024, several upgrades were completed at the lift station, including replacement of the standby generator, adding soft starters to the pumps, and connecting the lift station to SCADA.

Table 4-19: Lakemoor Lift Station 7 Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Lakemoor LS 7	2017	Grundfos	21	800	12”
	2017	Grundfos	21	800	

Table 4-20: Lakemoor Lift Station 7 Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	525	-34%
2	617	-23%

Lakemoor Lift Station 7 Performance and Deficiencies

The lift station is in good condition. There is evidence of groundwater infiltration in the wet well and in the valve vault and F.O.G is present. Piping in the wet well and valve vault is rusting and the bottom rungs of the ladder into the valve vault are corroded. The lift station received a new ATS in 2020, but the District has noted that the run schedule is abnormal.

Based on drawdown testing results, the pumps are operating well outside of and below the +/- 8% tolerance allowance. This lift station is also a triplex, but only houses two pumps. It is a critical lift station within the collection system. District staff have not noted any capacity issues at Lift Station 7.

Lakemoor Lift Station 7 Expansion and Upgrades

Drawings and specifications were prepared in 2019 to address rehabilitation and upgrades needed including replacement of the valve vault sump pump, blasting and painting of valve vault piping and replacement of wet well riser piping. Submersible pump replacement was not proposed at this time, but a third submersible pump will be added to the wet well. A safety grate will be retrofitted in the valve vault access hatch. The upgrades also include a new light pole and LED light fixture, a new control panel and enclosure, and a new generator. As funding becomes available, the District will be pursuing these lift station updates.

The District replaced the generator and equipment pad in early 2024. In addition to the upgrades listed above, TAI recommends replacing the valves and fittings in the valve vault. It is also recommended that a technician investigates and repairs the cause of the unpredictable ATS run schedule.

Further Lift Station 7 upgrades and changes are a part of the last phase of the Darrell Road Improvements.

The estimated cost for rehabilitation is $322,180.

Table 4-21: Lakemoor Lift Station 7 Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$100,300
LIFT STATION #7				$192,180
CONSTRUCTION SUB-TOTAL				**$292,480**
CONTINGENCY @ 5%				$14,700
CONSTRUCTION TOTAL				**$307,180**
BIDDING DOCUMENT PREPARATION AND BID ACTIVITIES				$15,000
TOTAL CONSTRUCTION COST				**$322,180**
	Quantity	**Unit**	**Unit Cost**	**Extended Cost**
LIFT STATION #7				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
Sump Pumps & Installation	1	Each	$900	$900
Pipe Paint	1	L.S.	$5,000	$5,000
Valve Vault Hatch Safety Grating & Installation	1	L.S.	$3,200	$3,200
Plug Valve	2	Each	$3,000	$6,000
Check Valve	2	Each	$3,000	$6,000
Electrical and Controls				
Conduit, Wiring, Labor	70	Lin. Ft	$60	$4,200
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
Pump Monitoring Module	1	Each	$1,800	$1,800
Radar Level Detection	1	Each	$1,800	$1,800
Primary Element Installation	1	L.S.	$1,800	$1,800
Pump & Primary Elements Connections	1	L.S.	$10,300	$10,300
Programming	1	L.S.	$25,700	$25,700
Sitework				
Demo & Dispose Existing Wood Fence and Posts	1	L.S.	$2,500	$2,500
Restoration	50	Sq. Yd.	$40	$2,000
Plants - Globe Arborvitae, Maiden Grass, Gold Flame Spirea, Prairie Drop Seed	17	Each	$180	$9,180
Plants - Compact Burning Bush, 4'	2	Each	$260	$520
Merrimac Stone, 3"	525	Sq. Ft.	$10	$5,250
Geotextile Fabric	525	Sq. Ft.	$2	$1,050
TOTAL LIFT STATION #7				**$192,180**

4.4.8 Burr Oak Lift Station

Burr Oak Lift Station, originally constructed in 1999, is located at 3314 Burr Oak Lane in Island Lake, directly north of Fox Trail. It was constructed with the Campbell Woods residential development. The service area includes approximately 70 acres of mainly residential property and a middle school in the Near East Drainage Basin.

The lift station is a duplex submersible pumping system. The lift station is equipped with a Sensaphone alarm system, mechanical float switches and a bypass pump connection.

Wastewater is pumped through a 4-inch diameter, 930 lineal foot long force main, and discharges into sanitary manhole D8NE21 on Burr Oak Lane, east of Matthews Middle School. Burr Oak Lift Station is tributary to South Shore Lift Station.

Table 4-22: Burr Oak Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Burr Oak	Unknown	Hydromatic	5	90	4"
	Unknown	Grundfos	5.5	90	

Table 4-23: Burr Oak Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	132	47%
2	135	50%

Burr Oak Lift Station Performance and Deficiencies

Burr Oak Lift Station is in good condition. Drawdown testing results indicate the pumps are pumping more flow than the rated capacity of 90 gpm. The valves and pipes are rusted, and at the time of the assessment visit, the functionality of the valves was unknown. There is visible groundwater infiltration in the wet well. The bottom ring of the wet well structure is offset from the rest of the structure and needs to be addressed. There is also standing water in the valve vault indicating the sump pump requires replacement. The pump control panel and traffic enclosure are in poor condition showing rust through the enclosure. There are no significant issues with F.O.G or ragging. The lift station does not have an on-site generator or a flow meter.

District staff noted that access to the valve vault from the access drive is difficult as it is surrounded by trees on two sides.

Burr Oak Lift Station Expansion and Upgrades

The Burr Oak Lift Station pumps are currently pumping above their designed capacity. District staff have not noted any capacity issues.

TAI recommends lining the wet well and valve vault. The riser piping in the wet well should be replaced due to the age of the lift station, built in 1999. The Hydromatic pump is recommended to be replaced within 20 years of installation due to useful lifespan. A new control panel and all other electrical components are recommended for replacement with new traffic enclosure. Staff have requested an intrusion alarm. TAI also recommends new valves, bypass, and fittings in the valve vault. The surrounding area should be cut back and landscaped for easier access to all lift station equipment. All recommended upgrades are included in the cost estimate below. The estimated cost for rehabilitation is $621,200.

Table 4-24: Burr Oak Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$128,600
BURR OAK LIFT STATION				$320,700
CONSTRUCTION SUB-TOTAL				**$449,300**
CONTINGENCY @ 20%				$89,900
CONSTRUCTION TOTAL				**$539,200**
DESIGN ENGINEERING @7.5%				$41,000
CONSTRUCTION ENGINEERING @ 7.5%				$41,000
TOTAL CONSTRUCTION COST				**$621,200**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
BURR OAK LIFT STATION				
Process				
Pumps & Installation	2	Each	$17,700	$35,400
VFD & Installation	2	Each	$2,000	$4,000
Sump Pumps & Installation	1	Each	$900	$900
Replace Pump Discharge Piping	25	Lin. Ft	$200	$5,000
Valve Vault Hatch Safety Grating & Installation	1	Each	$3,200	$3,200
Plug Valve	2	Each	$3,000	$6,000
Check Valve	2	Each	$3,000	$6,000
Coat Wet Well	1	L.S.	$25,000	$25,000
Coat Valve Vault	1	L.S.	$25,000	$25,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Pressure Transducer and Installation	1	L.S.	$3,500	$3,500
Back-up Floats and Installation	1	L.S.	$1,000	$1,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
Pump Monitoring Module	2	Each	$1,800	$3,600
PLC/Radio Panel	1	L.S.	$12,000	$12,000
Programming	1	L.S.	$25,700	$25,700
Intrustion Alarm	1	L.S.	$3,000	$3,000
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Access Improvements	1	L.S.	$50,000	$50,000
TOTAL BURR OAK LIFT STATION				**$320,700**

4.4.9 Clearwater Lift Station

Clearwater Lift Station, originally constructed in 1997, is located at the north end of Stone Drive in the Village of Lakemoor, at Clearwater Subdivision Outlot #21, directly west of Clear Lake. The service area includes approximately 20 acres of residential property in Clearwater Subdivision in the Central Drainage Basin.

Wastewater is pumped south through a 2-inch diameter, 300 lineal foot long force main into an 8-inch, approximate 1.5-mile-long force main and discharges into sanitary manhole C8NW56 on the 24-inch Route 176 West Interceptor. Clearwater Lift Station is tributary to the NMWRD WWTP.

The lift station is a submersible duplex steel can pumping system with a valve vault and meter vault. The lift station is not currently equipped with an on-site generator but may accept a portable generator and has a Sensaphone alarm system. The station is also equipped with mechanical float switches and a bypass pump connection.

Table 4-25: Clearwater Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Clearwater	Unknown	Hydromatic	2	30	2"/8"
	2022	Grundfos	3	30	

Table 4-26: Clearwater Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Pump Rated Capacity
1	41	36%
2	58	93%

Clearwater Lift Station Performance and Deficiencies

Clearwater Lift Station is in good condition. The steel structures show evidence of surface rusting. It is likely that the structure could potentially fail if cleaned by blasting. It is recommended that the District consider rehabilitating the structures with a lining system, similar to Lakemoor Lift Station 6. The lift station components and equipment are original to the 1997 construction. The valve vault is holding water indicating in infiltration or inflow issue. The piping and valves show signs of corrosion. District staff have indicated that the valves have likely not been exercised. The valves will need to be replaced. The control panel is original to the station and will likely require replacement within 10 years. Minor maintenance issues include a leaking back-up battery in the traffic enclosure, and electrical conduit should be sealed at the control panel to prevent the movement of sewer gases.

The manhole upstream of the lift station wet well has sunk and is causing inflow issues in the wet well. It is recommended that the structure be reset or replaced. This will improve the influent flow to the lift station. The wet well is clear of F.O.G. since the upstream manhole is acting as a grease trap. back-pitched, which creates an issue with clean out.

Drawdown testing results indicate that the Clearwater Lift Station pumps are currently pumping above their design capacity. TAI does not recommend pump replacement at this time, but pump replacement must occur at the end of the pumps' useful service lifespans.

A new control panel and all other electrical components are recommended for replacement with new traffic enclosure. TAI also recommends new piping, valves, bypass pump connection, guiderails due to the recommended structure rehab. All recommended upgrades are included in the cost estimate below.. The estimated cost for rehabilitation is $541,200.

Table 4-27: Clearwater Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$118,100
CLEARWATER LIFT STATION				$272,900
CONSTRUCTION SUB-TOTAL				**$391,000**
CONTINGENCY @ 20%				$78,200
CONSTRUCTION TOTAL				**$469,200**
DESIGN ENGINEERING @ 7.5%				$36,000
CONSTRUCTION ENGINEERING @ 7.5%				$36,000
TOTAL CONSTRUCTION COST				**$541,200**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
CLEARWATER LIFT STATION				
Process				
Replace Pump Discharge Piping	1	Each		
Plug Valve	2	Each	$3,000	$6,000
Check Valve	2	Each	$3,000	$6,000
Remove and Reinstall Piping and Pumps	1	Each	$40,000	$40,000
Monoform Plus Protective Liner System	1	Each	$100,000	$100,000
Upstream Manhole Replacement	1	Each	$15,000	$15,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Pressure Transducer and Installation	1	L.S.	$3,500	$3,500
Back-up Floats and Installation	1	L.S.	$1,000	$1,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
TOTAL CLEARWATER LIFT STATION				**$272,900**

4.4.10 Deer Grove Lift Station

The Deer Grove Lift Station, originally constructed in 2006, is located at 2629 Wisteria Way in the northeastern portion of the Village of Port Barrington, south of Slocum Lake and directly north of North Darrell Road. The service area includes approximately 16 acres of residential property in the Southern Drainage Basin.

Deer Grove Lift Station is a duplex submersible pumping system. The lift station has a generator housed within a brick and block building, along with the electrical and controls equipment. The lift station has a Sensaphone alarm system, a submersible pressure transducer, ISCO pump station monitor for flow measurement, and bypass pump connection.

Wastewater is pumped through an 8-inch diameter, 2,615 lineal foot long force main, and discharges into sanitary manhole D10SW05 near the intersection of Darrell Road and Noble Drive, east of West Roberts Road. Deer Grove Lift Station is tributary to the Rawson Bridge lift station.

Table 4-28: Deer Grove Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Deer Grove	2006	KJI	10	532	8"
	2022	Grundfos	40	532	

Table 4-29: Deer Grove Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	545	2%
2	519	-2%

Deer Grove Lift Station Performance and Deficiencies

Deer Grove Lift Station is in good condition. Pumps handle current influent flow and on average, run less than one hour per week. Pump 1 is likely a KJI unit and Pump 2 appears to be replaced with a Grundfos unit. Both pumps operate within the 8% tolerance allowance. District staff have not noted any capacity issues.

It appears some rebar is exposed in the wet well and there is noticeable and prominent I/I. F.O.G. levels are at acceptable levels. The wet well dual door access hatch only has a single safety grate for fall protection. It is recommended that the hatch be retrofitted with proper safety grates for the size of the opening.

The valve vault has no standing water, but infiltration is visible and the concrete structure joints do not align well. The coating on the piping and valves is peeling and the surface is starting to rust. The valve vault does not contain a safety grate.

The building containing the control panel and generator is in good condition. The transfer switch for the generator was serviced in November of 2023 and issues were resolved. However, the generator is original to the lift station and will be 20 years old in 2026. The District should budget for a replacement generator in the next 10 years. The lift station property is fenced and the landscaping is in good condition.

Deer Grove Lift Station Expansion and Upgrades

Drawdown testing results show the Deer Grove Lift Station pumps are currently pumping at their designed capacity. TAI recommends one pump replacement to be considered by 2025 due to pump 1 (KJI) nearing the end of its service life. The lift station's biggest issues are the wet well and valve vault structure and the I/I. The condition of the piping in both the wet well and the vault is poor so it is recommended that both are blasted and repainted. It is recommended that safety grates be installed on the wet well and valve vault access hatches. It is recommended that the generator be replaced in the next 10 years. All recommended upgrades are included in the cost estimate below. The estimated cost for rehabilitation is $404,200.

Table 4-30: Deer Grove Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$100,200
DEER GROVE LIFT STATION				$191,600
CONSTRUCTION SUB-TOTAL				**$291,800**
CONTINGENCY @ 20%				$58,400
CONSTRUCTION TOTAL				**$350,200**
DESIGN ENGINEERING @ 7.5%				$27,000
CONSTRUCTION ENGINEERING @ 7.5%				$27,000
TOTAL CONSTRUCTION COST				**$404,200**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
DEER GROVE LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
VFD & Installation	1	Each	$1,300	$1,300
Replace Pump Discharge Piping	50	Lin. Ft.	$200	$10,000
Pipe and Valve Blast and Re-coat	1	L.S.	$5,000	$5,000
Wet Well Hatch Safety Grating & Installation	2	Each	$3,200	$6,400
Valve Vault Hatch Safety Grating & Installation	1	Each	$3,200	$3,200
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Generator, ATS & Installation	1	L.S.	$73,900	$73,900
Telecommunications	1	L.S.	$4,300	$4,300
Pump Monitoring Module	1	Each	$1,800	$1,800
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Access Improvements	1	L.S.	$50,000	$50,000
TOTAL DEER GROVE LIFT STATION				**$191,600**

4.4.11 Fern Lift Station

Fern Lift Station, constructed in 1978, is located at the northeast corner of Fern Drive and Poplar Drive in the northeastern portion of the Village of Island Lake. The service area includes approximately 298 acres of residential and commercial property in the Central Drainage Basin.

The lift station is a duplex submersible pumping system with a valve vault. The submersible pumps are equipped with VFDs. The lift station is currently equipped with an on-site generator and has a Sensaphone alarm system and ISCO pump monitor system for flow measurement. The station is also equipped with a mechanical float switch and a bypass pump connection.

The lift station was upgraded in 2011. The upgrades included replacement of pumps, base elbows, guiderails and all discharge piping and valves onsite. The concrete lids and access hatches, electrical and controls panel were replaced. A new natural gas generator and ATS were installed as well as a new pump bypass connection. The railroad tie retaining wall was replaced and the asphalt pavement around the lift station site was replaced. The generator was again replaced in 2015 with a Blue Star unit.

Wastewater is pumped through an 8-inch diameter, 745 lineal foot long force main, and discharges into sanitary manhole D8NW02 at the southeast corner of Poplar Drive and East Burnett Road. Fern Lift Station is tributary to the NMWRD WWTP.

Table 4-31: Fern Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Fern	2011	Flygt	10	576	8"
	2022	Grundfos	10	576	

Table 4-32: Fern Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	470	-18%
2	368	-36%

Fern Lift Station Performance and Deficiencies

Fern Lift Station is in generally good working condition and structural condition. District staff noted the presence of Fat, oil, and grease (F.O.G) is acceptable.

Fern Lift Station pump capacity is adequate but both pumps are operating below and outside of the 8%+/- tolerance allowance based on drawdown tests results. District staff have not noted any capacity issues at Fern Lift Station.

Fern Lift Station Expansion and Upgrades

The District should consider retrofitting the existing control panel with a PLC and radio to match those to be installed at the Lakemoor Lift Stations. Other suggested additions to the lift station include a submersible pressure transducer and work light. The estimated cost for rehabilitation is $183,500.

Table 4-33: Fern Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$71,500
FERN LIFT STATION				$61,400
CONSTRUCTION SUB-TOTAL				**$132,900**
CONTINGENCY @ 20%				$26,600
CONSTRUCTION TOTAL				**$159,500**
DESIGN ENGINEERING @ 7.5%				$12,000
CONSTRUCTION ENGINEERING @ 7.5%				$12,000
TOTAL CONSTRUCTION COST				**$183,500**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
FERN LIFT STATION				
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Pressure Transducer and Installation	1	L.S.	$3,500	$3,500
Back-up Floats and Installation	1	L.S.	$1,000	$1,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
PLC/Radio Panel	1	L.S.	$12,000	$12,000
Programming	1	L.S.	$25,700	$25,700
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
TOTAL FERN LIFT STATION				**$61,400**

4.4.12 Hale 1 Lift Station

Hale 1 Lift Station, originally constructed in 1986, is located near 3439 Hale Lane in the most western portion of the Village of Island Lake, directly east of the Fox River. The service area includes approximately 63 acres of built-out residential property in the Waterford Drainage Basin.

Wastewater is pumped through a 6-inch diameter, 490 lineal foot long force main, and discharges into sanitary manhole B8SE13 on Portsmouth Drive near the intersection of Portsmouth Drive and Hale Lane. Hale 1 Lift Station is tributary to the Waterford Lift Station.

The lift station is a steel can duplex submersible pumping system. The submersible pumps are equipped with VFDs. The lift station is equipped with an on-site generator, installed in 2016, a submersible pressure transducer and back-up mechanical float switch system, a Sensaphone alarm system, odor control and bypass pump connection. The steel wet well and valve vault structures have been coated to prevent further corrosion from sewer gases.

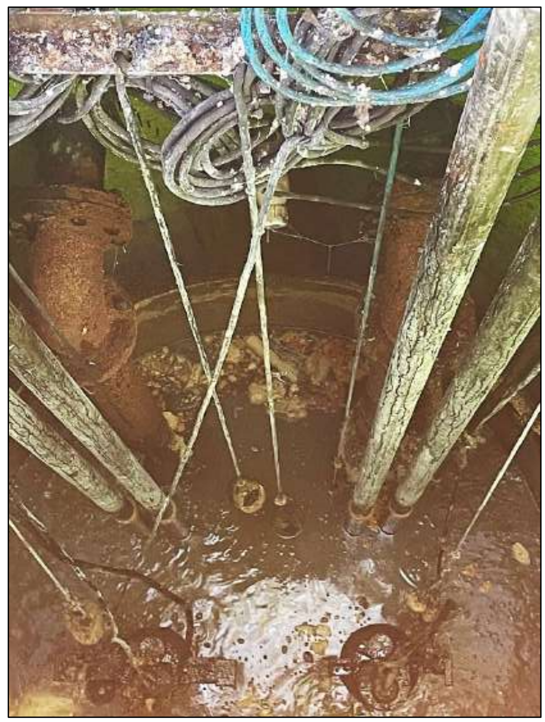


Table 4-34: Hale 1 Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Hale 1	2014	Hydromatic	5	363	6"
	2014	Hydromatic	5	363	

Table 4-35: Hale 1 Drawdown Test Results

Pump Number	Measured Flow (GPM)	% Difference From Design Flow
1	Not in Use/Inoperative	N/A
2	297	-18%

The Hale 1 Lift Station does not have any future development anticipated within the service area.

Hale 1 Lift Station Performance and Deficiencies

Hale 1 Lift Station is in good condition. The location of the lift station is situated in close proximity to the Fox River. Previous infiltration issues were resolved by coating the steel structures. The piping, valves, and bypass connection show **significant rusting or corrosion**. At the time of the assessment visit, the valve vault had some standing water. The control panel and traffic enclosure were replaced in 2022. The check valves, plug valves and pump bypass connection were replaced in 2023. The odor control/aerator in the wet well is operational. There appears to be an average amount of ragging and a moderate amount of F.O.G. The Blue Star natural gas generator was installed in 2016 and is in good condition.

The lift station is set back from Hale Lane, but the lift station structures are surrounded by turf grass. There is no paved pull off area for District maintenance vehicles.

Hale 1 Lift Station Expansion and Upgrades

Drawdown test results indicate Hale 1 Pump 2 is operating outside of and well below the +/- 8% tolerance allowance. In addition, Pump 1 was not operational at the time of drawdown testing and has been out of service for some time. It is recommended that both pumps be operating to provide pump redundancy and prevent lift station failure. District staff have not noted any capacity issues at Hale 1 Lift Station. It is also recommended that the structures are recoated to maintain corrosion protection.

It is recommended that the wet well riser piping and fittings be replaced due to the age of the lift station which was built in 1986. Other suggested additions to the lift station include a submersible pressure transducer and work light.

All rehabilitation recommendations can be found in the cost estimate below. The estimated cost for rehabilitation is $439,400.

Table 4-36: Hale 1 Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$104,900
HALE 1 LIFT STATION				$212,900
CONSTRUCTION SUB-TOTAL				**$317,800**
CONTINGENCY @ 20%				$63,600
CONSTRUCTION TOTAL				**$381,400**
DESIGN ENGINEERING @ 7.5%				$29,000
CONSTRUCTION ENGINEERING @ 7.5%				$29,000
TOTAL CONSTRUCTION COST				**$439,400**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
HALE 1 LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
VFD & Installation	1	Each	$2,000	$2,000
Remove and Reinstall Piping and Pumps	1	Each	$40,000	$40,000
Cathodic Protection for Steel Structures	1	L.S.	$30,000	$30,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Pressure Transducer and Installation	1	L.S.	$3,500	$3,500
Back-up Floats and Installation	1	L.S.	$1,000	$1,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
Pump Monitoring Module	1	Each	$1,800	$1,800
PLC/Radio Panel	1	L.S.	$12,000	$12,000
Programming	1	L.S.	$25,700	$25,700
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Access Improvements	1	L.S.	$50,000	$50,000
TOTAL HALE 1 LIFT STATION				**$212,900**

4.4.13 Hale 2 Lift Station

Hale 2 Lift Station, originally constructed in 1992, is located near 3923 Hale Lane in the western portion of the Village of Island Lake, directly east of the Fox River. The service area includes approximately 93 acres of built-out residential property in the Waterford Drainage Basin.

Wastewater is pumped through a 6-inch diameter, 1,405 lineal foot long force main, and discharges into sanitary manhole C8SW24 near the intersection of Newport Drive and Wembley Drive. Hale 2 Lift Station is tributary to Waterford Lift Station.

The lift station is a duplex submersible pumping system with a valve vault. The submersible pumps are equipped with VFDs. The lift station is currently equipped with an on-site generator, installed in 2016, a submersible pressure transducer and back-up mechanical float switches. The lift station has a pump bypass connection and a Sensaphone alarm system.

Table 4-37: Hale 2 Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Hale 2	2016	Grundfos	7.5	238	6"
	2016	Grundfos	7.5	238	

Table 4-38: Hale 2 Drawdown Test Results

Pump Number	Measured Flow (GPM)	% Difference From Design Flow
1	228	-4%
2	211	-11%

Hale 2 Lift Station Performance and Deficiencies

Hale 2 Lift Station is in good condition. The location of the lift station is situated in close proximity to the Fox River. The check valves, plug valves and pump bypass connection were replaced in 2023. There appears to be an average amount of ragging and a moderate amount of F.O.G. The Blue Star natural gas generator was installed in 2016 and is in good condition.

F.O.G. levels are fairly high considering that the station was cleaned out mid-2023, and ragging is generally average. A control panel replacement recently occurred but there is a broken latch on the inner Grundfos cabinet.

The lift station is set back from Hale Lane, but the lift station structures are surrounded by turf grass. There is no dedicated paved pull off area for District maintenance vehicles.

Hale 2 Lift Station Expansion and Upgrades

Drawdown test results indicate Hale 2 Pump 2 is operating outside of and slightly below the +/- 8% tolerance allowance. The Hale 2 Lift Station keeps up with capacity as designed and pumps run simultaneously only on rare occasions of wet weather conditions.

TAI recommends replacing the wet well piping due to the age of the lift station. It is suggested that the lift station be improved with the installation of a work light and a paved pull-off area for District maintenance vehicles.

All rehabilitation recommendations can be found in the cost estimate below. The cost of rehabilitation is estimated to be $290,500.

Table 4-39: Hale 2 Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$85,500
HALE 2 LIFT STATION				$124,900
CONSTRUCTION SUB-TOTAL				**$210,400**
CONTINGENCY @ 20%				$42,100
CONSTRUCTION TOTAL				**$252,500**
DESIGN ENGINEERING @ 7.5%				$19,000
CONSTRUCTION ENGINEERING @ 7.5%				$19,000
TOTAL CONSTRUCTION COST				**$290,500**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
HALE 2 LIFT STATION				
Process				
Replace Pump Discharge Piping	40	Lin. Ft.	$200	$8,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
PLC/Radio Panel	1	L.S.	$12,000.00	$12,000
Programming	1	L.S.	$25,700	$25,700
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Access Improvements	1	L.S.	$50,000	$50,000
TOTAL HALE 2 LIFT STATION				**$124,900**

4.4.14 Holiday Hills Lift Station

Holiday Hills Lift Station, originally installed in 2023, is located at the intersection of Sunset Drive and Holiday Drive in the north portion of the Village of Holiday Hills. The service area includes approximately 355 acres of residential property in the Waterford Drainage Basin, including the Village of Holiday Hills and the Le Villa Vaupell subdivision of unincorporated McHenry County. The lift station was constructed as part of Phase 1 of the Holiday Hills Sanitary Sewer Extension Project. The project includes the Holiday Hills Lift Station and approximately 11,131 linear feet of sewer and 3,799 linear feet of 8-inch force main. It was constructed in 2023 and serves 378 PE (108 homes). Future phases will serve another 794.5 PE (227 homes). Potential development to the north of Holiday Hills, approximately 293 acres, will be part of the Waterford Drainage Basin and will serve an approximate 1298.5 PE (371 homes).

Wastewater is pumped from the lift station, east on Sunset Drive to South River Road and discharges to both an 8-inch diameter force main and a 12-inch diameter force main from Lakemoor Lift Station 1 and Lakemoor Lift Station 7, respectively. Holiday Hills Lift Station is tributary to the NMWRD WWTP.

The lift station is a triplex submersible pumping system with a valve vault and a meter vault. and features three submersible pumps. Both the valve vault and meter vault contain sump pumps. The generator and control building holds the on-site generator, MCC equipment, ATS, pump controls, transformer, and flow transmitter for the electromagnetic flow meter. The wet well is equipped with a submersible pressure transducer and back-up mechanical float switches. The lift station has a bypass pump connection and an air release valve in the valve vault. This lift station was connected to SCADA in 2024.

Table 4-40: Holiday Hills Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Holiday Hills	2023	Grundfos	20		12"/8"
	2023	Grundfos	20		
	2023	Grundfos	20		

Drawdown testing was not conducted at this lift station since the pumps are new. The District has not noted any capacity issues especially since most homes in the Holiday Hills service area are not yet connected to the new sanitary sewer.

4.4.15 Prairie Woods Lift Station

Prairie Woods Lift Station, originally constructed in 2008, is located in the Prairie Woods Subdivision at the south end of Fen View Circle in the northern portion of the Village of Island Lake. The service area includes approximately 23 acres of residential property in the Central Drainage Basin encompassing its service area and receives flow from Walnut Glen Lift Station. The lift station was installed with the residential development – Prairie Woods Subdivision.

Wastewater is pumped through a 6-inch diameter, 855 lineal foot long force main, and discharges into sanitary manhole C7SE47, directly south of the lift station. Prairie Woods Lift Station is tributary to the Rolling Oaks Lift Station.

Part of the Walnut Glen subdivision was originally in the Eastern basin, represented in the 2014 Facility Plan Update. There were 69 original sewer permits issued in 2006 for this subdivision. The Village only approved 63 lots so 6 were refunded in 2007. It was known that the downstream lift station (Prairie Woods) could only accommodate the 52 lots and that the upgrade at the lift station, under paragraph 3 of the 2008 agreement, was to temporarily accommodate Walnut Glen subdivision until the Darrell Road Interceptor was installed, at which time flow from Walnut Glen would be re-directed to Darrell Road (or capacity would be freed up in the River Road Sewer).

The lift station is a submersible duplex pumping system with a valve vault. The lift station is currently equipped with an on-site generator, replaced in 2019, and has a Sensaphone alarm system. The station has a float pump control system and a sump pump in the valve vault. The pump control panel with ATS and generator are onsite and located in a traffic enclosure. The pump station has a bypass pump connection.

Table 4-41: Prairie Woods Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Prairie Woods	2019	Grundfos	7.5	265	6"
	Unknown	Hydromatic	7.5	265	

Table 4-42: Prairie Woods Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	231	-13%
2	222	-16%

Prairie Woods Lift Station Performance and Deficiencies

The Prairie Woods Lift Station is in good condition. The sump pump in the valve vault was replaced in early 2023, but the District noted issues with reliability because the GFCI needs to be replaced. During a site visit, the valve vault was submerged, indicating the presence of infiltration. Prairie Woods Lift Station is located close to wetlands with possible high groundwater table.

Hydrogen sulfide and methane gas are likely causing corrosion on terminals in the control panel due to a lack of a proper seal in the conduit between the wet well and the control panel. The Cummins generator replaced in 2019 also exhibits some issues of intermittence.

Prairie Woods Lift Station Expansion and Upgrades

Drawdown test results indicate Pump 1 and Pump 2 are operating outside of and below the +/- 8% tolerance allowance. The District has not noted any capacity issues with the lift station. TAI recommends pump replacement to be considered within 20 years of their installation. It is recommended that the valve vault GFCI be replaced for sump pump operation and proper electrical conduit seals be added. The District should budget for the control panel to be replaced in the next 10 years, or the addition of a PLC/radio panel. The lift station controls can be upgraded with the addition of a submersible pressure transducer. A service technician should provide insight and solutions to the unwanted intermittence coming from the generator that was installed in 2019.

All recommended upgrades are included in the cost estimate below. The cost of rehabilitation is estimated to be $362,000.

Table 4-43: Prairie Woods Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$94,700
PRAIRIE WOODS LIFT STATION				$166,900
CONSTRUCTION SUB-TOTAL				**$261,600**
CONTINGENCY @ 20%				$52,400
CONSTRUCTION TOTAL				**$314,000**
DESIGN ENGINEERING @ 7.5%				$24,000
CONSTRUCTION ENGINEERING @ 7.5%				$24,000
TOTAL CONSTRUCTION COST				**$362,000**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
PRAIRIE WOODS LIFT STATION				
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Pressure Transducer and Installation	1	L.S.	$3,500	$3,500
Back-up Floats and Installation	1	L.S.	$1,000	$1,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
GFCI Replacement in Valve Vault	1	L.S.	$1,000	$1,000
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Access Improvements	1	L.S.	$50,000	$50,000
TOTAL PRAIRIE WOODS LIFT STATION				**$166,900**

4.4.16 Rawson Bridge Lift Station

Rawson Bridge Lift Station, originally constructed in 1998, is located near 100 Rawson Bridge Road in the northwestern portion of the Village of Port Barrington, directly east of the Fox River and southeast of Fox Trail Park. The service area includes the entire 254 acres of residential property in the Southern Drainage Basin, including flow from Deer Grove Lift Station.

Wastewater is pumped through a 10-inch diameter, 5,470 lineal foot long force main, and discharges into sanitary manhole C9SE23, southeast of the NMWRD WWTP and west of Roberts Road. Rawson Bridge Lift Station is tributary to the 18-inch Southern Interceptor and the NMWRD WWTP.

The lift station is a submersible duplex pumping system with a valve vault. The lift station is equipped with the original on-site generator, installed in 1998, and has two autodialer systems – one for pump alarms and the other for intrusion alarms. The pump control panel with ATS and generator are housed within an adjacent building with heat and an intrusion alarm. The station has a mechanical float switch control system and a bypass pump connection. Flow is monitored with a Greyline Doppler flow meter. The District installed a composite sampler at the Rawson Bridge Lift Station site.

Table 4-44: Rawson Bridge Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Rawson Bridge	Unknown	Grundfos	30	740	10"
	2008	Hydromatic	30	740	

Table 4-45: Rawson Bridge Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	447	-40%
2	Non-functional	N/A

Rawson Bridge Lift Station Performance and Deficiencies

The Rawson Bridge Lift Station is in good condition. F.O.G. levels are not abnormal but a large number of rags were present when the pumps were last pulled out of the wet well. Standing water in the valve vault indicates potential infiltration. There is no sump pump in the valve vault.

The piping in the wet well shows significant rusting or corrosion. District staff have noted that the base elbows require replacement. The safety grates over the wet well hatch opening are severely corroding and they do not stay open, causing a safety concern.

The control and generator building is in good condition. The generator is original to the lift station and the ATS was replaced in 2019. The Kohler generator on site is currently inoperative. A service technician visited the lift station site in November of 2023.

There are no notable capacity issues. The overall landscaping is weedy and uncut.

Rawson Bridge Lift Station Expansion and Upgrades

Drawdown test results indicate that Rawson Bridge Pump 1 is operating outside of and well below the +/- 8% tolerance allowance. In addition, Pump 2 was not operational at the time of drawdown testing and has been out of service for some time. It is recommended that both pumps be operating to provide pump redundancy and prevent lift station failure. District staff have not noted any capacity issues at Rawson Bridge Lift Station. District staff reported a pump control issue with Pump 2. It is recommended that Pump 1 be replaced and the control issue be investigated further and corrected.

A sump pump should also be installed in the valve vault. TAI also recommends the replacement of the piping in the wet well due to the corrosion and age of the wet well. The safety grates/fall protection in the wet well access hatch should be replaced due to heavy corrosion.

The Kohler generator, original to the lift station building, is recommended for replacement due to its age. The District should consider adding low maintenance landscaping, or paving the area around the wet well dry wall structures.

All recommended upgrades are included in the cost estimate below. The cost of rehabilitation is estimated to be $410,050.

Table 4-46: Rawson Bridge Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$101,100
RAWSON BRIDGE LIFT STATION				$195,550
CONSTRUCTION SUB-TOTAL				**$296,650**
CONTINGENCY @ 20%				$59,400
CONSTRUCTION TOTAL				**$356,050**
DESIGN ENGINEERING @ 7.5%				$27,000
CONSTRUCTION ENGINEERING @ 7.5%				$27,000
TOTAL CONSTRUCTION COST				**$410,050**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
RAWSON BRIDGE LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
VFD & Installation	1	Each	$6,250	$6,250
Sump Pumps & Installation	1	Each	$900	$900
Replace Pump Discharge Piping	40	Lin. Ft.	$200	$8,000
Wet Well Hatch Safety Grating & Installation	3	Each	$3,200	$9,600
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Generator, ATS & Installation	1	L.S.	$73,900	$73,900
Telecommunications	1	L.S.	$4,300	$4,300
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Improved Access	1	L.S.	$50,000	$50,000
TOTAL RAWSON BRIDGE LIFT STATION				**$195,550**

4.4.17 Rolling Oaks Lift Station

Rolling Oaks Lift Station, originally constructed in 1992, is located near 2900 Spruce Terrace in the northern portion of the Village of Island Lake. The service area includes an approximate 98 acres of residential property in the Central Drainage Basin, as well as flow from the Prairie Woods and Walnut Glen Lift Stations.

Wastewater is pumped through a 6-inch diameter, 1,310 lineal foot long force main, and discharges into sanitary manhole C8NE60, directly southwest of Spruce Lake on Burnett Road. Rolling Oaks Lift Station is tributary to the NMWRD WWTP.

The lift station is a duplex submersible pumping system. The lift station is currently equipped with an on-site generator, installed in 2018, and has a Sensaphone alarm system. The lift station has a submersible pressure transducer with back-up mechanical float switch control system and a bypass pump connection. There are two overflow pipes in the wet well. Record drawings were not available to confirm their purpose.

Table 4-47: Rolling Oaks Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Rolling Oaks	2005	Hydromatic	7.5	115	6"
	2018	Grundfos	7.5	115	

Table 4-48: Rolling Oaks Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	76	-34%
2	148	29%

Rolling Oaks Lift Station Performance and Deficiencies

Rolling Oaks Lift Station is in good condition. According to District staff, fat, oil, and grease (F.O.G) levels and rags could be improved but are average.

The wet well shows visible signs of infiltration at ground level and at the second- and third-barrel section joints from the top of the well creating gaps where groundwater can enter the structure. There is standing water in the valve vault and no sump pump installed. The piping, valves, and bypass connection show significant rusting or corrosion.

The traffic enclosure with the control panel is rusting. The interior of the cabinet is dirty and the electrical conduit between the wet well and panel is not sealed properly. The lift station is set back from Spruce Terrace, but the lift station structures are surrounded by turf grass. There is no dedicated paved pull off area for District maintenance vehicles. The landscape surrounding the lift station is well-kept.

There are no capacity issues. There are no major safety items of concern, except the valve vault egress is unusable.

Rolling Oaks Lift Station Expansion and Upgrades

Drawdown test results indicate Pump 1 and Pump 2 are operating outside of the +/- 8% tolerance allowance. The District has not noted any capacity issues with the lift station. TAI recommends pump replacement to be considered within 20 years of their installation.

A sump pump is recommended for installation in the valve vault. Due to the age and condition of the lift station, constructed in 1992, the wet well piping and the valve vault valves, piping, and bypass are recommended for replacement in the next 10 years.

The control panel and enclosure are recommended for replacement due to age. As part of this work it is recommended that the conduit seals be addressed.

All recommended upgrades are included in the cost estimate below. The cost of rehabilitation is estimated to be $487,200.

Table 4-49: Rolling Oaks Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$111,100
ROLLING OAKS LIFT STATION				$241,500
CONSTRUCTION SUB-TOTAL				**$352,600**
CONTINGENCY @ 20%				$70,600
CONSTRUCTION TOTAL				**$423,200**
DESIGN ENGINEERING @ 7.5%				$32,000
CONSTRUCTION ENGINEERING @ 7.5%				$32,000
TOTAL CONSTRUCTION COST				**$487,200**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
ROLLING OAKS LIFT STATION				
Process				
Pumps & Installation	2	Each	$17,700	$35,400
VFD & Installation	2	Each	$2,400	$4,800
Sump Pumps & Installation	1	Each	$900	$900
Replace Pump Discharge Piping	40	Lin. Ft.	$200	$8,000
Coat Wet Well	1	L.S.	$25,000	$25,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Pressure Transducer and Installation	1	L.S.	$3,200	$3,200
Back-up Floats and Installation	1	L.S.	$1,000	$1,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
Pump Monitoring Module	1	Each	$1,800	$1,800
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Access Improvements	1	L.S.	$50,000	$50,000
TOTAL ROLLING OAKS LIFT STATION				**$241,500**

4.4.18 South Shore Lift Station

The South Shore Lift Station, constructed in 1978, is near 230 South Shore Drive in the southern and central portion of the Village of Island Lake, south of the lake. The service area includes approximately 87 acres of residential property in the Near East Drainage Basin and flow from Burr Oak Lift Station. Wastewater is pumped through a 6-inch diameter, 640 lineal foot long force main, and discharges into sanitary manhole D8SW16, directly south of the station at the intersection of Southern Terrace and Woodlawn Drive. South Shore Lift Station is tributary to the NMWRD WWTP.

The lift station is a duplex submersible pumping system with a valve vault. The submersible pumps are equipped with VFDs. The lift station is currently equipped with an on-site generator and has a Sensaphone alarm system and ISCO pump monitor system for flow measurement. The station is also equipped with a mechanical float switch control system and a bypass pump connection.

The lift station was upgraded in 2011. The upgrades included replacement of pumps, base elbows, guiderails and all discharge piping and valves onsite. The concrete lids and access hatches, electrical and controls panel were replaced. A new natural gas generator and ATS were installed as well as a new bypass pump connection. The generator originally installed during that rehabilitation project was replaced in 2024.

The railroad tie retaining wall and the asphalt pavement around the lift station site were replaced

Table 4-50: South Shore Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
South Shore	2018	Grundfos	5.5	235	6"
	2018	Grundfos	5.5	235	

Table 4-51: South Shore Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	120	-49%
2	Inoperative	N/A

South Shore Lift Station Performance and Deficiencies

The South Shore Lift Station is in good condition. Pump 1 falls outside of the 8% tolerance allowance. Pump 2 is not functioning. District notes that even when Pump 2 is on, the wet well water level still rises. This may indicate a rag issue or clogged pump. It was observed that this is not an issue with the valve or flange on the pump, due to the normal wastewater flow patterns observed at the bottom of the wet well when Pump 2 was running. The District performed VFD replacements in 2019 or 2020 and one of the Flygt pumps was replaced in 2011.

During the evaluation, it was noted that due to a natural gas leak, the 2015 Blue Star generator repeatedly goes into alarm disrupting residents near the lift station. That generator has since been replaced in 2024.

Additionally, the area around the lift station has some overgrown foliage.

South Shore Lift Station Expansion and Upgrades

The South Shore Lift Station pumps are currently not pumping at their designed capacity. Pump 2, the non-functional pump, should be replaced immediately. Pump 1 is pumping well under capacity. Pump 1 should be inspected for ragging or impellor issues and replaced if it is consistently underperforming. Pump 1 may also be past its useful lifespan of 20 year.

The wet well piping is recommended for replacement due to the age of the lift station, constructed in 1978. The valve vault piping, valves, and bypass are recommended for blasting and repainting. The generator alarm issue and natural gas leak should be investigated by a service technician.

Site improvements include clean-up of the surrounding foliage. All recommended upgrades are included in the cost estimate below. The cost of rehabilitation is estimated to be $268,100.

Table 4-52: South Shore Lift Station Rehabilitation Cost Estimate

Description	Quantity	Unit	Unit Cost	Extended Cost
SUMMARY				
GENERAL CONDITIONS				$82,400
SOUTH SHORE LIFT STATION				$111,000
CONSTRUCTION SUB-TOTAL				**$193,400**
CONTINGENCY @ 20%				$38,700
CONSTRUCTION TOTAL				**$232,100**
DESIGN ENGINEERING @ 7.5%				$18,000
CONSTRUCTION ENGINEERING @7.5%				$18,000
TOTAL CONSTRUCTION COST				**$268,100**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
SOUTH SHORE LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
Replace Pump Discharge Piping	24	Lin. Ft.	$200	$4,800
Pipe and Valve Blast and Re-coat	1	L.S.	$5,000	$5,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
Pump Monitoring Module	1	Each	$1,800	$1,800
Sitework				
Demolition and Disposal	1	L.S.	$2,500	$2,500
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Paved Access/Pull-off	1	L.S.	$50,000	$50,000
TOTAL SOUTH SHORE LIFT STATION				**$111,000**

4.4.19 Treatment Plant Lift Station

The Treatment Plant Lift Station, originally constructed in 1997, is located at the wastewater treatment facility, 420 Timber Trail in Island Lake. The service area includes approximately 53 acres of residential property in the South Central Drainage Basin.

Wastewater is pumped through a 4-inch diameter, 400 lineal foot long force main, and discharges into sanitary manhole C9NE12, located at the entrance of the WWTP.

The lift station is a duplex submersible pumping system. The lift station is connected to the treatment plant's standby power generator and alarm system. The lift station level monitoring system includes a submersible pressure transducer with back-up mechanical float switches. The pump control panel is adjacent to the wet well and valve vault structures.

Table 4-53: Treatment Plant Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Treatment Plant	N/A	N/A	N/A	N/A	4"
	2009	Grundfos	5.5	225	

Table 4-54: Treatment Plant Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	N/A	N/A
2	186	-17%

Treatment Plant Lift Station Performance and Deficiencies

The Treatment Plant Lift Station is only operating with one pump (Pump 2) but there are no reported capacity issues at this lift station. Pump 2 is not pumping at its designed capacity, below the +/- 8% tolerance allowance. TAI recommends installing Pump 1 immediately due to the lack of redundancy and investigating the capacity issue with Pump 2 to determine if it is a ragging issue, impellor issue, or useful lifespan issue.

The wet well piping shows heavy rust and corrosion. F.O.G. is visible in the wet well and there is visible ragging on Pump 2. The valve vault is holding water and the valves and piping are submerged in approximately two feet of water. There is no sump pump or sump pit in the vault.

A new control panel and enclosure were installed in November of 2022. The generator powering the lift station, the plant generator, will be replaced in 2024 through USEPA Community Grant funding.

The landscaping and surrounding area is free of debris. There is no safety grate on the valve vault.

Treatment Plant Lift Station Expansion and Upgrades

It is recommended that the wet well piping and valve vault piping be re-coated to prevent further corrosion and valves be replaced if they are not operational. Based on the age of the lift station, full replacement of the piping is not required. A safety grate is recommended in the hatch to the valve vault for fall prevention.

TAI recommends a bypass pump connection be installed in the valve vault.

All recommended upgrades are included in the cost estimate below. The cost of rehabilitation is estimated to be $187,400.

Table 4-55: Treatment Plant Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$71,900
TREATMENT PLANT LIFT STATION				$62,600
CONSTRUCTION SUB-TOTAL				**$134,500**
CONTINGENCY @ 20%				$26,900
CONSTRUCTION TOTAL				**$161,400**
DESIGN ENGINEERING @ 7.5%				$13,000
CONSTRUCTION ENGINEERING @ 7.5%				$13,000
TOTAL CONSTRUCTION COST				**$187,400**
Description	**Quantity**	**Unit**	**2024**	**Extended Cost**
TREATMENT PLANT LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
VFD & Installation	2	Each	$1,100	$2,200
Sump Pumps & Installation	1	Each	$900	$900
Pipe and Valve Blast and Re-coat	1	L.S.	$5,000	$5,000
Valve Vault Hatch Safety Grating & Installation	1	L.S.	$3,200	$3,200
Plug Valve	2	Each	$3,000	$6,000
Check Valve	2	Each	$3,000	$6,000
Bypass Pump Connection	1	Each	$7,500	$7,500
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Telecommunications	1	L.S.	$4,300	$4,300
Pump Monitoring Module	1	Each	$1,800	$1,800
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
TOTAL TREATMENT PLANT LIFT STATION				**$62,600**

4.4.20 Walnut Glen Lift Station

The Walnut Glen Lift Station, originally constructed in 2008, is located at 2285 Walnut Glen Boulevard in Island Lake, at the intersection of Walnut Glen Boulevard and West Dowell Road. The lift station was constructed with the Walnut Glen residential development. The service area includes approximately 101 acres of residential property in the Central Drainage Basin.

Wastewater is pumped through a 6-inch diameter, 575 lineal foot long force main, and discharges into sanitary manhole C7NE04 at the intersection of Dowell Road and Fen View Circle. Walnut Glen Lift Station is tributary to the Prairie Woods Lift Station.

The lift station is a duplex submersible pumping system with a valve vault. The lift station is equipped with an on-site generator and has a Sensaphone alarm system. The pump control panel with soft starters is adjacent to the wet well. The wet well contains a mechanical float switch control system and the valve vault holds a sump pump with integral float switch. The lift station has a bypass pump connection in the valve vault.

Table 4-56: Walnut Glen Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Walnut Glen	2007	KJI	10	284	6"
	2007	KJI	10	284	

Table 4-57: Walnut Glen Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	225	-21%
2	254	-11%

Walnut Glen Lift Station Performance and Deficiencies

The Walnut Glen Lift Station was examined to be in generally good working condition although both pumps operate outside of and below the +/- 8% tolerance allowance. The lift station wet well was cleaned mid 2023 but F.O.G. levels are already at notable levels. There is an average amount of ragging on the pumps. Operators reported an intermittent leak in the concrete wall. The valve vault contains no internal ladder, so it requires a temporary ladder to allow staff to enter and service the valve vault. The valve vault sump pump is nonfunctional.

The lift station piping and valves show rusting and corrosion. The bypass pump connection has not been exercised recently and may not be functional according to staff. The ISCO flow monitor and the backup generator are also non-functional. There are no noted capacity issues or safety concerns. The surrounding landscaping is clean and the large access driveway makes the lift station very accessible.

Walnut Glen Lift Station Expansion and Upgrades

The Walnut Glen Lift Station pumps are currently not pumping at their design capacity. TAI recommends pump replacement to be considered by 2027 due to pumps nearing the end of their service life. It is recommended that the wet well piping and valve vault piping be re-coated to prevent further corrosion and valves be replaced if they are not operational. Based on the age of the lift station, full replacement of the piping is not required. Leaks in the concrete structures around pipe penetrations should be addressed It is recommended that the leak is fixed within the valve vault. A new sump pump is recommended for the vault, as well.

The control panel enclosure is in good condition, however due to the age of the lift station, the control panel should be considered for replacement within the next 10 years. The foliage should be trimmed back and a new generator should be installed as the current generator will have reached its useful lifespan by 2027. A new flow analyzer is recommended, as well.

All recommended upgrades are included in the cost estimate in Table 4-58. The cost of rehabilitation is estimated to be $368,700.

Table 4-58: Walnut Glen Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$102,100
WALNUT GLEN LIFT STATION				$200,400
CONSTRUCTION SUB-TOTAL				**$302,500**
CONTINGENCY @ 20%				$60,500
CONSTRUCTION TOTAL				**$363,000**
DESIGN ENGINEERING @ 7.5%				$28,000
CONSTRUCTION ENGINEERING @ 7.5%				$28,000
TOTAL CONSTRUCTION COST				**$368,700**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
WALNUT GLEN LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
Replacement Flow Monitor & Installation	1	L.S	$2,500	$2,500
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Generator, ATS & Installation	1	L.S.	$73,900	$73,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
Pump Monitoring Module	1	Each	$1,800	$1,800
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
TOTAL WALNUT GLEN LIFT STATION				**$200,400**

4.4.21 Waterford Lift Station

The Waterford Lift Station, constructed in 1985, is near the intersection of Waterford Way and Newport Drive in the Village of Island Lake. The service area includes approximately 161 acres of built-out residential property in the Waterford Drainage Basin. The Lift Station receives flow from Hale 1 and Hale 2 Lift Stations.

Wastewater is pumped through an 8-inch diameter, 1,420 lineal foot long force main, and discharges into sanitary manhole C8NW56, near the intersection of South River Road and Route 176. Waterford Lift Station is tributary to the NMWRD WWTP.

The lift station employs an unlined steel can wet well/valve vault configuration and features two submersible pumps. The lift station is currently equipped with an on-site generator, installed in 2014, and has a Sensaphone alarm system. The station is also equipped with a float control system. The pump control panel with pump soft starters is adjacent to the lift station. The ATS for this lift station was replaced in 2024. A bypass pump connection was installed at this lift station in 2024.

Table 4-59: Waterford Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Waterford	2014	Hydromatic	20	850	8"
	2014	Grundfos	20	850	

Table 4-60: Waterford Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	388	-54%
2	592	-30%

Waterford Lift Station Performance and Deficiencies

The Waterford Lift Station was examined to be in poor structural condition and in poor condition related to pumping capacity. The individual pumps greatly fall outside and below the +/- 8% tolerance allowance.

The Waterford Lift Station is a large and critical station A bypass pump connection was installed in 2024. If there were to be a high-volume storm event and the lift station were to fail, the observed time for an overflow or sewer back-up is 30 minutes.

The unlined steel can wet well shows indication of infiltration as well as a considerable amount of rust. Fat, oil, and grease (F.O.G) levels could be improved upon but the Waterford F.O.G is not nearly as prominent as other lift stations within the District's facility planning area.

The 2014 Blue Star Generator repeatedly sends out an alarm which is largely disruptive to residents near the lift station. It was also noted that the area around the lift station is a busy intersection and a school bus stop.

Waterford Lift Station Expansion and Upgrades

The Waterford Lift Station pumps are currently not pumping at their designed capacity and below the +/- 8% tolerance allowance. These pump capacity issues lead TAI to recommend the pumps be replaced as soon as possible, especially due to the critical nature of the lift station and its age. Pumps should be replaced within 20 years of their installation. Pump 2 is Grundfos and is likely newer than Pump 1. However, Pump 2 is operating below design capacity. The reason for this capacity issue could be due to clogging and should be investigated immediately. As noted above, a pump bypass connection was installed in 2024. It is recommended that the bypass should be exercised regularly.

It is recommended that the steel wet well and valve vault be assessed further for their condition. Depending on the condition, the steel should be coated to prevent corrosion and cathodic protection installed, or potentially rehabilitated with a full concrete or FRP pipe liner if the condition is poor. It is recommended that the lift station piping be replaced as it is original to the lift station, constructed in 1985. TAI recommends the District consider generator replacement by 2034 as it will be at the end of its useful lifespan. Until then, it is recommended a service technician investigate the consistent issue with the generator alarm. The condition of the control panel is poor, and it is recommended that the control panel and enclosure are replaced.

Due to the lift station's location at a busy intersection with the presence of children, the District should consider installing a fence around the perimeter of the station.

All recommended upgrades are included in the cost estimate in Table 4-61. The cost of rehabilitation is estimated to be $518,000.

Table 4-61: Waterford Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$115,200
WATERFORD LIFT STATION				$259,800
CONSTRUCTION SUB-TOTAL				**$375,000**
CONTINGENCY @ 20%				$75,000
CONSTRUCTION TOTAL				**$450,000**
DESIGN ENGINEERING @ 7.5%				$34,000
CONSTRUCTION ENGINEERING @ 7.5%				$34,000
TOTAL CONSTRUCTION COST				**$518,000**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
WATERFORD LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
Replace Pump Discharge Piping	20	Lin. Ft.	$200	$4,000
Bypass Pump Connection	0	Each	$4,500	$0
Steel Coating or Rehabilitation	1	L.S.	$25,000	$25,000
Cathodic Protection for Steel Structures	1	L.S.	$25,000	$25,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
Pump Monitoring Module	1	Each	$1,800	$1,800
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
Access Improvements	1	L.S.	$50,000	$50,000
8' Tall Chain Link Fence	60	L.F.	$350	$21,000
Double Vehicular Gate	1	L.S.	$2,600	$2,600
Single Gate	1	L.S.	$1,300	$1,300
TOTAL WATERFORD LIFT STATION				**$259,800**

4.4.22 Water's Edge Lift Station

The Water's Edge Lift Station, originally constructed in 2000, is located at 4320 Water's Edge Drive in the Village of Island Lake, south of Route 176. The service area includes approximately 43 acres of residential and commercial property in the Near East Drainage Basin.

Wastewater is pumped through a 4-inch diameter, 975 lineal foot long force main, and directly discharges to the Westridge Lift Station, located on the east side of Westridge Drive directly north of Route 176.

The lift station is a duplex submersible pumping system with a valve vault. The lift station does not have an on-site generator but is equipped to accept the District's portable generator. The pump control panel sits on a concrete pad and houses pump controls, pump soft starters, a Sensaphone alarm system, and manual transfer switch. The wet well contains a mechanical float switch system and the valve vault has a sump pit for the District's portable sump pump. The lift station has a bypass pump connection.

Table 4-62: Water's Edge Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Water's Edge	2022	Grundfos	5.5	100	4"
	2022	Grundfos	5.5	100	

Table 4-63: Water's Edge Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	44	-56%
2	15	-85%

Water's Edge Lift Station Performance and Deficiencies

Drawdown test results indicate that Water's Edge Lift Station's pumps are operating well below design points and well below the +/- 8% tolerance allowance. One pump was replaced recently but the capacity

remained the same. Pumps must be replaced after the useful lifespan of 20 years. TAI recommends that the District investigate the pumps capacity for both pumps or replace both pumps.

There are signs of infiltration in the wet well, specifically around the pipe penetrations. The valve vault holds standing water and has a sump pit but no sump pump. The piping and valves in both structures shows significant rusting and corrosion. Staff noted that FOG levels are high. This lift station has had a ragging and pump impeller issues.

Water's Edge Lift Station Expansion and Upgrades

It is recommended that the leaking pipe penetrations be repaired. A permanent sump pump is recommended for installation in the valve vault. It is recommended that the wet well piping and valve vault piping be re-coated to prevent further corrosion and valves be replaced if they are not operational. Based on the age of the lift station, full replacement of the piping is not required.

TAI recommends an on-site generator be installed. The control panel enclosure is original to the lift station and should be considered for replacement when the lift station is upgraded. A pressure transducer level sensor should be installed for primary level measurement and the float system maintained as a back-up.

All recommended upgrades are included in the cost estimate on the next page. The cost of rehabilitation is estimated to be $594,800.

Table 4-64: Water's Edge Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$125,200
WATER'S EDGE LIFT STATION				$305,400
CONSTRUCTION SUB-TOTAL				**$430,600**
CONTINGENCY @ 20%				$86,200
CONSTRUCTION TOTAL				**$516,800**
DESIGN ENGINEERING @ 7.5%				$39,000
CONSTRUCTION ENGINEERING @ 7.5%				$39,000
TOTAL CONSTRUCTION COST				**$594,800**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
WATER'S EDGE LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
Sump Pumps & Installation	1	Each	$900	$900
Pipe and Valve Blast and Re-coat	1	L.S.	$5,000	$5,000
Plug Valve	2	Each	$3,000	$6,000
Check Valve	2	Each	$3,000	$6,000
Remove and Reinstall Piping and Pumps	2	Each	$40,000	$80,000
Concrete Wet Well Pipe Penetration Repair	2	Each	$5,000	$10,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Pressure Transducer and Installation	1	L.S.	$3,500	$3,500
Back-up Floats and Installation	1	L.S.	$1,000	$1,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Generator & Installation	1	L.S.	$63,900	$63,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
TOTAL WATER'S EDGE LIFT STATION				**$305,400**

4.4.23 Westridge Lift Station

The Westridge Lift Station, constructed in 1994, is located in the Village of Island Lake. This installation's service area includes roughly 17 acres of residential and commercial property in the Near East Drainage Basin, as well as flow from the Water's Edge Lift Station.

Wastewater is pumped through a 4-inch diameter, 640 lineal foot long force main, and discharges into sanitary manhole D9NE03, directly east of Country Trail Court. Westridge Lift Station is tributary to the NMWRD WWTP.

The lift station is a duplex submersible pumping system with a valve vault. The lift station is equipped to accept a portable generator and is equipped with a Sensaphone alarm system. There is a sump pit in the valve vault but no sump pump. The station is also equipped with mechanical float switches and a bypass pump connection.

Table 4-65: Westridge Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Westridge	2023	Hydromatic	15	236	4"
	2023	Hydromatic	15	236	

Table 4-66: Westridge Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	338	43%
2	345	46%

Westridge Lift Station Performance and Deficiencies

The Westridge Lift Station was examined to be in decent working condition and moderate structural condition. However, the pumps are operating above the +/- 8% tolerance allowance. F.O.G. levels are acceptable as there was no build up observed in the wet well structure. Ragging is not a notable issue at the Westridge Lift Station. Pump 2’s run time is higher than Pump 1, indicating that the pumps aren’t alternating correctly. At the time of testing, pump one needed to be reset in order to function properly. New pump starter relays were installed at the end of 2023.

The valve vault piping and valves show significant rusting and corrosion, however the bypass pump connection appears to have been replaced recently. It appears there may also be some old tracer wire in the vault. The vault has an old conduit protruding out of the concrete. There is a sump pit, but no sump pump within the valve vault.

The control panel cabinet is in very poor condition. Near the end of 2022, there was a Sensaphone issue due to the very low temperatures of the 2022 winter. This issue was resolved for the winter of 2022. The lift station is very close to a marsh and there is no driveway. The landscaping nearby is not clean or clear.

Westridge Lift Station Expansion and Upgrades

The Westridge Lift Station pumps are currently not pumping at their design point. It is recommended the pumps be evaluated for ragging or impellor issues and be considered for replacement when the pumps reach their useful lifespan after 20 years of the installation date.

The wet well piping and valve vault piping and valves are recommended for replacement due to the likelihood they are original to the lift station which was constructed in 1994, and are showing rusting and corrosion. A sump pump should be installed in the valve vault to keep the valve vault piping, valves, and bypass in the best condition possible. The bypass must be exercised regularly to ensure functionality.

It is also recommended that the control panel and enclosure be replaced. TAI recommends an on-site generator.

Site improvements include recommendation for easier lift station access with the installation of a driveway for District work vehicles. All recommended upgrades are included in the cost estimate in Table 4-67. The cost of rehabilitation is estimated to be $449,200.

Table 4-67: Westridge Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$106,100
WESTRIDGE LIFT STATION				$218,200
CONSTRUCTION SUB-TOTAL				**$324,300**
CONTINGENCY @ 20%				$64,900
CONSTRUCTION TOTAL				**$389,200**
DESIGN ENGINEERING @ 7.5%				$30,000
CONSTRUCTION ENGINEERING @ 7.5%				$30,000
TOTAL CONSTRUCTION COST				**$449,200**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
WESTRIDGE LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
Sump Pumps & Installation	1	Each	$900	$900
Replace Pump Discharge Piping	40	Lin. Ft.	$200	$8,000
Electrical and Controls				
Conduit, Wiring, Labor	100	Lin. Ft	$60	$6,000
Pressure Transducer and Installation	1	L.S.	$3,500	$3,500
Back-up Floats and Installation	1	L.S.	$1,000	$1,000
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Generator, ATS & Installation	1	L.S.	$73,900	$73,900
Telecommunications	1	L.S.	$4,300	$4,300
New Control Panel	1	Each	$61,600	$61,600
New Electrical & Control Enclosure	1	Each	$20,600	$20,600
Pump Monitoring Module	1	Each	$1,800	$1,800
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
Landscaping	1	L.S.	$10,000	$10,000
TOTAL WESTRIDGE LIFT STATION				**$218,200**

4.4.24 Woodman's Lift Station

The Woodman's Lift Station, constructed in 2019, is located west of the Woodman's Food Market in the Village of Lakemoor. The service area includes approximately 70 acres of commercial property in the Northeastern Drainage Basin.

Wastewater is pumped through a 6-inch diameter force main, approximately two-thirds of a mile in length, to the Route 120 Interceptor Sewer. Woodman's Lift Station is tributary to Lakemoor Lift Station 7.

The sewer was designed by Baxter & Woodman, Inc. (B&W) on behalf of the Village of Lakemoor in 2001 to serve properties within the District's Northeastern Basin along Route 120. Until frontage properties along Route 120 start to develop, an interim solution was constructed in 2014 to serve five properties along Route 120 between Lakemoor Village Hall and Fisher Road with a smaller diameter sewer. An 8" HDPE low pressure force main was installed with the intent that a larger gravity sewer would be installed in the future, as designed by B&W. Most recently, the Woodman's Market pump station was also connected to the existing 8" force main.

The lift station is a duplex submersible pumping system with a valve vault. The lift station is equipped with an on-site generator. The lift station has a pressure transducer for primary level measurement and a back-up float control system. The valve vault has a sump pump, and the lift station has a bypass pump connection. This lift station was connected to SCADA in 2024.

Table 4-68: Woodman's Lift Station Data

Lift Station	Installation Date	Pump Manufacturer	Pump (HP)	Flow (GPM)	Force Main Size
Woodman's	2019	Grundfos	10	206	6"
	2019	Grundfos	10	206	

Table 4-69: Woodman's Drawdown Test Results

Pump Number	Measured Flow (GPM)	Tolerance from Rated Pump Capacity
1	Not functional	N/A
2	180	-13%

Woodman's Lift Station Performance and Deficiencies

The Woodman's Lift Station was examined to be in good structural condition since the lift station was built in 2019. However, only one pump, Pump 2, is operational and is operating outside of and below the 8%+/- tolerance allowance. Fat, oil, and grease (F.O.G) levels could be improved upon but there are no ragging issues due to the purely commercial nature of the service area.

The surrounding area is a marsh, making infiltration of groundwater in the wet well possible. District staff have not noted any capacity issues and the lift station was designed to be oversized for its current service area of the Woodman's grocery store and developed out lots.

The 2019 Kohler on-site generator was experiencing consistent coolant issues, but this was rectified near the end of 2023. The control panel is also from 2019 and is in excellent condition. As draw down testing was taking place in December of 2023, Nicor responding to a natural gas leak identified on the meter set but was resolved.

Woodman's Lift Station Expansion and Upgrades

The Woodman's Lift Station pumps are not functioning at the design points. TAI recommends immediate replacement of Pump 1 since it is non-functional. The reason for failure should be investigated.

The wet well and valve vault wall should be evaluated annually due to the I/I from the nearby wetland.

All recommended upgrades are included in the cost estimate in Table 4-70. The cost of rehabilitation is estimated to be $126,600.

Table 4-70: Woodman's Lift Station Rehabilitation Cost Estimate

SUMMARY				
GENERAL CONDITIONS				$63,900
WOODMAN'S LIFT STATION				$26,600
CONSTRUCTION SUB-TOTAL				**$90,500**
CONTINGENCY @ 20%				$18,100
CONSTRUCTION TOTAL				**$108,600**
DESIGN ENGINEERING @ 7.5%				$9,000
CONSTRUCTION ENGINEERING @ 7.5%				$9,000
TOTAL CONSTRUCTION COST				**$126,600**
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
WOODMAN'S LIFT STATION				
Process				
Pumps & Installation	1	Each	$17,700	$17,700
Electrical and Controls				
Light Pole, LED Fixture and Installation	1	Each	$6,900	$6,900
Sitework				
Restoration	50	Sq. Yd.	$40	$2,000
TOTAL WOODMAN'S LIFT STATION				**$26,600**

4.5 FUTURE LIFT STATIONS

Future development, as presented in the previous sections, may require the addition of lift stations. Generally, future development within the District's current service area boundary will either be tributary to an existing lift station or the Districts's gravity sewers. Development that occurs outside of the District's existing service area boundary may require additional lift stations to provide sanitary service. Section 3 outlined the Rockwell Lift Stations proposed up Lily Lake Road.

In some cases, municipalities require developers to fund utility extensions required to serve their developments. If the utility extensions require the construction of a lift station and force main, it is recommended the developer design the facilities in accordance with District's standards. The design should then be reviewed and approved by the District's Engineer prior to commencing construction.

4.6 Summary of Recommendations

The following table is a general summary of the recommendations related to the District's lift stations.

Lift Station	Improvements	On-Site Generator Present	Installation Date of Current Generator	Last Lift Station Rehab Date
Lakemoor L.S. 1	N/A	Yes	2014	2023
Lakemoor L.S. 2	$188,300	No	N/A	2006
Lakemoor L.S. 3	$203,260	Yes	2009	2006
Lakemoor L.S. 4	$229,400	Yes	2024	2006
Lakemoor L.S. 5	$155,420	No	N/A	2006
Lakemoor L.S. 6	$219,300	Yes	2018	2023
Lakemoor L.S. 7	$322,180	Yes	2024	2018
Burr Oak	$621,200	No	N/A	No Major Rehab
Clearwater	$541,200	No	N/A	No Major Rehab
Deer Grove	$404,200	Yes	2005	No Major Rehab
Fern	$183,500	Yes	2015	2011
Hale 1	$439,400	Yes	2016	No Major Rehab
Hale 2	$290,500	Yes	2016	No Major Rehab
Holiday Hills	N/A	Yes	2023	2023
Prairie Woods	$362,000	Yes	2019	No Major Rehab
Rawson Bridge	$410,050	Yes	1998	No Major Rehab
Rolling Oaks	$487,200	Yes	2018	No Major Rehab
South Shore	$268,100	Yes	2024	2011
Treatment Plant	$187,400	Yes – Plant Generator	2024	2009
Walnut Glen	$419,000	Yes	2006 - 2008	No Major Rehab
Waterford	$518,000	Yes	2014	2014
Water's Edge	$594,800	No	N/A	No Major Rehab
Westridge	$449,200	No	N/A	No Major Rehab
Woodman's	$126,600	Yes	2019	2019
*Based on best available data				

4.6.1 Lift Station Hydraulic Analysis

Many or most of the existing lift station pumping units were found to operate well below or above their nameplate ratings for flow, outside acceptable tolerances established by the Hydraulics Institute Standards for water and wastewater pumping equipment. In some instances, the variance from nameplate ratings is extreme.

In those cases where the pumped output is below the pump ratings, this is an indication that either the pumping equipment is worn, or that the pump discharge or force main piping is clogged or otherwise obstructed. It could also be the case that the pumps were not properly designed or applied. It is recommended that hydraulic analyses be performed starting with the most extreme cases to determine if the observed pump output can be explained hydraulically. If not, further effort will be required in the field to locate and remove the blockage in the pipe.

In those cases where the pumped output is greater than the pump ratings, this is an indication of an oversized pump that was improperly designed or too conservatively sized. The hydraulic analyses would reveal this. Increased pump output is not necessarily desirable if the exceedance is enough to cause motor overloading or damaging cavitation.

The District should continue to conduct drawdown testing at each lift station on an annual basis to identify any trends in falling pumped output so that the cause can be located and rectified prior to causing damage to the pumps or backups within the collection system, as well as identifying lift stations that lack pumping redundancy.

4.6.2 Lift Station Rehabilitation

The Districts' system of lift stations is generally in poor to fair condition. As a result of the consistent issues the District experiences with their 24 lift stations, the lift stations have required and will continue to require constant maintenance, and several lift stations will need heavy capital improvements.

The District has roughly $32,646,100 worth of lift stations and force mains. Based on a straight-line depreciation over 20 years for the equipment, 50 years for structures and 75 years for force mains, it is estimated that the District should be reinvesting around $740,700 annually toward maintaining this asset.

Regarding specific rehabilitation projects, the District has indicated that the following are priority items for rehabilitation within the next 5 years:

1. Complete Rebuild/Rehab of LS and/or Wet Wells
    - Waterford LS w/ larger wet well
    - Lakemoor LS #6 Wet Well Lining
    - Evaluate other 3 Steel Cans to see if they need a Liner or Replacement. Check on Cathodic Protection.
2. Get 2 Working Pumps in All Lift Stations and One backup Pump in stock for all Lift Stations (extra backups for 5 HP)
3. Buy and replace Generator at Rawson Bridge LS
4. Buy and replace Generator at Walnut Glen LS
5. Buy and install Generator at Westridge LS
6. Buy and install Generator at Burr Oak LS

7. Buy and install Generator at Waters Edge LS
8. Start working through the list of LS issues by category/trade and prioritize by condition and flow (GPM). Order all control panels soon.
    a. Integrator - Alarms / PLC / SCADA
    b. Electrical - Control Panels
    c. Mechanical – Wet Well Piping / Base Elbows / Valve Vault / Sump Pump / Bypass
    d. Electrical – Lighting & Misc.
    e. Sitework – Landscaping / Fencing / Paving

Additionally, it is also recommended that a thorough investigation of the condition and capacity at the Waterford lift station be completed.

4.6.3 Emergency Power Generators

Continued operation of the District's lift stations during power outages is critical. 18 of the 24 existing lift stations are equipped with an on-site generator, including the Treatment Plant Lift Station which can use the WWTP generator in necessity. All future and existing lift stations should be equipped with either an on-site generator or a connection to accommodate one of the District's portable generators. Lift stations with and without on-site generators are listed in section 4.6, above.

4.6.4 Security Features

Several of the existing lift stations include features to secure them from entry by unauthorized personnel and to minimize the risk of vandalism. Lift stations and controls should be enclosed within either a fence or a building and have exterior lighting. Vandalism has been minimal, but in the event that it becomes a problem, the District can add motion sensors, cameras or intrusion alarms to the lift stations as needed.

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SECTION 5

EXISTING WASTEWATER TREATMENT PLANT

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5. EXISTING WASTEWATER TREATMENT PLANT

5.1 GENERAL BACKGROUND AND EXPANSION HISTORY

The Northern Moraine Wastewater Reclamation District serves the Villages of Island Lake, Lakemoor, Port Barrington, and Holiday Hills. The District owns and operates the wastewater treatment plant and the collection system that serves these communities. The plant discharges to the Fox River through a 30" outfall that passes through an existing wetland to the Fox River. The plant has undergone numerous projects in its nearly 45-year history. As the District's facility planning area has grown, so have wastewater treatment plant capacity requirements. This section describes sequential additions to the plant.

The Northern Moraine Wastewater Reclamation District (NMWRD) wastewater treatment plant was originally constructed in 1978. The original treatment plant included a raw sewage pump station, control building, garage, two package treatment plants, and drying beds. The biological processes consisted of contact stabilization with aerobic digestion. Biosolids were dewatered utilizing the drying beds and applied to agricultural ground.

In 1991, new chlorination and dechlorination facilities were constructed to comply with NPDES permit revisions. In 1992, additional upgrades included raw sewage flow metering and replacement of diffusers within the biological process and aerobic digesters. The District replaced the original comminutor (grinder) with a small mechanical fine screen in 1993. The blowers were replaced for the contact stabilization package plants in 1997.

The District completed a Facility Plan Amendment in April of 1998. At that time, the District was serving approximately 10,000 P.E. Recommendations made in the Facility Plan Amendment were based on the estimated 20-year design capacity of 30,000 P.E. The recommended plan included a phased expansion of the treatment plant. The Phase I improvements expanded the plant's design capacity from 1.2 MGD to 2.0 MGD.

The Phase I expansion was completed in 1999. It included installation of a second mechanical fine screen, replacement of the raw sewage pumps, construction of a two-ring oxidation ditch, two new final clarifiers, a sludge dewatering building, and a chemical feed building. Additionally, the existing package treatment plants were converted to aerobic digestion and sludge storage.

In 2004, the communities within the facility planning area (FPA) were experiencing an unprecedented increase in development. In response to the area's growing needs, the District completed a Facility Plan Update which included a thorough review of each community's comprehensive plan and land use plan.

Based on the needs demonstrated in the comprehensive plans, the District developed a phased expansion plan to increase the treatment plant's capacity from 2.0 MGD to 10.0 MGD.

The District considered several alternatives for rehabilitation/expansion of the aerobic digestion system. The Phase I Expansion completed in 1998 set precedence for the future expansion of the facility. While that expansion-phasing plan only anticipated one additional phase increasing the capacity from 2.0 to 3.0 MGD, it was concluded that future phases should be designed to parallel the processes as much as practical. It was also agreed that the expansion from 2 MGD to 10.0 MGD should be completed in a minimum of four phases. Therefore, the expansion-phasing program is as follows:

- **Phase I – 2.0 MGD - Completed 1998**
- **Phase II – 3.0 MGD**
- **Phase III – 4.5 MGD**
- **Phase IV – 6.0 MGD**
- **Phase V – 10.0 MGD**

The District completed a Facility Plan Update in 2014, ten years after the 2004 Plan, to comprehensively review the existing infrastructure and document the rehabilitation and replacement efforts. Between 2004 and 2014, the District acquired the Village of Lakemoor collection system. In addition, several improvements were made to the treatment plant. In 2012, the aerobic digesters were reconfigured into four equal quadrants to be operated in series by installing concrete dividing walls. A centrifuge was added to the dewatering facility, and five sludge drying beds were covered for sludge storage. Additional improvements included implementation of VFD's and DO control in the biological treatment process. In 2014 a new influent screen was installed, along with a new high-efficiency centrifugal blower for aerobic digestion.

Since the completion of the 2014 Facility Plan, the District has extended sanitary sewer to the Village of Holiday Hills and the nearby Le Villa Vaupell subdivision. Phase 1 of the project was completed in 2023, and Phase 2 is under construction. The treatment plant has had additional improvements since 2014. The District implemented chemical phosphorus removal with the addition of polyaluminum chloride (PACL) in 2019. In 2022, the District completed the Screen Channel Upgrades. The Screen Channel Upgrades included removal of the rotating fine screen and installation of a Headworks MS2 Mahr bar screen.

Other treatment plant projects completed since 2014 are:

- *Operations Building Floodproofing and Generator Modifications Project (2018)*
    - Installation of new flood barriers at all exterior openings and a poured concrete cap on the influent wet well channel wall to increase height above the 100-year elevation. New beams and grating installed at the top of the new wall around the existing influent screen equipment and a new FRP dumpster enclosure. Also a retrofit of the building facade, including new wall cladding and architectural canopies. A diesel generator was removed from the Operations Building and the MCC was modified to operate off the remaining 500kW generator. This included installation of a control panel, SCADA panel, and the installation of a new fiber loop at the plant.

- *Clarifier No. 1 Reconstruction (2020)*
    - Reconstruction and replacement of drives and equipment of Clarifier No. 1 (North Clarifier). Also included installation of a flow meter on the RAS force main.
- *WWTP Access Improvements – Phase 1 (2022)*
    - Removal of existing access road at the WWTP and replacement with heavy duty asphalt and curb.
- *Screen Channel Upgrades (2022)*
    - Removal of the existing rotating fine screen and installation of a new Mahr bar screen and screw conveyor.
- *Control Building Electrical Upgrades – Completed*
    - Removal of MCC1 and MCC-AE and installation of a new switchboard, ATS, and raw sewage pump VFDs. The project relocated existing control panels, blower VFD, blower starters and electrical equipment into a dedicated electrical and control room. A block wall and doors will be installed to isolate the electrical and controls from the rest of the building.

The plant is rated for 2.0 MGD and consists of influent screening, raw sewage pumping, extended aeration/biological treatment, chemical phosphorus removal, tertiary clarification, and chlorine disinfection. The waste activated sludge is aerobically digested, mechanically thickened, dewatered, and land applied as fertilizer.

5.2 Current Influent & Effluent Wastewater Parameters

5.2.1 Influent and Effluent Data

Wastewater flows and characteristics are monitored by influent and effluent flow meters, wastewater sampling units and on-site laboratory testing. The Illinois EPA determines a treatment plant's remaining hydraulic capacity based on the average of each year's 3 low-flow months. Table 5-1 summarizes the three low-flow months, annual average flows, and peak month flows as measured at the influent and effluent flow meters, from 2020 through 2022.

Table 5-1: Influent and Effluent Flow Meter Data

	3 Month Low Flow Average	Months	Annual Average	Peak Month Flow
Influent Flow Meter				
2020	0.90	Feb / Jan / Aug	1.11 MGD	1.39 MGD
2021	0.96	Oct / Sept / Nov	1.03 MGD	1.18 MGD
2022	0.97	Oct / Nov / Jan	1.07 MGD	1.31 MGD
Effluent Flow Meter				
2020	1.09	Aug / Sept / Oct	1.30 MGD	1.92 MGD
2021	1.03	Sept / July / June	1.11 MGD	1.26 MGD
2022	1.04	Oct / Aug / Sept	1.13 MGD	1.36 MGD

It should be noted that the influent flow meter measures a blended flow of influent raw sewage as well as return flows from the plant drain system, including filtrate from the sludge dewatering processes. In addition, a portion of the influent flow is removed in the form of waste activated sludges. In general, the return flows exceed the wasted flows such that the measured influent flow should be slightly greater than the measured effluent flow discharged from the treatment plant.

The influent sampling of constituents, such as total suspended solids (TSS), biochemical oxygen demand (BOD_5), ammonia, and phosphorus, does not measure the pure influent pollutant loading, but rather that contained in the blend of raw sewage and return flows.

Figure 5-1 below shows the average monthly influent and effluent flows to the WWTP from January 2020-January 2023. Influent is expected to be higher than effluent due to waste activated sludge being removed from the system. However, the data is inconsistent between the influent and effluent meters, with effluent consistently larger than influent. It is likely that the influent meter is accurate and that the effluent meter, a sharp-crested weir, provides unreliable data. The influent flow meter was installed in 2019.

During the 2014 Facility Plan, the effluent Parshall flume flow meter's issues were reviewed. It was determined that the issues were due to the flow meter's sizing and its configuration. The existing 18-inch throat flume has a maximum capacity of 15.9 MGD, which is more than current peak flow rates. Additionally, due to the flume having an inlet configuration, it is less than ideal with sharp edges and no means of ensuring normal subcritical flow entering the flow under low flow conditions. Therefore, it is recommended the effluent meter be calibrated or replaced.

Figure 5-1: NMWRD WWTP Influent vs. Effluent Flow (MGD)

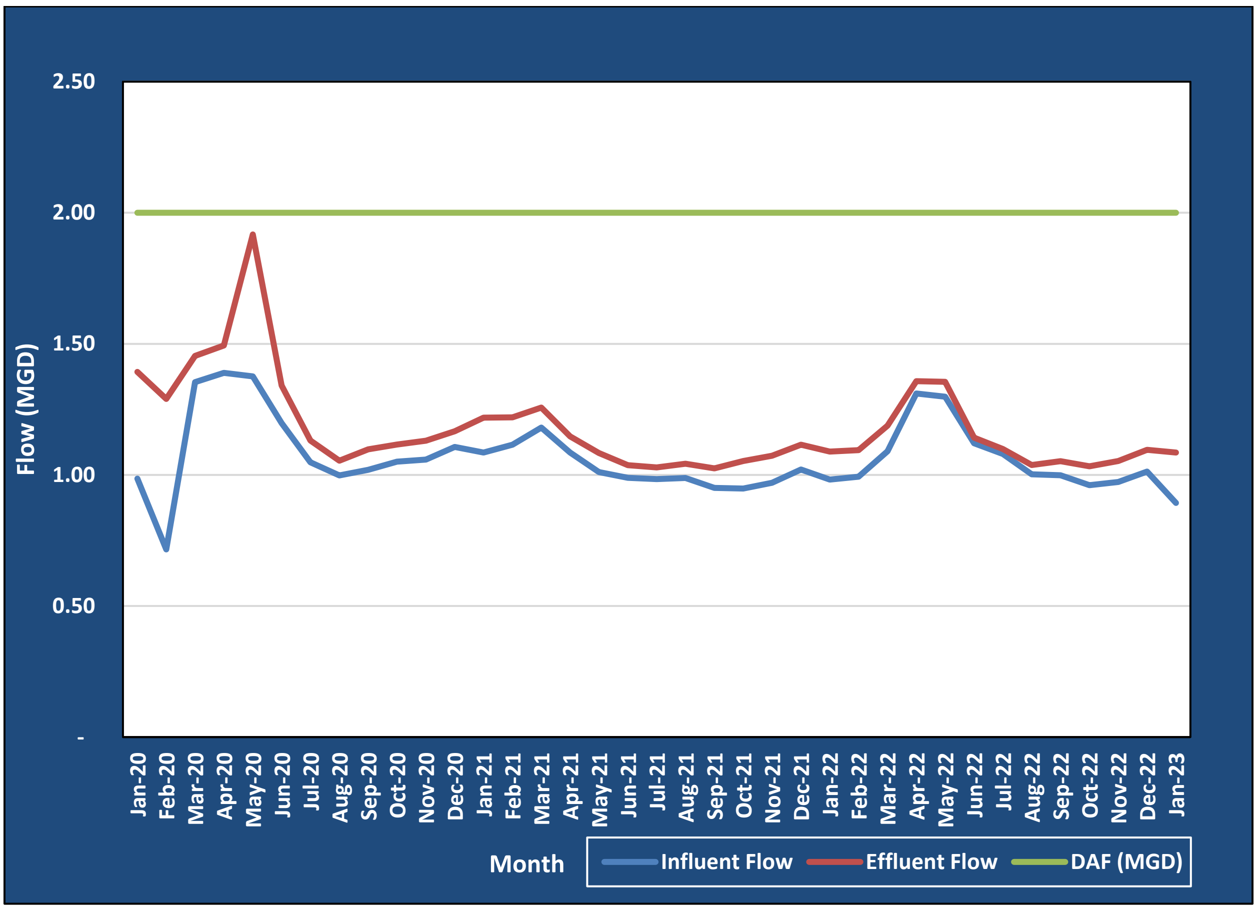


Figure 5-2 shows the monthly average influent BOD_5 and TSS concentrations between January 2020 and January 2023. The average monthly BOD_5 concentration ranges from 165 mg/L in May 2022 to 300 mg/L in January 2020, with an average concentration of 229 mg/L. The average monthly concentration of total suspended solids ranges from 220 mg/L in January 2023 to 1,057 mg/L in December 2020, with an average concentration of 471 mg/L. The large discrepancy between influent TSS and influent BOD is due to the District's septage receiving program. The District received 1,518,005 gallons of septage in the year 2022 alone.

Figure 5-2: NMWRD WWTP Influent BOD & TSS Concentrations (mg/L)

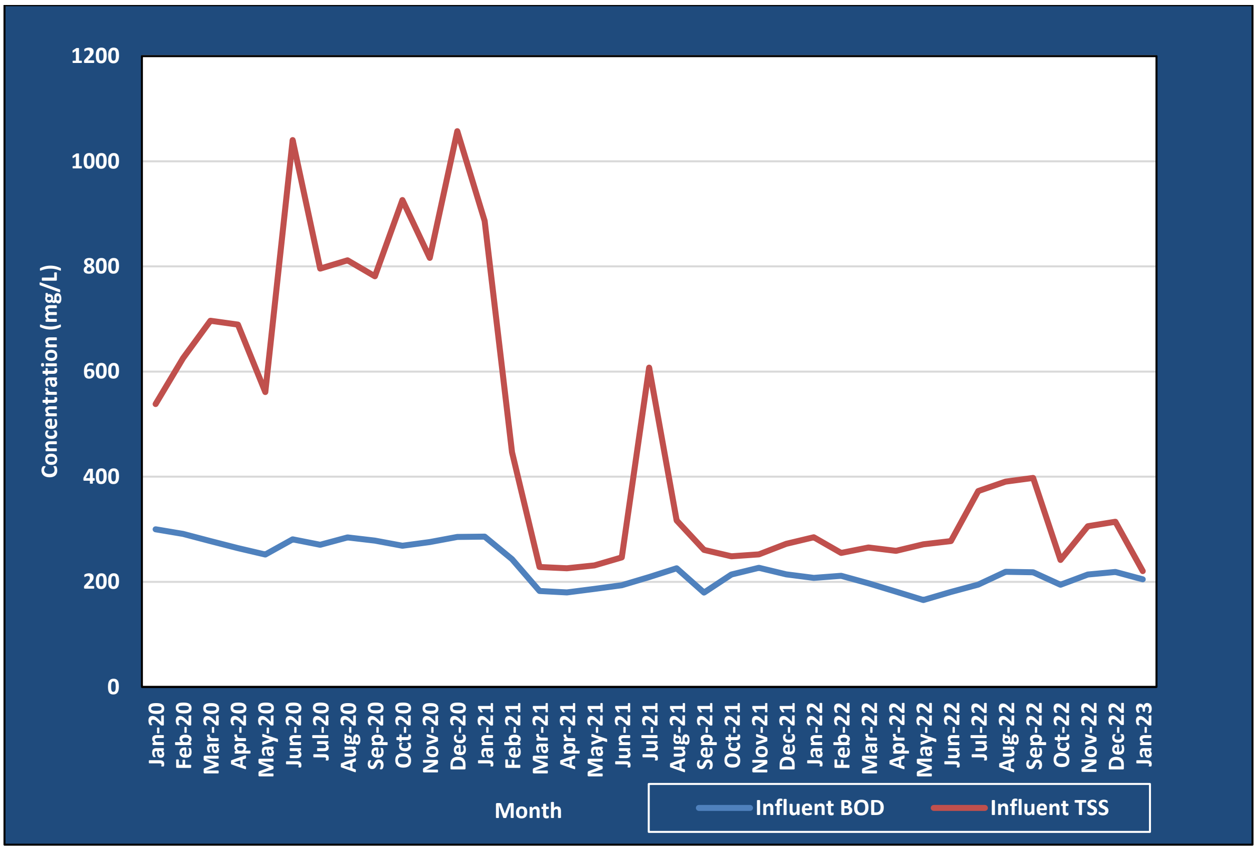
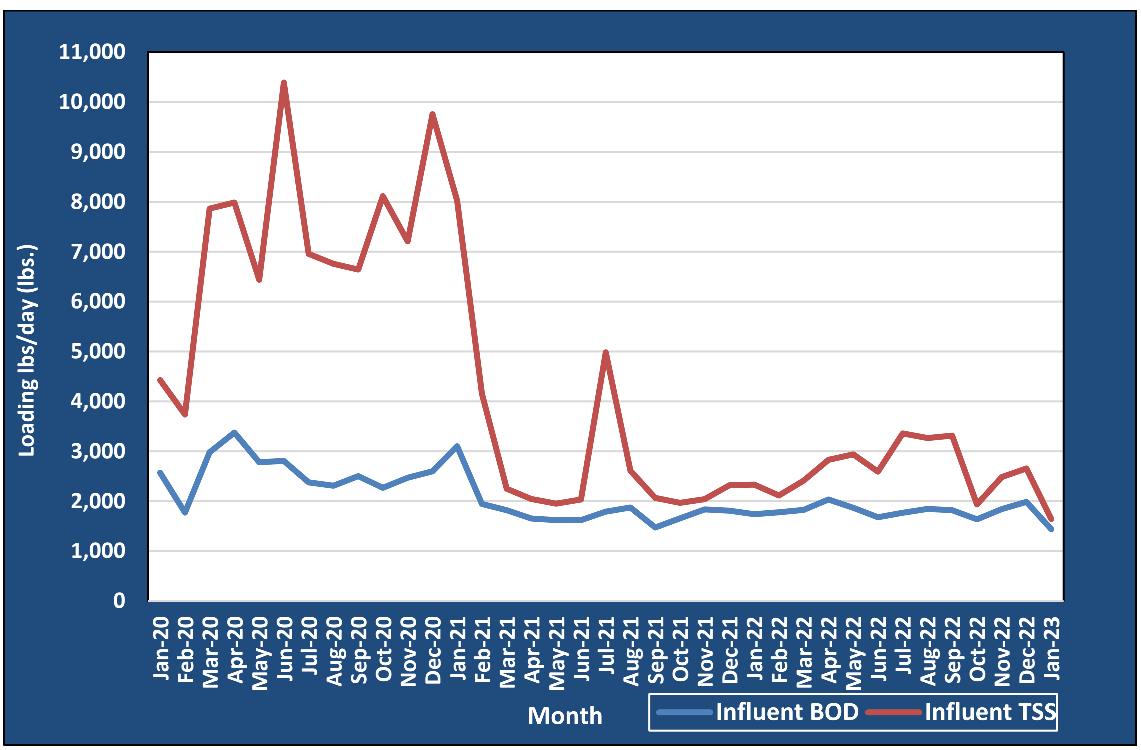


Figure 5-3 below shows the monthly average BOD_5 and total suspended solids loading to the wastewater treatment plant from January 2020 through January 2023. The monthly influent pounds of BOD_5 range from 1,438 pounds in January 2023 to 3,375 pounds in April 2020, with an average of 2,060 pounds. Also, the monthly influent loadings of total suspended solids range from 1,642 pounds in January 2023 to 10,391 pounds in June 2020. As noted previously, the discrepancy between the influent TSS and BOD loadings is due to the District's septage receiving program.

The WWTP's influent BOD_5 and TSS data were abnormally high in 2020 compared to 2022. The reasons for this increase are likely due to a combination of the following:

- 2020 was the start of the covid-19 pandemic, with many residents working from home. Since the District's customer base is predominantly residential, it is likely that with residents staying home during that year, they would have been contributing more solids/organics than in any other year.
- The District's septage receiving program opened in late 2019. The District started adding high solids concentrations to the headworks routinely.
- The WWTP's RDS was out of service for a 2–3-month period in Q1 of 2020. During this 2–3-month period, there would have been no screening within the headworks leading to higher solids/organics in the influent samples.
- The District's wasting/decanting procedure was altered in February 2021. Historically, Operations staff had a bad procedure for wasting/decanting (i.e they decanted weekly even if they didn't need to free up capacity in digesters). If it was a bad decant with a digester that didn't settle well, then they could have been recycling large amounts of solids/organics back to the headworks on a weekly basis.

Figure 5-3: NMWRD WWTP Influent BOD & TSS (lbs./day)



5.2.2 Influent Analysis Summary

The comparison below relates the treatment plant's influent data for 2022 to the design parameters. Based on this comparison, the treatment plant is operating at roughly 53% of its hydraulic capacity, 64% of its organic capacity, and 80% of its solids capacity.

Table 5-2: NMWRD WWTP – BOD_5 and TSS Loadings (2022)

	Influent	Design	% Capacity Utilized
3 Low-Flow Mo.	0.97 MGD	2.00 MGD	49%
Average Flow	1.07 MGD	2.00 MGD	53%
BOD_5	1,784 lbs./day	2,800 lbs./day	64%
TSS	2,699 lbs./day	3,370 lbs./day	80%

At build-out conditions, the BOD and TSS loading is anticipated to be 3,369 lbs./day and 4,554 lbs./day, respectively. This calculation is based on the existing flow and loading plus the remaining available flow capacity with the future loading based on IEPA design standards. The IEPA design standards equate to 100 gallons per day, 0.17 lbs. of BOD_5 per day (204 mg/L), and 0.22 lbs. of TSS per day per P.E (240 mg/L).

Anticipated loading at build-out based on 2022 Data:

BOD_{22}= 1,784 lbs. BOD/day / (1.07 MGD x 8.34 lbs./gal.) = **200 mg/l**

BOD_{design} = ((200 mg/l x 1.07 MGD) + (204 mg/l x 0.93 MGD)) / 2.0 MGD = 202 mg/l

BOD_{design} = 2.0 MGD x 202 mg/l x 8.34 lbs./gal. =3,369 lbs./day

TSS_{22}= 2,699 lb TSS/day / (1.07 MGD x 8.34 lbs./gal.) = **302 mg/l**

TSS_{design} = ((302 mg/l x 1.07 MGD) + (240 mg/l x 0.93 MGD)) / 2.0 MGD = 273 mg/l

TSS_{design} = 2.0 MGD x 273 mg/l x 8.34 lbs./gal. = 4,554 lbs./day

$NH_3\text{-}N_{ultimate}$ = 2.0 MGD x 35 mg/l x 8.34 lbs./gal. = 584 lbs./day

5.2.3 Effluent Data Summary

Figure 5-4 provides a graphical representation of the effluent BOD concentration from 2020 through January 2023. The average weekly and monthly effluent BOD concentration during this time were 1.80 and 1.81mg/L, respectively. The NPDES permit limits for weekly and monthly averages are 40 mg/L and 20 mg/L, and are represented by the purple and red lines, respectively. The green line and the blue line represent the average measured weekly and monthly effluent BOD concentrations.

Figure 5-4: NMWRD WWTP Effluent BOD (mg/L)

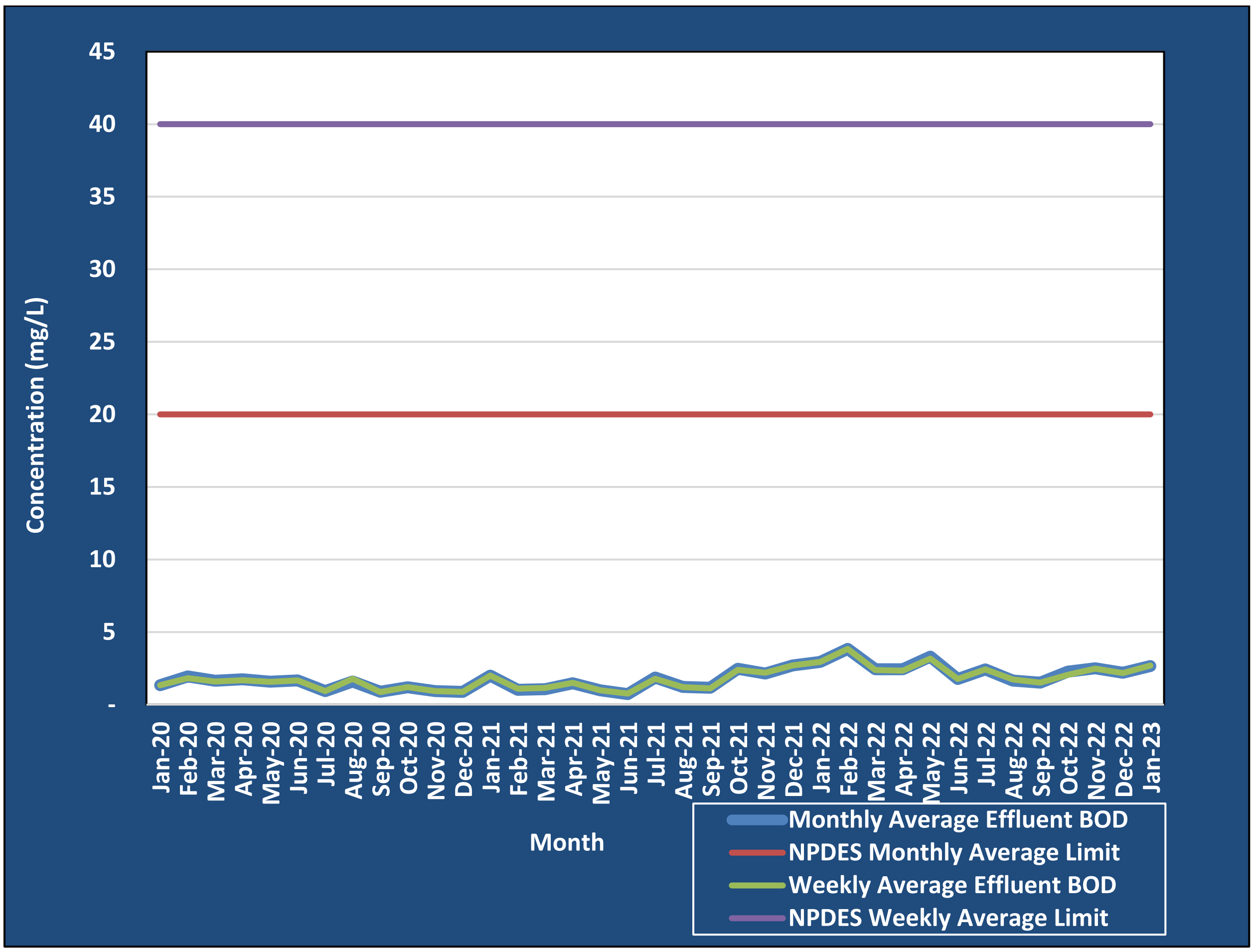
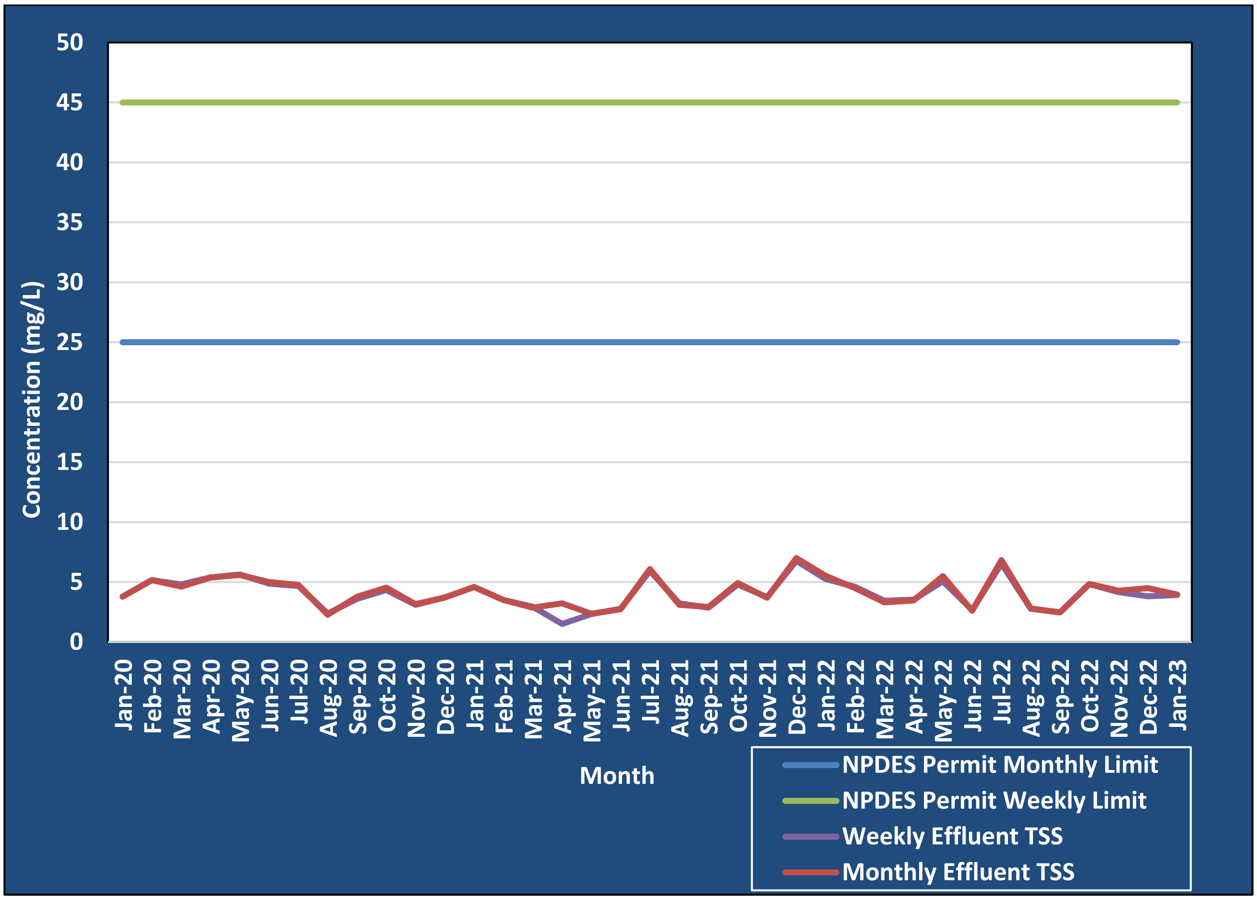


Figure 5-5 provides graphical documentation of the treatment plant's effluent TSS performance in comparison to the NPDES Permit Limits. The treatment plant's performance for total suspended solids meets the effluent limits in the plant's NPDES permit. The weekly and monthly average effluent total suspended solids concentrations range from 1.51 to 7.00 mg/L, with an average concentration for monthly effluent TSS of 4.14 mg/L and an average concentration for weekly effluent TSS of 4.04 mg/L. Overall, the plant has performed well.

Figure 5-5: NMWRD WWTP Effluent TSS (mg/L)



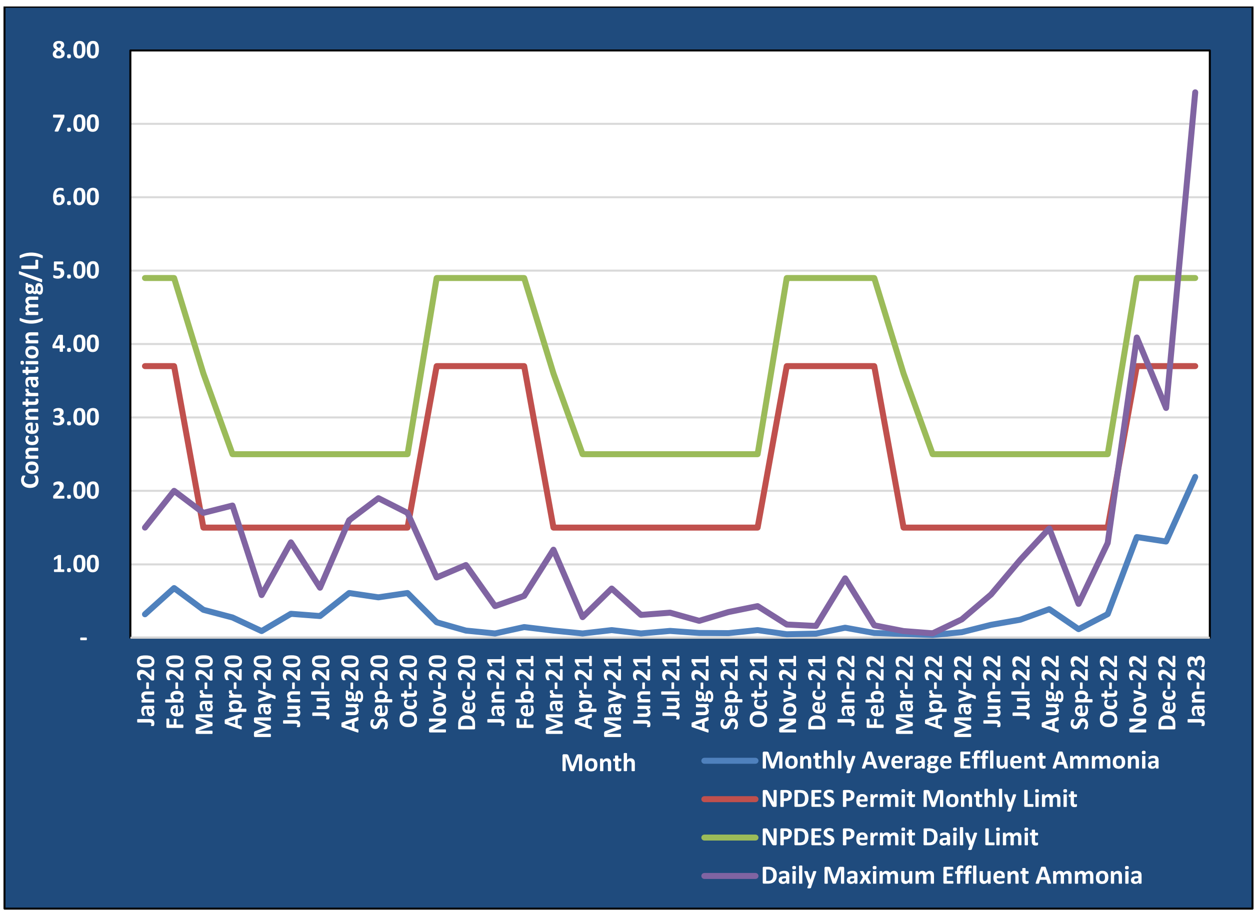
The District's NPDES Permit Limits for effluent ammonia are as follows:

Table 5-3: NMWRD WWTP – Ammonia Limits (mg/L)

	Monthly Average	Daily Maximum
April – October	1.5 mg/L	2.5 mg/L
November – February	3.7 mg/L	4.9 mg/L
March	1.5 mg/L	3.6 mg/L

Figure 5-6 below represents the District's effluent ammonia concentration from 2020 through January 2023. The green line represents the daily maximum concentration permissible under the NPDES permit while the purple line represents the treatment plant's daily maximum effluent ammonia concentration. The red line shows the monthly average concentration limits under the NPDES permit while the blue line shows the average monthly effluent ammonia.

Figure 5-6: NMWRD WWTP Effluent Ammonia (mg/L)



The plant has also historically performed adequately regarding ammonia removal, with two exceptions in 2022 and 2023. The District had a permit violation on January 23th, 2023, with a sample of 7.4 mg/L, which exceeds the daily maximum limit of 4.9 mg/L. This issue was due to the District's transition in operational leads at the time and the issue has been corrected. However, the District's overall average monthly effluent ammonia concentration from 2020 through January 2023 was 0.32 mg/L.

Figure 5-8 below provides a graphical representation of the District's effluent phosphorus concentration from 2020 through January 2023. The District adds polyaluminum chloride (PACl) upstream of the final clarifiers for removal of phosphorus after the oxidation ditch. In the figure below, the blue line shows the treatment plant's monthly effluent phosphorus concentration, while the red line shows the annual average phosphorus limit.

Figure 5-7: NMWRD WWTP Monthly Average Effluent Phosphorus

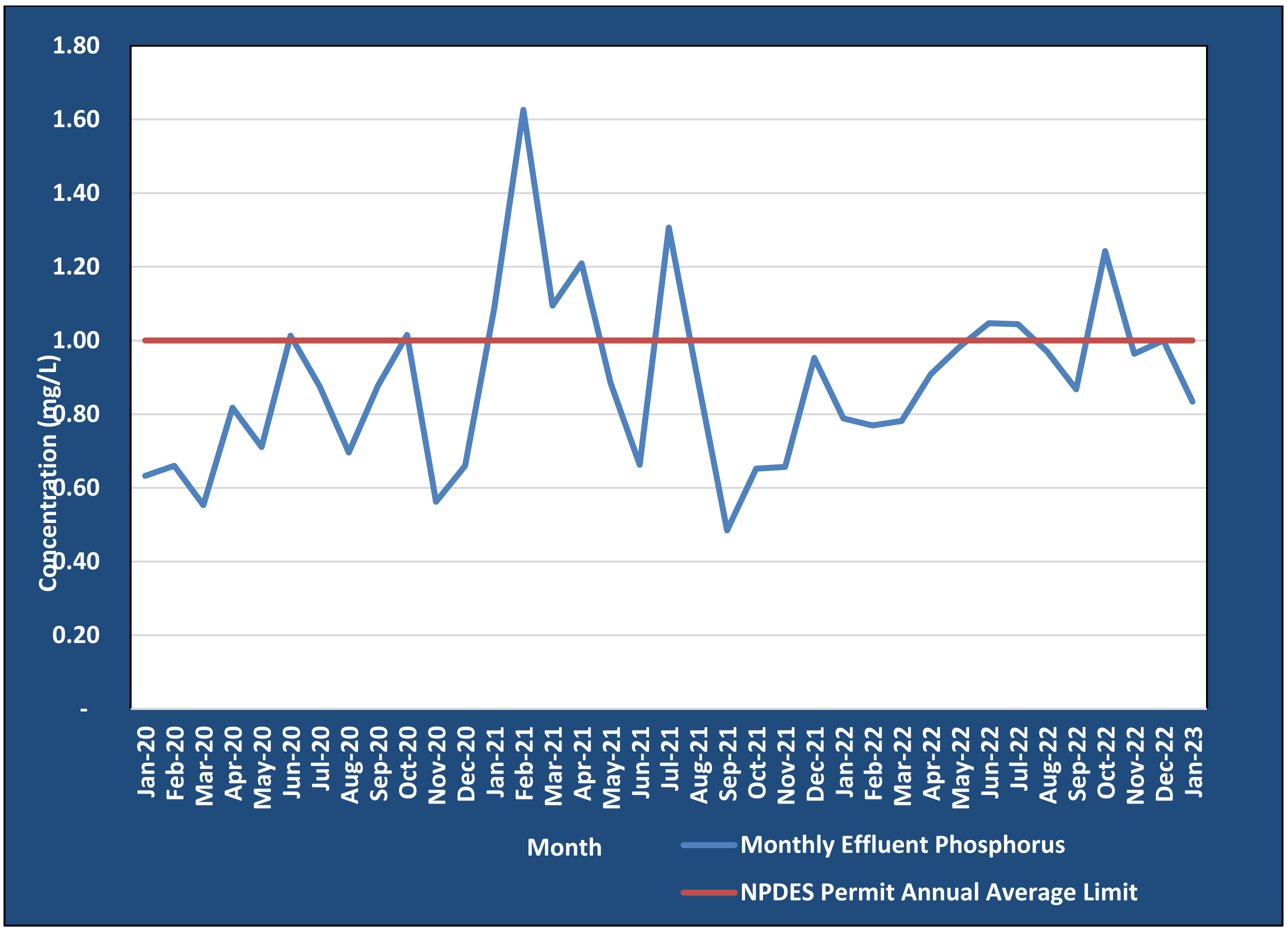
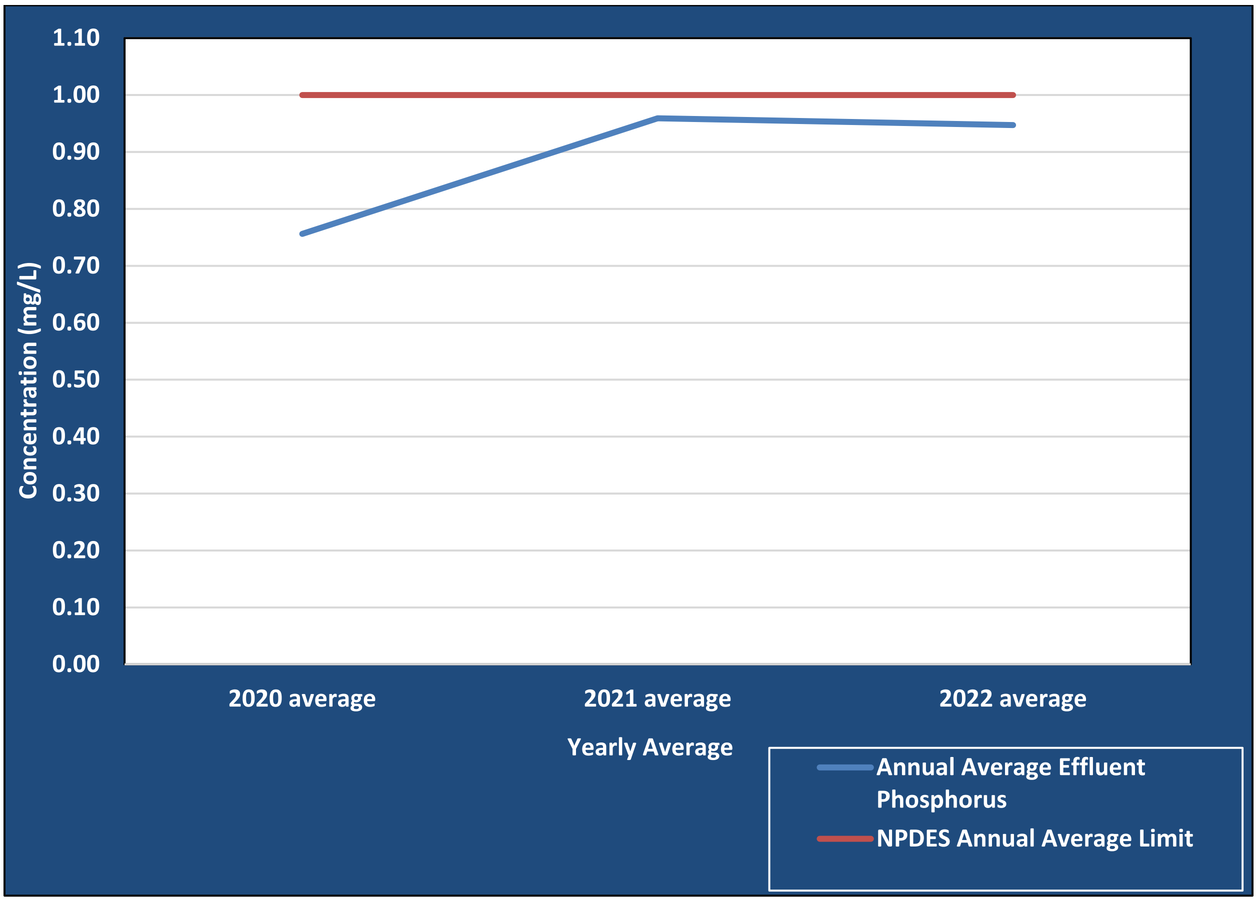


Figure 5-8 below provides a graphical representation of the District's effluent phosphorus concentration from 2020 through January 2023. The blue line shows the treatment plant's annual average effluent phosphorus concentration, while the red line shows the annual average concentration limit (1 mg/L) in the District's NPDES permit.

Figure 5-8: NMWRD WWTP Annual Average Effluent Phosphorus Concentration



5.2.4 NPDES Permit Limits:

Flow	
Design Average Flow, MGD	2.0
Design Maximum Flow, MGD	5.0
Effluent $CBOD_5$	
Monthly Average, mg/L	20
Monthly Average, lbs.	334 (834)
Weekly Average, mg/L	40
Weekly Average, lbs.	667(1,668)
Effluent Suspended Solids	
Monthly Average, mg/L	25
Monthly Average, lbs.	417 (1,043)
Weekly Average, mg/L	45
Weekly Average, lbs.	751 (1,877)
Effluent pH	
Range	6 – 9
Effluent Fecal Coliform	
Monthly Geometric Mean	200 per 100 ml
Effluent Chlorine Residual	
Daily Maximum, mg/L	0.05
Effluent Ammonia Nitrogen	
April through October	
Daily Maximum, mg/L	2.5
Daily Maximum, lbs.	42 (104)
Monthly Average, mg/L	1.5
Monthly Average, lbs.	25 (63)
November through February	
Daily Maximum, mg/L	4.9
Daily Maximum, lbs.	82(204)
Monthly Average, mg/L	3.7
Monthly Average, lbs.	62(154)
March	
Daily Maximum, mg/L	3.6
Daily Maximum, lbs.	60(150)
Monthly Average, mg/L	1.5
Monthly Average, lbs.	25(63)

Total Phosphorus	
Annual Average, mg/L	1.0
Annual Average, lbs.	17(42)
Total Nitrogen	
Monthly Average	Monitor Only
Dissolved Phosphorus	
Monthly Average	Monitor Only
Nitrate/Nitrite	
Monthly Average	Monitor Only
Total Kjeldahl Nitrogen (TKN)	
Monthly Average	Monitor Only
Alkalinity	
Monthly Average	Monitor Only
Temperature	
Monthly Average	Monitor Only
Dissolved Oxygen	
March through July	
Monthly Average not less than, mg/L	N/A
Weekly Average not less than, mg/L	6.0
Daily Minimum, mg/L	5.0
August through February	
Monthly Average not less than, mg/L	5.5
Weekly Average not less than, mg/L	4.0
Daily Minimum, mg/L	3.5

5.3 Past Reports

The District's WWTP NPDES permit was originally reissued with an effective date of October 1, 2018. The permit was then reissued with an effective date of October 1, 2020, with a date extension for Special Condition 20's due date.

5.3.2 Phosphorus Removal Feasibility Study

Special Condition 18 of the District NPDES permit mandates completion of a Phosphorus Removal Feasibility Study (PRFS) within 18 months of the permit's effective date, or by April 1, 2020. The objective of the phosphorus removal feasibility study is to evaluate the method, timeframe, and costs of reducing phosphorus levels in the District's discharge to a level meeting a potential future effluent limit of 0.1 mg/L. In addition, the study is required to evaluate construction and O&M costs of the application of the limits on a monthly, seasonal, and annual average basis. The study was submitted to the IEPA in March 2020.

The study noted the District currently utilizes Hyper+Ion for chemical removal of phosphorus. The use of Hyper+Ion allowed the District to meet final effluent standards in the range of 0.5 to 1.0 mg/L with capital and operating costs funded through existing rates and capital improvement funds on hand.

However, to meet a future 0.1 mg/L limit, it would require installation of an additional chemical feed system, tertiary screening facilities, and a UV disinfection system. These improvements are estimated to have a capital cost of $5.5M with corresponding increases in operating costs required to operate the technology required to meet the limit. Additionally, capital funding would be required either through the IEPA SRF program or local bonding. The costs outlined above are reflective of costs in 2020.

5.3.3 Phosphorus Discharge Optimization Plan

Special Condition 20 of the District's NPDES permit mandates completion of a Phosphorus Discharge Optimization Plan (PDOP) by March 26, 2021. The objective of the phosphorus discharge optimization plan is to develop a plan for reducing phosphorus discharges from the WWTP, including possible source reduction measures, operational improvements, and minor plant modifications that will optimize reductions in phosphorus discharges from the wastewater treatment plant. Optimization measures evaluated included influent reduction and effluent reduction measures such as evaluating the phosphorus reduction potential of users and optimizing the existing treatment process. An additional requirement of the special condition is to submit progress reports on the optimization measures beginning 12 months from the submittal of the report. The study was submitted to the IEPA in October 2020.

Several recommendations were provided in the report for the District to complete to optimize phosphorus in the wastewater influent and effluent:

1. Optimize Chemical Addition
2. Complete Soluble Non-Reactive Phosphorus (SNRP) Testing
3. Oxidation Ditch Additional Testing
4. Oxidation Ditch Optimization for BPR
    - Includes: SRT and Aeration Optimization, Volume, Recycle Streams, and VFAs analysis as well as determining the practicality of an inline analyzer
5. Intermediate WWTF Process Testing
6. Side Stream WWTF Testing
7. Evaluate Water Supply
8. Facility Planning Area Testing
9. Hauled Waste Testing
10. Industrial and Commercial Customers Evaluation
11. Evaluation of Local Limits

The District has worked to complete several of the recommended optimization measures within the required time frame, such as optimizing chemical addition. For two weeks in summer 2023, the District performed a trial by targeting a total 0.5 mg/L effluent limit with chemical addition only. This was to determine the cost of additional chemical usage. Results showed the District achieved an average of 0.53 mg/L total phosphorus in the effluent at a chemical feed rate of 23.2 gpd. The District will also be performing an additional trial of the 0.5 mg/L limit during the winter to determine the chemical usage during those months. However, the District may no longer need multiple feed points for chemical addition due to their optimization of the oxidation ditch for BPR, as noted below.

In addition, the District is also in the process of optimizing the oxidation ditch for BPR. In 2023, it was determined that by decoupling all four aerators in their southwest and southeast zones in the oxidation ditch, the decoupling created an anoxic zone for biological phosphorus removal. The District has also completed the required testing recommended in the report.

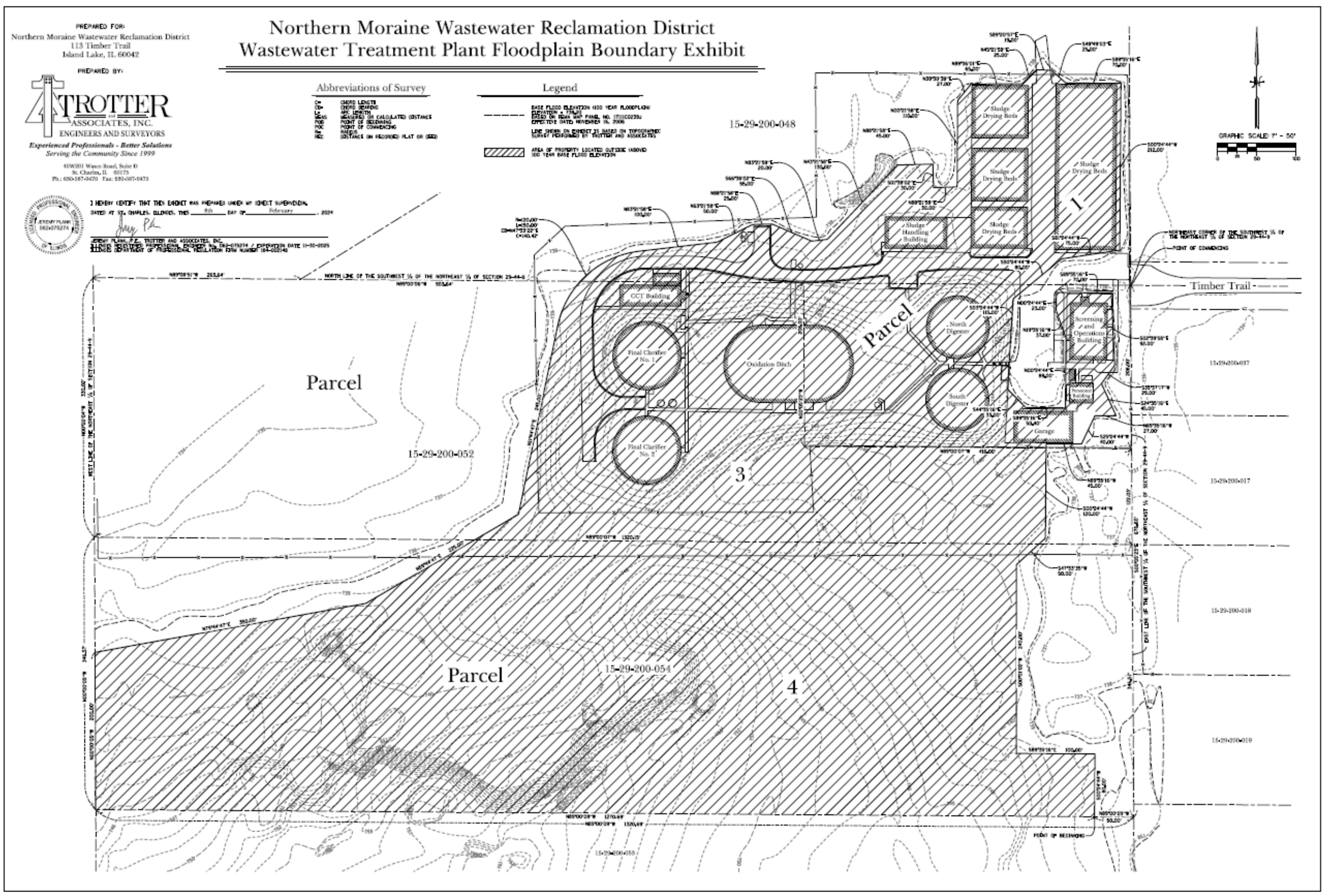
5.3.4 NMWRD NPDES Nutrient Trading Program

The NMWRD has worked with an outside consultant and the Illinois EPA to establish the first POTW nutrient trading program in Illinois. The Memorandum of Understanding (MOU) for the program, effective July 1, 2024, was issued by the Illinois EPA on May 10, 2024. The pilot will allow the NMWRD to have the nutrient offset program included in its NPDES permit for the District to meet their future permit limit of 0.5 mg/L effluent total phosphorus. The District will work with third party entities directly and utilize offsets based on projects completed by the third parties. The efforts will be quantified through models such as the USDOA’s Nutrient Tracking Tool (NTT) and the USEPA’s STEP-L and PLET models. Credits from these offsets will be able to be banked for up to 10 years.

5.3.5 WWTP FEMA Letter of Map Amendment (LOMA)

TAI recently completed a Letter of Map Amendment (LOMA) that removed a portion of the Northern Moraine WRD WWTP from the 100-year floodplain. Exhibit 5-1 below highlights the area that was removed. All existing buildings at the WWTP are not in the 100-year floodplain. To complete the LOMA, survey data was pulled together to create a legal boundary for all areas on the property that were above the 100-year floodplain elevation of 738.2 ft. For all future projects, the map and the determination will need to be shown during the permitting process to show the WWTP is out of the floodplain.

Exhibit 5-1: NMWRD WWTP Floodplain Boundary



5.4 HEADWORKS

5.4.1 Description

The Headworks facility provides screening of the influent wastewater. Influent flow enters the Headworks via a 30" diameter sewer. The plant drain system, which receives flow from throughout the facility, also discharges at the Headworks facility.

The Headworks includes one mechanical fine screen and one bar screen installed in parallel channels adjacent to the Control Building and over the raw sewage wet well.

A 36-inch diameter fine screen was installed in 2014 and has a peak hydraulic capacity of 2.0 MGD with 3 mm openings. The Mahr bar screen was installed in 2022 as part of the Screen Channel Upgrades project and has a hydraulic capacity of 5.0 MGD. The screen collects rags, sticks, plastics and other non-biodegradable debris and protects the influent pumps from heavy debris.

The fine screen removes particles larger than 3 mm, while the bar screen removes ¼ inch sized particles.

A grinder is installed upstream of the fine screen. Screenings from the screens are disposed of in a dumpster adjacent to the screening channel. Screenings from the bar screen are conveyed by a shafted screw conveyor. The dumpster is enclosed in a FRP enclosure with a roll door.

5.4.2 Design Data

Number of channels	2 each
Number of Mechanical Fine Screens	1 each
Capacity	2.0 MGD
Screen Opening Size	3 mm
Number of Bar Screens	1 each
Capacity	5.0 MGD
Screen width	2.0 ft
Bar Screen Opening	¼ inch

5.4.3 Performance and Deficiencies

The District replaced the rotating fine screen with a Mahr bar screen and shafted screw conveyor in 2022. The walls of the screening channel structure were capped with poured concrete and grating installed to increase the top of wall elevation 2-feet above the 100-year floodplain. The grating improved access to the screen equipment. The grinder motor was replaced in 2020 with a submersible motor. The motor supply power was also upgraded at that time.

The District is in the process of completing design engineering of the Darrell Road Collection System project, a multi-phase project with the intent to provide service to future development, particularly the Village of Lakemoor (Northeastern Drainage Basin) and Eastern Drainage Basin. This solution also benefits existing system users by providing the flexibility to re-route flow from built-out areas thereby off-loading the existing downstream sewers and lift stations.

The Darrell Road Collection System Phase 1A – Headworks project includes construction of a new Headworks Facility including influent screening equipment, washer/compactor equipment, screenings conveyance, and an access road for screen removal and screenings disposal at the wastewater treatment plant. The proposed screens are sized for 5.0 MGD each. In addition, the project will also include a septage receiving station and a new on-site well for potable water. The septage receiving station also includes a keypad security access and flow measurement system for $39,000, an external rock trap for $33,000, and a continuous bagger assembly for $900 included in the estimated cost. The table below includes the probable construction costs for the Phase 1A Headworks project, which are estimated to be $5,570,000. The new Headworks Facility will provide provisions for connection to the future Darrell Road Collection System Phase 1B Treatment Plant Interceptor construction.

Table 5-4: Darrell Road Phase 1A Project Probable Construction Costs

Phase 1A: Headworks Project	
SUMMARY	
GENERAL CONDITIONS	$702,000
HEADWORKS	$2,817,870
POTABLE WATER WELL SYSTEM	$172,900
SEPTAGE RECEIVING STATION	$289,000
ELECTRICAL UTILITY ALLOWANCE (UTILITY POLE & OVERHEAD WIRE)	$50,000
UNFORESEEN SUBSURFACE CONDITIONS ALLOWANCE	$10,000
CONSTRUCTION SUB-TOTAL	**$4,041,770**
CONTINGENCY @ 20%	$809,000
CONSTRUCTION TOTAL	**$4,850,770**
DESIGN ENGINEERING	$163,200
CONSTRUCTION ENGINEERING @ 7%	$364,000
TOTAL PROBABLE PROJECT COST	**$5,380,000**

5.5 RAW SEWAGE PUMPING

5.5.1 Description

Flow from the screen channel and enters the Raw Sewage Pump Station wet well beneath the screen channels. The basement of the Operations Building includes a dry well with four centrifugal pumps. Each pump is equipped with a variable frequency drive to provide flow-pacing capability. The maximum capacity of the lift station with the largest pump out of service is 4.5 MGD. Flow is pumped to the oxidation ditch.

5.5.2 Design Data

<u>Raw Sewage Pumping Station</u>

Number of Pumps	4 each
Type	Centrifugal, Solids Handling
Rated Pump #2 & #3 Capacity (1999), each	2 @1,160 gpm
Rated Pump #1 Capacity (2023), each	782 gpm
Rated Pump #4 Capacity (2019), each	1,180 gpm
Firm Capacity	3,102 gpm
Force Main Diameter	12-inch and 18-inch

5.5.3 Performance and Deficiencies

The firm capacity of the raw sewage pumps is 3,102 gpm (4.47 MGD). The pump station has performed as expected, but substantial increases in plant capacity would warrant extensive modifications to the pump station.

Recent improvements to the Raw Sewage Pump Station include two of the four pumps were replaced in 2019 and 2022 with Grundfos centrifugal pumps with immersible motors. The other two pumps were installed during the Phase I Expansion in 1999. The pump discharge piping was reconfigured in 2019 with the replacement of Pump #4. The new piping arrangement allowed a 12" mag meter to be installed and meter flow from all pumps. Pump #1 was replaced in 2023 as well as the suction plug valves on all four pumps and the discharge plug and check valves on Pumps #1-3. The remaining two valves on the force main that were not replaced in 2019 were replaced in 2023. Therefore, all valves at the pump station have been replaced since 2019. Within the District's FY25, Pump #3 will be replaced with a Grundfos pump that is identical to Pump #1 and Pump #2 will be replaced with a pump that is identical to Pump #4. The firm capacity of the raw sewage pumps will be 2,744 gpm (3.95 MGD).

The District's current influent autosampler is about 10 years old and is in working condition. Additionally, the District acquired a new cold weather autosampler from Teledyne in 2021 if there are issues with the existing autosampler.

5.6 Biological Process

5.6.1 Process Description

Raw sewage contains organic matter, suspended solids and nutrients (including ammonia and phosphorus). Which must be converted to meet regulatory effluent standards. The NMWRD treatment facility employs a single stage nitrification suspended growth biological treatment process. The single stage nitrification process is a version of activated sludge that creates an environment to promote BOD reduction and nitrification of ammonia within the same process. The environment promotes the growth of microorganisms, which convert the influent BOD and nutrients to energy and biomass. The process can be expanded to incorporate biological phosphorus removal and denitrification (conversion of nitrite and nitrate to nitrogen gas) by constructing additional cells and increasing detention time.

The existing aeration tanks include a two-ring oxidation ditch having a volume split of 60 percent in the outer ring and 40 percent in the inner ring. The actual influent flow is split approximately 80% between the outer ring, and 20% between the inner ring. Mechanical surface disc aerators on VFDs are used to aerate the mixed liquor. The oxidation ditch design allows for the aeration channels to be operated in series or parallel mode. The process is equipped with chemical polishing for phosphorus removal to meet NPDES permit limits. Treated effluent is split at the ditch and conveyed through a 24” diameter pipes to the final clarifiers.

The phasing plan described in the 1998 Facility Plan proposed the construction of a third ring to increase the facility capacity from 2.0 MGD to 3.0 MGD. Based on future development discussed in Section 2 (development within the corporate boundaries of the Villages served by the District), it is estimated within the next 20 years the District will eventually receive an average daily flow of 1.83 MGD. Therefore, this is not expected within the planning period for this report. At this time, expansion of the oxidation ditch is not needed.

5.6.2 Design Data

<u>Design criteria for the oxidation ditch</u>

Number of Units	2-channels
Design	Oxidation Ditch
Design Average Flow	2.0 MGD
Peak Hourly Flow	5.0 MGD
Organic Loading, (mg/L BOD_5)	168 mg/L
Organic Loading, (lbs/day BOD_5)	2,800 lbs/day
TSS (mg/L)	202 mg/L
Number of channels	2 each
Side Water Depth	14 feet
Channel Width	20 feet
Detention time	16.1 hrs
Total Volume	1,346,000 gallons
Solids Production	2,000 lbs/day
Solids Inventory	45,000 lbs
Sludge Age	22 days
Oxygen Required	342 lbs/hr
Oxygen Supplied	450 lbs/hr

5.6.3 Performance and Deficiencies

Under existing conditions, the process has performed exceptionally well and is resilient to changes in MLSS concentration as well as shock loading from the collection system.

The District implemented chemical phosphorus removal in 2019 to achieve the 1.0 mg/L total phosphorus effluent limit in the NPDES permit. The District doses Hyper+Ion to the oxidation ditch and has inline chemical monitoring (installed in 2020).

The maintenance requirements for the system have been very minimal (change oil in the drives, replace drive belts, etc). The moving parts operate at relatively low speeds and the expected life of the equipment is greater than 20 years. The District regularly replaces individual components as needed. For example, the southwest middle bearing associated with the inner oxidation ditch ring Aerator #2 was replaced in summer 2023 due to failure. Additionally, all 8 of the drive shaft bearings associated with the inner ring were replaced in 2017, while 6 of the of the driven shaft bearings associated with the outer ring were replaced in 2017. One shaft associated with the inner ring of Aerator #2 was replaced in 2017, while the remaining 7 shafts are from the original construction. Also, both motors on the south end of the oxidation ditch were replaced in 2019, while both North motors were replaced in fall 2023.

The District is in the process of optimizing the oxidation ditch for BPR. In 2023, it was determined that decoupling the aerators in the southwest and southeast zones of the oxidation ditch will create an anoxic zone for biological phosphorus removal. The south couplers were replaced in summer 2023, while the north couplers were replaced in February 2024.

Additionally, the District installed Insite instrumentation on the oxidation ditch to monitor operation and biological phosphorus removal performance more actively. The inner oxidation ditch ring includes a probe that reads temperature and DO, with a separate probe dedicated to ORP. The outer ring has an Insite probe that reads temperature and DO. The Insite instrumentation is located in the northwest quadrant and are positioned after the aerators. The District also has an ORP probe located in the Northeast quadrant of the inner ring prior to the aerators.

In order to improve, it is recommended that the District install and integrate instrumentation to monitor total phosphorus, total nitrogen, and ammonia.

At the time of this report, the District plans to replace the oxidation ditch sluice gates. The replacement project includes the installation of two gates on the 18” influent pipe, two gates on the 30” effluent pipe to the final clarifiers, and one sluice gate on an opening between the inside and outside rings. All gates to be replaced on the influent and effluent pipe will be equipment with a motorized actuator. The probable construction costs of the oxidation ditch gate replacement is $359,560, which is located in the table below.

Table 5-5: Oxidation Ditch Gate Replacement Project Probable Construction Costs

WWTP Oxidation Ditch Gate Replacement SUMMARY	
GENERAL CONDITIONS	$78,500
GATE REPLACEMENT	$183,500
CONSTRUCTION SUB-TOTAL	**$262,000**
CONTINGENCY (20%)	$52,400
ENGINEERING (8%)	$25,160
TOTAL PROBABLE PROJECT COST	**$339,560**

5.7 FINAL CLARIFIERS

5.7.1 Description

The existing treatment plant includes two covered, 85-foot diameter clarifiers. The clarifiers were oversized to accommodate future expansion. The MLSS from the oxidation ditch is fed through the center pier into the influent center well. The suspended solids form a floc and begin settling to the floor of the clarifier. The clarified water travels to the periphery of the clarifier and exits through the effluent weirs and launders. The settled sludge is collected from the bottom by a rotating collection header. The sludge is piped to the RAS/WAS Pump Station. Scum from the clarifier surface is collected on scum beaches and is also tributary to the RAS/WAS Pump Station.

5.7.2 Design Data

Pertinent design criteria related to the final clarifiers are listed below.

Number of clarifiers	2	each
Design	Circular	
Design Average Flow	2.0	MGD
Peak Hourly Flow	5.0	MGD
Diameter	85	ft
Sidewater Depth	12	ft
Surface Area- Each	5,675	sf
Surface Area-Total	11,350	sf
Weir Length – Each	247	ft
Weir Length –Total	494	ft
Surface Loading Rate at PHF	440	gpd/sf
Solids Loading Rate at PHF	21	lbs/day/sf
Weir Loading Rate	10,121	gpd/ft

5.7.3 Performance and Deficiencies

In 2020, the District emptied Clarifier No. 1 for cleaning. During the cleaning, geostatic pressure heaved the center column and damaged the mechanical drives. To repair the damage, the concrete slab was removed 5 feet from the outside wall, a new concrete floor and center concrete pier was poured, and all pressure relief valves were replaced. The clarifier mechanical equipment (drive assembly, skimmer assembly, sludge suction header, influent well and center support pier, bridge and walkway) was replaced at this time.

Prior to this work, several 12” diameter wells were drilled around the clarifier to keep groundwater at an acceptable level during the reconstruction work.

Additionally, a 12” flow meter in a vault was installed on the 14” RAS/WAS force main in 2020.

The typical service life of clarifier equipment is 25-30 years. Replacement of Clarifier No. 2 equipment is recommended within the next 5 years (by 2029). The table below includes the probable construction costs for the replacement of the Clarifier No. 2 equipment, which is estimated to be $1,092,000.

Table 5-6: Final Clarifier No. 2 Rehabilitation Probable Construction Costs

Final Clarifier No. 2 Rehabilitation	
SUMMARY	
GENERAL CONDITIONS	$178,000
EXISTING STRUCTURE DEMOLITION	$37,000
SECONDARY CLARIFIER REHABILITATION	$695,000
CONSTRUCTION SUBTOTAL	**$910,000**
CONTINGENCY @ 20%	$182,000
TOTAL PROBABLE PROJECT COST	**$1,092,000**

5.8 CHLORINE CONTACT TANK

5.8.1 Process Description

Effluent flow from the final clarifiers is metered by a Parshall flume and conveyed to two chlorine contact tanks for disinfection. The chlorine contact tanks were constructed in 1999 as part of the Phase I Expansion. Chlorine is an oxidizing agent, which is commonly used to kill remaining micro-organisms in the effluent prior to discharge. The District converted the system in 2013 from a chlorine gas system to one that uses hypochlorite as the source of chlorine via a chemical feed system. Dechlorination is similarly accomplished by feeding bisulphate. To protect ecosystem health, the NPDES Permit limits the concentration of chlorine in the final effluent. Dechlorination is accomplished by feeding sodium bisulfate at the tail end of the contact tanks. Disinfected effluent is conveyed to the outfall at the Fox River. Sodium hypochlorite and bisulfate are stored in opaque containers in the chemical feed building adjacent to the chlorine contact tanks.

5.8.2 Design Data

Pertinent design criteria

Number of Tanks	2 tanks
Channel Width	12 feet
Channel Length	56 feet
Sidewater Depth	8.5 feet
Total Volume	11,425 cu. ft
Total Volume	85,460 gallons
Design Average Flow	2.0 MGD
Peak Hourly Flow	5.0 MGD
Detention Time @ Peak Design Flow	15.84 MGD

5.8.3 Performance & Deficiencies

The chlorine contact tank is operating effectively. The District utilizes a grab sample of the effluent taken on 3 days out of the week (Mondays, Wednesdays, and Fridays) to analyze the free chlorine residual and adjusts the feed pump settings manually to reach the target residual.

In 2013, the District converted the chlorine gas system for disinfection to one that utilizes liquid sodium hypochlorite. The District continues to utilize sodium bisulfite for dechlorination. Also, the District upgraded the chlorine tanks and pumps in 2020-2021.

Chlorine is a very strong oxidizing agent used for disinfection. The efficiency of the chlorine disinfection process is a function of chlorine concentration and detention time. Depending on the detention time, chlorine residual is likely to be present prior to discharge. If the concentration of the chlorine in the effluent is significant, it may have a negative effect on native species within the receiving waters. The NPDES permit limits the concentration of chlorine in the effluent to 0.05 mg/L to avoid these issues. However, although chlorination/dechlorination has been a preferred disinfection technology, concerns such as those noted above are leading several treatment facilities such as NMWRD's WWTP to consider long term solutions such as converting from chlorination to ultraviolet (UV) disinfection.

The District intends to convert the existing disinfection system to UV light technology. Ultraviolet disinfection (UV) is an environmentally friendly method of disinfecting wastewater. Microorganisms, including viruses, are inactivated when exposed to UV-C light in a controlled environment and dosage. The project will include conversion of the existing chlorine contact tank to two channels and installation of two UV light disinfection units, gates and aluminum covers to prevent algae production. The proposed disinfection system will have the capacity to treat the WWTP's existing Design Maximum Flow of 5 MGD. The system will have provisions for additional UV modules and lamps to increase the treatment capacity to 6 MGD (future expansion) and a fully redundant bank. The second existing chlorine contact tank will be abandoned. This project has received planning approval through the Illinois EPA and is eligible for loan funding through the Illinois EPA Public Water Supply Loan Program. The table below includes the probable construction costs for the UV Disinfection Project.

Table 5-7: UV Disinfection Project Probable Construction Costs

UV Disinfection SUMMARY	
GENERAL CONDITIONS	$215,000
UV DISINFECTION	$1,032,000
Construction Sub-Total	$1,247,000
Contingency @ 20%	$250,000
Design Engineering @ 7.5%	$113,000
Construction Engineering @ 7.5%	$113,000
TOTAL PROBABLE PROJECT COST:	**$1,723,000**

Table 5-8: UV Disinfection Project Design Parameters

UV Disinfection Project	
Peak Design Flow, MGD	5 (Future 6)
UV Transmission, % (Field measured transmissivity = 80%)	65%
TSS, mg/L	20
Disinfection Limit, fecal count	200
Design Maximum Power Draw, kW	30
Number of Channels	1
Number of Reactors per channel	1
Number of Banks/ Reactor	3
Number of Modules per Bank	5
Number of UV Lamps per Module	8
Total Number of UV Lamps	120
Type of level control	Fixed Weir
Automatic Mechanical Cleaning	Yes
Chemical Cleaning System	Yes

Exhibit 5-2: Proposed UV Disinfection Project

5.9 RAS/WAS Pump Station

5.9.1 Process Description

Each final clarifier is equipped with a telescoping valve to withdraw return activated sludge (RAS). The telescoping valves are located in the withdrawal box attached to each clarifier and can be lowered or raised to increase or decrease the RAS withdrawal rate, respectively. The Phase 1 Expansion design anticipated a RAS withdrawal rate at each clarifier ranging from 100 to 700 gpm. The RAS then flows by gravity to the RAS/WAS Pump Station.

The RAS/WAS Pump Station is a duplex submersible pump station, each pump having a rated capacity of 1,400 gpm. The pumps are installed in a 10-foot diameter precast wet well. Pump check and isolation valves are located in an adjacent precast vault. The RAS pumps are float controlled and operate in an on/off mode, pumping RAS through a 14-inch force main. Waste Activated Sludge (WAS) is withdrawn from the RAS force main via an 8-inch WAS force main and is controlled by a manually operated valve located on the south side of the oxidation ditch. A flow meter monitors flow rate.

5.9.2 Design Data

<u>RAS/WAS Pump Station</u>

Number of Pumps	2 each
Type	Submersible
Pump Capacity, each	1,400 gpm
RAS Force Main Diameter	14 inch
WAS Force Main Diameter	8 inch

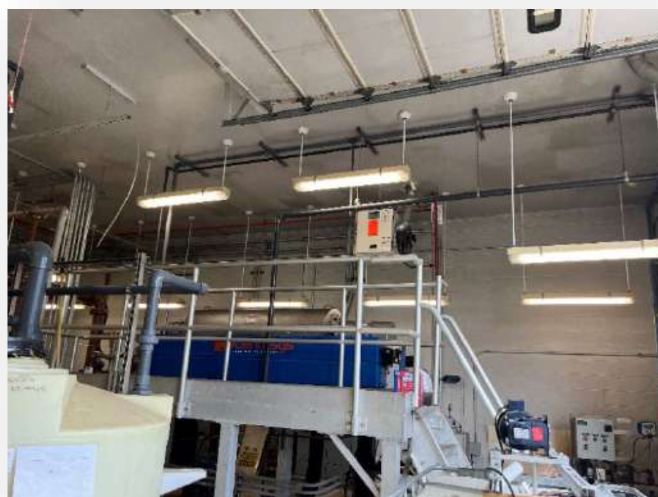
5.9.3 Performance and Deficiencies

Flow meters were installed on the RAS and WAS force mains in 2021 and includes a metering station. Additionally, one of the RAS pumps was replaced in 2024. Also, the pump station also has a new control panel that was installed in 2020.

5.10 Sludge Treatment and Solids Handling

5.10.1 Description

During the Phase I Expansion, the packaged contact stabilization tanks were converted to serve as aerobic digesters. The contact tank in the north digester was converted to two gravity thickening tanks. The design calculations provided in the 1999 Facility Plan identify the volume of each gravity thickening tank as 5,150 cubic feet. Each gravity thickener was retrofitted with a telescoping valve for decant and a submersible thickened WAS transfer pump. The remaining compartments were converted to aerobic digestion and sludge holding.



In 2013, the two 78-foot diameter aerobic digesters were rehabilitated. The project included removal of the interior steel walls, replacement of the diffused aeration system, and minor modifications to waste activated sludge, decant, and digested sludge piping. The improvements also included aluminum covers to maintain temperature during winter operation. A new 200 hp HSI multistage centrifugal blower, capable of supplying 4000 scfm of air to the digesters, was installed in 2015. Three 75hp centrifugal blowers were maintained for redundancy.

Sludge dewatering is accomplished using a centrifuge, which is located in the Sludge Thickening Building. The centrifuge was installed in 2013. The centrifuge is utilized for both mechanical sludge thickening and dewatering.

Dewatered sludge is conveyed to the sludge drying beds. The District typically stores the dewatered sludge in the drying beds and contracts for its disposal with a local land application firm. Two sludge storage covers were installed in 2012, covering 5 of the 14 drying beds. The third sludge storage cover was installed in 2019. Additionally, the sludge pumps were replaced in 2020 and 2023, respectively.

5.10.2 Design Data

Aerobic Digestion

Number of Units	2	each
Design	Covered	
Volume:		
Digester #1	66,897	cf
Digester #2	66,897	cf
Total Digester Volume	133,794	cf
Total Digester Volume	1,001,183	gal
Volatile Solids Loading Rate (per Digester)	2,157	lbs VSS/day
Detention Time (Total)	62	days
Air Required, VSS reduction & mixing (per Digester)	2,006	scfm

Centrifuge

Number of Units	1	each
Capacity (gpm)	80	gpm
Capacity (lbs/hr)	1,109	lbs/hr
Capacity (hrs/wk)	23.5	hrs/wk

Sludge Drying Beds

Number of Drying Beds	14	
Drying Bed Volume	175	cu. yd
Total Volume Provided	2,450	cu. yd
Volume Produced at 15% Solids	10.66	cu. yd/day
Storage Provided (sludge based)	230 days	

5.10.3 Performance and Deficiencies

Aerobic Digestion

The District performed a study in 2019 to select and replace the three 75hp Lamson centrifugal blowers with one larger blower, similar in capacity to the existing 200 hp (4,000 cfm) centrifugal blower. Three blower technologies were evaluated: Positive Displacement rotary lobe blower; Rotary Screw blower; and Hybrid rotary lobe blower. Blower units from Aerzen and Kaeser were evaluated based on previous successful installations. In summary, it was recommended that the three existing blowers be replaced with one Kaeser 4000 scfm screw blower outside adjacent to the aerobic digesters with a shelter. In October 2024, the District has selected to install two 2000 scfm Kaeser Positive Displacement rotary lobe blowers instead. The decision was based on lowering the capital costs and is also based on the current operation and air demands in the aerobic digestion process. The current cost of the blower replacement is $771,600.

In 2024, it was determined upon inspection that nine diffusers had been dislodged on the North Digester. Those diffusers have since been upgraded. As part of the upgrade, the District ordered forty diffusers to keep in stock at the WWTP for diffuser upgrades for both digesters as needed.

Dewatering

Since the previous facility plan, the District has removed the Belt Filter Press in 2019. Additionally, the District has performed upgrades to dose HyperIon+ to the oxidation ditch, which is stored in the Sludge Dewatering room.

The District has upgraded the polymer dosing system in the Dewatering/Sludge Handling Building. A tote stand with a tilter allows for a clean pour of polymer into the new mixing tank. The mixing tank feeds polymer into the skid where water is mixed to create polymer solution for the centrifuge. A portion of the existing concrete curb and pit will be filled to create equipment pads for the polymer mixing tank and polymer skid or leveled with the finished floor to accommodate the polymer tote stand and tilter. The new polymer dosing system was designed to work with the existing centrifuge system but required modifications to existing NPW piping, as well as a new piping configuration for the polymer and the polymer solution. The District also installed a safety railing and modified a pit drain.

In 2020, the District installed a conveyor to convey dewatered sludge from the Sludge Handling Building to the Sludge Drying Beds. The District selected a grain conveyor for this application due to the high capital cost associated with installing a piece of wastewater conveyance equipment. Although the service life of the grain conveyors is less than the wastewater conveyance equipment, the replacement cost is significantly less. The District is very satisfied with the existing operation.

5.11 Electrical Infrastructure & Controls System

5.11.1 Electrical Infrastructure

The plant electrical infrastructure has been implemented over time as the plant was expanded. MCCs 1 and 1A, installed in 1977 and 1999, are located in the Control Building. This infrastructure feeds power to the rest of the plant, including MCCs in the Dewatering Building and Chemical Feed Building. In 2023 the District replaced MCCs 1 and 1A and moved all switch gear to a designated Electrical and Controls Room in the Control Building.

The District's electrical infrastructure is a high resistance ground system and has a single utility service from ComEd. The District has a 500kW diesel standby generator installed in 1998. The ungrounded system was converted to High Resistance Ground in 2012 with the HSI centrifugal blower installation. The conversion consisted of the addition of a grounding resistor assembly on the main service and a grounding resistor at the engine generator. The addition of the grounding resistors allow stored energy of capacitance to drain to ground, assist with control of harmonic noise, and eliminate 90% of arc flash hazard (phase to ground). In addition, the grounding resistor provides an earth reference for the electrical system and reduces potential arc fault overvoltage from 16 times nominal line to line voltage (7600V) to 2.5 times nominal (1200V). Equipment has withstood ratings of 3000V so potential damage is significantly reduced.

The total calculated running load based on NEC full load motor currents and information available on engineering drawings is 929 Amps, or 641.1 kW (assuming a 0.83 power factor). This full load includes the 200hp centrifugal blower supplying air to the aerobic digestion process. This is greater than the 800A breaker on the generator. While the running load calculations were performed using full load currents and NEC amp values for connected horsepower, these values are conservative as motors normally operate at some percentage of full load. This is difficult to quantify and full load currents, which are known, are usually used for this purpose.

NFPA 70 220.87 addresses this. NFPA allows the "service" or "feeder" to be sized for 125% of the maximum load experienced over the previous 12 months, which in the case of NMWRD in 2019 is 241.44kW x 1.25 = 301.80kW, or 437.36A assuming 480V and power factor of 0.83. This meets the requirements of NFPA 70 220.87. Additionally, the actual kW delivered over the previous 24 months 2018-2019 was 280.68kW or 406.75 Amps, which is less than the breaker rating of 800A.

While historic conditions show that the existing 500kW generator could handle the additional load from the 200 hp blower, there are situations where the running load could exceed the capacity of the existing generator. If the running load is exceeded, then the 800A breaker for the generator would trip and the plant would be without power until reset or utility power is restored. The existing 200 hp centrifugal blower is used in conjunction with the aerobic digestion process and is not critical to maintain effluent quality. The aerobic digesters can sustain an extended period (8 hours without air supply). It is recommended that this blower be placed into operation when treatment plant staff are present, rather than utilizing an automatic restart.

The District will replace the 500kW Cummins generator in 2024 with a 600kW unit, sized for full running load. The District has received $250,000 in Community Grant funding from the FY2023 Consolidated Appropriations Act. The table below includes the probable construction costs for generator replacement.

Table 5-9: WWTF Emergency Power Upgrades Project Probable Construction Costs

WWTF Emergency Power Upgrades Project	
SUMMARY	
GENERAL CONDITIONS	$134,050
GENERATOR REPLACEMENT	$415,000
TOTAL PROBABLE PROJECT COST	**$549,050**

5.12 LAB/CONTROL BUILDING

The District's Control building is the primary hub on the WWTP site and contains the Headworks, Raw Sewage Pump Station, Electrical and Controls Room, Blower Room, Lab, and Plant Operations offices. The building was originally constructed in 1977 and an addition was constructed in 1999. The building's exterior was renovated in 2019, including new wall cladding, exterior doors and architectural canopies. The Operations offices were renovated in 2018.

The District performed an internal assessment of the laboratory which highlighted that some equipment is outdated and/or marginally functional and is in need of replacement. In particular the Vaccum system for TS filtration, muffle furnace, and ventilation system associated with the muffle furnace require replacement. Replacement of these equipment items is estimated to cost $10,000. In addition, HVAC, electrical and mechanical systems in the lab should be further evaluated to identify any safety hazards or compliance issues.

5.13 OTHER WWTP FACILITIES' PROJECTS

5.13.2 Garage And Personnel Rehabilitation Projects

The original WWTP garage was built during initial treatment facility construction in 1977. In 1998, the original garage structure was remodeled into a Personnel Building that includes a breakroom, toilet room, mechanical and storage rooms. The existing space is between the Control Building and the newer/larger Garage, and has undergone various modifications over time. The Personnel Building is in poor condition and the breakroom amenities do not meet the needs of the plant's staff. The building has two (2) man-doors and does not have any windows.

Previous work has not been well documented, but field measurements confirm that the existing toilet room does not meet current accessibility code. At the time of this report the District is renovating and improving the space for personnel by providing a full kitchen, windows to the exterior and updated finishes and lighting throughout.

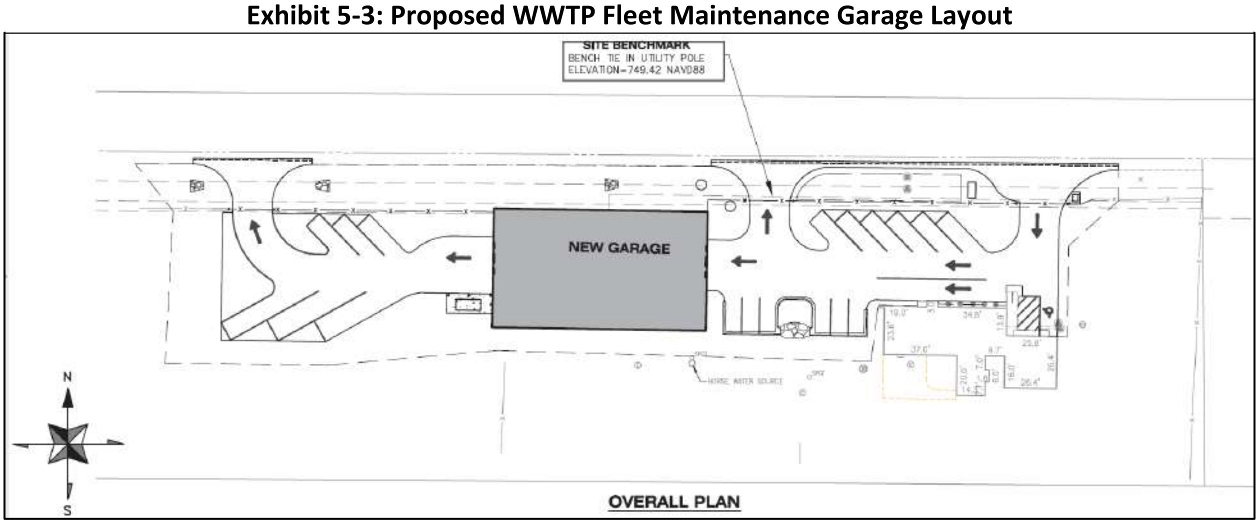
The District is also planning other infrastructure projects to address aging infrastructure.

WWTP Fleet Maintenance Garage Project

A proposed Fleet Maintenance Garage has been sited adjacent to the District's Administration Building and Offices on District-owned property at 113 Timber Trail, Island Lake, Illinois. The proposed Fleet Maintenance Garage will allow the District to store and repair its vehicles used by District staff, including work trucks and heavy-duty equipment. The District has determined construction of a Garage to be a priority as they continue to invest in their vehicles and equipment.

The proposed fleet garage would utilize a total of 6,480 square feet (108'x60'), and a parking lot which provides one entrance and two exit driveways. In order to construct the new Garage and associated paving improvements, the District will demolish an existing metal and wood sided storage structure. The existing horse barn structure is on a residential property purchased by the District in 2010.

Exhibit 5-3: Proposed WWTP Fleet Maintenance Garage Layout



A second-floor loft with kitchenette facilities will serve as the District Board Room. The loft space will be available to the public as a rental space.

The proposed fleet maintenance garage will include an education center which will educate customers, school children on the water cycle, local environmental, and wastewater treatment. The District is committed to protecting waterways, public health, and the environment, through the proper collection and treatment of municipal wastewater. The education center will support the District's on-going efforts to foster partnerships and relationships with those in the Service Area through residential and business education. The District promotes education through staff's involvement with elementary and high schools in our area. Staff regularly connect with students and educators by hosting operator led tours of the treatment facility and processes. The District's goal is to enhance awareness of wastewater treatment and the environment as we continue develop educational resources and opportunities that promote this effort.

The table below includes the preliminary opinion of probable costs for the Fleet Maintenance Garage Project is $2,506,550, including material, labor, 20% contingency and engineering.

Table 5-10: WWTF Fleet Maintenance Garage Probable Construction Cost Summary

WWTF Fleet Maintenance Garage	
SUMMARY	
GENERAL CONDITIONS	$248,000
FLEET MAINTENANCE GARAGE CONSTRUCTION	$1,568,550
Construction Sub-Total	**$1,816,550**
Contingency @ 20%	$363,000
Construction Total	**$2,179,550**
Design Engineering @ 7.5%	$163,500
Construction Engineering @ 7.5%	$163,500
TOTAL PROBABLE PROJECT COST	**$2,506,550**

WWTP Garage and Breakroom Replacement

The existing garage was constructed in 1986 as a pole barn on a concrete slab. Pole barns have a typical service life of 30 years. The existing garage has reached its service life and requires replacement. The NMWRD intends to demolish the existing garage structure and concrete slab and demolish the Personnel Building. The Personnel Building concrete foundation will be retained and reused. One new building will be constructed in their place. The proposed replacement will include a new, larger garage building and concrete slab to accommodate a tandem axle vactor truck. The concrete slab will be poured at the same elevation as the existing Personnel Building slab and connected. The new building will serve dual purposes – garage and breakroom.

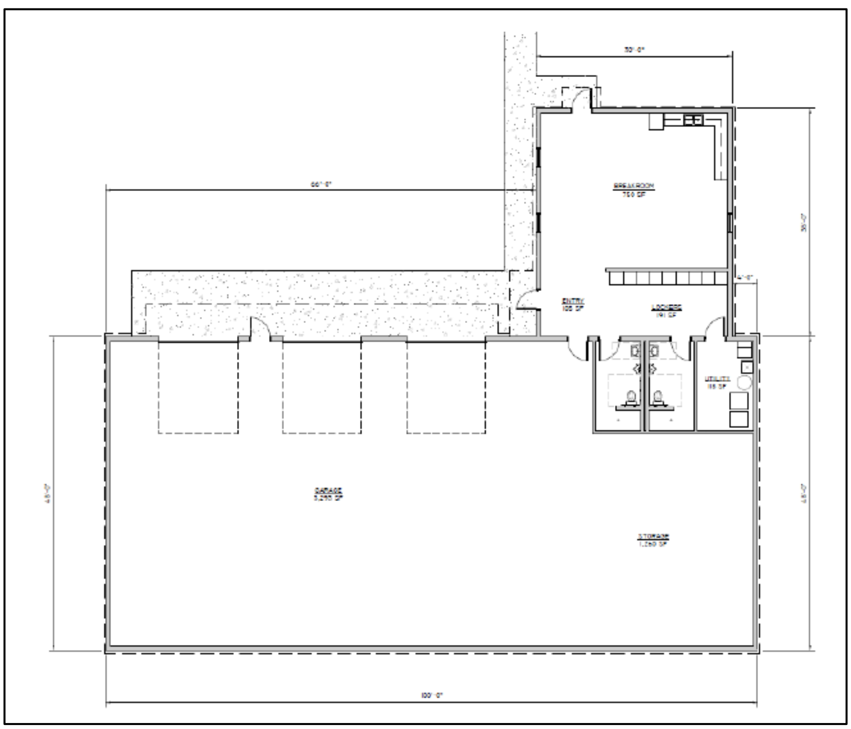
The proposed building will contain a garage space for District vehicles and equipment with an attached storage space. The total square footage of the garage is roughly 4,600 sf. The total square footage of the breakroom space is roughly 2,600 sf. Vehicles and equipment necessary to keep the treatment plant in good condition will be better protected, and temperature regulated.

The table below includes the preliminary opinion of probable costs for the WWTP Garage and Personnel Building Replacement Project is $2,834,300 including material, labor, 20% contingency and engineering.

Table 5-11: Garage and Personnel Building Replacement Project Probable Construction Cost – Summary

Garage and Personnel Building Replacement Project	
SUMMARY	
GENERAL CONDITIONS	$336,000
GARAGE AND PERSONNEL BUILDING	$1,717,800
Construction Sub-Total	$2,053,800
Contingency @ 20%	$410,800
Design Engineering @ 7.5%	$184,900
Construction Engineering @ 7.5%	$184,900
TOTAL PROBABLE PROJECT COST:	**$2,834,400**

Exhibit 5-4: Proposed Garage and Breakroom Layout



WWTP Garage and Breakroom Remodel

The District was in need of upgraded break room facilities and began a remodel of the Personnel Building in 2024. The building has undergone various modifications over time. It was constructed as a garage in

1977 and converted to an occupied space as a Personnel Building in 1998. The remodel includes a full kitchen, windows to the exterior, bathroom and updated finishes and lighting throughout. The complete remodel is anticipated to cost $100,000.

The District is also considering updating the exterior of the garage and providing a partial remodel of the garage interior instead of a complete replacement. It is estimated that this work will cost approximately $400,000. A remodel of the Garage and Breakroom is estimated to cost approximately $500,000.

5.13.3 Solar Array Project

The District wants to continue putting an emphasis on environmental sustainability and aims to utilize available solar incentives to install a solar panel system at the wastewater treatment plant (WWTP). The District currently utilizes traditional electric utility to supply approximately 1,246,000 kWh to the treatment plant annually. With an end goal of net zero energy use through energy efficiency and renewable energy generation, a comprehensive solar panel system would create significant energy savings in a 30-year projection. Obtaining net zero energy offers a multitude of practical and environmental benefits such as: lowering impacts of climate change, negating reliance on electric utilities, and providing immediate returns on electric costs. Energy savings generated from utilizing renewable energy allocates additional resources for addressing other proposed projects in the capital plan. Available solar incentives for an installation which supplies the entirety of the WWTP's energy needs have the potential to offset a significant portion of the financial burden associated with installing a solar energy system. Installation of the solar energy system would generate financial benefits for the District as savings accrued will be available for other vital service area developments.

The District has identified a system in which the entire treatment facility's annual energy expenditure is supplied by solar energy. The size of the proposed solar energy field has been evaluated based on historical facility energy usage not to exceed 110%.

Figure 5-9: Proposed Solay Array Layout

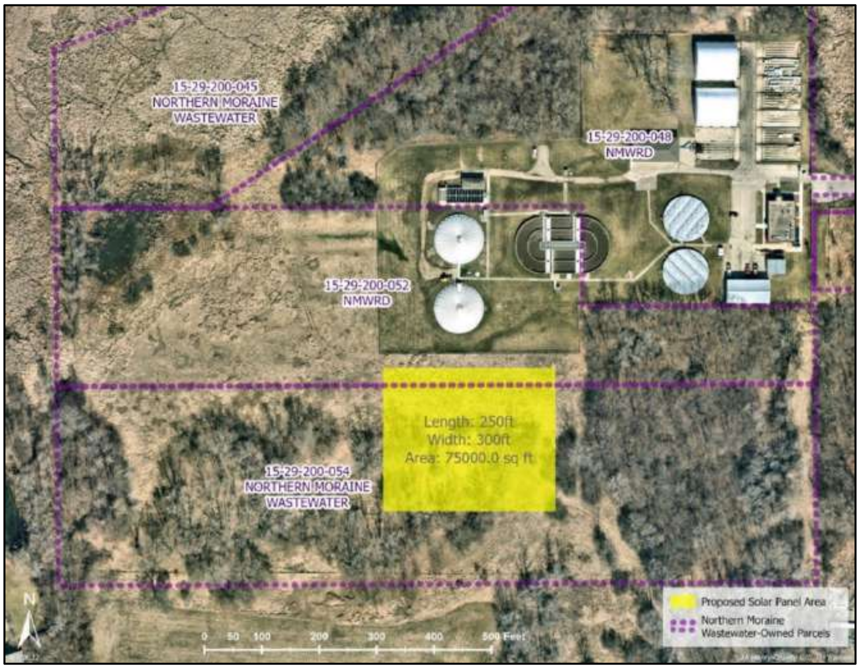


Table 5-12. Basis of Design - 850 kW DC Solar Energy Field

Design Parameters:	
Solar Panel Wattage	450
Solar Panel Qty	1884
System Size (kW DC)	847.8
System Size (kW AC, approx.)	600
Annual Production (kWh)	1,246,266
Annual Consumption (kWh)	1,249,548
Annual Offset	100%

The preliminary opinion of probable costs for the Solar Energy Field Project are summarized in the table below. These costs are derived from an installed cost proposal provided by Infiniti Energy dated April 2024. The proposed solar array will be located on District property – no additional property will need to be purchased. As a cost saving alternative, the District will investigate procuring the equipment directly.

Table 5-13: Solar Array Field Construction Cost Summary

WWTP Solar Renewable Energy	
SUMMARY	
WWTP Solar Renewable Energy	$2,360,000
Construction Sub-Total	**$2,360,000**
Contingency @ 20%	$472,000
Design Engineering @ 7.5%	$213,000
Construction Engineering @ 7.5%	$213,000
PROBABLE PROJECT COST:	**$3,258,000**

5.14 RECOMMENDATIONS

The following is a summary of the recommended projects related to the NMWRD WWTP. While each of the projects identified may be pursued as stand-alone projects, many of the projects are similar in nature and the recommended time frame for implementation. The projects are listed in no particular order and may be implemented as needed.

Table 5-10: Probable Construction Costs – Recommended Improvement Projects

Project Name	Probable Construction Cost
Darrell Road Phase 1A Headworks Project	**$5,380,000**
WWTF Oxidation Ditch Gate Replacement Project	**$339,560**
Final Clarifier No. 2 Rehabilitation	**$1,092,000**
UV Disinfection Project	**$1,723,000**
Aerobic Digester Blower Replacement	**$771,600**
Generator Replacement	**$549,050**
Laboratory Equipment Remodel	**$80,000**
WWTF Fleet Maintenance Garage Project	**$2,506,550**
Garage and Personnel Building Remodel Project	**$600,000**
Solar Array Project	**$3,258,000**

5.15 CONCLUSIONS

The existing NMWRD WWTP produces an exceptional quality effluent. The treatment plant is in good condition with several scheduled major or critical improvements.

The Illinois EPA is in the process of implementing nutrient criteria for phosphorus and total nitrogen. A thorough evaluation of the possible future treatment requirements should be completed so that funds are utilized effectively as possible.

As noted in Section 2, the future build-out of the District's FPA will exceed the hydraulic capacity of the plant which will need to be expanded from 2.0 MGD to 6 MGD. In addition, more stringent regulatory standards are anticipated to come into effect within the 20-year planning period. In an effort to prepare for each of these conditions, the remainder of this report will address future capacity and regulatory needs. Overall, the treatment facility is foreseen to undergo some major improvements in the next ten years. The improvements will continue to address rehabilitation and regulatory needs of the facility.

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SECTION 6

TREATMENT CAPACITY AND REGULATORY REQUIREMENTS

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6. Treatment Capacity and Regulatory Requirements

This section presents alternatives to address specific treatment issues as identified in previous sections of the report, including expansion needs, and nutrient removal. This section also provides recommendations and associated budgetary opinions of probable costs.

6.1 General Discussion

6.1.1 Expansion Needs

In order to meet long term needs of the community, the Northern Moraine Wastewater Reclamation District (NMWRD) acknowledges the need for expansion of the wastewater treatment plant. Previous phased expansion efforts have been successful and the District will continue the phased approach with future expansions. Phase I expanded the facility from 1.0 to 2.0 MGD, and was completed in 1998. The next expansion planned would be Phases II through V (to 10 MGD). However, based on growth projections within the District's FPA during the 2014 facility plan and confirmed during the future population analysis performed for this 2024 Facility Plan Update, it was determined that the District's WWTP would only need to be expanded to 6.0 MGD (Phase IV):

- **Phase I – 2.0 MGD - Completed 1998**
- **Phase II – 3.0 MGD**
- **Phase III = 4.5 MGD**
- **Phase IV – 6.0 MGD**

Section 2 outlined projected growth of the District's capacity needs based on the Comprehensive Plans from each community served by the District and input from each community. The existing, Future Development, and Build-Out projections of the NMWRD FPA are summarized in Table 6-1. The ultimate build-out of the treatment facility is based on an average daily flow of 6 MGD. For the purposes of this report, the ultimate build-out as listed in Table 6-1 concurs with the WWTP expansion plan from the 2014 facility plan. Also, as noted in Section 5, the WWTP is operating at 53% of its hydraulic capacity, 64% of its organic capacity, and 80% of its solids' capacity. The WWTP will reach its organic and solids capacity prior to reaching its hydraulic capacity. As connections are made to the collection system, available capacity will be reduced.

Table 6-1: Projected Population and Wastewater Flows

Design Year	Projected Total Population Equivalent	ADDF
	PE	(MGD)
2023 PE	14,487	1.07
Future Development (within Municipal Corporate Boundaries)	22,051	1.83
Build-Out Projection	61,149	5.74

The District's goal is to continue using the existing infrastructure, when determined feasible, while expanding the capacity of the NMWRD WWTP to meet the communities' long-term needs.

6.1.2 Nutrient Removal

The Illinois EPA will be implementing additional nutrient removal requirements for phosphorus (0.5 mg/L) and total nitrogen within the next ten years. TAI has reviewed the operations of the existing plant with respect to future regulations and has determined that, while the plant is currently capable of meeting some of the pending requirements, changes to plant operations will be necessary in order to meet the rest of the proposed effluent limits.

Phosphorus is removed through biological phosphorus removal (BPR) in the recently optimized oxidation ditch and through chemical addition dosed to the oxidation ditch. The WWTP consistently meets the existing 1 mg/L NPDES Permit limit for phosphorus. In 2022, the Fox River Study Group completed the 2022 FRIP Update, which is an update of the 2015 Fox River Implementation Plan to meet water quality standards. This FRIP Update Implementation Plan requires lower effluent phosphorus concentrations. All NPDES Permits in the Fox River Study Group will include effluent limits of 0.5 mg/L effluent total phosphorus. The existing process at the NMWRD WWTP should be capable of meeting effluent limits of 0.5 mg/L phosphorus. When the facility is expanded and lower limits are implemented in the future, tertiary filtration facilities may be required.

Since the WWTP oxidation ditch is only for BPR, total nitrogen is not currently removed by the biological process.

6.2 HYDRAULIC EXPANSION NEEDS

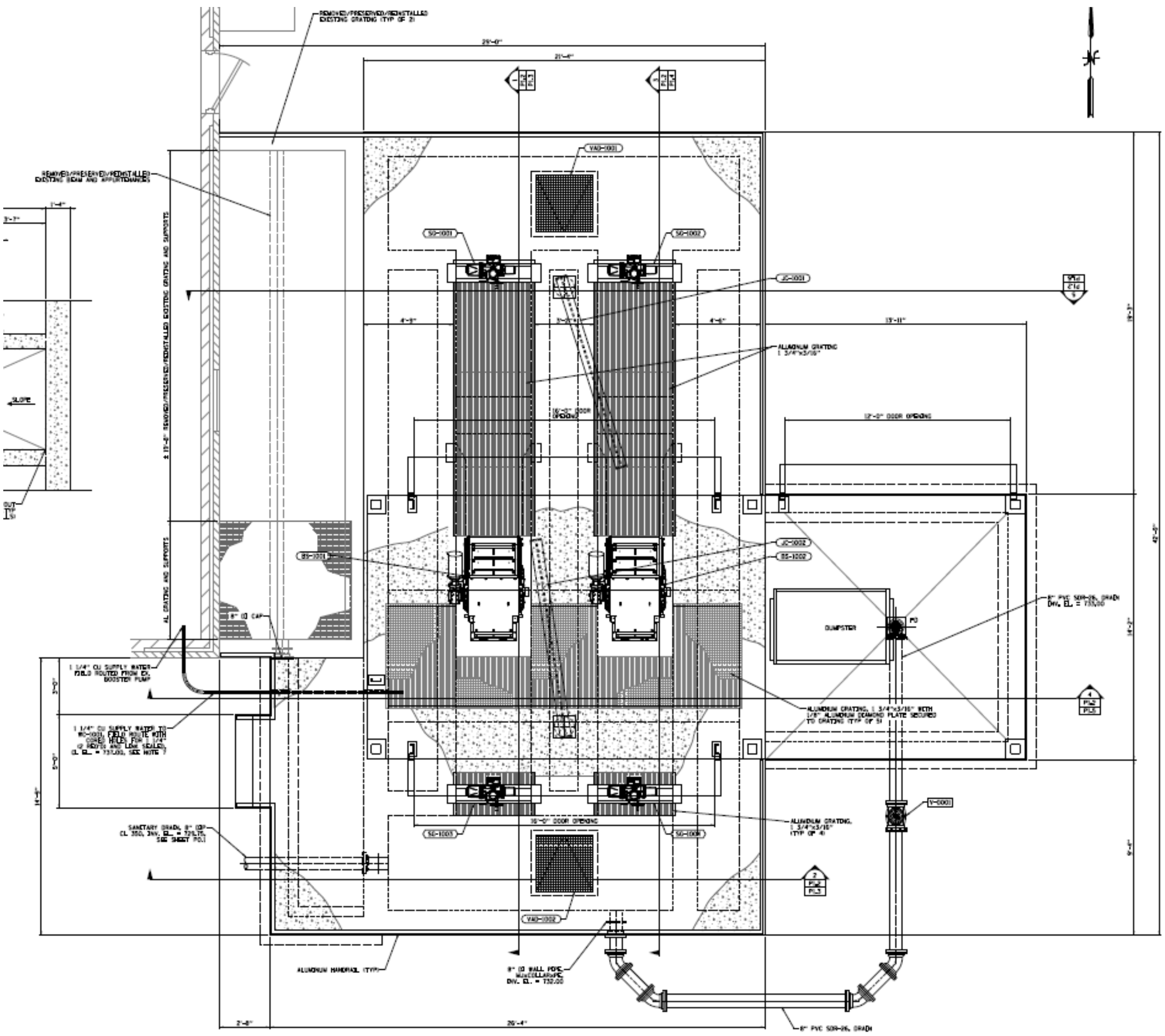
6.2.1 Headworks

Influent Screening

In 2022, as part of the 2022 Screen Channel Upgrades project a fine screen in the Headworks facility was replaced with a new Mahr bar screen and a screw conveyor. The facility has a short screening channel with two parallel channels that is fed from the 30-inch interceptor sewer. The screening channel is directly connected to the wet well, which is located underneath the channel. The current Headworks includes one mechanical fine screen and one bar. The screening structure, with capacity to treat peak flows up to 7.0 MGD, has adequate capacity for the current peak design flow of 5.0 MGD.

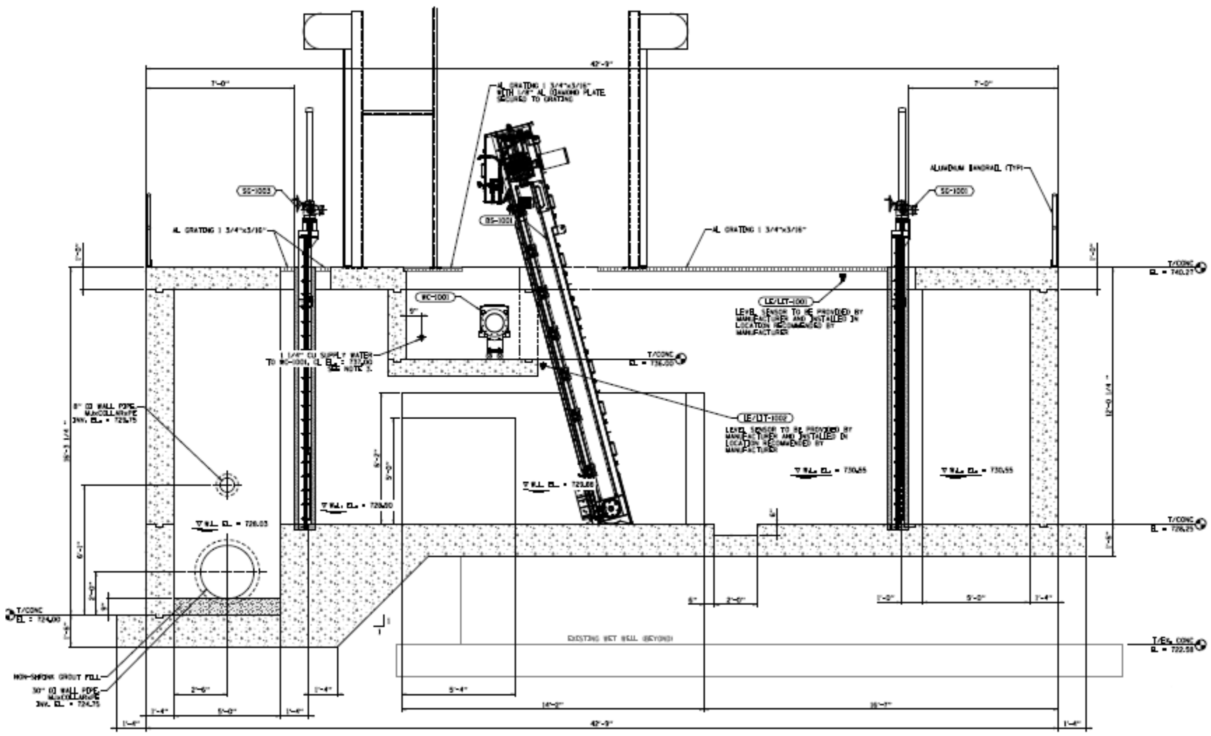
Section 5 includes costs related to the Darrell Road Collection System Phase 1A – Headworks project which will likely be constructed prior to the Phase II expansion and includes construction of a new Headworks Facility adjacent to the existing screen channels including influent screening equipment in two parallel screen channels, additional wet well capacity, washer/compactor equipment, screenings conveyance, a modular fiberglass building to enclose the screens and compactor equipment, and an access road for screen removal and screenings disposal. The expansion of the existing headworks was the preferred alternative. It was determined that the structure should be expanded only once more to provide the most economical approach. The improvements will include construction of a new structure adjacent to the existing influent channel and wet well. The design of the structure allows it to be completed without any major shutdowns or extended bypass pumping.

Exhibit 6-1: NMWRD WWTP Darrell Rd Phase 1A Headworks Project Process Plan



The proposed screen channels are sized to convey Phase IV peak flows of 13.2 MGD each. The channels will be grouted initially to allow for the installation of two proposed screens sized for 5.0 MGD each (current peak flow). The existing screens, screen channel floor and center wall will be removed above the existing wet well. This will provide improved access for maintenance and cleaning. The existing 30-inch interceptor sewer will be replaced with a 42-inch influent sewer as part of the Darrell Road Collection System Phase 1B – WWTP Interceptor project.

Exhibit 6-2: NMWRD WWTP Darrell Rd Phase 1A Headworks Project Proposed Process Section



A large portion of the NMWRD Facility Planning Area is currently served by septic tanks and private mechanical systems. The District started a septage receiving program in 2019. The Headworks expansion will include a septage receiving station and a new on-site well for potable water.

A septage receiving station would require convenient truck access. The preferred design would incorporate the septage receiving station into the headworks facility to minimize screenings handling and odor control. However, it is recognized that the receiving station could be constructed in a separate location and housed in its own building. This would require separate odor control, screening and grit facilities. In Section 5, it was recommended to implement the Lakeside package septage receiving station treatment unit that serves to remove grit and ground screenings as pretreatment. Additionally, the septage receiving station also includes the ability to meter and sample hauled-in waste.

The Influent Screening phasing plan is summarized below:

<u>Phase II – 3.0 MGD</u>

Number of channels...2 each

Design Average Flow..3.00 MGD

Peaking Factor...2.48

Peak Hourly Flow ....7.50 MGD

Number of Screens .... 2 each

Screen Hydraulic Capacity, each .... 5.0 MGD

Opening Size, each .... ¼ inch

Phase III – 4.5 MGD

Number of channels .... 2 each

Design Average Flow .... 4.50 MGD

Peaking Factor 2.31

Peak Hourly Flow .... 10.38 MGD

Number of Screens .... 2 each

Screen Hydraulic Capacity, each .... 10.38 MGD

Opening Size, each .... ¼ inch

Phase IV – 6.0 MGD

Number of channels .... 2 each

Design Average Flow .... 6.00 MGD

Peaking Factor 2.19

Peak Hourly Flow .... 13.15 MGD

Number of Screens .... 2 each

Screens Hydraulic Capacity, each .... 13.2 MGD

Opening Size, each .... ¼ inch

6.2.2 Raw Sewage Pump Station and Force Main

The pumping system installed during the Phase I Expansion only provided firm capacity for a peak flow of 5.0 MGD, which will not meet the future Phase II requirements of 7.5 MGD peak flow. The Phase I pumps were recently replaced or are scheduled to be replaced in FY25; however, their capacity with the largest pump out of service is only 4.5 MGD. It is assumed that by the time of the Phase II Expansion, the pumps will be at the end of their service life and will need to be replaced. As discussed in Section 5, in 2019, the pump discharge piping was reconfigured, and a 12-inch mag meter was installed and meters flow from all pumps.

Raw sewage pumps will continue to be controlled by variable frequency drives. As such the pumping system will be able to flow pace and maintain a near-constant level in the wet well, reducing pump cycling and life shortening electric motor starts. The dry well has space for four pumps. The pumping system for each phase should possess the maximum range to limit start and stop operation. In addition, the pump station is rated with the largest pump out of service. Therefore, the range of flows must be covered by a three-pump system. Expansion of the wet well volume will provide greater flexibility in operation for the pump station and would significantly reduce motor starts.

For Phase II Expansion, all four pumps could be replaced with dry-pit immersible pumps all similarly sized, or of variable sizes (like the existing pump line-up). Similarly sized pumps would allow for automatic alternation of all four pumps, thereby equalizing pump wear. This arrangement will also allow for load sharing between the pumps when operating at variable speed thereby ensuring optimal pumping efficiencies and avoiding potential cavitation.

During the Phase I Expansion, the original 12-inch main which conveyed pumped raw sewage to the package treatment facilities was not replaced and still remains in service. The force main was extended to the new oxidation ditch as an 18-inch force main. Typically, force mains are sized to flow at velocities ranging from 2 feet per second to 9 feet per second. This range prevents the settling of solids yet does not cause unnecessary headloss through the piping.

The current firm pumping rate of 3,102 gpm (4.5 MGD) results in velocities within the 12-inch segment of force main of nearly 9 fps, but will be higher with the addition of more flow at Phase II flows (3 MGD). The original design of the raw sewage pump station provided for dual 12-inch force main connections. It is recommended however that the existing 12-inch force main be replaced with an 18-inch diameter pipe.

The future Phase II raw sewage pumps would include installation of four new raw sewage pumps: two smaller capacity pumps and two larger capacity pumps. The smaller pumps would be rated for 1,300 gpm (1.87 MGD) each. The larger pumps would be rated for 2,600 gpm (3.74 MGD) each. The firm capacity of the pumps would be 5,200 gpm (7.5 MGD). This meets IEPA Title 35 firm capacity requirements with the largest capacity pump out of service. Once the force main is increased to 18-inch diameter along the entire length, velocity will be approximately 6.5 ft/sec.

At the Phase III expansion, one additional 2,600 gpm pump would be added to the Phase II configuration providing a firm capacity of 7,800 gpm (11.2 gpm). This would also meet Title 35 capacity requirements with the largest pump out of service.

Velocities in the 18-inch force main would reach close to 10 fps but only during maximum flow wet weather events and is considered adequate. Means to divert flow between the existing oxidation ditch and the Phase III adjacent ditch would be incorporated into the raw sewage force main piping.

For the ultimate Phase IV Expansion (6MGD), the 18-inch force main would need to be replaced with a 24-inch force main in order to maintain velocities below 9 fps.

The following summarizes the phasing plan for the Raw Sewage Pump Station and Force Main for Phase II Flows:

<u>Phase II – 3.0 MGD</u>

Design Average Flow..3.00 MGD

Peaking Factor..2.48

Peak Hourly Flow .... 7.5 MGD

Number of Phase II Pumps... 4 each (gpm)

Pump Rated Capacity, each, gpm .... 2 @ 1,300gpm (new)

Pump Rated Capacity, each, gpm .... 2 @ 2,600gpm (new)

Installed Pumping Capacity..11.2 MGD

Firm Pumping Capacity ....7.5 MGD

Phase III – 4.5 MGD

Design Average Flow.. 4.5 MGD

Peaking Factor.. 2.31

Peak Hourly Flow .... 10.3 MGD

Number of Phase II Pumps (existing)... 4 each

Number of new Phase III Pumps.. 1 each

Pump Rated Capacity, each, gpm ....2 @ 1,300gpm (existing)

Pump Rated Capacity, each, gpm ....2 @ 2,600gpm (existing)

Pump Rated Capacity, each, gpm .... 1 @ 2,600gpm (new)

Installed Pumping Capacity..15.0 MGD

Firm Pumping Capacity ....11.2 MGD

6.2.3 Biological Process

As explained in Section 5, the District employs a suspended growth biological process defined as single stage nitrification. The single stage nitrification process is a version of activated sludge that creates an environment to promote BOD_5 reduction and nitrification of ammonia (conversion to nitrate and nitrite) within the same process. The environment promotes the growth of aerobic microorganisms, which metabolize the influent BOD_5 and nutrients to energy and biomass.

The current process is completed within a two-ring oxidation ditch. The oxidation ditch design allows for the completely mixed basins to operate in series or parallel. Mechanical surface disc aerators on VFDs are used to aerate the mixed liquor. The discs provide both mixing energy and the oxygen required by the microorganisms for aerobic respiration. The oxidation ditch design allows for the aeration channels to be operated in series or parallel mode. The process is equipped with chemical polishing for phosphorus removal to meet NPDES permit limits.

The multi-ring oxidation ditch design possesses significant flexibility in which it has been adapted for biological phosphorus removal and can be adapted for denitrification (conversion of nitrite and nitrate to nitrogen gas) by implementing slight operational modifications.

For the Phase II (3 MGD) expansion, it is recommended to construct a third ring to increase the capacity of the oxidation ditch to meet the increased loading. The third ring will create an anaerobic zone for the oxidation ditch for biological nutrient removal when it is operated very close to an oxygen deficit. Therefore, the oxidation ditch will be converted to a biological nutrient removal process from a biological phosphorus removal process.

The Phase III (4.5 MGD) expansion will include construction of a second oxidation ditch. Phase IV (6.0 MGD) will increase organic and nutrient loading. The oxidation ditch will not need to be expanded but the aerobic digesters would be upgraded to address the increased sludge production.

The following summarizes the phasing plan for expansion of the oxidation ditch.

<u>Phase II – 3.0 MGD</u>

Design.. Oxidation Ditch

Number of Oxidation Ditches. 1

Number of Channel Rings. .... 3 (2 existing, 1 new outside)

Sidewater Depth. .... 14.0 ft

Channel #1 (Outer Ring) Width.. *20 ft (new)*

Channel #2 (Middle Ring) Width... 20 ft

Channel #3 (Inner Ring) Width... 20 ft

Detention Time. ....18.9 hrs

Tank Volume:

Total Volume, total .... 315,186 cf

Total Volume, total .... 2,357,588 gal

Organic Loading, BOD_5 .... 5,008 lbs/day

Organic Loading Rate, BOD_5/1,000 cf .... 15.90 lbs/day/1000 cf

MLSS .... 4,000 mg/L

Solids Inventory. .... 78,649 lbs

WAS .... 4,007 lbs/day

WAS Volume .... 60,051 gpd

Air Required .... 386 lbs/hr

Air Provided .... 475 lbs/hr

Sludge Age .... 19.6 days

F/M Ratio 0.064

<u>Phase III – 4.5 MGD</u>

Design .... Oxidation Ditch

Number of Oxidation Ditches. .... 2 (1 new)

Number of Channel Rings. 3

Sidewater Depth. .... 14.0 ft

Channel #1 (Outer Ring) Width .... 20 ft

Channel #2 (Middle Ring) Width .... 20 ft

Channel #3 (Inner Ring) Width .... 20 ft

Detention Time. .... 25.15 hrs

Tank Volume:

Total Volume, total .... 630,371 cf

Total Volume, total .... 4,715,176 gal

Organic Loading, BOD_5 .... 7,512 lbs/day

Organic Loading Rate, BOD_5/1,000 cf .... 11.92 lbs/day/1000 cf

MLSS .... 4,000 mg/L

Solids Inventory. .... 157,298 lbs

WAS .... 6,010 lbs/day

WAS Volume .... 90,077 gpd

Air Required .... 579 lbs/hr

Air Provided ....712 lbs/hr

Sludge Age.. 26.2 days

F/M Ratio 0.048

Phase IV – 6.0 MGD

Design.. Oxidation Ditch

Number of Oxidation Ditches. ....2 (existing)

Number of Channel Rings. 3

Sidewater Depth. .... 14.0 ft

Channel #1 (Outer Ring) Width.. 20 ft

Channel #2 (Middle Ring) Width... 20 ft

Channel #3 (Inner Ring) Width... 20 ft

Detention Time. ....18.9 hrs

Tank Volume:

Total Volume, total.. 315,186 cf

Total Volume, total.. 2,357,588 gal

Organic Loading, BOD_5.. 10,017 lbs/day

Organic Loading Rate, BOD_5/1,000 cf .... 15.90 lbs/day/1000 cf

MLSS.. 4,000 mg/L

Solids Inventory. .... 157,298 lbs

WAS.. 8,013 lbs/day

WAS Volume .... 120,102 gpd

Total Oxygen Required...772 lbs/hr

Total Oxygen Provided...950 lbs/hr

Sludge Age.. 19.6 days

F/M Ratio 0.064

6.2.4 Final Clarifiers

The performance of the existing final clarifiers has been exceptional. The solids concentration in the final effluent (4 mg/L TSS) is similar to that of a tertiary treatment facility because the clarifiers are oversized. The Illinois EPA standard for final clarifier surface overflow rates is 1,000 gpd/ft^2. The existing 85-foot diameter final clarifiers are currently designed for a surface overflow rate of 440 gpd/ft^2 which will only increase to 661 gpd/ft^2 during the future Phase II. Additionally, with implementation of disc filters in the Phase II Expansion, the WWTP will continue to have tertiary filtration.

As discussed in Section 5, the District rehabilitated Clarifier No. 1 in 2020 due to damage that occurred when the clarifier was emptied for cleaning. The Clarifier No. 1 pier was rebuilt, and mechanical drives and equipment were replaced at that time with mechanisms from Walker Process Equipment. Additionally, per Section 5, Clarifier No. 2 will be rehabilitated within the next 5 years similar to Clarifier No. 1.

The current design is large enough to accommodate the future Phase II flow. A third final clarifier would be constructed in Phase III and a fourth in Phase IV.

The phasing plan for the final clarifiers is summarized below:

Phase II – 3.0 MGD

Number	2 each (2 existing)	
Diameter	85	ft
Design	Circular	
Peak Hourly Flow	7.5	MGD
Surface Area - Total	11,349	sf
Weir Length – Total	494	lf
Surface Loading Rate at PHF	661	gpd/sf
Solids Loading Rate at PHF	22	lbs/day/sf
Weir Loading Rate at PHF	15,174	gpd/lf

Phase III – 4.5 MGD

Number	3 each (2 existing, 1 new)	
Diameter	85	ft
Design	Circular	
Peak Hourly Flow	10.38	MGD
Surface Area - Total	17,024	sf
Weir Length – Total	741	lf
Surface Loading Rate at PHF	610	gpd/sf
Solids Loading Rate at PHF	20.3	lbs/day/sf
Weir Loading Rate at PHF	14,005	gpd/lf

Phase IV – 6.0 MGD

Number	4 each (3 existing, 1 new)	
Diameter	85	ft
Design	Circular	
Peak Hourly Flow	13.15	MGD
Surface Area - Total	22,698	sf
Weir Length – Total	989	lf
Surface Loading Rate at PHF	579	gpd/sf
Solids Loading Rate at PHF	19	lbs/day/sf
Weir Loading Rate	13,304	gpd/lf

6.2.5 Tertiary Filtration and UV Disinfection

Tertiary Filtration

As noted in Section 5, the District completed testing in 2023 to determine if the WWTP can meet a 0.5 mg/L total phosphorus effluent limit. Results of the 2-week pilot testing in Summer 2023 show the District achieved an average 0.53 mg/L concentration utilizing chemical phosphorus removal and optimization of the oxidation ditch for BPR. It is recommended to incorporate tertiary filters into the Phase II expansion to help the District to meet the 0.5 mg/L or lower total phosphorus limits with limited use of chemical polishing. As the plant becomes loaded, higher TSS loading will impact the ability for total phosphorus removal.

Based on a review of the District's DMR data, the average WWTP effluent solids concentration is 4 mg/L. With the assumption that particulate phosphorus is 6% of the effluent solids, the concentration of particulate phosphorus in the effluent is 0.24 mg/L. Based on the Facility's pilot performance results of 0.53 mg/L total phosphorus, it can be estimated that the orthophosphate component is approximately 0.29 mg/L PO4. If tertiary filters are implemented, effluent TSS will be reduced to approximately 2 mg/L, and particulate phosphorus concentration reduced to 0.12 mg/L. Effluent total phosphorus concentration will be approximately 0.41 mg/L.

Traditionally, sand filters have been used in tertiary filtration systems. Other alternative filtration system solutions, including media disc filter systems, are also available and can provide increased performance, greater hydraulic capacity, better reliability, lower energy costs, lower backwash rates and less maintenance than the sand filter counterparts. Within the present framework of more and more restrictive legislation and potential criteria for phosphorus and nitrogen in the future, the disc filter technology is a viable option for tertiary filtration.

The principal components of a disc filter unit are a rotating drive shaft, media filter panels, a backwash system, influent and effluent and overflow weir, and a drive motor. Secondary process effluent wastewater enters the disc filter tank and passes through the filter media. Filtered solids are collected on the filter panel surface. As a result of the accumulation of solids on the filter media, an increase in headloss occurs and backwashing is initiated to clean the cloth filter. Filtration is continuous and does not stop during the backwashing cycle. Several models of disc filters can be self-contained or installed in open tanks. To reach low levels of total phosphorus, dosing with coagulants such as ferric chloride or alum may be required.

In the Phase II Expansion, it is recommended to build a tertiary filter building to house the disc filter units for tertiary filtration. The design will include two units, each sized to meet the Phase II (3.0 MGD) peak flows of 7.5 MGD. Since one unit will meet peak flows, the other unit will provide redundancy for the system. Also, the building will be sized to have extra space for installation of a future third unit for installation during Phase III (4.5 MGD). With installation of the third unit meeting peak flows at 7.5 MGD, the tertiary filtration system will be sized to meet the Phase IV (6 MGD) Peak Hourly Flows at 13.2 MGD.

Table 6-2: Tertiary Filtration Requirements

Parameters	Phase II - 3 MGD	Phase III - 4.5 MGD	Phase IV - 6 MGD
Design Average Flow, MGD	3.0	4.5	6.0
Peak Hourly Flow, MGD	7.5	10.4	13.2
Unit Size, MGD			
Firm Capacity, MGD	7.5	15.0	15.0
Number of Units	2 (new)	3 (2 existing, 1 new)	3 (existing)
Influent TSS, mg/L (from final clarifiers)	4	4	4
Expected Tertiary Filter Effluent TSS, mg/L	2	2	2

UV Disinfection

The District currently utilizes chlorine disinfection for its treated wastewater prior to it being discharged to the Fox River. The chlorination facility was constructed in 1998 as part of the Phase I Expansion. The original design provided adequate capacity for a Peak Hourly Flow of 7.5 MGD, which under current flow projections represents the future Phase II peak flow.

As discussed in Section 5, it is recommended to convert the existing chlorine disinfection system to ultraviolet (UV) Disinfection utilizing UV light technology. The project will include conversion of one existing chlorine contact tank to one UV channel and installation of UV light disinfection units, gates, aluminum canopy and channel covers to prevent algae growth in the effluent channel. The system will have provisions for additional UV modules and lamps to increase the treatment capacity to 6 MGD (future expansion) and a fully redundant bank. The second existing chlorine contact tank will be abandoned.

If the system is installed in the near term, it is likely it will be at the end of its service life by the time the Phase II expansion is constructed. Therefore, it is recommended to build a Tertiary Filter/UV Disinfection Building as part of the expansion. The building will include two UV Disinfection units and tertiary filter units to decrease phosphorus concentrations in the WWTP effluent and should be included with the expansion.

Expansion Plan Summary

The proposed Tertiary Filter and UV building will include two tertiary disc filter units with space for a redundant third unit during future expansions. Additionally, two UV Disinfection units will be installed, with room for installation of a third unit during future expansions. It is recommended to reserve footprint west of the existing final clarifiers for a future tertiary filter and UV Disinfection building.

During the design of the Phase II Expansion, it is recommended that a hydraulic profile be completed for the site. Based on a preliminary review of elevations of the structures at the WWTP, it appears there is adequate head available for installation of the filters between the final clarifiers and the existing chlorine contact tank. It is estimated that there is 3 feet of head available between the final clarifiers and the floodplain. If it is determined after completion of the hydraulic profile that there is not enough head for the installation, it is recommended to add a low head pump station instead.

The following summarizes the phasing plan for UV Disinfection:

Table 6-3: UV Disinfection Requirements

Parameters	Phase II - 3 MGD	Phase III - 4.5 MGD	Phase IV - 6 MGD
Design Average Flow, MGD	3.0	4.5	6.0
Peak Hourly Flow, MGD	7.5	10.4	13.2
TSS, mg/L	4	4	4
Number of Channels	3	3	3
Number of Units	2 (new)	2 (existing)	3 (2 existing, 1 new)
UV Transmission, % (Field Measured Transmissivity = 80%)	65%	65%	65%

6.2.6 RAS/WAS Pump Station

The existing RAS/WAS pump station consists of two constant speed 1,400 gpm pumps in a 10-foot diameter pre-cast wet well. The pumps are controlled by floats and operate in an on/off mode, pumping RAS through a 14-inch force main. Flow meters were installed on the RAS/WAS force mains in 2021 and include a metering station. The existing pumps currently have sufficient capacity for the existing flows and loadings, but do not have capacity for future Phase II and beyond. The RAS/WAS pumps were replaced in 2014, except for one. It was replaced in 2024. It is recommended that consideration be given to providing variable speed drives for the RAS/WAS pumps to reduce the cycling of pumps at the currently lower RAS rates associated with the lower influent flows and loads. RAS pumping requirements for Phases II-IV are located in 4. A new RAS/WAS pump station would be needed for Phase II.

Table 6-4: RAS Pumping Requirements

Parameters	Phase II - 3 MGD	Phase III - 4.5 MGD	Phase IV - 6 MGD
Design Average Flow	3.0	4.5	6.0
Influent BOD, mg/L	200	200	200
MLSS Concentration, mg/L	4,000	4,000	4,000
RAS Concentration	7,500	7,500	7,500
RAS Rate, MGD	3.26	4.89	6.51
Number of Pumps	4	4	4
RAS Pumping Rate, gpm	1,500	1,500	1,500

The waste activated sludge from the biological process is expected to be equal to the incoming BOD_5 due to the potential inclusion of biological phosphorus removal. WAS Pumping requirements for the Phases II-IV expansions are summarized in 6-5.

The waste sludge volume will increase with each expansion; however, the pumps will be able to meet the IEPA capacity requirements with the largest unit out of service.

Table 6-5: WAS Pumping Requirements

Parameters	Phase II - 3 MGD	Phase III - 4.5 MGD	Phase IV - 6 MGD
Design Average Flow	3.0	4.5	6.0
Influent BOD, mg/L	200	200	200
WAS lbs/day	3,756	5,634	7,512
WAS Concentration, mg/L	7,500	7,500	7,500
WAS Rate, gpd (at 7-day loading)	60,051	90,077	120,102
Number of Pumps	2	2	2
WAS Pumping Rate, gpm	250	250	250

6.2.7 Sludge Stabilization

The District is required to stabilize the sludge produced by the wastewater treatment process prior to disposal. The District currently disposes its biosolids through land application. The biosolids must meet the Class B requirements of the 503 Sludge Regulations prior to disposal. As such, the District must reduce the volatile solids concentration of the sludge by 38% or more prior to land application. In addition, the District is required to meet vector attraction requirements. In 2013, the aerobic digesters were upgraded. The interior steel walls were removed, the diffused aeration system was replaced, and the digesters were covered. The digesters in their current configuration are adequate for the existing 2.0 MGD treatment facility, and for the 3.0 and 4.5 MGD expansions (Phases II and III).

The District is currently capable of providing mechanical thickening and dewatering using a centrifuge. The District currently decants the digesters to accomplish sludge thickening. Previous facility plans recommended implementation of a membrane thickening technology for thickening digested solids to 3.0 – 3.5% solids. However, currently, it is recommended to continue with the existing operation to only thicken solids to 2%. Therefore, it is not recommended to implement membrane thickening and is instead recommended to build additional aerobic digestion capacity during Phase IV (6 MGD) when additional digestion volume is required. These digesters should be located directly south of the existing North and South Digesters for ease of operation.

Additionally, the WWTP has adequate blower capacity with the existing 200 hp (4,000 scfm total) centrifugal blower and the three 75 hp Lamson centrifugal blowers for redundancy. Per Section 5, the three 75 hp Lamson centrifugal blowers are scheduled to be replaced with two 2000 scfm Kaeser Positive Displacement blowers in the near term (FY26). These blowers meet the aeration needs of the digesters through the Phase III Expansion (4.5 MGD, 4,014 scfm). During the Phase IV Expansion, additional blowers will need to be installed to meet the capacity needs of the two additional aerobic digesters (additional 4,014 scfm each, 8,028 scfm total).

The following summarizes the phasing plan for the aerobic digesters:

Table 6-6: Aerobic Digestion Performance and Aeration Requirements

Parameters	Phase II - 3 MGD	Phase III - 4.5 MGD	Phase IV - 6 MGD
Temperature	20°C	20°C	20°C
WAS solids concentration	2%	2%	2%
Tanks On-line (Aerobic Digestion)	North and South Digesters	North and South Digesters	North and South Digesters; 2 New Aerobic Digesters
Total Aerobic Digestion Volume	133,794 cu. ft.	133,794 cu. ft.	267,588 cu. ft.
Anticipated VS Destruction	45%	42%	47%
Aeration Requirements, for reduction and mixing, scfm (1)	4,014	4,014	8,028
(1) AOR/SOR = 0.44			

6.2.8 Sludge Handling and Storage

The District is currently capable of providing mechanical thickening and dewatering using the centrifuge. In the Phase II expansion, it is recommended that the District install a centrifuge specifically designed for thickening applications and a separate centrifuge solely for dewatering.

During the Phase II expansion, it is recommended to replace the existing 80 gpm centrifuge with the two separate larger centrifuges to handle higher loadings from the WWTP and still maintain operation within the 5-day workweek. The thickening centrifuge is recommended to have a maximum capacity of 250 gpm, while the dewatering centrifuge will have a capacity of 150 gpm. During the expansion, it is also recommended to install progressive cavity pumps designed to handle the increased flows of each centrifuge and to also replace the polymer units to meet the feed requirements of the larger centrifuges. A sludge conveyor should be designed based on the ultimate layout of the proposed centrifuges to convey cake from the Sludge Handling Building to Sludge Storage.

Additionally, the larger centrifuge solely for dewatering will be able to handle flows up to 6 MGD. For the Phase III expansion (4.5 MGD), an additional centrifuge for thickening will need to be installed to keep up with the additional WAS flow from the additional loading associated with installation of the second oxidation ditch.

Table 6-7: Sludge Handling Performance and Operation

Condition	Process	Sludge Flow (gpd) (1)	Equipment Capacity (gpm)	Operating Time (hrs/week)
Aerobic Digestion				
Phase II - 3 MGD	Thickening	60,051	250	28
	Dewatering	20,177	150	16
Phase III - 4.5 MGD	Thickening	90,077	250	42 (Total for 2 units)
	Dewatering	31,592	150	25
Phase IV - 6 MGD	Thickening	120,102	250	56 (Total for 2 units)
	Dewatering	39,345	150	31
(1) 7-day flows and loadings. Operating time is based on 5-day loading based on actual operation of the WWTP.				

Phase II expansion will include construction of a 150 x 100 sludge storage barn in the location of the existing sludge storage beds. The size of the storage barn will allow the District to provide more than 150 days storage for biosolids at 3 MGD. In the Phase III expansion (4.5 MGD), it is recommended to build an additional barn in that location to meet 150 days storage. The storage associated with both barns will meet the 150-day storage requirement for the Phase IV Expansion (6 MGD) as well. The District currently contracts for land application of biosolids on agricultural property.

The following summarizes the phasing plan for Sludge Storage Barn(s):

Table 6-8: Sludge Storage Barn Design and Requirements

Condition	Number of Storage Barns	Barn Size (L X W X D)	Storage Volume Needed for 150 days Storage (cy)	Storage Capacity of Barn(s) (cy)
Phase II - 3 MGD	1	150 X 100 X 3	1,427	1,667
Phase III - 4.5 MGD	2	150 X 100 X 3	2,235	3,333
Phase IV - 6 MGD	2	150 X 100 X 3	2,783	3,333
(1) 7-day flows and loadings. Operating time is based on 5-day loading based on actual operation of the WWTP.				

6.3 Phase II Expansion Summary and Costs

6.3.1 Phase II (3.0 MGD) Expansion Summary

The following is a summary of the Phase II Expansion scope:

- Headworks – Influent Screens (Darrell Road Phase 1A – Headworks design)
- Raw Sewage Pump Station – Additional pumping capacity and expanded wet well/new pump station
- Biological Process – Add third ring on existing oxidation ditch
- RAS/WAS Pump Station – Additional pumping capacity (new pump station)
- Secondary Clarifiers – No work required
- Tertiary Treatment – Add tertiary filters (new building)
- Disinfection – Add UV units in new Tertiary Filter Building
- Sludge Handling
    - Aerobic Digestion – no work required
    - Sludge Thickening – Install dedicated centrifuge
    - Sludge Dewatering – Install dedicated centrifuge
- Sludge Storage – Add one new barn

6.3.2 Phase II Expansion Probable Capital Cost

The probable capital cost for the Phase II WWTP Expansion is approximately $32.8 million and is shown in Table 6-9.

Table 6-9: Probable Capital Costs – Phase II WWTP Expansion

Item	Probable Cost
General Conditions	$4,726,100
Site Work	$3,190,400
Headworks (completed in Darrell Road Phase 1A prior to Phase II expansion)	$0
Raw Sewage Pump Station	$3,539,100
Oxidation Ditch	$2,642,300
RAS/WAS Pump Station and Structure	$2,097,800
Tertiary Filter/UV Disinfection Building	$3,490,400
Sludge Handling	$2,472,700
Sludge Storage Barn	$1,630,500
Construction Subtotal	$23,789,300
Contingency @ 20%	$4,757,900
Design Engineering @ 7.5%	$2,141,100
Construction Engineering @ 7.5%	$2,141,100
Total Probable Capital Cost	**$32,829,400**

6.4 Regulatory Requirements

6.4.1 Nutrient Removal

Although the natural environment is able to assimilate some pollution, this ability decreases as urbanization (and the associated wastewater load) increases. This leads to degradation of the water quality and wildlife habitat. In order to ensure stability within the environment, governmental agencies on the federal, state, and local levels are continuously evaluating the effectiveness of wastewater regulations. The regulatory issues that will be focused on in this section are nutrient removal, chlorides, and PFAS. The two nutrients of concern are total nitrogen and phosphorus.

The NMWRD WWTP discharges to the Fox River. According to the Illinois EPA Clean Water Act Section 303(d) List, the Fox River does not meet water quality standards for its intended use in the majority of the segments, including the segment immediately downstream of the discharge point from the NMWRD Wastewater Treatment Plant (Waterbody Segment DT-22). The impairment on the river for aquatic life is based on a low dissolved oxygen concentration. This low dissolved oxygen content is due to algal growth and exacerbated by the presence of pools upstream of the low head dams along the river.

In 2001, the Illinois EPA was contemplating performing a Total Maximum Daily Load (TMDL) study on the Fox River in an attempt to address the impairment. At that time, there was insufficient data available to support a TMDL. Therefore, modeling would simply be an exercise which would not reflect actual environmental conditions. Many of the communities along the Fox River (including the District) joined forces with other stakeholders, including Friends of the Fox and Sierra Club, to form the Fox River Study Group (FRSG). The FRSG determined that it was in the best interest of all the stakeholders if a comprehensive solution was developed through a model that could be calibrated based on extensive river monitoring data. The FRSG, in concert with the POTWs along the river, have monitored the river for numerous constituents including phosphorus, nitrogen, fecal coliform and chlorophyll a. This water quality data provided the basis for development of QUAL2K and HSPF models.

In 2004, the Illinois EPA implemented statewide nutrient removal criteria for wastewater treatment facilities that were proposing expansion of their hydraulic capacity. Two nutrients of concern were total nitrogen and phosphorus. The NPDES Permits issued for these facilities typically contained an interim phosphorus limit of 1.0 mg/L and a requirement to monitor total nitrogen.

In 2011, the Illinois EPA was receiving increased pressure by the USEPA and environmental stakeholders to address nutrient criteria on all POTWs, not only treatment facilities undergoing expansion. Several NPDES permits along the Fox River had expired and were due to be reissued by the Illinois EPA. However, the Illinois EPA elected to delay reissuance so the NPDES permits could incorporate language agreed upon in ongoing discussions on nutrient criteria.

In January 2012, in an attempt to build consensus among all stakeholders, the Illinois EPA presented the FRSG with special conditions in draft form for nutrient criteria. The FRSG had not yet completed the low flow monitoring required to calibrate the HSPF and QUAL2K models. Therefore, determination of a water quality-based phosphorus limit could not be determined at that time. The FRSG in conjunction with the Illinois EPA worked to develop a schedule for completion of the modeling effort and determination of water quality-based phosphorus standards. During the drought in the summer of 2012, the FRSG was able to obtain low flow monitoring for the Fox River and is on schedule to present a calibrated model by May 2013.

In January 2013, the Illinois EPA and FRSG were able to agree on special conditions for all dischargers greater than 1.0 MGD. These conditions included a 1.0 mg/L interim phosphorus standard and a schedule for completion of the water quality modeling for the development of permanent phosphorus criteria. Ultimately, the permit language required the FRSG to complete analysis of the alternatives and provide recommendations by December 2015. The permit also required the POTWs to perform a feasibility study and determine the cost for compliance. It is the intent of the special conditions that all dischargers along the Fox River will meet the recommended standards by 2030.

The NMWRD WWTP currently has an effluent TP limit of 1.0 mg/L based on an annual average. The IEPA has begun issuing permits lowering the TP limit for major POTWs to 0.5 mg/L by 2030. The new recommendation for major WWTPs in the FRSG is also an effluent limit of 0.5 mg/L, which is lower than the NMWRD WWTP's existing limit. Phosphorous removal in wastewater treatment plants was common in the 1970's. The most widespread method of phosphorous removal used at that time was the addition of chemical coagulants that cause phosphate compounds to settle out of solution. Phosphorous removal is also possible through biological processes, but the amount of phosphorous that can be removed through such processes is limited. Both biological and chemical phosphorus removal options were evaluated in the 2014 Facility Plan, the Phosphorus Removal Feasibility Study (PRFS) completed in 2020, and the Phosphorus Discharge Optimization Plan (PDOP) completed in 2020.

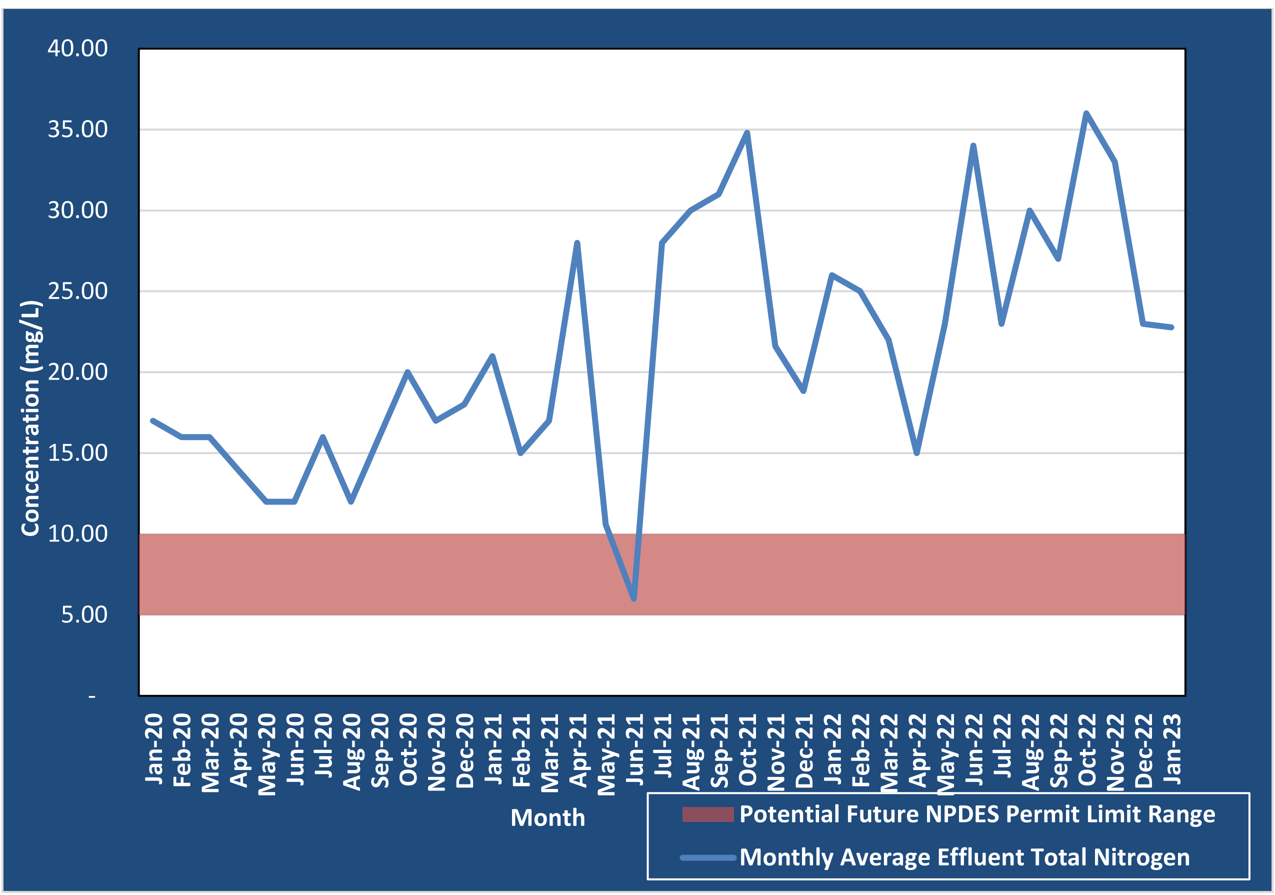
To comply with this limit, the District currently uses Hyper+Ion for chemical removal of phosphorus. In addition, the District is optimizing its oxidation ditch for biological phosphorus removal. Also, as discussed in Section 5, the District has established the first POTW nutrient trading program in Illinois. The District will work with third party entities directly and utilize offsets for phosphorus removal based on projects completed by third parties. The District plans to continue utilize all methods of phosphorus removal to meet the 0.5 mg/L effluent TP limit by 2030.

6.4.1.1 Nitrogen Removal

Another nutrient of concern is total nitrogen. At this time, the anticipated limit is between 5 and 10 mg/L for TN. Nitrogen in wastewater can be found in several forms including ammonia (NH_3), ammonium (NH_4^+), nitrate (NO_3^-) and nitrite (NO_2^-). In the past, limits were placed only on the levels of ammonia discharged from wastewater treatment facility since that is the only form of nitrogen that is toxic to aquatic life. Even though they do not directly harm fish, nitrates and nitrites can contribute to algal blooms. Phosphorous, in the form of phosphates (PO_4^-), can also trigger algal growth if it is present in high enough concentrations. By limiting phosphorus and total nitrogen, the sum of all forms of soluble nitrogen helps to preserve ecosystems in the surrounding watershed.

As discussed earlier in this report, the Illinois EPA is currently contemplating implementation of a Total Nitrogen limit, although the final effluent standard has not yet been identified. Figure 6-1 illustrates the District's current total nitrogen removal performance. It is anticipated that the future total nitrogen limit will be around 8 mg/L. Although the District is only required by their NPDES permit to monitor total nitrogen, it can be seen on Figure 6-1 below that the District would not meet a potential limit in the range from 5-10 mg/L TN on an average monthly basis based on the past five years of effluent data. The District's 5-year overall monthly effluent average is 21.3 mg/L.

Figure 6-1: Comparison of Historical Total Nitrogen Performance to Potential Future Limits



The NMWRD WWTP currently employs a single stage nitrification suspended growth biological treatment process. The single stage nitrification process is a version of activated sludge that creates an environment to promote BOD reduction and nitrification of ammonia within the same process. The environment promotes the growth of microorganisms, which convert the influent BOD and nutrients to energy and biomass.

The NMWRD WWTP biological process will need to be modified to remove total nitrogen removal through biological means through the denitrification process.

In order to achieve nitrogen removal, the oxidation ditch would need to be converted from a BPR process to a BNR process to remove both nitrogen and phosphorus. This is currently proposed for the Phase II Expansion (3 MGD) with the addition of a third ring around the WWTP's oxidation ditch. The third ring would operate as an anaerobic zone. Thus, the oxidation ditch would be converted to a BNR process with anaerobic, anoxic, and aerobic zones for biological nutrient removal.

The process of nitrogen removal in a BNR process works as the following: the removal of total nitrogen is achieved through nitrification (the biological oxidation of nitrogen from ammonia to nitrate), followed by denitrification (the reduction of nitrate to nitrogen gas). Nitrogen gas is released into the atmosphere and thus removed from the water.

The biological process would be designed for conversion of soluble biodegradable organic contaminants and nutrients, specifically ammonia nitrogen. Most aerobic biological processes are designed for the development of beneficial bacteria that are able to convert organic compounds and are capable of performing this task within a very short amount time. However, the conversion of ammonia nitrogen to nitrite (nitrification) is accomplished by *Nitrosomonas* bacteria. In order to develop and maintain a sufficient population of *Nitrosomonas* bacteria within the biomass, the process must maintain a low feed to mass ratio (F/M), with typical values ranging from 0.08 to 0.12. Since the plant cannot control the influent food source, operators control the biomass (MLSS) within the basins. There is a practical limit to the concentration of MLSS ranging from 2,000 to 3,000 mg/L. Therefore, the basins must be constructed large enough to allow the operators to develop a bio-mass population that is 10 to 12 times greater than the incoming food (soluble BOD). The operators maintain the ratio of food to mass by wasting the proper amount of solids from the process.

Denitrification is a biological process in which nitrite and nitrate are converted into nitrogen gas in order to break down a food source. This conversion is accomplished by the *Nitrobacter* bacteria. Denitrification is an alternative to respiration and is initiated by incorporating a zone that is rich in soluble BOD and operates at a dramatically lower dissolved oxygen concentration. This zone, known as the anoxic zone, is typically near the beginning of the biological process where the soluble BOD is plentiful. However, in order to convert the nitrate to nitrogen gas it must be first converted from ammonia to nitrate, which typically is near the end of the biological process. Therefore, most designs incorporate an internal loop, which brings the nitrate rich mixed liquor into contact with the high strength soluble organic matter. The operation of the oxidation ditch can be easily adapted for denitrification by lowering the dissolved oxygen level in the outer ring.

The flow rate of the internal recycle loop is a controlling factor in the efficiency of the nitrogen removal process. Simply stated, a recycle rate that equals the forward flow would equate to 50% removal, while a recycle rate that equates to twice the forward flow equates to 66% removal.

Recycle Rate = $(NH\text{-}N_{in} / NO_3\text{-}N_{out}) - 1$ (Assuming 66% TKN Removal)

6.4.1.2 Ammonia Removal

NMWRD's current NPDES Permit limits for ammonia are listed in the following table.

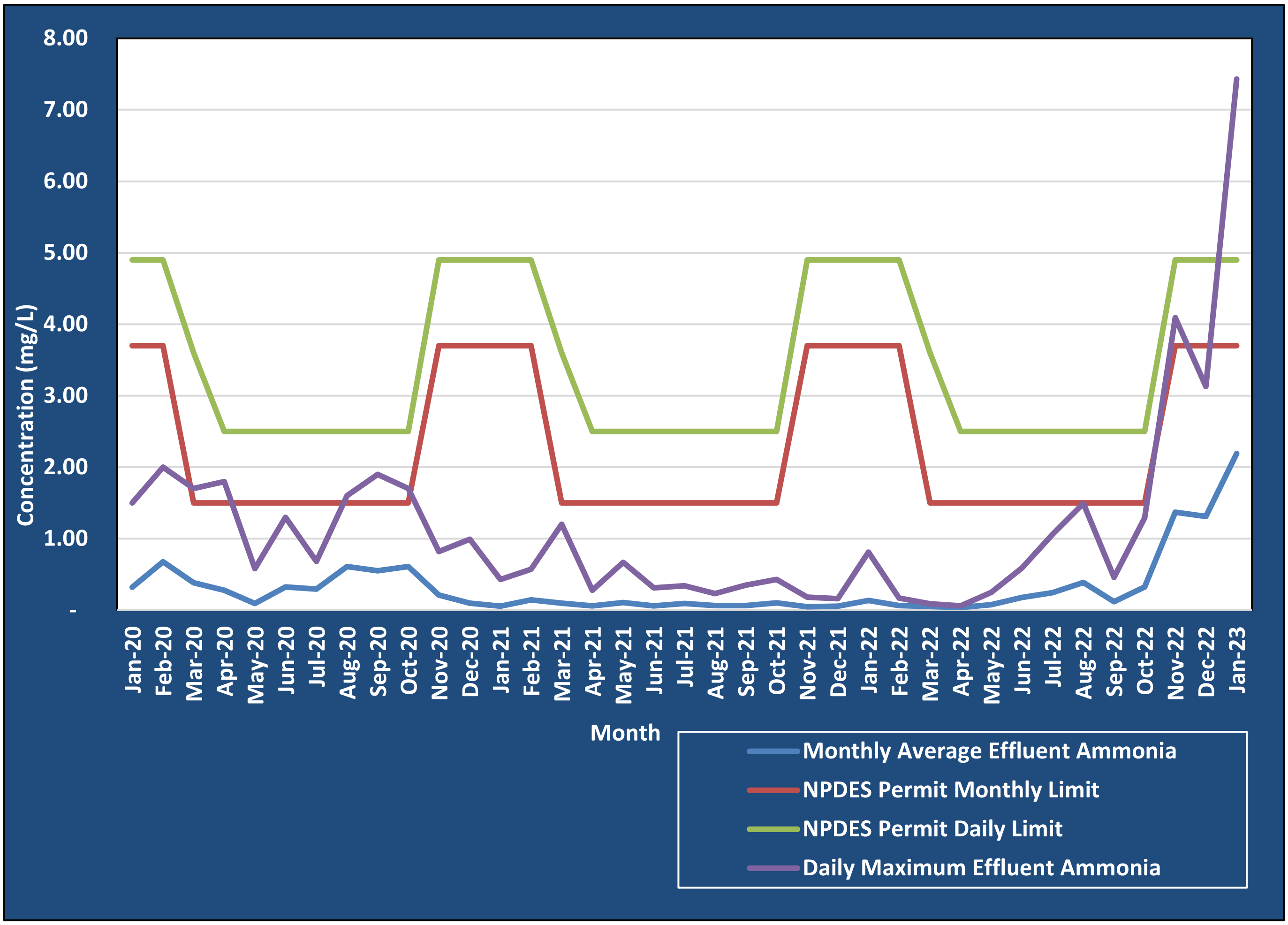
Table 6-10: NMWRD NPDES Permit Ammonia Limits

Months	Monthly Average	Daily Maximum
April - October	1.5 mg/L	2.5 mg/L
November - February	3.7	4.9 mg/L
March	1.5 mg/L	3.6 mg/L

It is unlikely that the Illinois EPA will implement lower limits for ammonia in the near future. The chart below is a graphic representation of the current ammonia removal performance.

Figure 6-2 on the next page demonstrates that the effluent ammonia concentrations meet the existing limits, as noted previously in Section 5. Currently, the existing biological process is capable of meeting these limits, and it is anticipated that the District will continue to meet these limits without needing to make any design modifications to the biological process.

Figure 6-2: Historical Ammonia Performance



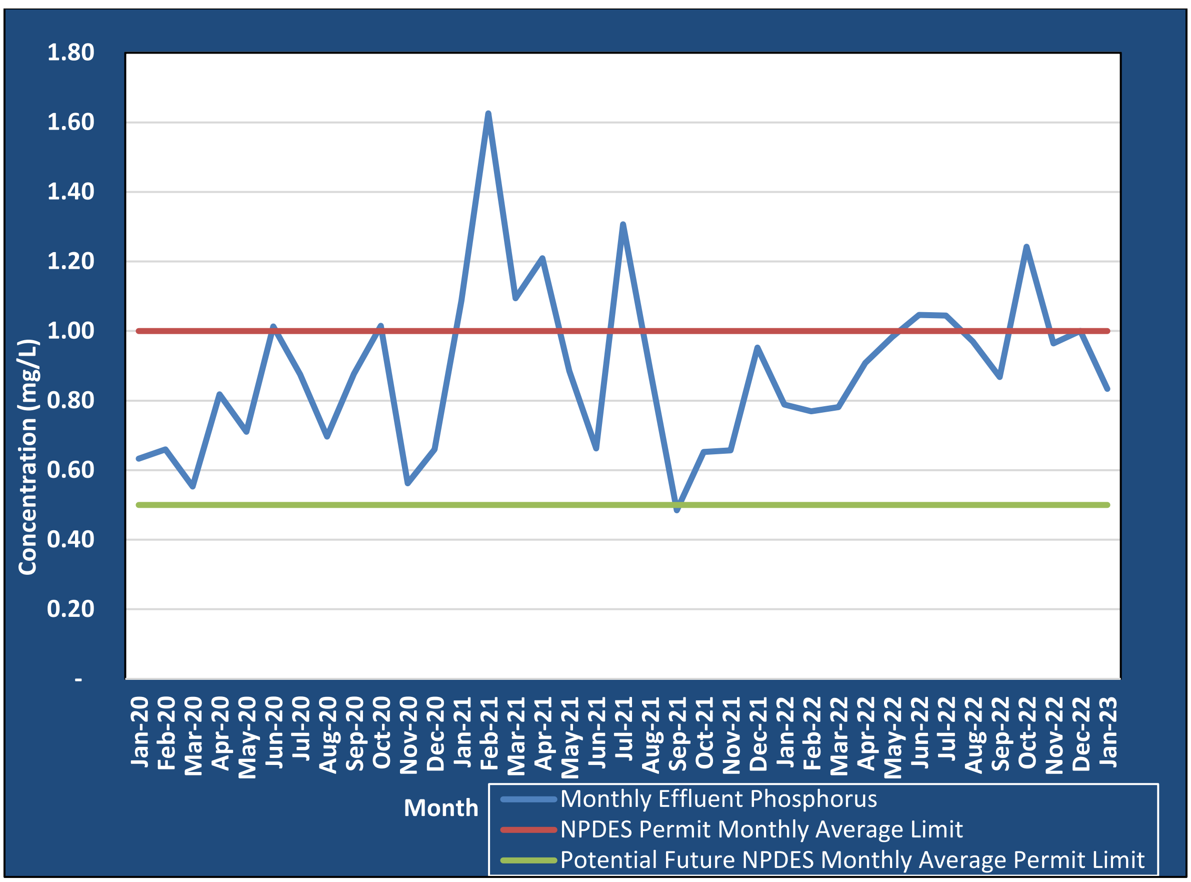
6.4.1.3 Phosphorus Removal

As indicated in 6.4.1, the Illinois EPA implemented statewide nutrient removal criteria in 2004 for wastewater treatment facilities seeking to increase their hydraulic capacity. The NPDES Permits issued for these facilities typically contained an interim phosphorus limit of 1 mg/L. Since that time, IEPA and the various stakeholders affected by this limit have conducted a significant amount of work studying the impacts of phosphorus on the environment and refining the analysis to determine appropriate regulatory limits.

The NMWRD NPDES Permit currently includes an effluent phosphorus limit of 1 mg/L. A limit of 0.5 mg/L or below is expected in 2030 based on the Fox River Study Group's Nutrient Assessment Reduction Plan (NARP).

Figure 6-3 demonstrates the District's current phosphorus removal performance. Over the past five years, the District has had four occurrences in which they exceeded the phosphorus monthly average limit of 1 mg/L. It is unlikely that the District would be able to consistently meet any limits lower than 1 mg/L without chemical buffering based on an overall effluent monthly average of 0.8 mg/L over the past five years. However, as noted previously, the District is utilizing a combination of chemical phosphorus removal, BPR, and a nutrient trading program to reach a 0.5 mg/L total effluent phosphorus limit.

Figure 6-3: Comparison of Historical Phosphorus Performance to Potential Future Limit



Additionally, as noted in Section 5, the District completed testing in 2023 to determine if the WWTP can meet a 0.5 mg/L effluent limit. Results for two weeks in summer 2023 show the District achieved an average 0.53 mg/L concentration utilizing chemical phosphorus removal and their optimization of the oxidation ditch for BPR.

If lower limits are implemented or the District cannot meet a 0.5 mg/L limit, additional methods for phosphorus removal may need to be reviewed. The District may need to install tertiary filters downstream of the final clarifiers to meet the 0.5 mg/L or lower total phosphorus limits. Tertiary filtration will reduce the effluent solids, which are about 6% particulate phosphorus.

Traditionally, sand filters have been used in tertiary filtration systems. Other alternative filtration system solutions, including media disc filter systems, are also available and can provide increased performance, greater hydraulic capacity, better reliability, lower energy costs, lower backwash rates and less maintenance than the sand filter counterparts. Within the present framework of more and more restrictive legislation and potential criteria for phosphorus and nitrogen in the future, the disc filter technology is a viable option for tertiary filtration.

The principal components of a disc filter unit are a rotating drive shaft, media filter panels, a backwash system, influent and effluent and overflow weir, and a drive motor. Secondary process effluent wastewater enters the disc filter tank and passes through the filter media. Filtered solids are collected on the filter panel surface. As a result of the accumulation of solids on the filter media, an increase in headloss occurs and backwashing is initiated to clean the cloth filter. Filtration is continuous and does not stop during the backwashing cycle. Several models of disc filters can be self-contained or installed in open tanks. To reach low levels of total phosphorus, dosing with coagulants such as ferric chloride or alum may be required.

To comply for 0.5 mg/L effluent TP limit after the Phase II expansion, it is recommended to reserve footprint west of the existing final clarifiers for a future tertiary filter building. The cost associated with a tertiary filter building is included in the Phase II expansion cost.

6.4.2 PFAS In Biosolids

The District's biosolids are treated to meet Class B land application requirements. The biosolids are land applied on farm fields through a contract the District has with a local land application firm. There have been recent concerns about the risk to crops and livestock from PFAS in biosolids that are land applied.

The USEPA is currently in the process of completing a risk assessment for two PFAS (perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS)) in biosolids. This pending risk assessment is estimated to be complete at the end of 2024. Also, per preliminary conversations with the Illinois EPA, it is known that WWTPs that are in the process of expanding will be receiving a monitor only limit for PFAS in their biosolids. However, this would not apply to the District because the WWTP's expanded 3 MGD permit limits have already been approved.

6.4.3 Effluent Chlorine Residual Limits

It should be noted that the Illinois EPA will be reducing the chlorine residual limit in wastewater effluent permits to 0.038 mg/L from the current level of 0.05 mg/L. Based on a review of the District's effluent data, the District will meet this limit. However, the District should be aware that if this changes, they may need to complete closer monitoring or consider switching to UV Disinfection.

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SECTION 7

IMPLEMENTATION PLAN

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7. Implementation Plan

The previous sections of this report included assessments of current and future conditions within the NMWRD FPA. The capabilities of the existing collection system (gravity sewers, lift stations, and force mains) to convey current and projected future flows were assessed and recommendations made for improvements necessary to support continued growth.

The existing treatment capabilities at the NMWRD WWTP were also assessed and recommendations presented for: the replacement or rehabilitation of existing equipment; the incorporation of phosphorus removal capabilities to meet new regulatory requirements; and the necessary expansions to support future growth.

This section integrates all of the recommended improvements into an overall Implementation Plan considering expected service life, regulatory requirements, and projected development.

7.1 Collection System Improvements

The need to set aside replacement funds to reinvest in the aging collection system infrastructure was discussed and was approximated at $1.49 million per year. Replacement funds to reinvest in the lift station infrastructure were approximated at $740,700 per year.

The collection system assessment is presented in Section 3. The recommended capital improvements include construction of the Darrell Road Collection System and sewer extensions to the Village of Holiday Hills and Le Villa Vaupel beyond the current Phase 2 project.

Table 7-1: Total Probable Capital Costs – Collection System

Description	Probable Cost
Darrell Road Collection system Phase 1A - Headworks	$5,621,000
Darrell Road Collection System Phase 1B – Treatment Plant Interceptor	$6,676,000
Darrell Road Collection System Phase 2 – Force Main	$12,447,000
Darrell Road Collection System Phase 3 – Lakemoor LS#7 Upgrades	$4,494,000
Unsewered Community Sanitary Sewer Extension	$6,663,000
Total Probable Capital Costs	**$35,901,000**

As discussed in Section 4, the lift stations are in poor to fair condition and regular maintenance is required of the equipment and structures to ensure efficient operation. Rehabilitation of all lift stations except for Lakemoor LS#1 and Holiday Hills is recommended.

The District has roughly $32,646,100 worth of lift stations and force mains. Based on a straight-line depreciation over 20 years for the equipment, 50 years for structures and 75 years for force mains, it is estimated that the District should be reinvesting around $740,700 annually toward maintaining this asset.

7.2 Treatment Facility Improvements

The assessment of the existing treatment processes and equipment at the NMWRD WWTP resulted in significant critical upgrades to improve operations, the rehabilitation or replacement of existing equipment that is reaching the end of its expected service life. Probable costs for the various improvements at the NMWRD WWTP are summarized in Table 7-2. While each of the projects identified may be pursued as stand-alone projects, many of the projects are similar in nature and the recommended time frame for implementation. The projects are listed in no particular order and may be implemented as needed.

While the Darrell Road Phase 1A Headworks project is listed in the collection system projects, it is included in the treatment plant projects since the improvements are at the WWTP.

Table 7-2: Total Probable Capital Costs – Recommended Treatment Plant Improvement Projects

Project Name	Probable Cost
Darrell Road Phase 1A Headworks Project	$5,380,000
WWTF Oxidation Ditch Gate Replacement Project	$339,560
Final Clarifier No. 2 Rehabilitation	$1,092,000
UV Disinfection Project	$1,723,000
Aerobic Digester Blower Replacement	$771,600
Generator Replacement	$549,050
Laboratory Equipment Remodel	$80,000
WWTF Fleet Maintenance Garage Project	$2,506,550
Garage and Personnel Building Remodel Project	$600,000
Solar Array Project	$3,258,000
Total Probable Capital Costs	**$16,299,760**

Section 6 identified process and capacity upgrades to be made to the plant. While not required at the time of this report, additional facilities to expand the plant capacity in response to growth throughout the NMWRD FPA will be required as open land within the District's FPA develops.

Table 7-3: Total Probable Capital Costs –WWTP Phase II Expansion

Description	Phase II WWTP Expansion Cost
Construction Subtotal	$23,789,300
Contingency @20%	$4,757,900
Design Engineering @ 7.5%	$2,141,100
Construction Engineering @ 7.5%	$2,141,100
Total Probable Capital Cost	**$32,829,400**

7.3 Implementation Plan

In consideration of the remaining service life of the existing facilities, regulatory requirements, and projected growth through the NMWRD FPA, the phased Implementation Plan for this 2024 Facility Plan Update is summarized in Table 7-4.

Table 7-4: Phased Implementation Plan

Description	Type	Probable Capital Costs ($ millions)						
		2025	2026	2027	2028	2029	2030 to 2039	2040 to 2049
Treatment Plant								
Aerobic Digester Blower Replacement	R/R	$0.77						
WWTF Oxidation Ditch Gate Replacement	R/R	$0.34						
Generator Replacement	R/R	$0.55						
Laboratory Equipment Remodel	R/R	$0.08						
Final Clarifier No. 2 Rehabilitation	R/R				$1.09			
UV Disinfection Project	R/R			$1.72				
WWTF Fleet Maintenance Garage	R/R		$2.51					
Garage and Personnel Building Remodel	R/R	$0.60						
Darrell Road Phase 1A Headworks	E				$5.38			
Solar Array Project		$3.26						
Phase 2 WWTP Expansion	E							$32.83
Annual rehabilitation / replacement		$0.0	$0.0	$0.0	$0.41	$1.50	$15.0	$15.0
Collection System								
Darrell Road Collection System Phase 1B – Treatment Plant Interceptor	E				$6.68			
Darrell Road Collection System Phase 2 – Force Main	E				$12.45			
Darrell Road Collection System Phase 3 – Lakemoor LS#7 Upgrades	E				$4.49			
Holiday Hills Sewer Extension	E				$6.63			
Annual rehabilitation / replacement		$1.49	$1.49	$1.49	$1.49	$1.49	$14.9	$14.9
Lift Stations								
Annual rehabilitation / replacement		$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74
Total Probable Capital Costs		**$7.83**	**$2.23**	**$3.95**	**$38.95**	**$3.73**	**$33.15**	**$63.47**

Note: (1) Probable costs are presented above in 2023 dollars and do not account for future inflation.
(2) Project Type indicates Rehabilitation/Replacement (R/R) or Expansion (E).
(3) R/R Type Projects are deducted from the annual rehabilitation/replacement investment for each category.

Replacement expenditures for sanitary sewers were estimated at approximately $1.49 million annually. Attention should first be given to older areas in the collection system and to those areas where I/I has been detected and is most severe. Replacement costs for lift stations and force mains were estimated to be approximately $740,000 per year. Replacement costs for the treatment plant were estimated to be approximately $1.5 million annually.

While each of the WWTP projects identified may be pursued as stand-alone projects, many of the projects are similar in nature and the recommended time frame for implementation. The projects are listed in no particular order and may be implemented as needed. The Phase II WWTP Expansion is expected in the next 20 years as projected under the growth assumptions discussed in Section 2.

The scheduling of these improvements are initial estimates employed for planning purposes. The lift stations rehabilitation upgrades are critical improvements. Several of the lift stations need implementation of a second pump for risk of failure. Scheduling for Phase II WWTF expansion will become known with greater certainty over time as open lands within the NMWRD FPA develop. As stated in Section 2, the District should prepare to start the engineering phase of the plant expansion as the District permits connections up to 1.6 MGD.

The existing 24” Route 176 sewer has approximately 3,342 PE in available capacity remaining. Based on the potential sewer permits to be issued through 2028 that are tributary to this sewer, the Darrell Road Collection projects would need to be constructed and online by the end of 2028. It is assumed engineering would be completed in 2025 and 2026, construction would begin in 2026, and debt service beginning in 2029.

SECTION 8

ANTI-DEGRADATION AND ENVIRONMENTAL IMPACTS ANALYSIS

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8. ANTI-DEGRADATION AND ENVIRONMENTAL IMPACTS ANALYSIS

8.1 GENERAL DISCUSSION

The Northern Moraine Wastewater Reclamation District is responsible for providing sanitary service and treatment for the populations in Island Lake, Port Barrington, and Lakemoor. Additionally, the District has recently completed Phase 1 of a sewer extension project to extend sewers to the Village of Holiday Hills. Sections 1 through 6 describe the Corporate Boundaries and Facility Planning Area, the anticipated development, collection system and treatment facility needs and regulatory issues. The District is also responsible for meeting the long-range goals of the Clean Water Act and to minimize the environmental impacts of pollution from the sanitary waste generated within the Facility Planning Area. The District has and continues to work with the communities served by the District and McHenry and Lake Counties by providing sanitary service, encouraging responsible development practices and working with state and local agencies to clean-up the Fox River.

In addition to actively pursuing solutions to the community's wastewater collection needs, the District has invested in upgrading the treatment facility with newer technologies to meet the needs of the Fox River Watershed. During the last expansion, the District expanded its wastewater treatment facility from 1.2 MGD to 2.0 MGD. Some of the improvements specifically implemented to protect the environment included:

- Construction of a two-ring oxidation ditch
- Two new final clarifiers for improved settling and solids capture
- A sludge dewatering building
- A chemical feed building
- Conversion of the existing package treatment plant into aerobic digestion and sludge storage

Additionally, since the last expansion, the District has implemented chemical phosphorus removal with the addition of polyaluminum chloride (PACL) in 2019. Also, the District is also in the process of optimizing the oxidation ditch for BPR. In 2023, it was determined that by decoupling all four aerators in their southwest and southeast zones in the oxidation ditch, the decoupling created an anoxic zone for biological phosphorus removal.

As shown in Section 5, the wastewater treatment facility's performance has been outstanding. The BOD_5, suspended solids, and ammonia are continuously below the NPDES Permit Limits. The District is ultimately committed to operating the wastewater treatment facility in a manner that will continue to meet permit limits and be a benefit to both the community served and the ecosystem. In addition, the capacity of the treatment facility is to be expanded from 2.0 MGD to 3.0 MGD. Due to the proposed increase in discharge and the new regulatory limits imposed it is critical to conduct an environmental impacts analysis. The analysis consists of three steps:

1. Identify the parameters of concern with an increase in discharge
2. Discuss the parameters and impacts with stakeholders
3. Develop alternatives to minimize the impact or to improve the existing conditions

It is intended that this Section provide information and analysis with respect to the indirect, direct, and cumulative impacts of the proposed project.

8.2 Environmental Areas of Concern

The treatment facility discharges into the upper Fox River in Island Lake. Typically, treated effluent from wastewater treatment facilities is a leading source of BOD, TSS, nutrients, organic chemicals and metals discharged into their receiving waterways. These pollutants, normally found in treated effluent, have an impact on water quality and ecosystems. The impact to the waterway depends on factors such as the volume and the quality of the effluent being discharged, as well as the ability of the receiving waterway to dilute and assimilate contaminants.

The most significant environmental concern for expansion of the treatment facility includes the quality of the final effluent. The facility's current effluent quality consistently meets permit limits. However, growth within the Facility Planning Area will lead to higher pollutant loading from other sources. Furthermore, concerns over impacts on the surrounding environment including wetlands, wildlife habitat, and endangered species must be considered in development of the comprehensive collection system and treatment plan.

8.2.1 Water Quality Concerns

Methods to Determine Effluent Limits

The Clean Water Act was established to protect and revive the lakes, rivers, and streams throughout the United States. Restoring their quality is crucial in maintaining a healthy environment and ensuring the sustainability of these waters for all to use and enjoy.

Title 35 of the Illinois Administrative Code, Section 302 establishes the method for determining, implementing, and regulating Water Quality Standards. Section 302.105 – Antidegradation is included in the Code to protect existing uses of all water, maintain the quality of waters, and prevent unnecessary deterioration of the waterways.

The Clean Water Act also established the NPDES Permitting program managed by the individual state agencies. The program establishes effluent limits that the Publicly Owned Treatment Works (POTWs) must meet. There are two methods of determining effluent limits. The first is Water Quality Based Effluent Limits (WQBEL's). WQBEL's have historically been used throughout Illinois to establish the NPDES Permit Limits for POTW discharges.

The second method is to study a particular body of water and establish TMDL's (Total Maximum Daily Load) based on the ecosystem's ability to receive pollutants without having an adverse effect on the streams ability to support its designated uses. By taking a watershed approach, a TMDL considers all potential sources of pollutants, both point and non-point sources. It also takes into account a margin of safety, which reflects scientific uncertainty and future growth. The effects of seasonal variation are also included.

In short, a TMDL is calculated using the following equation:

$$TMDL = WLA + LA + MOS + SV$$

Where:

WLA = Waste Load Allocation (point sources)

LA = Load Allocation (non-point sources)

MOS = Margin of Safety

SV = Seasonal Variation

Watershed Specific Effluent Limit Development

Section 303(d) of the Clean Water Act requires each state to prepare a list of waters of the state that are considered to be impaired. The Illinois EPA updates its list of impaired waters every two years. Portions of the Fox River have been placed on the Illinois EPA's 303(d) list, which identifies waters of the states that are considered to be impaired with respect to their desired use.

In 2022, the Illinois EPA issued a revised Integrated Water Quality report and Section 303(d) List. The Northern Moraine Wastewater Reclamation District Wastewater Treatment Facility discharges to segment IL_DT-22. Segment IL_DT-22 includes 7.86 miles of the Fox River. The section 303(d) List has identified this segment as an impaired segment. An impaired segment indicates that at least one designated use is not being supported. Segment IL_DT-22 is listed as impaired due to cause unknown, sedimentation/siltation, aldrin, dieldrin, endrin, heptachlor, mercury, mirex, polychlorinated biphenyls, and toxaphene. This segment has been identified as a medium priority water not supporting the Designated Uses of Aquatic Life and Fish Consumption.

Table 8-1: Appendix C-1 from Illinois' 2024 303(d) List and Prioritization: IL_DT-22

Priority	Hydrologic Unit Code	Water Name	Water Size	Designated Use	Cause
Medium	0712000611	Fox River	7.77	Aquatic Life	Cause Unknown, Sedimentation/Siltation
Medium	0712000611	Fox River	7.77	Fish Consumption	Aldrin, Dieldrin, Endrin, Heptachlor, Mercury, Mirex, PCBs, Toxaphene

Additionally, in the 2024 303(d) list, no causes of impairment have been removed for Segment IL_DT-22.

The Illinois EPA defines the potential causes and sources of impairment for given water bodies. Specific assessment information was provided by the IEPA in 2024, and the causes of these impairments for fish consumption use are listed as abbreviations which are summarized below:

Table 8-2: Appendix A-1 from Specific Assessment Info. for Streams, 2024: IL_DT-22

Cause Abbreviation	Description
Aldrin	Aldrin
Dieldrin	Dieldrin
Endrin	Endrin
Heptachlor	Heptachlor
Hg	Mercury
Mirex	Mirex
PCBs	Polychlorinated biphenyls
Toxaphene	Toxaphene

In addition, the causes for these impairments for aquatic life use and abbreviations are summarized below:

Table 8-3: Appendix A-1 from Specific Assessment Info. for Streams, 2024: IL_DT-22

Cause Abbreviation	Description
CauseUnk	Cause Unknown
Sed/Silt	Sedimentation/Siltation

**NOTE: Excerpt from Integrated Water Quality Report and Section 303(d) List – Appendix A1: Specific Assessment Information for Streams 2024*

The USEPA, along with the IEPA, is currently considering initiatives to limit nutrient concentrations in an effort to reduce or eliminate local water quality impairments as well as hypoxia in the Gulf of Mexico. As discussed in Section 6, the Illinois EPA is focused on statewide nutrient removal criteria for wastewater treatment facilities. The Illinois EPA, along with the Fox River Study Group and other stakeholders, are developing solutions to address the impairments found along the Fox River.

For many years, the IEPA has enforced nutrient removal criteria for treatment facilities seeking to expand their hydraulic capacity. The IEPA has revised water quality standards in Illinois which have resulted in a 1 mg/L total phosphorus limit in the District's most recent NPDES Permit effective October 2018. However, per Special Condition 17 of the permit, the District's effluent phosphorus limit did not become effective until May 1, 2019. Lower effluent limits for ammonia-nitrogen are also anticipated to become effective for Illinois POTWs in the future.

The Fox River Study Group, along with other stakeholders have developed the Fox River Implementation Plan, a watershed-based plan to improve dissolved oxygen and reduce excessive algal growth. The Implementation Plan is an alternative to a TMDL which is mandated by the Clean Water Act. The goals of the Implementation Plan are to:

1. provide a document approvable by the IEPA and USEPA
2. specify actions that are practical and implementable by POTWs
3. stipulate permit limits and conditions that are achievable and affordable
4. gain support by stakeholders

8.2.2 Threatened and Endangered Species

For planning purposes, the IDNR provides an online Ecological Compliance Assessment Tool, EcoCAT, to help state agencies initiate natural resource reviews to identify sites of potential endangered and threatened species. An EcoCAT review of the Fox River conducted on May 31, 2024, at and directly downstream of the District's Wastewater Treatment Plant's outfall location indicated protected resources may be in the vicinity; however, the IDNR concluded adverse effects to state-identified threatened or endangered species are unlikely.

8.3 MEETINGS WITH STAKEHOLDERS

To address the water quality concerns with expansion of the treatment facility the District intends to meet with the Illinois EPA, Illinois DNR, Friends of the Fox, the Fox River Study Group and Sierra Club.

Sierra Club is America's oldest and largest grassroots environmental organization. The Sierra Club has national, state, and local chapters, which highlight issues of concern on the environment. The Illinois Sierra Club is very active in the study and protection of waterways throughout the state including the Fox River.

Similarly, Friends of the Fox is a non-profit organization established for the purpose of protecting and maintaining the quality of the Fox River and its tributaries. Both organizations are attempting to work closely with communities to promote responsible development.

The Fox River Study Group (FRSG) is a coalition formed to address sustainable growth and water quality issues in the Fox River Watershed. The coalition members include Sierra Club, Friends of the Fox, Fox River Ecosystem Partnership, local municipalities, state agencies, and other interested parties. As discussed in Section 6, the FRSG has developed and calibrated a comprehensive model of the Fox River Watershed and prepared a Fox River Implementation Plan. The ultimate goal is development of a watershed model that will lead to a better understanding of the water quality issues, provide a tool to assist in the decision-making regarding future development, and ultimately improve the water quality in the watershed. The Fox River Implementation Plan is a dynamic document with an objective of improving calibration of the watershed model with continued data collection.

8.4 IMPACTS OF EXPANSION

The most significant impact of expansion on the environment will be from an increased discharge to the Fox River. To assess the impacts of the treatment facility expansion each of the listed potential causes for impairment identified in the 303(d) listing of the segment should be addressed to develop solutions for minimizing or eliminating the impact to the Fox River. Additionally, any additional Water Quality Standards that may be impacted due to an increase in discharge, in accordance with the Section 302.105 - Antidegradation should also be addressed.

As stated previously, the Illinois EPA has identified cause unknown, sedimentation/siltation, aldrin, dieldrin, endrin, heptachlor, mercury, mirex, polychlorinated biphenyls, and toxaphene. as the causes for impairment of Segment IL_DT-22.

8.4.1 Cause Unknown

IL_DT-22 is considered impaired for aquatic life due to “Cause Unknown.” According to USEPA guidance on Water Pollution Reporting Categories, “cause unknown is a reporting category used when a state has detected degraded conditions in a waterway but has reported no specific details about those conditions or the pollutions that caused them.” Therefore, it is unknown if the treatment plant’s proposed expansion would affect this impairment either positively or negatively.

8.4.2 Sedimentation/Siltation

The Illinois Administrative Code does not have a standard for sedimentation and sludge. However, it does have an offensive condition noted in Section 302.203, which states the following: “Waters of the State shall be free from sludge or bottom deposits, floating debris, visible oil, odor, plant or algal growth, color or turbidity of other than natural origin.” However, since the treatment plant’s expansion would involve implementation of tertiary filters to remove additional solids, the treatment plant’s proposed expansion would affect this impairment positively.

8.4.3 Aldrin

Not toxic to insects on its own, aldrin is oxidized within insects and the environment to form dieldrin (see below) which is toxic. This substance was therefore used as a pesticide until the EPA banned its use for everything except termite control in 1974. In 1987, the EPA banned all uses of this substance. This impairment is most likely due to run-off from agricultural usage. Therefore, the treatment plant’s proposed expansion would not affect this impairment either positively or negatively.

8.4.4 Dieldrin

Dieldrin is a chlorinated hydrocarbon that was used within pesticides/insecticides such as aldrin, or on its own. The substance, developed in 1948, is a bioaccumulating neurotoxin, and is now banned in most parts of the world. The EPA banned its use for everything except termite control in 1974. In 1987, the EPA banned all uses of this substance. This impairment is most likely due to run-off from agricultural usage. Therefore, the treatment plant’s proposed expansion would not affect this impairment either positively or negatively.

8.4.5 Endrin

Endrin is a white, solid crystalline substance that dissolves in a liquid carrier. It is a pesticide that was used to control insects, rodents, and birds. It has not been produced or sold for general use in the United States since 1986. This impairment is most likely due to run-off from agricultural usage. Therefore, the treatment plant’s proposed expansion would not affect this impairment either positively or negatively.

8.4.6 Heptachlor

Heptachlor was used in the 1950s through the 1970s as a seed and soil treatment to control insects/pests. It was also sometimes used for treating wood for the same purposes. Nearly all registered uses of the substance have been cancelled. This impairment is most likely due to run-off from agricultural usage.

Therefore, the treatment plant's proposed expansion would not affect this impairment either positively or negatively.

8.4.7 Mercury

Mercury has been listed as a cause for impairment for Segment IL_DT-22 of the Fox River indicating that fish-tissue data from this segment found mercury levels greater than 0.06 mg/kg.

8.4.8 Mirex

Mirex was primarily used as a flame retardant (trade name "dechlorane") in plastics, rubber, paint, paper, and electrical components from the 1950s to the 1970s. It was also sometimes used as an insecticide to control fire ants during the same period. It has not been manufactured or used in the United States since 1978. Therefore, the treatment plant's proposed expansion would not affect this impairment either positively or negatively.

8.4.9 Polychlorinated Biphenyls

Polychlorinated Biphenyls (PCB) are a class of organic compounds that were used as coolants and insulating fluids for transformers and capacitors, stabilizing additives in PVC coatings, pesticide extenders, cutting oils, flame retardants, hydraulic fluids, sealants, adhesives, wood floor finishes, paints and other industrial applications. PCB production was banned in the United States in the 1970's due to the high toxicity of most PCB mixtures.

8.4.10 Toxaphene

Toxaphene was used as a pesticide for agriculture as well as livestock and poultry. Its uses were mostly cancelled in 1982, then fully cancelled in 1990, in the United States. This impairment is most likely due to run-off from agricultural usage. Therefore, the treatment plant's proposed expansion would not affect this impairment either positively or negatively.

8.5 REDUCING IMPACTS OF EXPANSION

8.5.1 Reducing construction impacts on wetlands

While the District has no authority to impact or dictate development practices, the District's responsibilities are to improve the environment within its jurisdiction through providing superior wastewater collection and treatment solutions. The District has developed a collection system plan that minimizes the impact on the existing wetlands and open space. Additionally, the use of trenchless technologies such as directional drilling will be utilized, when necessary, in order to minimize the impact of construction projects.

8.5.2 Water Reuse

One of the methods for reducing the impact from the plant expansion would be to incorporate a water reuse program into the project. After reviewing the Land Use Plan and the Facility Planning Area Boundary, conservation areas and golf courses are the most eligible recipients for reuse water. Through discussions with the stakeholders, it is intended to investigate potential uses for reclaimed water such as irrigation of the plant site or golf courses.

The District has also considered upgrading the non-potable water distribution system to support other uses at the treatment facility, such as cleaning equipment and structures. Increasing non-potable water usage at the treatment plant will free up valuable drinking quality water to use towards water demands.

8.5.3 Biological Nutrient Removal

One approach to mitigating the impacts of the increased discharge quantity is to reduce the concentration of nutrients discharged from the treatment facility. The current biological process includes the 2-ring oxidation ditch. The performance of the oxidation ditch has been exceptional and produced effluent results well below the current NPDES Permit Limits, including ammonia. As noted in earlier Sections, since the last expansion, the District has implemented chemical phosphorus removal with the addition of polyaluminum chloride (PACL) in 2019. Also, the District is also in the process of optimizing the oxidation ditch for BPR. In 2023, it was determined that by decoupling all four aerators in their southwest and southeast zones in the oxidation ditch, the decoupling created an anoxic zone for biological phosphorus removal. However, this process does not address concerns over total nitrogen, which is a contributing factor to algal blooms.

It is well documented that the dams along the Fox River create the still water environment that promotes algae blooms. Removal of the dams has been discussed in several forums, and some are under consideration for removal. Yet, it is very unlikely that all the dams would be removed. Without removal of the dams, the next best solution is to minimize the nutrients that algae need for reproduction.

Phosphorus removal can be accomplished either by chemical precipitation or by biological means. Nitrogen removal is commonly accomplished through the denitrification process. This process occurs under anoxic conditions, thereby starving the microorganisms for oxygen. The microorganisms are forced to breakdown the nitrate and nitrite molecules produced during nitrification to oxygen and nitrogen gas.

The proposed expansion to 3 MGD at the treatment facility will expand the capacity of the oxidation ditch with an additional 1.0 MGD ring built around the existing process. The expansion will address regulatory issues associated with effluent nutrient concentrations.

8.5.4 NPDES Permitting

The current NPDES Permit has limits on BOD_5, TSS, Total Phosphorus, and Ammonia. Based on the historical performance of the facility, it is projected that the expanded treatment facility will not exceed the expanded permit's annual permitted pounds contribution for BOD_5, TSS or Ammonia.

The expanded permit has been approved to increase the design average flow to 3.0 MGD and Design Maximum Flow to 6.0 MGD. The permit will maintain the same weekly and monthly effluent concentration limits but will incorporate annual limits for BOD_5 and TSS. The Ammonia effluent limits are Water Quality Based Effluent Limits and should maintain the same concentrations in the proposed permit. The 1.0 mg/L limit for total phosphorus has been in effect since May 1, 2019. The Permit's current monitoring requirement for total nitrogen in the final effluent can be maintained.

The District's NPDES Permit is included as Appendix A.

SECTION 9

RECOMMENDATIONS AND SUMMARY

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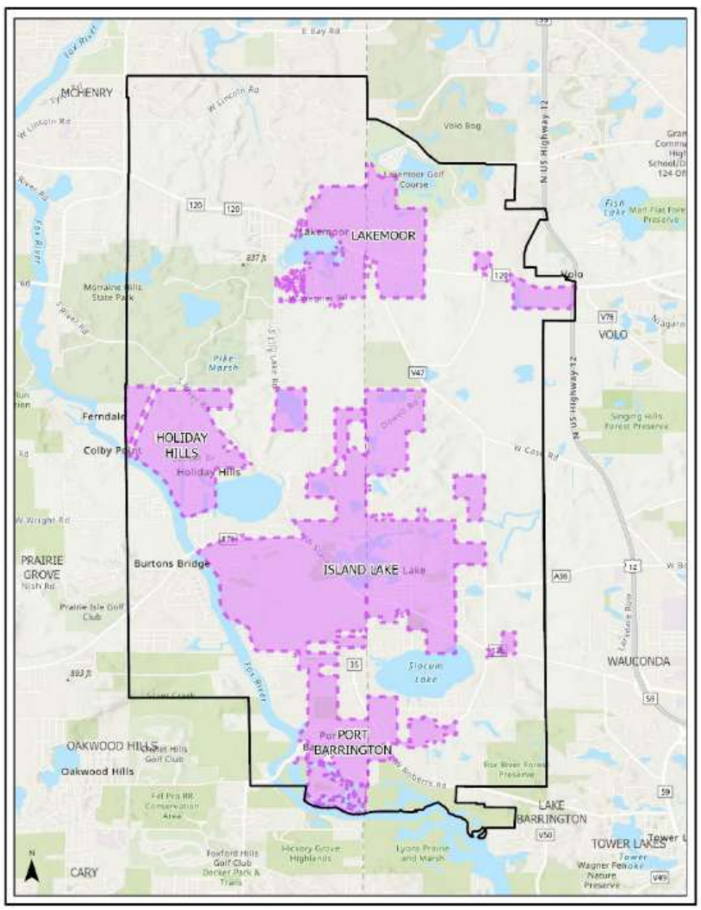
9. Recommendations and Summary

9.1 General Background

The Northern Moraine Wastewater Reclamation District serves populations in Island Lake, Port Barrington, and Lakemoor. Additionally, the District has recently completed Phase 1 of a sewer extension project to serve the community of Holiday Hills, but no residents have connected yet. Portions of the Villages of Volo and Lake Barrington are located within the District's Facility Planning Area (FPA), but do not receive wastewater service.

The District serves a facility planning area (FPA) consisting of 16,723 acres. Within the FPA boundary, an approximate 12,957 acres are incorporated into the municipalities served by the District. The District's corporate boundary includes approximately 4,327 acres incorporated into the NMWRD. The District's FPA and Corporate Boundaries are shown in Exhibit 9-1.

Exhibit 9-1: NMWRD FPA And Corporate Boundaries



9.2 COMMUNITY'S NEEDS

At complete development of the corporate boundaries of the Villages served by the District (future development), it is estimated that the District will serve 22,051 Population Equivalents (PE), which equates to an average daily wastewater flow of 1.83 MGD. At buildout of the District's Facility Planning Area, the District will serve 61,149 PE, which equates to an average daily wastewater flow of 5.74 MGD. Future population equivalents for both the future development and buildout categories were calculated utilizing user and parcel data provided by the District, McHenry County, and Lake County. Additionally, TAI utilized information from each Village's Comprehensive Plans.

The NMWRD wastewater treatment plant (WWTP) is designed to treat an average wastewater flow of 2.0 MGD. Build-out of the District's FPA will require expansion of the WWTP's capacity.

9.3 COLLECTION SYSTEM

9.3.1 Sewer Rehabilitation

The NMWRD collection system includes approximately 77 miles of sanitary sewer and force main, and 1,555 manholes. Assuming an average of $420 per foot of sanitary sewer and $10,000 per manhole for complete installation and restoration, it can be estimated the total replacement cost of the sanitary sewer collection system is approximately $186,309,000. This replacement value includes the total replacement cost of the improvements, including surface restoration, general conditions, contingencies, and engineering.

The typical service life for collection system infrastructure is 75 years. However, rehabilitation efforts can extend the service life an additional 50 years, for an overall service life of 125 years. Based on straight-line depreciation over a 125-year life, the District should be reinvesting $1.49 million annually toward collection system rehabilitation. It is recommended that the District continue to work toward fully funding the collection system replacement amount.

9.3.2 Sewer Capacity and Extensions

The collection system has capacity to convey dry weather flows without surcharging. However, additional capacity is needed to address future growth within the Northwestern and Northeastern Basins.

The Darrell Road Unsewered Facilities Project is a proposed solution to provide sanitary sewer service to future development, particularly in the Northeastern and Eastern Drainage Basins. It also provides the flexibility to reroute flow from built-out areas in the Northeastern Basin thereby off-loading the existing downstream sewers and lift stations within the Northwestern Basin. The ultimate phased solution to serve the Darrell Road Facilities Service Area was originally recommended in the 2004 Facility Plan Update. The Northeastern and Eastern Drainage Basins are directly benefited by the proposed Collection System. The Northwestern Drainage Basin is indirectly benefited by the Collection System due to off-loading tributary flow to it.

Funding and timing of the Darrell Road Unsewered Facilities has always been contingent upon development within the Eastern Basin. During compilation of the 2014 Wastewater Facility Plan Update the District acknowledged that previously anticipated development within the Eastern Basin had been postponed indefinitely. Because of that, a lesser cost alternative method, an Interim Solution, was conceived that would allow for growth to continue in the Northwestern and Northeastern Basins by constructing a completely pumped system to serve the northernmost reaches of the FPA.

The Darrell Road Unsewered Facilities Project would need to be completed prior to exhaustion of the available capacity in the Route 176 West Interceptor in the Northwestern Basin. Available capacity in the Route 176 West Interceptor sewer is 3.1 MGD, or an additional 10,500 P.E. Construction of the Darrell Road Facilities Project should be initiated when 80% of the Route 176 West Interceptor Sewer capacity is utilized, or 4.3 MGD. This equates to an additional 6,500 PE connected and tributary to the 24" interceptor.

Additionally, the District is in the process of extending sewer to the Village of Holiday Hills and the nearby subdivision of Le Villa Vaupell. Construction of phase 1 of the Holiday Hills Sewer Extension project is complete, Phase 2 construction is ongoing, and the future Phase 3 design is complete and awaiting funding.

The recommended capital improvements include construction of the Darrell Road Collection System and sewer extensions to the Village of Holiday Hills and Le Villa Vaupel beyond the current Phase 2 project.

Table 9-1: Probable Capital Costs – Collection System

Description	Probable Cost
Darrell Road Collection System Phase 1A - Headworks	$5,621,000
Darrell Road Collection System Phase 1B – Treatment Plant Interceptor	$6,676,000
Darrell Road Collection System Phase 2 – Force Main	$12,447,000
Darrell Road Collection System Phase 3 – Lakemoor LS#7 Upgrades	$4,494,000
Unsewered Community Sanitary Sewer Extension	$6,663,000
Probable Capital Cost	**$35,901,000**

9.4 Lift Stations

The Northern Moraine Wastewater Reclamation District owns and operates twenty-four (24) lift stations throughout the collection system which includes the Villages of Island Lake, Lakemoor, Port Barrington, and Holiday Hills. The Districts' system of lift stations is generally in poor to fair condition. As a result of the consistent issues the District experiences with their 24 lift stations, the lift stations have required and will continue to require constant maintenance, and several lift stations will need heavy capital improvements.

The District has roughly $32,646,100 worth of lift stations and force mains. Based on a straight-line depreciation over 20 years for the equipment, 50 years for structures and 75 years for force mains, it is estimated that the District should be reinvesting around $740,700 annually toward maintaining this asset.

9.5 Wastewater Treatment Plant

The existing wastewater treatment plant has undergone numerous rehabilitation projects in its 45 year history. The WWTP was most recently expanded to 2.0 MGD in 1998. The average daily flow to the WWTP is estimated to be 1.07 MGD, which means the plant is operating at 53% of its hydraulic capacity. The treatment process consists of influent screening, raw sewage pumping, extended aeration/biological treatment, chemical phosphorus removal, tertiary clarification, and chlorine disinfection. The waste activated sludge is aerobically digested, mechanically thickened, dewatered, and land applied as fertilizer.

The NMWRD WWTP performs at an exceptional level and complies with all NPDES permit effluent limits. However, significant recommended projects are needed in order to improve operations and rehabilitate and replace equipment at the end of its service life. These projects are listed in Table 9-2.

Table 9-2: Probable Capital Costs – Recommended Treatment Plant Improvement Projects

Project Name	Probable Cost
Darrell Road Phase 1A Headworks Project	$5,380,000
WWTF Oxidation Ditch Gate Replacement Project	$339,560
Final Clarifier No. 2 Rehabilitation	$1,092,000
UV Disinfection Project	$1,723,000
Aerobic Digester Blower Replacement	$771,600
Generator Replacement	$549,050
Laboratory Equipment Remodel	$80,000
WWTF Fleet Maintenance Garage Project	$2,506,550
Garage and Personnel Building Remodel Project	$600,000
Solar Array Project	$3,258,000
Total Probable Capital Costs	**$16,299,760**

9.6 WASTEWATER TREATMENT PLANT CAPACITY AND REGULATORY REQUIREMENTS

The District WWTP's capacity and ability to meet regulatory requirements received an in-depth analysis by the project team for expansion needs and nutrient removal.

9.6.1 Hydraulic Expansion

While the treatment facility is currently only operating at 53% of the hydraulic capacity, the District must be prepared to start to prepare to expand the treatment plant when the District permits connections up to 1.6 MGD.

The Headworks, Raw Sewage Pump Station, Oxidation Ditch, RAS/WAS Pump Station, Sludge Handling, and Sludge Storage will require expansion to accommodate additional wastewater flows. The Headworks will be expanded during the Darrell Road Phase 1A Headworks project, which will be completed prior to the Phase II Expansion project. Additionally, during the Phase II Expansion, the District will need to build a Tertiary Filter/ UV Building to add tertiary filters and UV disinfection to WWTP treatment processes. The District has developed a phased approach to expanding the treatment plant. The District should prepare to start the engineering phase of the plant expansion as the District permits connections for up to 1.6 MGD. At that time, it is estimated that design and construction of the Phase II Expansion will be completed within five years: one year for conceptual design; one year for preliminary design, final design and permitting; and three years for construction.

The probable construction cost for the expansion of the above-listed facilities is roughly $32.8 million.

9.6.2 Nutrient Removal

The District must be able to address current and long-term treatment needs and the impact of possible future regulations. The District's current NPDES permit contains effluent limits for ammonia nitrogen and phosphorus. The District recognizes the potential for future limitations on effluent concentrations of total nitrogen and more stringent limits on total phosphorus concentrations. The NMWRD WWTP currently has an effluent TP limit of 1.0 mg/L based on an annual average. The IEPA has begun issuing permits lowering the TP limit for major POTWs to 0.5 mg/L by 2030. The new recommendation for major WWTPs in the FRSG is also an effluent limit of 0.5 mg/L, which is lower than the NMWRD WWTP's existing limit.

To comply with this limit, the District currently uses Hyper+Ion for chemical removal of phosphorus. In addition, the District is optimizing its oxidation ditch for biological phosphorus removal. Also, as discussed in Section 5, the District has established the first POTW nutrient trading program in Illinois. In the case that these methods will not achieve the target concentration, the District must supplement with tertiary filters.

If a total nitrogen limit were to be imposed, the project team anticipates a total nitrogen effluent concentration limit of 8.0 mg/L. The District would not be able to meet this limit, it and would require modifications to the current operation and existing process to convert the oxidation ditch to remove total nitrogen through denitrification.

9.7 Cash Flow Assessment and Capital Funding Requirements

Sections 1 through 6 of this Facility Plan Update identified significant rehabilitation needs as well as capital improvements to address aging infrastructure, continued development and regulatory issues. In order to evaluate the financial impact of the recommendations outlined in this report, the project team developed recommendations to modify existing user rates and connection fees necessary to fund the improvements.

The District's proposed budget (including capital expenses) for fiscal year (FY) 2024/2025 is $17,669,003.02, including bond proceeds and grants received. The budgeted FY 2024/2025 revenues are $3,493,700. The revenues received by the District are limited by statute and generally include user fees, real estate taxes, and connection fees. Connection fees are generally applied to expansion, or extension of services for new development. User fees and taxes are the primary source of revenue responsible for sustaining operation, maintenance, and replacement costs associated with the utility.

The budgeted FY 2024/2025 Operation and Maintenance Expenses include the following three categories: Administration, Collections, and Treatment. The budgeted sewer fund expenditures are $2,614,347.

Current Debt Service includes a bond set to mature in 2030. This bond was issued in 2019. In addition, the District received a loan through the IEPA's Water Pollution Control Loan Program for a portion of Phase 1 of the Holiday Hills Sewer Extension Project. The annual debt payment budgeted for this fiscal year is roughly $752,824.

Table 9-3: NMWRD FY 2024/2025 Existing Debt Service

Debt	Value
General Obligation Alternate Revenue Source Refunding Bond 2019	$455,954
IEPA Loan Holiday Hills Phase 1 Principal & Interest (L17#5824)	$296,870
2024/2025 Sewer Debt Service	$752,824

Based on the proposed Implementation Plan as presented in Section 7, capital funding will need to be secured to fund the Phase II WWTP Expansion with an associated capital cost of approximately $32.83 million and Darrell Road Collection System Projects with an associated capital cost of approximately $35.9 Million.

A funding option for the District to consider is the State Revolving Fund low-interest loan program administered by the IEPA. Additional funding options for the improvements include replacement funds, revenue bonds, and grants. Grants available include WWTP Energy Efficiency grants administered by the Illinois EPA. All additional options are also supported by user fees. Within the last few years, the District has been awarded approximately $11 million in grant funds for projects at the WWTP, lift station upgrades, and for the Holliday Hills/Le Villa Vaupell Sewer Extension Project. Table 9-4 includes a summary of grants the District has been awarded since 2020.

Table 9-4: NMWRD Grants Awarded Since 2020

Year	Project Name	Grant Program Name	Amount Awarded
2020	Control Building Electrical Upgrades	IL Department of Commerce and Economic Opportunity (IL Senator Wilcox)	$ 200,000.00
2020	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 1	IEPA Unsewered Communities Construction Grant Program	$ 3,495,600.00
2021	Lakemoor LS#1 and #6 Modifications	IL Department of Commerce and Economic Opportunity (IL Representative Weber)	$ 400,000.00
2022	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 2	US Community Development Block Grant Program (CDBG) - McHenry County	$ 96,364.00
2022	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 2	Advance McHenry County - American Rescue Plan Act (ARPA)	$ 2,000,000.00
2022	WWTP Generator Replacement	USEPA Community Grant Program (US Senator Durbin)	$ 250,000.00
2022	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 2	USEPA Community Grant Program (US Congressional Representative Underwood)	$ 2,500,000.00
2023	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 2	USEPA Community Grant Program (US Congressional Representative Foster)	$ 959,752.00
2024[(1)]	Holiday Hills/Le Villa Vaupell Sewer Extension - Phase 3	USEPA Community Grant Program (US Congressional Representative Foster)	$ 1,100,000.00
Total			**$ 11,001,716.00**

(1) Selected for grant but not yet received. At the time of this report, the US Congressional Budget is not yet complete.

9.8 Estimated User Fees

The last rate study was performed in 2020 and the recommendations of that study were implemented. As part of this Facility Plan, a simple fiscal model was developed using the District's FY 2024/2025 budget, current accounts and metered usage data. The anticipated revenue, expenditures and debt service were compared over a 20-year period to better evaluate the District's financial stability over that planning period and to determine adjustments to the current user fee in order to fund the recommended projects and replacement funds.

9.8.1 Sewer Fund Evaluation

When the District was established, not all District customers had water meters so it was not feasible to utilize water usage as a basis for the District's rates. Therefore, the customer base was separated into two categories, residential and non-residential, and a flat monthly user fee was applied to both types of customers. Non-residential users generally include industry, commercial and institutional users. If a non-residential customer exceeds 10,000 gallons per month, then they are subject to an additional fee per 1,000 gallons. The District has required non-residential connections to install a meter on their sanitary sewer service if the proposed use indicates that more than 10,000 gallons per month will be discharged.

The District's sewer user fees as of May 1, 2024 are the following:

- $47.00 per month **per residential connection.**
- $47.00 per month **per apartment unit.**
- $47.00 per month **per non-metered, non-residential connection** who can consistently demonstrate a usage of <u>10,000 gallons or less</u> per month.
- $94.00 per month **per non-metered, non-residential connection**, <u>up to 20,000 gallons</u> discharged per month.
- $4.70 per 1,000 gallons of metered usage for **metered, non-residential connections**, or a minimum monthly bill of $47.00.

  Note: The metered rate is <u>only</u> applied to non-residential accounts if discharges exceed 10,000 gallons.

The estimated sewer user fee revenue based on nonmetered users at a fixed bill of $47.00 each is $3,015,650. The metered usage data utilized for Section 2 provided an estimate of the annual metered usage and income. Total metered sewer fees are approximately $171,550. The sum of fees collected from metered and non-metered accounts totals $3,187,200.

Table 9-5: NMWRD FY 2024/2025 Revenues

Revenue Source	Value
Sewer User Fees	$3,187,200
Hauled Waste Income	$105,000
Other Income	$201,500
2024/2025 Revenue	$3,493,700

As stated earlier, the budgeted FY 2024/2025 operation and maintenance expenditures and debt service is $2,614,347 and $752,824, respectively. The total expenses (not including capital) are therefore $3,367,171. The District currently funds the operations and maintenance expenses and the debt service with revenue from user fees and other income. The total surplus is $126,529 (not including capital).

(User Fees & Other Income) - (O&M Expenses + Debt Service) = Surplus

$3,493,700 - ($2,614,347+ $752,824) = $126,529

In addition to operation and maintenance expenses and debt service, the District should also address replacement costs. The following table provides a breakdown of the annual operation, maintenance and replacement costs.

Table 9-6: NMWRD Full Cost Pricing (FY 24/25)

Expense	Annual Cost
Operation and Maintenance Expenses	$2,614,347
Collection System Replacement	$1,491,000
Lift Station Replacement	$740,700
WWTF Replacement	$1,500,000
2024/2025 Sewer Debt Service	$752,824
Total Operation, Maintenance & Replacement Cost	$7,098,871

The District's cost of providing sewer service to its residents and consumers is $7,098,871 per year. This includes operation and maintenance costs as well as replacement costs for the collection system, lift stations and WWTF.

It is imperative to include replacement costs of the sewer, lift station and treatment facility infrastructure in annual budgets to be prepared for replacement at the time of need. The District should consider investing the replacement funds into an account or back into the system on an annual basis to continue the high level of service that the District currently provides.

The District's current bond and loans are paid by the sewer operations and maintenance fund.

Future capital projects intended to replace existing infrastructure can also be applied toward the annual sewer, lift station and WWTF replacement investment. These projects include:

- Aerobic Digester Blower Replacement
- WWTF Oxidation Ditch Gate Replacement
- Generator Replacement
- Laboratory Equipment Remodel
- Final Clarifier No. 2 Rehabilitation
- UV Disinfection Project
- WWTF Fleet Maintenance Garage
- Garage and Personnel Building Remodel

The District's current shortfall is roughly $3,605,171.

(User Fees & Other Income) - Full Cost Pricing = Deficit

$3,493,700 - $7,098,871 = -$3,605,171

9.8.2 Model Development

From Table 9-6, the OM&R costs based on full cost pricing equate to $7,098,871. In order to develop a projection for the annual increase in OM&R costs, the Construction Cost Index (CCI) was applied. The CCI is a database maintained by Engineering News Record (ENR), a private enterprise which has developed and continually monitors average construction costs. An annual increase of 4% was used in the model to represent the annual increase in OM&R costs over the next 20 years.

Three scenarios were evaluated using the fiscal model:

1. Full Cost of Service – Fully Funding Asset Depreciation Amount
    a. Annual increase over 10 years
    b. One Time Increase
    c. Annual increase over 10 years with New Flat Fee for Metered, Non-residential Users
2. Full Cost of Service – Fully Funding Annual Infrastructure Reinvestment from Operating Fund
    a. Annual increase over 10 years
    b. One Time Increase
3. Partially Funding Annual Infrastructure Reinvestment
    a. Annual increase over 10 years
    b. One Time Increase

9.1.1 Scenario 1: Fully Funding Asset Depreciation Amount (recommended)

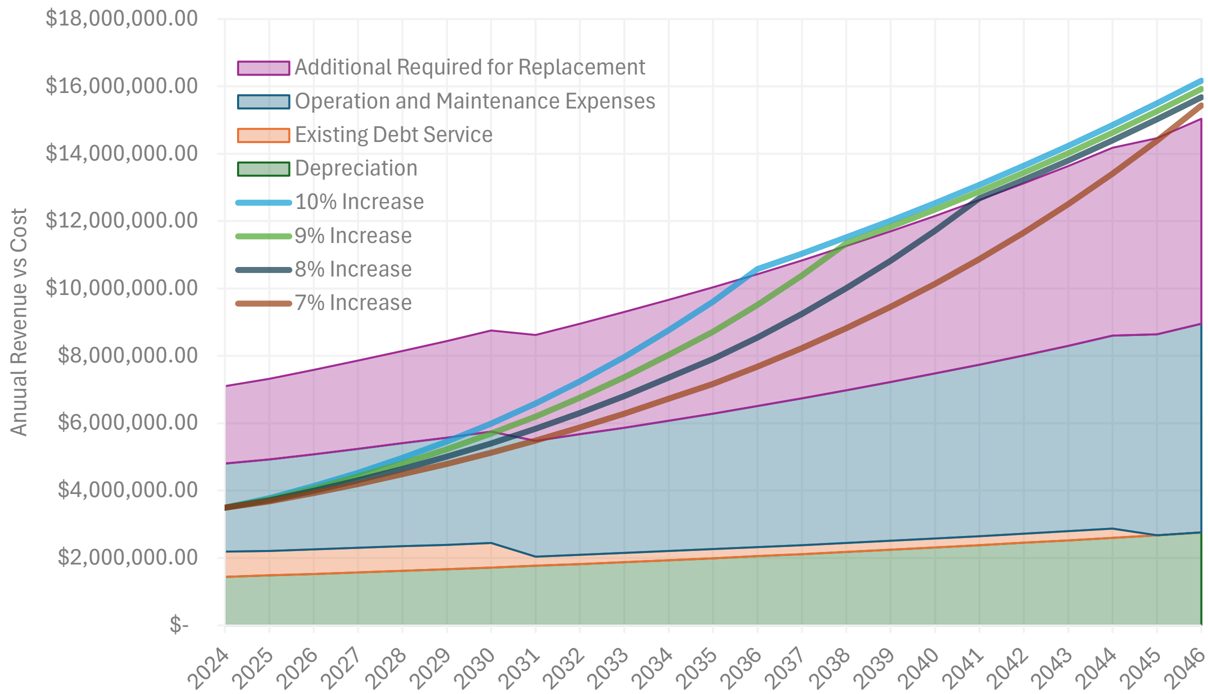
As previously stated, the revenue generated from the District's current rate structure does not fully fund the full cost of service, including operation, maintenance and replacement costs. If the District continues to utilize its current fiscal model, including increasing the sewer user rate annually by 4%, the District will have a continuously growing deficit over the entire planning period.

The District's 2024 audit evaluated that the accumulation of the District's assets was depreciating at a rate of $1.44 million/year. This value was then scaled up by CCI for the following years. In Scenario 1, it was estimated that the District would be reinvesting at least the amount of depreciation into the WWTP, collection system, and lift stations throughout the planning period. However, the District does have projects planned throughout the next several years (as noted above). If the amount of these projects scheduled in a year was greater than the value of depreciation, that value was assumed for the expenses in the year.

Based on that determination, three sub-scenarios were developed:

- Scenario 1a determined that a 7% annual rate increase over 10 years is required to fully fund the District's operation, maintenance and replacement (OM&R). The flat fee in 2034 is $88.23.
- Scenario 1b showed that a 50% one-time rate increase would also fully fund the District's OM&R with 4% annually thereon to match inflation and establish a balanced budget. The flat fee in 2025 is $70.50.
- Scenario 1c coupled the 7% annual rate increase over 10 years with implementation of a new metered user base charge (described below). At 7%, the flat fee in 2034 is $88.23 and the new metered, non-residential fee includes a base charge of $31.00 and a usage rate of $8.23/1,000 gallons used. Scenario 1c was also evaluated at 8, 9, and 10% annual increases to determine if the District can fully fund OM&R sooner if higher rate increases were implemented. The following chart on the next page presents the analysis:

Figure 9-1: Scenario 1c Rate Increase Comparison



Based on the scenarios presented in the chart, it was determined that an 8% increase will fully fund the District's OM&R expenses in 2030, earlier than the 7% increase.

During development of the fiscal models, the District evaluated moving to metered billing instead of the flat fees currently in place. This metered billing structure would apply to metered, non-residential accounts and replace the current $47.00 flat fee plus $4.70/1,000 gallons above 10,000 gallons used (Scenario 1c). Instead, the fee for metered, non-residential accounts would include a base charge plus $4.70/1,000 gallons. The base charge amount was developed to include 1) a portion of the original flat fee and 2) the cost for the District to generate a bill for a metered account.

The portion of the original flat fee included in the new base charge is $20.

The cost to the District to generate a bill for a metered user is $11. The average hourly rate, inclusive of benefits (total compensation) of a Full-Time Equivalent employee is $48.56/hour ($101,000/yr salary / 2080 hours = $48.56/hour). The District spends 24 hours/month generating the 110 metered user bills (to read meters, generate, and mail bills). Therefore, it costs the District at least $11 to generate a metered user bill ($48.56 x 288 hours/year / 1,320 metered user bills = $10.76).

The proposed metered, non-residential rate would include the $31 base charge ($20 + $11 = $31) plus the $4.70/ 10,000 gallons usage charge. The District also will consider offering this rate to interested residential accounts, which may be appealing to low usage residential users. The metered rate and base charge will increase annually with the same rate increase as the flat rate.

The Scenario 1 computations are provided in Appendix G.

9.1.2 Scenario 2: Fully Funding Annual Infrastructure Reinvestment from Operating Fund

The District's cost of providing sewer service to its residents and consumers is $7,098,871 per year. This includes operation and maintenance costs as well as full replacement costs for the collection system, lift stations and WWTP at the current value.

In Scenario 2, it was estimated that the District would be reinvesting in the collection system at a rate of $1.49 million/year, the lift stations at $740,700/yr, and the WWTP at $1.5 million/yr, based on the current value of replacing the District's assets. However, the District does have projects planned throughout the next several years (as noted above). If the amount of these projects scheduled in a year was greater than the value of asset reinvestment amount, that value was assumed for the expenses in the year. This value was then scaled up by CCI for the following years.

Based on those inputs, two scenarios were developed. Scenario 2a determined that a 12% annual rate increase for 10 years was required to fully fund the District's OM&R. Alternatively, Scenario 2b showed that a 125% one-time increase would also fully fund the District's OM&R with a 4% increase annually thereon to match inflation and establish a balanced budget.

The Scenario 2 computations are provided in Appendix G.

9.1.3 Scenario 3: Partially Funding Annual Infrastructure Reinvestment from Operating Fund

In Scenario 2, it was estimated that the District would be reinvesting in the collection system at a rate of $1.49 million/year, the lift stations at $740,700, and the WWTP at $1.5 million/yr, based on the value of replacing the District's. These values were increased annually at 4% based on CCI values. However, since this requires a significant cost on behalf of the District, it is unlikely the District would be fully meeting this cost to update the system every year. Also, the District has projects planned throughout the next several years (as noted above). If the amount of these projects scheduled in a year was greater than the value of asset reinvestment amount, that value was assumed for the expenses in the year.

Scenario 3 includes an alternative for partially funding the District's infrastructure from the operating fund. The partial reinvestment assumes the District will reinvest $300k annually into each category of the system: WWTP, Lift Stations, and the Collection System. This value would be increased by 4% based on CCI values.

Based on those inputs, two scenarios were developed. Scenario 3a determined that a 5% annual rate increase was required for 10 years to fully fund the District's OM&R. Alternatively, Scenario 3b showed that a 31% one-time increase would also fully fund the District's OM&R with 4% annually thereon to match inflation and establish a balanced budget.

The Scenario 3 computations are provided in Appendix G.

9.1.4 Sewer User Fee Recommendation

After reviewing Scenarios 1-3 with the District, it was determined Scenario 1c was the best option to meet the District's needs. Scenario 1c – Full Cost of Service – Fully Funding Asset Depreciation Amount with an annual rate increase of 8% through 2030, and a new base charge and usage fee structure for metered (residential and non-residential) users will meet the District's capital needs to fully fund depreciation. It is recommended that the District implement an 8% rate increase starting in FY26 through 2030 for the flat fee, new base charge and meter use fee. Starting in FY26, two new monthly base charges will be implemented for metered users: a $20 base charge and a Cost of Meter Use fee of $11.

The proposed District's sewer user fees as of May 1, 2025 are the following:

- $50.76 per month **per residential connection.**
- $50.76 per month **per apartment unit.**
- $50.76 per month **per non-metered, non-residential connection** who can consistently demonstrate a usage of 10,000 gallons or less per month.
- $100.52 per month **per non-metered, non-residential connection**, up to 20,000 gallons discharged per month.
- $31.00 per month base charge plus $5.08 per 1,000 gallons discharged per month for **metered, non-residential connections (rate also available to metered residential connections)**
- ~~$4.70 per 1,000 gallons of metered usage for **metered, non-residential connections**, or a minimum monthly bill of $47.00.~~

Table 9-7 includes a comparison of the District's existing rates compared to neighboring communities. These include sewer rates, and the total monthly residential sewer bill based on average usage amounts. The tables below indicate the sewer user fees for different Sanitary Districts and municipalities within proximity to Northern Moraine Wastewater Reclamation District based on average usage (6,500 gallons per month). For comparison, low usage is characteristic of a single person and high usage is characteristic of a family.

Table 9-7: Regional Comparison of Monthly Sewer Bills –Average Usage (6,500 gallons/month)

Municipality/Sanitary District	Residential User Rate/1,000 gal	Fixed Charge	Fixed Charge Period	Monthly Sewer Bill
Lake in the Hills SD	$0.00	$72.00	Quarterly	$24.00
McHenry - non-metered sewer	$0.00	$71.17	Bi-monthly	$35.59
Kishwaukee WRD	$4.36	$15.25	Bi-monthly	$35.95
Cary	$5.26	$3.50	Monthly	$37.69
Round Lake Beach	$4.20	$22.00	Bi-monthly	$38.30
Elgin (FRWRD)	$6.35	$0.00	-	$41.27
Volo (Lake County PW)	$6.64	$0.00	-	$43.16
Hawthorne Woods (Lake County PW)	$6.64	$0.00	-	$43.16
Mundelein	$6.22	$6.00	Bi-monthly	$43.41
NMWRD	**$0.00**	**$47.00**	**Monthly**	**$47.00**
McHenry - metered sewer	$4.37	$37.53	Bi-monthly	$47.17
Crystal Lake	$5.92	$10.36	Monthly	$48.84
Woodstock	$6.60	$22.17	Quarterly	$50.32
Fox Lake - non-metered sewer	$1.14	$88.61	Bi-monthly	$51.72
Fox Lake - metered sewer	$3.37	$72.98	Bi-monthly	$58.40
Wauconda	$10.32		-	$67.08
Algonquin	$10.05	$5.00	Monthly	$70.33
Fox River Grove	$5.68	$88.90	Bi-monthly	$81.37
Aurora (Fox Metro WRD)	$12.28	$10.53	Monthly	$90.36

9.2 ESTIMATED CONNECTION FEES

Sewer connection fees are outlined in District Ordinance No. 08-11 and Darrell Road Special Connection Fees are outlined in District Ordinance No. 20-02. The last revision to the Sewer Connection Fee was made in 2007 likely based on recommendations made in the 2004 Facility Plan Update.

Connection fees are one-time fees intended to recover capital costs associated with expansion of the sewer and wastewater treatment infrastructure used to deliver service to new customers. Connection fees are designed such that new connections pay their proportionate share of the expansion costs, otherwise these costs would need to be funded through user charges. Ultimately, the connection fee ensures new customers who directly benefit from the service, pay for the service, rather than receive a subsidy from all other customers through user charges. The following exercise will analyze the District's existing sewer connection fee to determine if it sufficiently funds future capital projects associated with expansion of system capacity to provide the necessary collection and treatment of wastewater.

The capital projects accounted for in connection fee calculations are necessary to extend sewer service and provide treatment capacity for future development within the District's Facility Planning Area. These projects were identified in the 2004, 2014 and 2024 Facility Plans. Existing sanitary sewer infrastructure restricts the growth potential within the District's Facility Planning Area due to limited sewer conveyance and lift station pumping capacity. The District's expansion costs are associated with the WWTF Phase 2 Expansion Project and the Darrell Road Collection System Project in order to expand the plant's treatment capacity and provide adequate sewer conveyance capacity to accommodate for continued development within the region.

The current sewer connection fee is $7,574.00 per residential unit. The current connection fee generally represents $2,164.00 per population equivalent.

The existing treatment facility has sufficient capacity to treat the projected wastewater flows and pollutant loads at build-out of the incorporated areas. However, development of unincorporated properties within the Facility Planning Area will require expansion(s) of the NMWRD facility. The existing treatment facility is designed for an average flow of 2.0 MGD (20,000 population equivalents) and is designed to facilitate the subsequent expansion to 3.0 MGD (30,000 population equivalents). The WWTP Phase II Expansion scope was originally presented in the 2004 Wastewater Facility Plan, updated in the 2014 Facility Plan Update, and was updated again for this 2024 Facility Plan. The current estimated cost to expand the WWTP is $32,830,000. This will provide capacity to connect and serve an additional 10,000 PE.

The table below compares the existing and proposed connection fee per PE and per single-family dwelling. It is recommended to increase connection fees over the next 4 years in anticipation of the inflated cost. The cost of the WWTP Phase II Expansion Project in 4 years assuming a 4% annual inflation rate is $38,407,000 or $3,840 per PE. The connection fee for a single-family dwelling is calculated using 3.5 PE, or $13,443 per dwelling.

Table 9-8: Current and Projected Connection Fees - WWTP Expansion

Additional PE Served	10,000
WWTP Expansion Cost (2023$)	$32,830,000
WWTP Expansion Cost (2028$)	$38,407,000
Proposed Connection Fee/PE (2028)	**$3,840**
Proposed Connection Fee per Single Family Dwelling	**$13,443**
Existing Connection Fee/PE	$2,164
Existing Connection Fee per Single Family Dwelling	$7,574

Since 2004, the District has invested in planning, design and easement acquisition for construction of the Darrell Road Collection System. The Darrell Road Collection System is a multi-phased project that will offload future flow from existing sewer infrastructure and ultimately benefit all users of the system. The table below summarizes the current and potential future population equivalents (PE) at complete build-out of the District's Facility Planning Area. There is growth potential of an additional 42,765 PE at build-out conditions across the entire Facility Planning Area.

Table 9-9: Current and Projected Connection Fees – Sewer Expansion

Basin	Current PE	FPA Build-out PE	Additional PE
Eastern	69	5,323	5,254
Northeastern	1,912	14,587	12,675
Northwestern	1,618	7,243	5,625
Central	3,155	5,425	2,270
Near East	2,235	3,487	1,252
Waterford	3,131	6,821	3,690
South Central	378	2,085	1,707
Southern	1,197	11,489	10,292
TOTAL	**13,695**	**56,460**	**42,765**

The total estimated cost of the Darrell Road Collection System in 2024$ is $29,680,000. To determine the connection fee associated with sewer capacity expansion project, 70% of the potential additional future PE was used as a realistic expectation of the overall development to take place within the Facility Planning Area, or 29,936 PE.

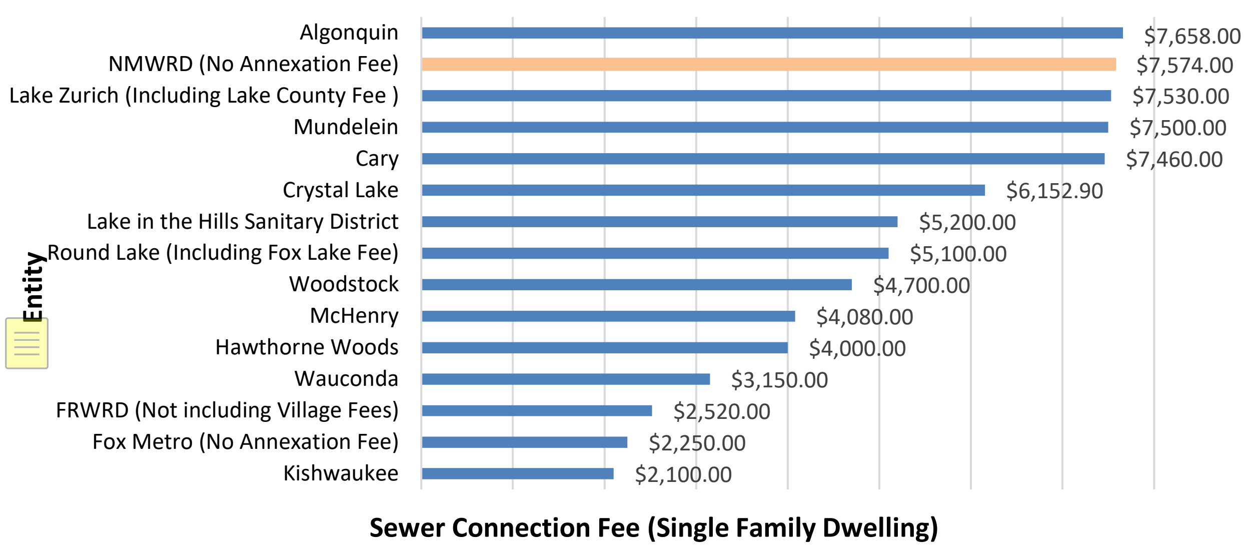
The connection fee to fully fund this proposed project is $1,159.87 per PE. The table below compares the existing and proposed connection fee per PE and per single-family dwelling. Similar to the connection fee associated with Expansion Project A – WWTP Phase II Expansion, it is recommended to increase connection fees over the next 4 years. The cost of the Darrell Road Collection System project in 4 years assuming a 4% annual inflation rate is $34,721,000, or$1,159.87 per PE. The connection fee for a single-family dwelling is calculated using 3.5 PE, or $4,059.56 per dwelling.

Table 9-10: Current and Projected Connection Fees – Sewer Expansion

Additional PE Served	29,936
Sewer Expansion Cost (2024$)	$29,680,000
Sewer Expansion Cost (2028$)	$34,721,000
Proposed Connection Fee/PE (2028)	**$1,159.87**
Proposed Connection Fee per Single Family Dwelling	**$4,059.56**
Existing Connection Fee/PE	$1,100.44
Existing Connection Fee per Single Family Dwelling	$3,851.54

A comparison of the District's connection fee to local municipalities and Sanitary Districts in the same region was performed. Fees were compared in a logical way, largely comparing the fee associated with connecting single-family dwellings to available sewer. Municipal connection fees typically have a base connection fee for either a single-family dwelling or by drinking water connection size (inches). Additional Sanitary District Fees, other municipality fees, or annexation fees may apply depending on the entity providing service. The table below indicates the sewer connection fees for different Sanitary Districts and municipalities within proximity to Northern Moraine Wastewater Reclamation District. Annexation fees, municipality fees, or municipality pass-through fees are noted where applicable.

Figure 9-2: Regional Comparison of Sewer Connection Fees



The Northern Moraine Wastewater Reclamation District connection fees rank reasonably compared to local municipalities and sanitary districts, especially when considering annexation fees or municipality fees not included in the total sewer connection cost.

It is recommended that the sewer connection fee combines both treatment expansion and sewer expansion fee amounts as both projects will benefit the entire system. Table 9-11 is a 5-year table with total recommended connection fees (with plant expansion and sewer expansion components). It is recommended that the District honor the existing connection fee for future customers in the Village of Holiday Hills and Le Villa Vaupell subdivision.

Table 9-11: NMWRD Connection Fee Recommendation

Date	Plant expansion	Sewer expansion	TOTAL	Per PE
Existing	$7,574.00	$3,851.54	$11,425.54	$3,264.44
May-25	$9,041.06	$3,903.54	$12,944.61	$3,698.46
May-26	$10,508.13	$3,955.55	$14,463.68	$4,132.48
May-27	$11,975.19	$4,007.55	$15,982.75	$4,566.50
May-28	$13,442.26	$4,059.56	$17,501.82	$5,000.52

An alternative to the recommended connection fee increase is to maintain the current connection fee and distribute the cost of the Development Projects to all ratepayers in the user fee. The total combined cost of the Development Projects is $58,680,000. The debt service associated with a 30-year loan of this amount at 2% interest rate is approximately $216,900 per month. Distributed across the existing 5295 District customers, the additional fee is approximately $41.00 per month. Added to the existing monthly user fee of $47.00, the total monthly user fee would be $88.00 per month, an 87% increase for all ratepayers. This is not recommended; therefore, it is recommended to implement the total combined connection fee for all new connections.

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APPENDIX A –NPDES PERMIT

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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397

JB PRITZKER, GOVERNOR JOHN J. KIM, DIRECTOR

217/782-0610

MAJOR

October 15, 2020

Northern Moraine Wastewater Reclamation District
P.O. Box 240
Island Lake, Illinois 60042

Re: Northern Moraine Wastewater Reclamation District WWTP
NPDES Permit No. IL0031933
Bureau ID W1114540001
Modification of NPDES Permit (After Public Notice)

Gentlemen:

The Illinois Environmental Protection Agency has reviewed the request for modification of the above referenced NPDES Permit and issued a public notice based on that request. The final decision of the Agency is to modify the Permit as follows:

1. The Phosphorus Discharge Optimization Plan submittal date required by Special Condition 20 has been extended to March 26, 2021 as requested.

Enclosed is a copy of the modified Permit. You have the right to appeal this modification to the Illinois Pollution Control Board within a 35 day period following the modification date shown on the first page of the permit.

Pursuant to the Final NPDES Electronic Reporting Rule, all permittees must report DMRs electronically unless a waiver has been granted by the Agency. The Agency utilizes NetDMR, a web based application, which allows the submittal of electronic Discharge Monitoring Reports instead of paper Discharge Monitoring Reports (DMRs). More information regarding NetDMR can be found on the Agency website, https:www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/pages/quick-answer-guide.aspx. If your facility has received a waiver from the NetDMR program, a supply of preprinted paper DMR Forms will be sent to your facility. Additional information and instructions will accompany the preprinted DMRs. Please see the attachment regarding the electronic reporting.

Should you have questions concerning the Permit, please contact Frantz Altidor at 217/782-7395.

Sincerely,

Amy L. Dragovich

Amy L. Dragovich P.E.
Manager, Permit Section
Division of Water Pollution Control

IEPA - DIVISION OF RECORDS MANAGEMENT
RELEASABLE

APR 26 2021

REVIEWER: ~~JMR~~ MDB

ALD: FJA: 20050701

Attachments: Final Permit

cc: Records Unit
Des Plaines Region
Compliance Assurance Section
Billing
CMAP

NPDES Permit No. IL0031933

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Modified (NPDES) Permit

Expiration Date: September 30, 2023

Issue Date: September 26, 2018
Effective Date: October 1, 2018
Modification Date: October 15, 2020

Name and Address of Permittee:

Northern Moraine Wastewater Reclamation District
P.O. Box 240
Island Lake, Illinois 60042-0240

Facility Name and Address:

Northern Moraine Wastewater Reclamation District WWTP
420 Timber Trail
Island Lake, Illinois 60042
(McHenry County)

Receiving Waters: Fox River

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the Effluent Limitations, Monitoring, and Reporting requirements; Special Conditions and Attachment H Standard Conditions attached herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Amy L. Dragovich

Amy L. Dragovich, P.E.
Manager, Permit Section
Division of Water Pollution Control

ALD:FJA:20050701

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Existing Plant)

Load limits computed based on a design average flow (DAF) of 2.0 MGD (design maximum flow (DMF) of 5.0 MGD).

From the modification date of this permit until the start of operation of the proposed 3.0 MGD STP or expiration date, whichever comes first, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS mg/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
$CBOD_5$**,****	334 (834)	667 (1668)		20	40		1 Day/Week	Composite
Suspended Solids****	417 (1043)	751 (1877)		25	45		1 Day/Week	Composite
pH	Shall be in the range of 6 to 9 Standard Units						1 Day/Week	Grab
Fecal Coliform	The monthly geometric mean shall not exceed 200 per 100 mL No more than 10% of the samples during the month shall exceed 400 per mL						3 Days/Week	Grab
Chlorine Residual						0.05	3 Days/Week	Grab
Ammonia Nitrogen: As (N)								
April-Oct.	25 (63)		42 (104)	1.5		2.5	3 Days/Week	Composite
Nov.-Feb.	62 (154)		82 (204)	3.7		4.9	3 Days/Week	Composite
March	25 (63)		60 (150)	1.5		3.6	3 Days/Week	Composite
Total Nitrogen (as N)	Monitor Only						1 Day/Week	Composite
Dissolved Phosphorus	Monitor Only						1 Day/Month	Composite
Nitrate/Nitrite	Monitor Only						1 Day/Month	Composite
Total Kjeldahl Nitrogen (TKN)	Monitor Only						1 Day/Month	Composite
Alkalinity	Monitor Only						1 Day/Month	Grab
Temperature	Monitor Only						1 Day/Month	Grab
			Annual Average			Annual Average		
Total Phosphorus (as P)***			17 (42)			1.0	1 Day/Week	Composite
				Monthly Average not Less than	Weekly Average. not less than	Daily Minimum		
Dissolved Oxygen								
March-July				N/A	6.0	5.0	3 Days/Week	Grab
August-February				5.5	4.0	3.5	3 Days/Week	Grab

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Existing Plant) (continued)

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 17.
****BOD_5 and Suspended Solids (85% removal required): In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this Permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent $CBOD_5$ concentration to determine the effluent BOD_5 concentration. Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a monthly geometric mean and a daily maximum value.

pH shall be reported on the DMR as minimum and maximum value.

Chlorine Residual shall be reported on the DMR as daily maximum value.

Ammonia Nitrogen shall be reported on the DMR as a daily maximum value.

Dissolved oxygen shall be reported on the DMR as a minimum value.

Total Phosphorus shall be reported on the DMR as a monthly average and daily maximum value.

The Annual Average, 12 month rolling average (calculated monthly), phosphorus limit shall be computed monthly. The Annual Average shall be calculated by adding the sum of the total phosphorus monitoring values from the previous 12 months of data expressed in milligrams/liter and divided by the number of samples collected. The Annual Average value for total phosphorus shall be reported on the DMR.

NPDES Permit No. IL0031933

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Proposed Plant)

Load limits computed based on a design average flow (DAF) of 3.0 MGD (design maximum flow (DMF) of 6.0 MGD).

From the completion and start of operation of the proposed plant expansion until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*				CONCENTRATION LIMITS mg/L					
Parameter	Annual Avg.	Monthly Avg.	Weekly Avg.	Daily Max.	Annual Avg.	Monthly Avg.	Weekly Avg.	Daily Max.	Sample Frequency	Sample Type
Flow (MGD)									Continuous	
CBOD$_5$**/****	250 (500)	500 (1001)	1001 (2002)		10	20	40		3 Days/Week	Composite
Suspended Solids****	300 (600)	600 (1201)	1126 (2252)		12	25	45		3 Days/Week	Composite
pH	Shall be in the range of 6 to 9 Standard Units								3 Days/Week	Grab
Fecal Coliform	The monthly geometric mean shall not exceed 200 per 100 mL No more than 10% of the samples during the month shall exceed 400 per mL								3 Days/Week	Grab
Chlorine Residual								0.05	3 Days/Week	Grab
Ammonia Nitrogen: As (N)										
April-Oct.		38 (75)		63 (125)		1.5		2.5	3 Days/Week	Composite
Nov.-Feb.		93 (185)		123 (245)		3.7		4.9	3 Days/Week	Composite
March.		38 (75)		90 (180)		1.5		3.6	3 Days/Week	Composite
Total Phosphorus (as P)		25 (50)				1.0			3 Days/Week	Composite
Total Nitrogen (as N)***		Monitor Only							1 Day/Week	Composite
Dissolved Phosphorus		Monitor Only							1 Day/Month	Composite
Nitrate/Nitrite		Monitor Only							1 Day/Month	Composite
Total Kjeldahl Nitrogen (TKN)		Monitor Only							1 Day/Month	Composite
Alkalinity		Monitor Only							1 Day/Month	Grab
Temperature		Monitor Only							1 Day/Month	Grab

Parameter	Monthly Average not less than	Weekly Average not less than	Daily Minimum	Sample Frequency	Sample Type
Dissolved Oxygen					
March-July	N/A	6.0	5.0	3 Days/Week	Grab
August-February	5.5	4.0	3.5	3 Days/Week	Grab

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Proposed Plant) (Continued)

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 15.
****BOD_5 and Suspended Solids (85% removal required): In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this Permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent $CBOD_5$ concentration to determine the effluent BOD_5 concentration. Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a daily maximum value.

pH shall be reported on the DMR as minimum and maximum value.

Chlorine Residual shall be reported on the DMR as daily maximum value.

Dissolved oxygen shall be reported on the DMR as a minimum value.

Phosphorus shall be reported on the DMR as a monthly average and daily maximum value.

Total Nitrogen shall be reported on the DMR as a monthly average. Total Nitrogen is the sum total of Total Kjeldahl Nitrogen, Nitrate and Nitrite.

Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

Parameter	Sample Frequency*	Sample Type
Flow (MGD)	Continuous	
BOD_5	1 Day/Week	Composite
Suspended Solids	1 Day/Week	Composite

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

*When the proposed plant becomes operational, influent monitoring sample frequency shall be increased to 3 days/week.

Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws and regulations. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 1 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR § 122.63 and Without Public Notice.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302 and 303.

SPECIAL CONDITION 6. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) electronic forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR Form shall be submitted with no discharge indicated.

The Permittee is required to submit electronic DMRs (NetDMRs) instead of mailing paper DMRs to the IEPA unless a waiver has been granted by the Agency. More information, including registration information for the NetDMR program, can be obtained on the IEPA website, http://www.epa.state.il.us/water/net-dmr/index.html.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 25th day of the following month, unless otherwise specified by the permitting authority.

Permittees that have been granted a waiver shall mail Discharge Monitoring Reports with an original signature to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 7. The provisions of 40 CFR Section 122.41(m) & (n) are incorporated herein by reference.

SPECIAL CONDITION 8. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 9. The Permittee shall conduct semi-annual monitoring of the effluent and report concentrations (in mg/l) of the following listed parameters. Monitoring shall begin three (3) months from the effective date of this permit. The sample shall be a 24-hour effluent composite except as otherwise specifically provided below and the results shall be submitted on Discharge Monitoring Report Forms to IEPA unless otherwise specified by the IEPA. The parameters to be sampled and the minimum reporting limits to be attained are as follows:

STORET CODE	PARAMETER	Minimum reporting limit
01002	Arsenic	0.05 mg/L
01007	Barium	0.5 mg/L
01027	Cadmium	0.001 mg/L
01032	Chromium (hexavalent) (grab)	0.01 mg/L
01034	Chromium (total)	0.05 mg/L
01042	Copper	0.005 mg/L
00720	Cyanide (total) (grab)***	5.0 ug/L
00722	Cyanide (grab) (available**** or amenable to chlorination)***	5.0 ug/L
00951	Fluoride	0.1 mg/L
01045	Iron (total)	0.5 mg/L
01046	Iron (Dissolved)	0.5 mg/L
01051	Lead	0.05 mg/L
01055	Manganese	0.5 mg/L

Special Conditions

71900	Mercury (grab)**	1.0 ng/L*
01067	Nickel	0.005 mg/L
00556	Oil (hexane soluble or equivalent) (Grab Sample only)	5.0 mg/L
32730	Phenols (grab)	0.005 mg/L
01147	Selenium	0.005 mg/L
01077	Silver (total)	0.003 mg/L
01092	Zinc	0.025 mg/L

Minimum Reporting Limits are defined as – (1) The minimum value below which data are documented as non-detects. (2) Three to ten times the method detection limit. (3) The minimum value of the calibration range.

All sample containers, preservative, holding times, analyses, method detection limit determinations and quality assurance/quality control requirements shall be in accordance with 40 CFR 136.

Unless otherwise indicated, concentrations refer to the total amount of the constituent present in all phases, whether solid, suspended or dissolved, elemental or combined, including all oxidation states.

*1.0 ng/L = 1 part per trillion.
**Utilize USEPA Method 1631E and the digestion procedure described in Section 11.1.1.2 of 1631E.
***Analysis for cyanide (available or amenable to chlorination) is only required if cyanide (total) is detected or more than the minimum reporting limit.
****US EPA Method OIA-1677.

If the Permittee has any new significant industrial users tributary to the Permittee's treatment facility, the Permittee shall provide a report briefly describing the permittee's pretreatment activities and a listing of the Permittee's significant industrial users. The list should specify which categorical pretreatment standards, if any, are applicable to each Industrial User. Such report shall be submitted within six (6) months of the commencement of any industrial user discharge to the Permittee's treatment facility to the following addresses:

U.S. Environmental Protection Agency
Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604
Attention: Water Assurance Branch Enforcement and Compliance

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance assurance Section, Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 10. The Permittee has undergone a Monitoring Reduction review and the influent and effluent sample frequency has been reduced for parameters due to sustained compliance. The IEPA may require that the influent and effluent sampling frequency for these parameters be increased without Public Notice. This provision does not limit EPA's authority to require additional monitoring, information or studies pursuant to Section 308 of the CWA.

SPECIAL CONDITION 11. During January of each year the Permittee shall submit annual fiscal data regarding sewerage system operations to the Illinois Environmental Protection Agency/Division of Water Pollution Control/Compliance Assurance Section. The Permittee may use any fiscal year period provided the period ends within twelve (12) months of the submission date.

Submission shall be on forms provided by IEPA titled "Fiscal Report Form For NPDES Permittees".

SPECIAL CONDITION 12. The Permittee shall conduct biomonitoring of the effluent from Discharge Number(s) 001.

Biomonitoring

A. Acute Toxicity - Standard definitive acute toxicity tests shall be run on at least two trophic levels of aquatic species (fish, invertebrate) representative of the aquatic community of the receiving stream. Testing must be consistent with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fifth Ed.) EPA/821-R-02-012. Unless substitute tests are pre-approved; the following tests are required:

   1. Fish - 96 hour static LC_{50} Bioassay using fathead minnows (Pimephales promelas).

   2. Invertebrate 48-hour static LC_{50} Bioassay using Ceriodaphnia.

B. Testing Frequency - The above tests shall be conducted using 24-hour composite samples unless otherwise authorized by the IEPA. Samples must be collected in the 18th, 15th, 12th, and 9th month prior to the expiration date of this Permit.

C. Reporting - Results shall be reported according to EPA/821-R-02-012, Section 12, Report Preparation, and shall be submitted to IEPA, Bureau of Water, Compliance Assurance Section within one week of receipt from the laboratory. Reports are due to the IEPA no later than the 16th, 13th, 10th, and 7th month prior to the expiration date of this Permit.

D. Toxicity - Should a bioassay result in toxicity to >20% of organisms test in the 100% effluent treatment, the IEPA may require, ~~upon notification, six (6) additional rounds of monthly testing on the affected organism(s) to be initiated within 30 days of the~~ toxic bioassay. Results shall be submitted to IEPA within (1) week of becoming available to the Permittee. Should any of the additional bioassays result in toxicity to ≥50% of organisms tested in the 100% effluent treatments, the Permittee shall immediately notify IEPA in writing of the test results.

E. Toxicity Reduction Evaluation and Identification - Should the biomonitoring program identify toxicity and result in notification by IEPA, the permittee shall develop a plan for toxicity reduction evaluation and identification. This plan shall be developed and implemented in accordance with Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833B-99/002, and shall include an evaluation to determine which chemicals have a potential for being discharged in the plant wastewater, a monitoring program to determine their presence or absence and to identify other compounds which are not being removed by treatment, and other measures as appropriate. The Permittee shall submit to the IEPA its plan within ninety (90) days following notification by the IEPA. The Permittee shall implement the plan within ninety (90) days of notification date of the permittee above or other such date as is received by letter from IEPA.

The IEPA may modify this Permit during its term to incorporate additional requirements or limitations based on the results of the biomonitoring. In addition, after review of the monitoring results and toxicity reduction evaluation, the IEPA may modify this Permit to include numerical limitations for specific toxic pollutants and additional whole effluent toxicity monitoring to confirm the results of the evaluation. Modifications under this condition shall follow public notice and opportunity for hearing.

SPECIAL CONDITION 13. For the duration of this Permit, the Permittee shall determine the quantity of sludge produced by the treatment facility in dry tons or gallons with average percent total solids analysis. The Permittee shall maintain adequate records of the quantities of sludge produced and have said records available for IEPA inspection. The Permittee shall submit to the IEPA, at a minimum, a semi-annual summary report of the quantities of sludge generated and disposed of, in units of dry tons or gallons (average total percent solids) by different disposal methods including but not limited to application on farmland, application on reclamation land, landfilling, public distribution, dedicated land disposal, sod farms, storage lagoons or any other specified disposal method. Said reports shall be submitted to the IEPA by January 31 and July 31 of each year reporting the preceding January thru June and July thru December interval of sludge disposal operations.

Duty to Mitigate. The Permittee shall take all reasonable steps to minimize any sludge use or disposal in violation of this Permit.

Sludge monitoring must be conducted according to test procedures approved under 40 CFR 136 unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this Permit.

Planned Changes. The Permittee shall give notice to the IEPA on the semi-annual report of any changes in sludge use and disposal.

The Permittee shall retain records of all sludge monitoring, and reports required by the Sludge Permit as referenced in Standard Condition 25 for a period of at least five (5) years from the date of this Permit.

If the Permittee monitors any pollutant more frequently than required by the Sludge Permit, the results of this monitoring shall be included in the reporting of data submitted to the IEPA.

The Permittee shall comply with existing federal regulations governing sewage sludge use or disposal and shall comply with all existing applicable regulations in any jurisdiction in which the sewage sludge is actually used or disposed.

The Permittee shall comply with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish the standards for sewage sludge use or disposal even if the permit has not been modified to incorporate the requirement.

The Permittee shall ensure that the applicable requirements in 40 CFR Part 503 are met when the sewage sludge is applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator.
Monitoring reports for sludge shall be reported on the form titled "Sludge Management Reports" to the following address:

Special Conditions

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 14. This Permit may be modified to include alternative or additional final effluent limitations pursuant to an approved Total Maximum Daily Load (TMDL) Study, an approved Implementation Plan, or an approved trading program.

SPECIAL CONDITION 15. The Permittee shall operate the facilities consistent with its design parameters for biological nutrient removal (BNR). Monitoring for Total Nitrogen is required to document the actual total nitrogen effluent concentration. The Permittee shall monitor the influent and effluent for total nitrogen once per week. The monitoring shall be a composite sample and the results reported as a monthly average and a daily maximum on the Permittee's Discharge Monitoring Forms.

SPECIAL CONDITION 16. The Permittee shall participate in the Fox River Study Group (FRSG) throughout the duration of this permit cycle. The Permittee shall work with other watershed members of the FRSG to determine the most cost effective means to remove dissolved oxygen (DO) impairment and offensive condition impairments in the Fox River to the extent feasible. The Permittee shall participate in the FRSG for the completion of the following tasks set out in the 2015 Fox River Implementation Plan (either by the permittee or through the FRSG) by the schedule dates set forth below:

A. The Permittee shall implement the recommendations of the 2015 Fox River Implementation Plan that are applicable to said Permittee during the term of this Permit.
B. The FRSG will conduct these activities during the term of the permit:
   1. Work with the Army Corps of Engineers and Illinois Department of Natural Resources to restart the Fox River Habitat & Connectivity Study.
   2. Collect continuous dissolved oxygen data and other water quality parameters at the Algonquin Bike Bridge from May through September 2018 to update the FRSG's water quality model.
   3. Analyze Fox River and Major Tributary Water Quality Data and Trends, for the period 1998-2016 by December 31, 2018.
   4. Update the Fox River DB database with newly collected data, by July 31, 2019.
   5. Amend the modelling and use the modified model to reevaluate water quality improvement scenarios, by August 31, 2019.
   6. Amend the Implementation Plan by December 31, 2022 based on the improved modelling and which will include proposed watershed improvement projects.
C. The Permittee shall submit an annual progress report on the activities identified in Item B above to the Agency by March 31 of each year. The Permittee may work cooperatively with the FRSG to prepare a single annual progress report that is common among FRSG permittees.
D. In its application for renewal of this permit, the Permittee shall consider and incorporate recommended FRSG activities listed in the Implementation Plan that the Permittee will implement during the next permit term.

SPECIAL CONDITION 17. A phosphorus limit of 1.0 mg/L (12-month rolling average, calculated monthly) shall become effective one and one-half (1 ½) years from the effective date of this Permit.

In order for the Permittee to achieve the above limit, it will be necessary to modify existing treatment facilities to include phosphorus removal, reduce phosphorus sources or explore other ways to prevent discharges that exceed the limit. The Permittee must implement the following compliance measures consistent with the schedule below:

A. Progress Report	6 months from effective date of permit
B. Achieve Annual Concentration and Loading Effluent Limitations for Total Phosphorus	May 1, 2019

Reporting shall be submitted on the NetDMR's on a monthly basis.

REPORTING

The Permittee shall submit reports for items A and B of the compliance schedule indicating: a) the date the item was completed, or b) that the item was not completed, the reasons for non-completion and the anticipated completion date to the Agency Compliance Section.

SPECIAL CONDITION 18. The Permittee shall, within 18 months of the effective date of this permit, prepare and submit to the Agency a Phosphorus Removal Feasibility Study (PRFS) that identifies the method, timeframe, and costs of reducing phosphorus levels in its discharge to a level consistently meeting a potential future effluent limit of 0.1 mg/L. The study shall evaluate the construction and O &

Special Conditions

M costs of the application of this limit on a monthly, seasonal and annual average basis. The feasibility report shall also be shared with the Fox River Study Group. Previously submitted feasibility studies may be updated with supplemental treatment technologies necessary to achieve 0.1 mg/L.

SPECIAL CONDITION 19. An effluent limit of 0.5 mg/L Total Phosphorus 12-month rolling geometric mean (calculated monthly) (hereinafter Limit) will be applicable to the Permittee beginning January 1, 2030. The Agency may modify the permit if:

A. The Permittee demonstrates that the Limit is not technologically feasible; or
B. The Permittee demonstrates the Limit would result in substantial and widespread economic or social impact. Substantial and widespread economic impacts must be demonstrated using applicable USEPA guidance, including but not limited to any of the following documents:
   1. Interim Economic Guidance for Water Quality Standards, March 1995, EPA-823-95-002;
   2. Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development, February 1997, EPA-832—97-004;
   3. Financial Capability Assessment Framework for Municipal Clean Water Act Requirements, November 24, 2014; or
C. If the Implementation Plan determines that a greater phosphorus reduction is necessary and achievable before January 1, 2030, then the Permittee shall meet the phosphorus limit identified in the Implementation Plan in accordance with the schedule set out therein; or
D. If the Limit is demonstrated not to be technologically or economically feasible by January 1, 2030, but is feasible within a longer timeline, then the Limit shall be met as soon as feasible; or
E. If the Limit is demonstrated not to be technologically or economically achievable by the Permittee, then an effluent limit that is achievable by the Permittee must be met as soon as feasible and shall not exceed 0.6 mg/L Total Phosphorus 12-month rolling geometric mean (calculated monthly).

The Agency will modify the NPDES permit if necessary. Any permit modification will be public noticed and made available for public review and comment prior to issuance of any permit modification. No date deadline extension or effluent limitation modification will be effective until it is included in a modified or Modified NPDES permit.

SPECIAL CONDITION 20. The Permittee shall develop and submit to the Agency a Phosphorus Discharge Optimization Plan shall be submitted by March 26, 2021. The plan shall include a schedule for the implementation of these optimization measures. Annual progress reports on the optimization of the existing treatment facilities shall be submitted to the Agency by May 1 of each year beginning 12 months from the modified date of the permit. In developing the plan, the Permittee shall evaluate a range of measures for reducing phosphorus discharges from the treatment plant, including possible source reduction measures, operational improvements, and minor facility modifications that will optimize reductions in phosphorus discharges from the wastewater treatment facility. The Permittee's evaluation shall include, but not be limited to, an evaluation of the following optimization measures:

A. WWTF influent reduction measures.
   1. Evaluate the phosphorus reduction potential of users.
   2. Determine which sources have the greatest opportunity for reducing phosphorus (i.e., industrial, commercial, institutional, municipal and others).
      a. Determine whether known sources (i.e., restaurant and food preparation) can adopt phosphorus minimization and water conservation plans.
      b. Evaluate implementation of local limits on influent sources of excessive phosphorus.
B. WWTF effluent reduction measures.
   1. Reduce phosphorus discharges by optimizing existing treatment processes.
      a. Adjust the solids retention time for either nitrification, denitrification, or biological phosphorus removal.
      b. Adjust aeration rates to reduce dissolved oxygen and promote simultaneous nitrification-denitrification.
      c. Add baffles to existing units to improve microorganism conditions by creating divided anaerobic, anoxic, and aerobic zones.
      d. Change aeration settings in plug flow basins by turning off air or mixers at the inlet side of the basin system.
      e. Minimize impact on recycle streams by improving aeration within holding tanks.
      f. Reconfigure flow through existing basins to enhance biological nutrient removal.
      g. Increase volatile fatty acids for biological phosphorus removal.

Special Conditions

SPECIAL CONDITION 21. The Permittee shall notify the IEPA in writing once the treatment plant expansion has been completed. A letter stating the date that the expansion was completed shall be sent to the following address within fourteen (14) days of the expansion becoming operational:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 22. The Permittee shall monitor the wastewater effluent for Total Phosphorus, Dissolved Phosphorus, Nitrate/Nitrite, Total Kjeldahl Nitrogen (TKN), Ammonia, Total Nitrogen (calculated), Alkalinity and Temperature at least once a month beginning on the effective date of this permit. The Permittee shall monitor the wastewater influent for Total Phosphorus at least once a month. The results shall be submitted on electronic Discharge Monitoring Report Forms (NetDMRs) to IEPA unless otherwise specified by the IEPA.

SPECIAL CONDITION 23. The Permittee shall work towards the goals of achieving no discharges from sanitary sewer overflows or basement back-ups and ensuring that overflows or back-ups, when they do occur do not cause or contribute to violations of applicable standards or cause impairment in any adjacent receiving water. Overflows from sanitary sewers are expressly prohibited by this permit and by Ill. Adm. Code 306.304. As part of the process to ultimately achieve compliance through the elimination of and mitigating the adverse impacts of any such overflows if they do occur, the Permittee shall (A) identify and report to IEPA all SSOs that do occur; and (B) develop, implement and submit to the IEPA a Capacity, Management, Operations, and Maintenance (CMOM) plan which includes an Asset Management strategy within Eighteen (18) months of the effective date of this Permit or review and revise any existing plan accordingly. The Permittee shall modify the Plan to incorporate any comments that it receives from IEPA and shall implement the modified plan as soon as possible. The Permittee should work as appropriate, in consultation with affected authorities at the local, county, and/or state level to develop the plan components involving third party notification of overflow events. The Permittee may be required to construct additional sewage transport and/or treatment facilities in future permits or other enforceable documents should the implemented CMOM plan indicate that the Permittee's facilities are not capable of conveying and treating the flow for which they are designed.

The CMOM plan shall include the following elements:

A. Measures and Activities:

1. A complete map and system inventory for the collection system owned and operated by the Permittee;
2. Organizational structure; budgeting; training of personnel; legal authorities; schedules for maintenance, sewer system cleaning, and preventative rehabilitation; checklists, and mechanisms to ensure that preventative maintenance is performed on equipment owned and operated by the Permittee;
3. Documentation of unplanned maintenance;
4. An assessment of the capacity of the collection and treatment system owned and operated by the Permittee at critical junctions and immediately upstream of locations where overflows and backups occur or are likely to occur; use flow monitoring and/or sewer hydraulic modeling, as necessary;
5. Identification and prioritization of structural deficiencies in the system owned and operated by the Permittee. Include preventative maintenance programs to prevent and/or eliminate collection system blockages from roots or grease, and prevent corrosion or negative effects of hydrogen sulfide which may be generated within collection system;
6. Operational control, including documented system control procedures, scheduled inspections and testing, list of scheduled frequency of cleaning (and televising as necessary) of sewers;
7. The Permittee shall develop and implement an Asset Management strategy to ensure the long-term sustainability of the collection system. Asset Management shall be used to assist the Permittee in making decisions on when it is most appropriate to repair, replace or rehabilitate particular assets and develop long-term funding strategies; and
8. Asset Management shall include but is not limited to the following elements:
   a. Asset Inventory and State of the Asset;
   b. Level of Service;
   c. Critical Asset Identification;
   d. Life Cycle Cost; and
   e. Long-Term Funding Strategy.

B. Design and Performance Provisions:

1. Monitor the effectiveness of CMOM;
2. Upgrade the elements of the CMOM plan as necessary; and
3. Maintain a summary of CMOM activities.

Special Conditions

C. Overflow Response Plan:

1. Know where overflows and back-ups within the facilities owned and operated by the Permittee occur;
2. Respond to each overflow or back-up to determine additional actions such as clean up; and
3. Locations where basement back-ups and/or sanitary sewer overflows occur shall be evaluated as soon as practicable for excessive inflow/infiltration, obstructions or other causes of overflows or back-ups as set forth in the System Evaluation Plan.
4. Identify the root cause of the overflow or basement backup, and document to files;
5. Identify actions or remediation efforts to reduce risk of reoccurrence of these overflows or basement backups in the future, and document to files.

D. System Evaluation Plan:

1. Summary of existing SSO and Excessive I/I areas in the system and sources of contribution;
2. Evaluate plans to reduce I/I and eliminate SSOs;
3. Evaluate the effectiveness and performance in efforts to reduce excessive I/I in the collection system;
4. Special provisions for Pump Stations and force mains and other unique system components; and
5. Construction plans and schedules for correction.

E. Reporting and Monitoring Requirements:

1. Program for SSO detection and reporting; and
2. Program for tracking and reporting basement back-ups, including general public complaints.

F. Third Party Notice Plan:

1. Describes how, under various overflow scenarios, the public, as well as other entities, would be notified of overflows within the Permittee's system that may endanger public health, safety or welfare;
2. Identifies overflows within the Permittee's system that would be reported, giving consideration to various types of events including events with potential widespread impacts;
3. Identifies who shall receive the notification;
4. Identifies the specific information that would be reported including actions that will be taken to respond to the overflow;
5. Includes a description of the lines of communication; and
6. Includes the identities and contact information of responsible POTW officials and local, county, and/or state level officials.

For additional information concerning USEPA CMOM guidance and Asset Management please refer to the following web site addresses. http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf and
http://water.epa.gov/type/watersheds/wastewater/upload/guide_smallsystems_assetmanagement_bestpratices.pdf

Attachment H

Standard Conditions

Definitions

Act means the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

Agency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) means Pub. L 92-500, as amended. 33 U.S.C. 1251 et seq.

NPDES (National Pollutant Discharge Elimination System) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 of the Clean Water Act.

USEPA means the United States Environmental Protection Agency.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum Daily Discharge Limitation (daily maximum) means the highest allowable daily discharge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

Grab Sample means an individual sample of at least 100 milliliters collected at a randomly-selected time over a period not exceeding 15 minutes.

24-Hour Composite Sample means a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

8-Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour period.

Flow Proportional Composite Sample means a combination of sample aliquots of at least 100 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

(1) **Duty to comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.

(2) **Duty to reapply.** If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.

(3) **Need to halt or reduce activity not a defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(4) **Duty to mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

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

(6) **Permit actions.** This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62 and 40 CFR 122.63. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(7) **Property rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

(8) **Duty to provide information.** The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency upon request, copies of records required to be kept by this permit.

(9) **Inspection and entry.** The permittee shall allow an authorized representative of the Agency or USEPA (including an authorized contractor acting as a representative of the Agency or USEPA), upon the presentation of credentials and other documents as may be required by law, to:

(a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.

(10) **Monitoring and records.**

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of this permit, measurement, report or application. Records related to the permittee's sewage sludge use and disposal activities shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503). This period may be extended by request of the Agency or USEPA at any time.

(c) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The individual(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

(d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Where no test procedure under 40 CFR Part 136 has been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

(11) **Signatory requirement.** All applications, reports or information submitted to the Agency shall be signed and certified.

(a) **Application.** All permit applications shall be signed as follows:

(1) For a corporation: by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation:

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

(b) **Reports.** All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a); and

(2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and

(3) The written authorization is submitted to the Agency.

(c) **Changes of Authorization.** If an authorization under (b) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of (b) must be submitted to the Agency prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) **Certification.** Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(12) **Reporting requirements.**

(a) **Planned changes.** The permittee shall give notice to the Agency as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source pursuant to 40 CFR 122.29(b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements pursuant to 40 CFR 122.42 (a)(1).

(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

(b) **Anticipated noncompliance.** The permittee shall give advance notice to the Agency of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(c) **Transfers.** This permit is not transferable to any person except after notice to the Agency.

(d) **Compliance schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(e) **Monitoring reports.** Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR).

(2) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR 136 or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

(3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Agency in the permit.

(f) • **Twenty-four hour reporting**. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24-hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and time; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported within 24-hours:

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit.

(2) Any upset which exceeds any effluent limitation in the permit.

(3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit or any pollutant which may endanger health or the environment.

The Agency may waive the written report on a case-by-case basis if the oral report has been received within 24-hours.

(g) **Other noncompliance**. The permittee shall report all instances of noncompliance not reported under paragraphs (12) (d), (e), or (f), at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (12) (f).

(h) **Other information**. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Agency, it shall promptly submit such facts or information.

(13) **Bypass**.

(a) Definitions.

(1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

(2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(b) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (13)(c) and (13)(d).

(c) Notice.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph (12)(f) (24-hour notice).

(d) Prohibition of bypass.

(1) Bypass is prohibited, and the Agency may take enforcement action against a permittee for bypass, unless:

(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(iii) The permittee submitted notices as required under paragraph (13)(c).

(2) The Agency may approve an anticipated bypass, after considering its adverse effects, if the Agency determines that it will meet the three conditions listed above in paragraph (13)(d)(1).

(14) **Upset**.

(a) Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(b) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (14)(c) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(c) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated; and

(3) The permittee submitted notice of the upset as required in paragraph (12)(f)(2) (24-hour notice).

(4) The permittee complied with any remedial measures required under paragraph (4).

(d) Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

(15) **Transfer of permits**. Permits may be transferred by modification or automatic transfer as described below:

(a) Transfers by modification. Except as provided in paragraph (b), a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued pursuant to 40 CFR 122.62 (b) (2), or a minor modification made pursuant to 40 CFR 122.63 (d), to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

(b) Automatic transfers. As an alternative to transfers under paragraph (a), any NPDES permit may be automatically transferred to a new permittee if:

(1) The current permittee notifies the Agency at least 30 days in advance of the proposed transfer date;

(2) The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage and liability between the existing and new permittees; and

(3) The Agency does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement.

(16) All manufacturing, commercial, mining, and silvicultural dischargers must notify the Agency as soon as they know or have reason to believe:

(a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant identified under Section 307 of the Clean Water Act which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:

(1) One hundred micrograms per liter (100 ug/l);

(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6 dinitrophenol; and one milligram per liter (1 mg/l) for antimony.

(3) Five (5) times the maximum concentration value reported for that pollutant in the NPDES permit application; or

(4) The level established by the Agency in this permit.

(b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the NPDES permit application.

(17) All Publicly Owned Treatment Works (POTWs) must provide adequate notice to the Agency of the following:

(a) Any new introduction of pollutants into that POTW from an indirect discharge which would be subject to Sections 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and

(b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

(c) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

(18) If the permit is issued to a publicly owned or publicly regulated treatment works, the permittee shall require any industrial user of such treatment works to comply with federal requirements concerning:

(a) User charges pursuant to Section 204 (b) of the Clean Water Act, and applicable regulations appearing in 40 CFR 35;

(b) Toxic pollutant effluent standards and pretreatment standards pursuant to Section 307 of the Clean Water Act; and

(c) Inspection, monitoring and entry pursuant to Section 308 of the Clean Water Act.

(19) If an applicable standard or limitation is promulgated under Section 301(b)(2)(C) and (D), 304(b)(2), or 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in the permit, or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked, and reissued to conform to that effluent standard or limitation.

(20) Any authorization to construct issued to the permittee pursuant to 35 Ill. Adm. Code 309.154 is hereby incorporated by reference as a condition of this permit.

(21) The permittee shall not make any false statement, representation or certification in any application, record, report, plan or other document submitted to the Agency or the USEPA, or required to be maintained under this permit.

(22) The Clean Water Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $25,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both.
Additional penalties for violating these sections of the Clean Water Act are identified in 40 CFR 122.41 (a)(2) and (3).

(23) The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

(24) The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

(25) Collected screening, slurries, sludges, and other solids shall be disposed of in such a manner as to prevent entry of those wastes (or runoff from the wastes) into waters of the State. The proper authorization for such disposal shall be obtained from the Agency and is incorporated as part hereof by reference.

(26) In case of conflict between these standard conditions and any other condition(s) included in this permit, the other condition(s) shall govern.

(27) The permittee shall comply with, in addition to the requirements of the permit, all applicable provisions of 35 Ill. Adm. Code, Subtitle C, Subtitle D, Subtitle E, and all applicable orders of the Board or any court with jurisdiction.

(28) The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit is held invalid, the remaining provisions of this permit shall continue in full force and effect.

APPENDIX B –CAPACITY, MANAGEMENT, OPERATIONS, AND MAINTENANCE PLAN

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Capacity, Management, Operations and Maintenance (CMOM) Plan

rev. September 2023

113 Timber Trail, PO Box 240, Island Lake, IL 60042
Phone: 847-526-3300
Fax: 847-526-3349
Email: info@nmwrd.org
Web: www.nmwrd.org

Capacity, Management, Operations, and Maintenance Plan

Northern Moraine Wastewater Reclamation District

Contents

List of Tables

List of Figures

List of Appendices

Section 1 - Introduction and CMOM Background

1.1 Northern Moraine Wastewater Reclamation District – Sanitary District

Northern Moraine Wastewater Reclamation District (NMWRD) is located in Island Lake, IL approximately 40 miles Northwest of downtown Chicago. NMWRD is a standalone government entity which operates under the Sanitary District Act of 1917 (Sanitary District). The District provides service to four communities; Lakemoor, Island Lake, Port Barrington, and Holiday Hills located in both McHenry County and Lake County. The combined population of the four communities was estimated at 16,423 people as of 2022, according to the U.S. Census Bureau. The NMWRD Service Area map is provided in *Figure 1*. The District is responsible for approximately 16,700 acres located within our Facility Planning Area (FPA), 36 acres of which is dedicated to the WWTP site. Note that the District's collection system is entirely comprised of sanitary sewer mains with no combination of stormwater collection infrastructure.

The NMWRD Wastewater Treatment Facility (WWTF) is located at 420 Timber Trail in Island Lake, IL. The WWTF has a Design Average Flow capacity of 2.0 million gallons per Day (MGD) and the current Daily Average Flow observed at the plant is approximately 1.2 MGD. The Design Maximum Flow is 5.0 MGD.

1.1.1 Lakemoor

The Village of Lakemoor is located in the two Northern basins within NMWRD's service area (Northwest & Northeast Drainage Basins). The Village population was estimated at 6,274 people as of 2022 according to the U.S. Census Bureau.

1.1.2 Island Lake

The Village of Island Lake is located in the four Central basins within NMWRD's service area (Waterford, Central, Near East & Eastern Drainage Basins). The Village population was estimated at 7,954 people as of 2022 according to the U.S. Census Bureau.

1.1.3 Port Barrington

The Village of Port Barrington is located in the two Southern basins within NMWRD's service area (South Central & Southern Drainage Basins). The Village population was estimated at 1,578 people as of 2022 according to the U.S. Census Bureau.

1.1.4 Holiday Hills

The Village of Holiday Hills is located in the two Southern basins within NMWRD's service area (Waterford Drainage Basin). The Village population was estimated at 617 people as of 2022 according to the U.S. Census Bureau. Note that go-live for this lift station is anticipated for late 2023. Information pertaining to Holiday Hills is included in this version of the CMOM but will need to be updated once the station is live.

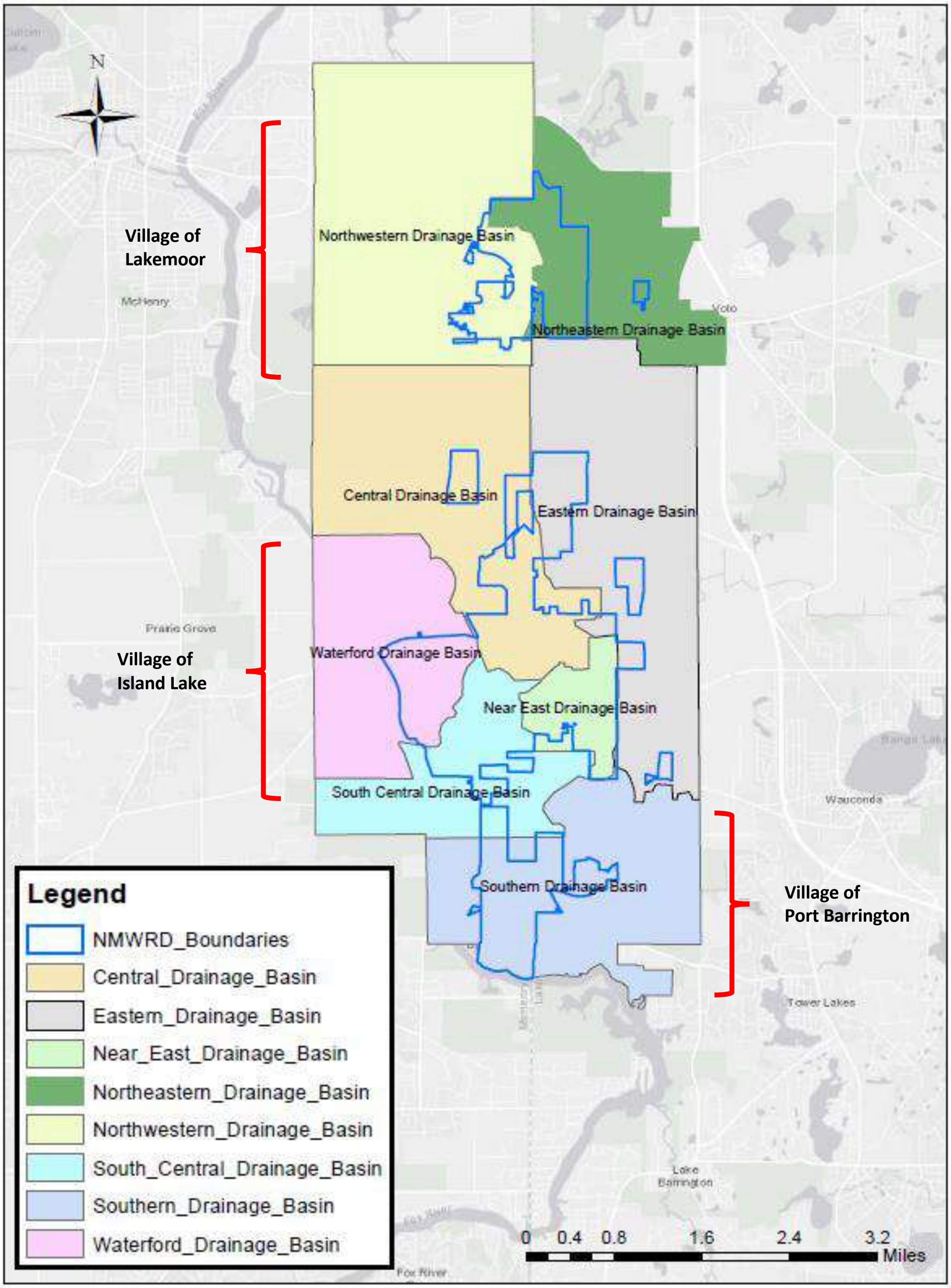


Figure 1. NMWRD Service Area & Drainage Basins

1.2 CMOM Plan Overview

The design of the sanitary sewer system and its components were engineered while considering factors such as population and contributor flows plus a contributing growth factor for future growth over time. Specifically, the design considers residential, commercial, and industrial sources while also considering a calculated leakage rate representing natural degradation of the system over time. For even the most well-engineered systems, unexpected variability in flow can result in cases where flows exceed what the system capacity was designed for. The unexpected variability can include population increases beyond the growth factor used in the design basis, system integrity degradation resulting in a leakage rate greater than the design basis, and inappropriate connections including Inflow and Infiltration (I/I). These factors can lead to overflows at various locations throughout the entire collection system. Failing to maintain the collection system can also result in overflows with no relation to flow increases. Sewer pipe blockages can form due to buildup from grease, rags, roots, and other foreign objects. Regular maintenance and cleaning regimens can minimize these occurrences.

Overflows, regardless of the cause, may release untreated sewage to surface waters, at times leading to substantial negative impacts on the receiving body. Overflows can also apply to household backups which can lead to potential unsanitary health risks for tenants. This Capacity, Management, Operations and Maintenance (CMOM) plan will address the NMWRD sewer system, discuss general measures and activities performed to maintain a reliable sewer system, and review procedures to ensure this CMOM remains effective through routine reviews and audits. An Overflow Response Plan is also be provided as part of this CMOM plan.

1.2.1 History of CMOM Program

The Clean Water Act initiated the Sanitary Sewer Overflow (SSO) Policy, which resulted in the 1995 Urban Wet Weather Flows Advisory Committee. The 1995 Wet Weather Flows Advisory Committee followed up with a Phase II Stormwater Subcommittee and the SSO Policy Dialogue Subcommittee. In 1999, the SSO Subcommittee began working on regulations for separate sanitary collection systems which included CMOM regulations; the CMOM regulations then went through various phases of review and revisions. Even though there was a consensus that the CMOM plan was needed, there were concerns regarding separating it from the SSO Policy. In 2005, the USEPA published the “Guidance” document on CMOM plans and that initiated other USEPA regional offices to develop their own CMOM regulations. The Illinois Environmental Protection Agency (IEPA) started implementing CMOM regulation into National Pollutant Discharge Elimination System (NPDES) permits in 2007. The CMOM was added as a Special Condition Requirement to NMWRD’s NPDES permit that was issued on September 28, 2018. The District’s current NPDES Permit No. IL0031933 is attached in *Appendix A* of this CMOM plan.

1.2.2 Purpose of CMOM Program

There are typically four general goals of CMOM plans;

- Prevent overflows from the sanitary sewer to the extent possible and practicable.
- Manage the assets of the utility program inclusive of personnel and equipment to craft regular maintenance programs and to be able to respond to emergency overflows of the system.

- Through the use of analytical and engineering methods, develop a system to assess and prioritize maintenance, rehabilitation and replacement activities for the portions of the collection system under operational control of the Utility.
- Through effective management, develop and enforce appropriate ordinances that will help to better manage the performance of the collection system.

1.2.3 Components of CMOM

NPDES Permit No. IL0031933 mandates that NMWRD develop a CMOM plan that outlines several items which must be included in the plan. The U.S. Environmental Protection Agency (USEPA) has also created multiple documents regarding recommended contents of CMOM plans. CMOM plans are applicable to small, medium, and large wastewater collection systems. It is important to note that the CMOM plan itself makes no quantitative rules regarding the sewer system management; it is meant to be a guidance document that assists in efficient management of the sewer system.

Section 2 – Sewer Use Ordinance & Sanitary Sewer Users

2.1 Sewer Use Ordinance

The Northern Moraine Wastewater Reclamation District Sewer Use Ordinance (SUO) is outlined in Ordinance 09-03. This Ordinance outlines several procedures relating to protecting the centralized collection system, and in turn, the centralized wastewater treatment facility. See Section 4.2 of this CMOM plan for legal authorities with regards to sewer use.

2.1.2 SUO Procedures

The Northern Moraine Wastewater Reclamation District enforces various SUO procedures that are outlined in the District's Sewer User Ordinance (i.e. Ordinance 09-03). These procedures include, but are not limited to; pretreatment requirements, building/sewer permit issues, and general prohibitions with regards to prohibited constituents allowed in the public sewer. Note that inspection and construction standards are outlined in a separate District Ordinance (i.e. Ordinance 07-09) and covers pre-construction, construction, testing, and acceptance procedures.

2.1.3 Industrial Pretreatment Program

The Northern Moraine Wastewater Reclamation District does not currently possess an Industrial Pretreatment Program. However, Section(s) 5.5 through 5.11 in Ordinance 09-03 outline provisions of a pretreatment program should the District determine that an industrial user require pretreatment standards as outlined in 40 CFR 403.

2.1.4 Owner Inspection Program for Grease Traps

The Northern Moraine Wastewater Reclamation District serves commercial users who are required to install and operate a grease trap when, in the opinion of the District, are necessary for the proper handling of liquid waste containing fats, oils or grease (FOG) in excessive amounts as outlined in Section 5.6 of Ordinance 09-03. It is the commercial owner's responsibility to maintain and clean their grease trap to ensure that excessive amounts of FOG are not entering the public sewer. In the event that the District discovers excessive FOG entering the public sewer, the District shall perform an investigation to determine the point source and enforce a more stringent cleaning schedule.

2.2 Breakdown of Users

The Northern Moraine Wastewater Reclamation District serves three (3) user types; Residential, Commercial, and Industrial. Note that 95% of our users fall under residential designation while the remaining 5% are commercial/industrial users.

2.2.1 Residential User

Residential users account for 95% of all NMWRD users. Chemical composition of residential wastewater is assumed to consist of the following constituents; water, solids, organics, inorganics, nutrients, pathogens, fats, oils, and grease.

2.2.2 Commercial / Industrial Users

Commercial/Industrial Users account for 5% of all NMWRD users. Chemical composition of commercial and industrial influent is highly variable.

2.2.3 Categorical Industry Users (CIUs) and Significant Industrial Users (SIUs)

As of the most current edition of the District's CMOM plan, the District has not identified any CIUs nor SIUs. Table 1 (CIUs) and Table 2 (SIUs) below will remain unpopulated unless industrial users who meet the requirements of either category are identified.

Table 1. NMWRD Categorical Industrial Users (CIUs)

Industrial User	Discharge Volume

Table 2. NMWRD Significant Industrial Users (SIUs)

Industrial User	Discharge Volume

Section 3 - Existing Sewer System

3.1 Sanitary Sewer System Metrics

Consistent analysis and a competent understanding of the sanitary sewer system by District staff will help guide NMWRD in making feasible and cost-effective decisions regarding the CMOM plan. The following section outlines several key metrics concerning the District's sanitary sewer system.

The subsequent sections will provide a general overview of specific components of the NMWRD collection system. Those components include sanitary sewer pipe (includes force mains, gravity mains, and low-pressure force mains), lift stations and the WWTF and also include information stored in construction record drawings retained in a both physical and digital format.

3.1.1 Sanitary Sewer (Pipe) Metrics

The District's collection system is of varying age and condition. The older sections of the collection system are generally located near the treatment facility in the Village of Island Lake. These sewers are constructed of mostly ABS Truss pipe and PVC pipe. *Table 3* displays the quantities of sanitary sewer pipe, current as of September 2021. The District Sewer map is provided in *Figure 2*.

Table 3. NMWRD Sewer Quantities

Sewer Diameter	Quantity (miles)
6" pipe	0.1
8" pipe	50.6
10" pipe	4.1
12" pipe	2.5
15" pipe	1.3
18" pipe	0.4
21" pipe	0.4
24" pipe	2.0
30" pipe	0.4
42" pipe	0.2
Various dia. force main	18
Total	**80 miles**

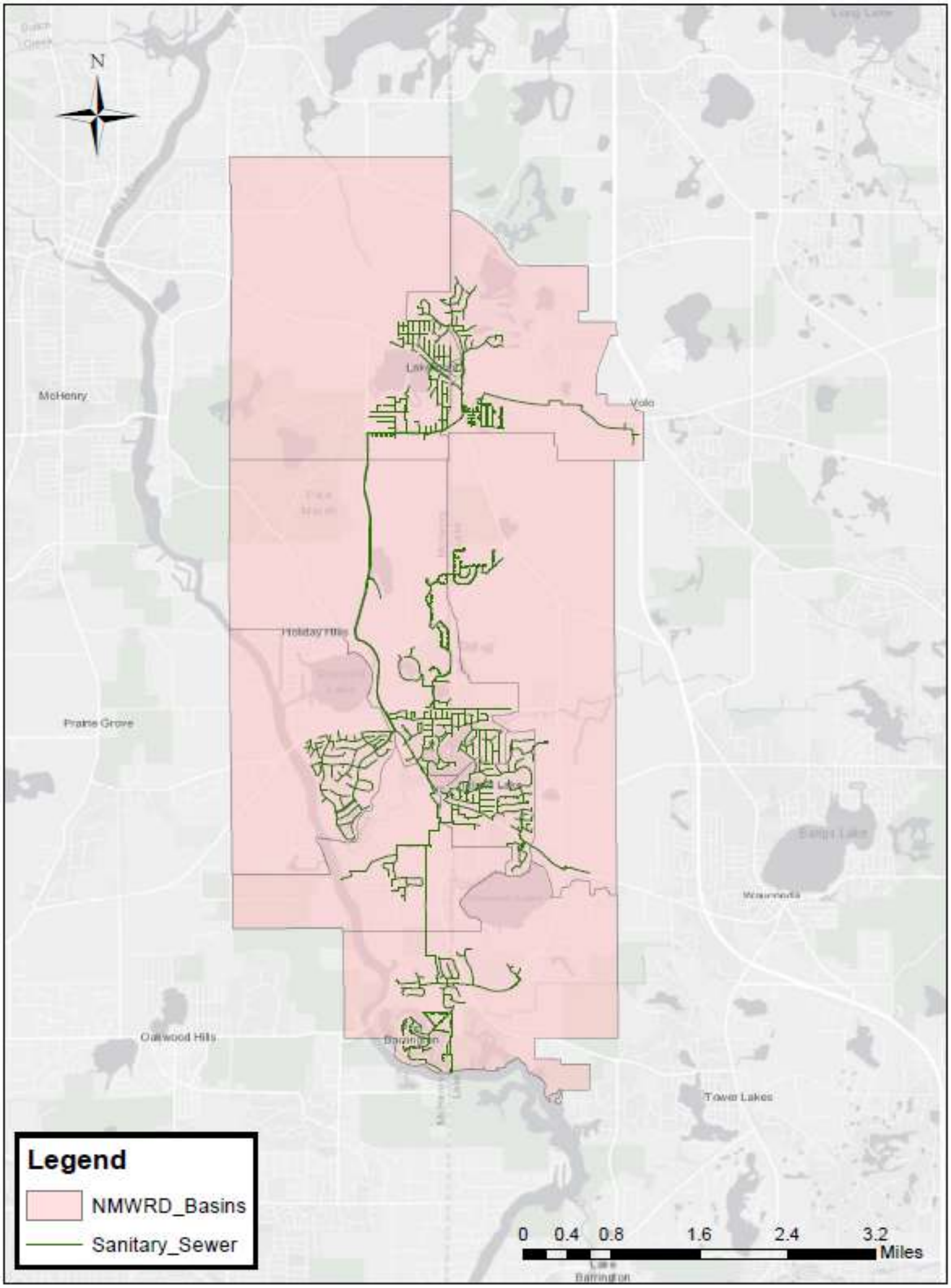


*Figure 2. NMWRD Sanitary Sewer Map (** Does not include Holiday Hills sewer since station is not live yet.**)*

A review of the NMWRD collections system capacity is provided in *Table 4*. Basins that are projected to exceed collection system design capacity based on population estimates, should development occur, are bolded. The sewer system components (gravity main, force main, lift stations, pumps, etc.) for the bolded basins will need to be re-evaluated when the District anticipates additional PE demand will be added. For the purpose of this evaluation, Population Equivalents (PE) were used. Population equivalents provide a common basis for residential and non-residential use to be analyzed. One PE is equivalent to the water consumed or wastewater generated by one resident. This data comes from the most recent review of sewer system capacity, performed in the *2014 Facility Plan Update*. The NMWRD Collection System Flow Diagram is provided in *Figure 3*.

Table 4. NMWRD Collection System Capacity

Drainage Basin	Total PE Usage
Central Drainage Basin	3,155
Eastern Drainage Basin	69
Near East Drainage Basin	2,235
Northeastern Drainage Basin	1,912
Northwestern Drainage Basin	1,618
South Central Drainage Basin	378
Southern Drainage Basin	1,197
Waterford Drainage Basin	3,131

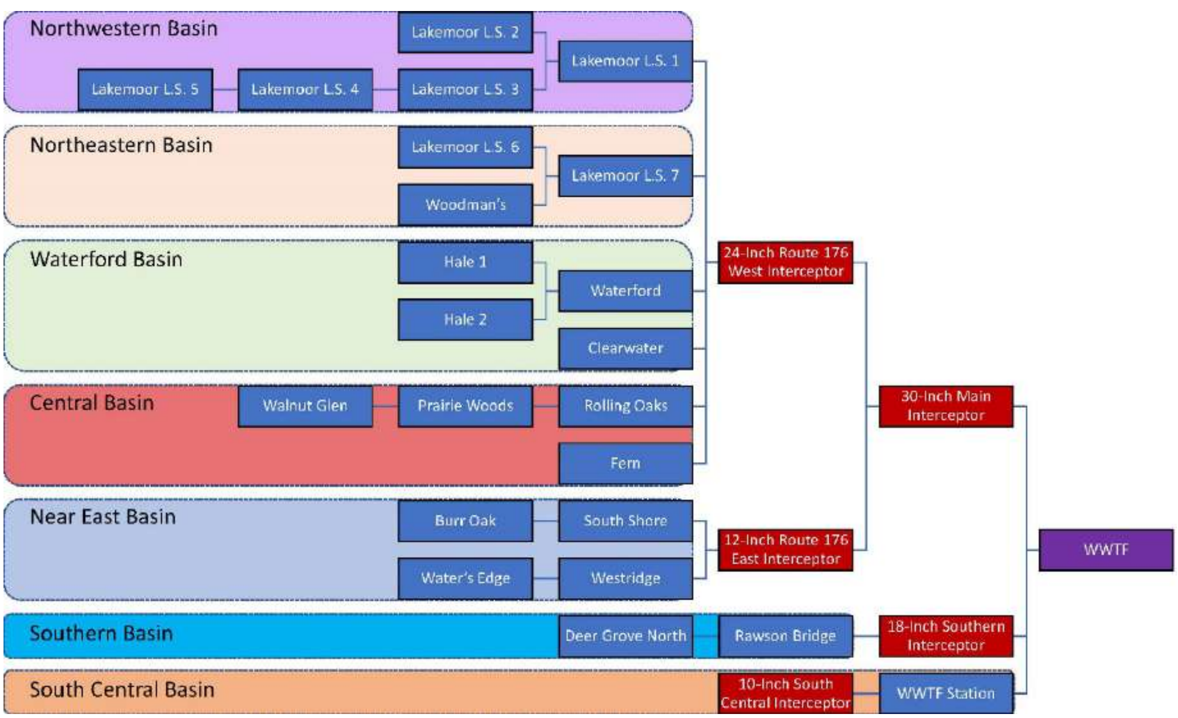


*Figure 3. NMWRD Collection System Flow Diagram (** Does not include Holiday Hills since station is not live yet.**)*

3.1.2 Lift Station Metrics

Table 5 identifies lift station information including basin location, village location, rated capacity, which subsequent station (or WWTF) the lift station sends flow to, and backup power availability. The NMWRD Lift Station map is provided in *Figure 4*.

Table 5. NMWRD Lift Station Information

Lift Station	Basin(s)	Village	Pump Rated Capacity (gpm)	Flows to	Backup Power	Monitoring Type
Burr Oak	East & Near East	Island Lake	90	South Shore	No	Autodialer
Clearwater	Central	Island Lake	60	WWTF	No	Autodialer
Deer Grove	Southern	Port Barrington	532	Rawson Bridge	Backup Generator	Autodialer
Fern	Central	Island Lake	576	WWTF	Backup Generator	Autodialer
Holiday Hills	Waterford	Holiday Hills	TBD	WWTF	Backup Generator	Autodialer
Hale 1	Waterford	Island Lake	363	Waterford	Backup Generator	GRM & Autodialer
Hale 2	Waterford	Island Lake	238	Waterford	Backup Generator	GRM & Autodialer
Lakemoor L.S. 1	Northwestern	Lakemoor	450	WWTF	Backup Generator	Autodialer
Lakemoor L.S. 2	Northwestern	Lakemoor	270	Lakemoor L.S. 1	No	Autodialer
Lakemoor L.S. 3	Northwestern	Lakemoor	270	Lakemoor L.S. 1	Backup Generator	Autodialer
Lakemoor L.S. 4	Northwestern	Lakemoor	270	Lakemoor L.S. 3	No	Autodialer
Lakemoor L.S. 5	Northwestern	Lakemoor	200	Lakemoor L.S. 4	No	Autodialer
Lakemoor L.S. 6	Northeastern	Lakemoor	500	Lakemoor L.S. 7	Backup Generator	GRM & Autodialer
Lakemoor L.S. 7	Northeastern	Lakemoor	800	WWTF	Backup Generator	GRM Only
Prairie Woods	Central	Island Lake	265	Rolling Oaks	Backup Generator	Autodialer
Rawson Bridge	Southern	Port Barrington	740	WWTF	Backup Generator	Autodialer
Rolling Oaks	Central	Island Lake	200	WWTF	Backup Generator	Autodialer

South Shore	Near East	Island Lake	200	WWTF	Backup Generator	Autodialer
Walnut Glen	Central & Eastern	Island Lake	284	Prairie Woods	Backup Generator	Autodialer
Water's Edge	East & Near East	Island Lake	100	Westridge	No	Autodialer
Waterford	Waterford	Island Lake	850	WWTF	Backup Generator	Autodialer
Westridge	Near East	Island Lake	236	WWTF	No	Autodialer
Woodman's	Northeastern	Island Lake	180	Lakemoor L.S. 7	Backup Generator	GRM Only
WWTF L.S.	South Central	Island Lake	235	WWTF	Backup Generator	Autodialer

(** List includes Holiday Hills but does not have pump rating information station is not live yet.**)

3.1.3 Lift Station Recordkeeping

Lift Station recordkeeping is a necessity to track the overall performance and track historical upgrades/repairs over time. Lift Station records are stored both physically at the WWTP and digitally on the District's Server.

3.1.4 Lift Station Emergency Response

The District possesses a unique emergency response procedure for our 24 lift stations. Each procedure is specific to one of 24 unique lift stations and details bypass metrics along with other emergency responses. These response procedures are stored both physically at the WWTP and digitally on the District's Server. Similar information can also be found in the District's Emergency Response Plan. Note that the District's Emergency Response Plan (ERP) also contains detailed response plans for various emergencies for both the WWTP and the District's collection system.

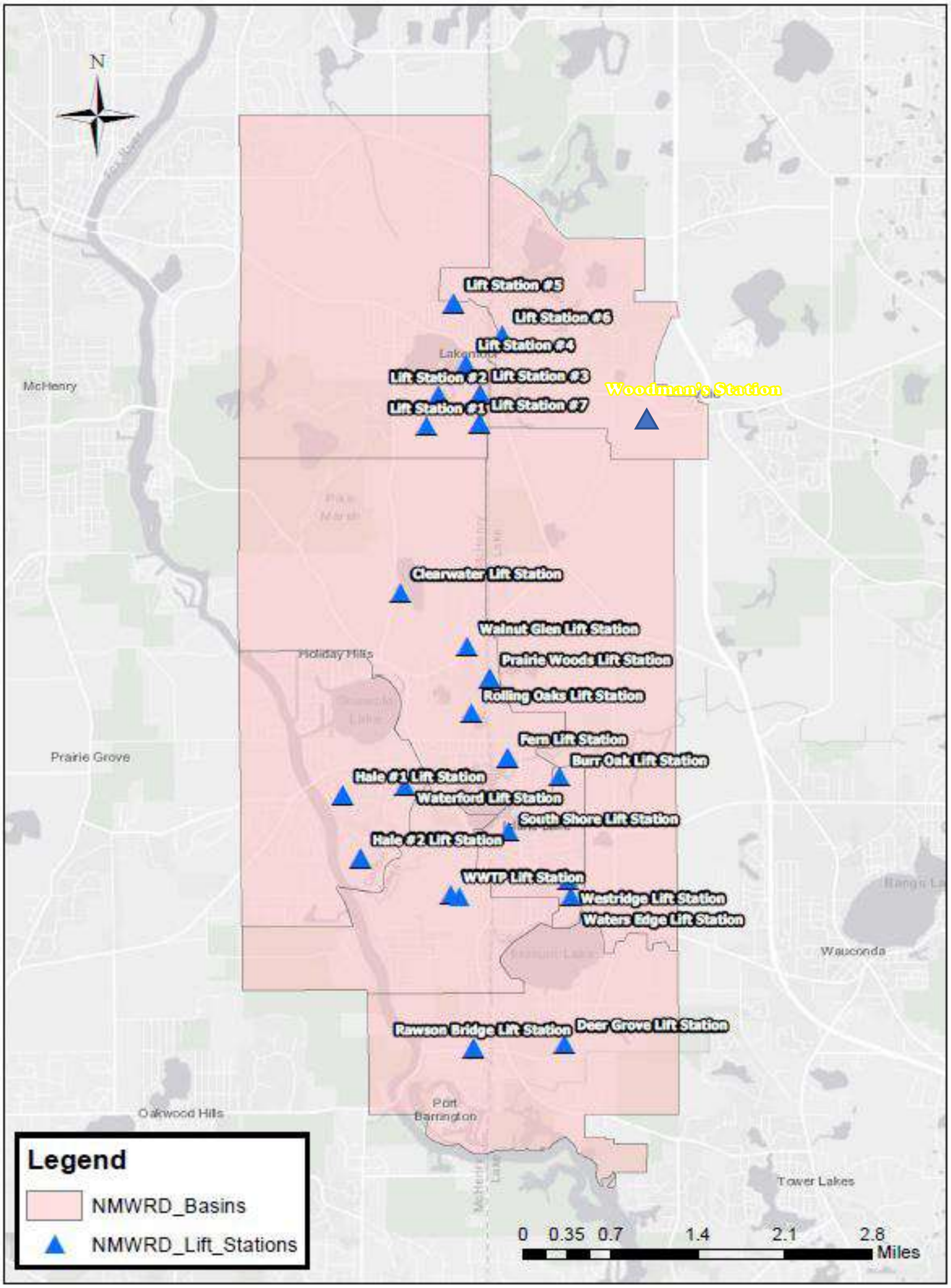


*Figure 4. NMWRD Lift Station Map (** Does not include Holiday Hills since station is not live yet.**)*

3.1.5 Bypass Pumping Equipment Metrics

Bypass pumps may be used to bypass a lift station if the station is out of service for any reason. Typical causes that may result in a scenario for the need to bypass pump a lift station includes increased flow events or severe blockage. None of the 24 District owned Lift Stations have a history of backups or overflows due to precipitation events. The District purchased a Godwin CD150S 6" By-Pass Pump during June of 2020. This asset allows for NMWRD to handle most bypassing efforts without contracting the work out.

3.1.6 General Maintenance Equipment Metrics

Table 6 identifies additional inventory of sewer maintenance equipment that is used for general maintenance, which could include emergency or non-emergency scenarios.

Table 6. NMWRD Sewer Maintenance Equipment

Equipment	Manufacturer	Notes
Vac Truck	Vactor 2110 (2005)	Purchased April 2020
Crane Truck	Ford F-450 & Crane	Chassis replaced May 2018
Televising Camera	EdgeAI	Rented June 2023
Televising Van	Ford Transit 250	Purchased July 2020. Outfitting complete October 2021
By-Pass Pump & Equipment	Godwin CD150S	Purchased June 2020
Locator	Radiodetection	
Pipe Inspection Software (PipeTech SCAN)	Peninsular Technologies	

3.2 Existing Sanitary Sewer Evaluation

The District utilizes various methods to assess the condition of the existing sanitary sewer system. The main source of information used to determine the condition of the sanitary sewer assets is televising data. The District utilizes a televising software called PipeTech SCAN developed by Peninsular Technologies. This software provides a suite of integrated inspection, maintenance and asset program management solutions to evaluate the District's sanitary sewer system. PipeTech SCAN provides a common software where District employees can review televising footage to determine condition of the sewers based on NASSCO Coding Standards. Specifically, the District follows Manholes Assessment and Certification Program (MACP) ratings for manhole assessments and Pipeline Assessment and Certification Program (PACP) ratings for sewer assessments. The District also utilizes historical event information such as historical SSOs, operator callouts for damages to the system, and more. These assessments are the main driver for preventative and predictive maintenance for the collection system. The 2020 *ICOM Asset Condition Report* is provided below in *Figure 5* (2-page report). Note that the District made the switch from ICOM to Cartegraph / PipeTech SCAN in July 2020. Note that in November 2022, the District moved away from Cartegraph. Another notable change to the Dsitrict's approach to televising is that the District rented an Edge AI bot to trial out. This decision was made due to the signifigant amount of repairs that the Aeries camera required over the last few years. A sample televising report from a live televising run is included in *Figure 6* (5-page report). Recent assessment reports are readily available on the District's server.

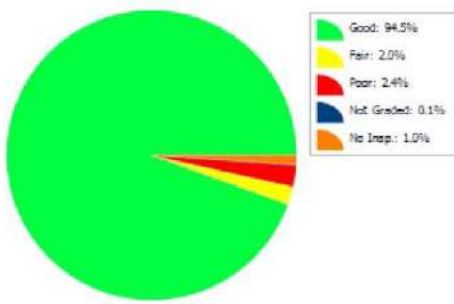
Asset Condition Report: Jan 01, 1970 - Mar 08, 2020

RedZone ROBOTICS

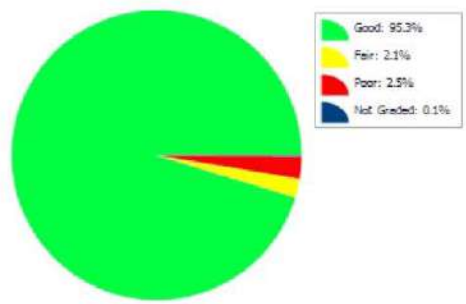
Structural Condition Summary

Structural Grade (1-5)	Assets (Count)	Length	% of System
1-2 (Good)	1,377	277,217	94.4%
3 (Fair)	25	6,002	2.0%
4-5 (Poor)	30	7,137	2.4%
Not Graded	3	255	0.1%
No Inspection (Unknown)	28	2,939	1.0%
Total	1,463	293,550	100%

Structural Condition Summary



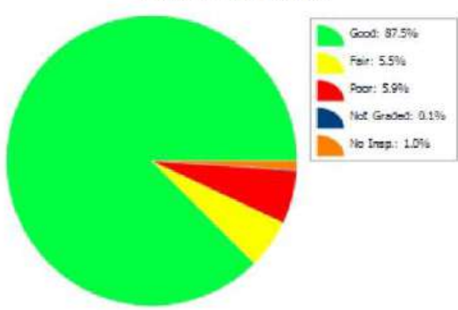
Inspected Asset Structural Condition



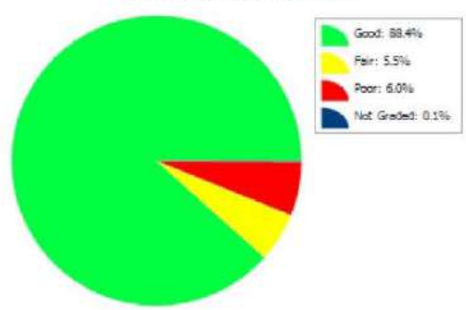
Operation and Maintenance Condition Summary

O&M Grade (1-5)	Assets (Count)	Length	% of System
1-2 (Good)	1,288	256,935	87.5%
3 (Fair)	69	16,035	5.5%
4-5 (Poor)	75	17,385	5.9%
Not Graded	3	255	0.1%
No Inspection (Unknown)	28	2,939	1.0%
Total	1,463	293,550	100%

O&M Condition Summary



Inspected Asset O&M Condition



Sunday, March 8, 2020 1

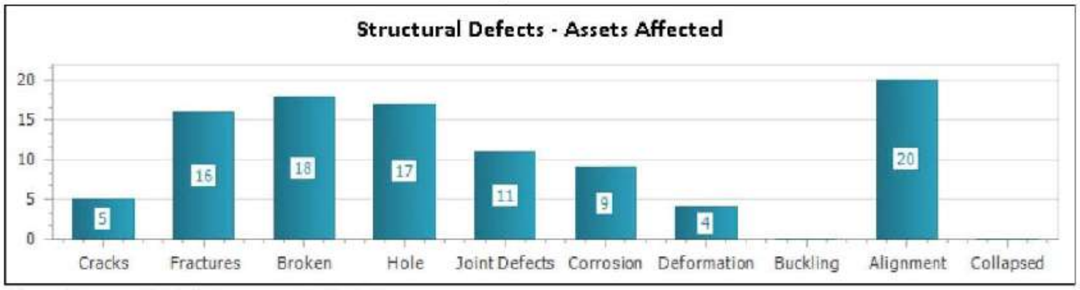
Figure 5. NMWRD 2020 ICOM Asset Condition Report Page 1 of 2

Asset Condition Report: Jan 01, 1970 - Mar 08, 2020

RedZone ROBOTICS

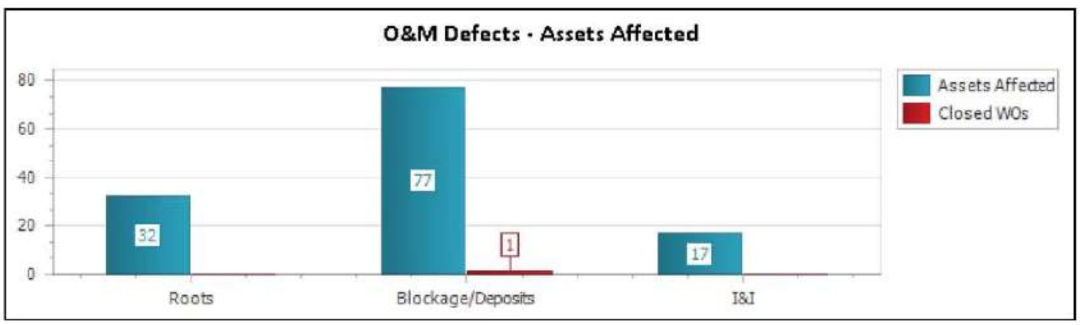
Structural Defect Summary

Structural Defect Type	Assets Affected (Count)
Cracks	5
Fractures	16
Broken	18
Hole	17
Joint Defects	11
Corrosion Indications	9
Deformation	4
Buckling	0
Alignment	20
Collapsed	0
UNINSPECTED	28



Operation and Maintenance Defect Summary

O&M Defect Type	Assets Affected (Count)	Work Order Closed Against Asset
Roots	32	0
Deposits/Blockage	77	1
Infiltration and Inflow	17	0
UNINSPECTED	28	



Sunday, March 8, 2020 2

PipeTech® NASSCO PACP

Peninsular Technologies
555 Ada Drive SE • P.O. Box 728
Ada, Michigan 49301-0728
616-676-9811 • www.pipetech.tv

Surveyors name	CHRIS MOLIDOR
Certificate Number	U-1220-70400534
System Owner	NMWRD
Survey Customer	
Drainage Area	
Sheet	1
P/O No.	
Pipeline Segment Reference	
Date	20220328
Time	13:49
Location (Street Name and number)	PILGRAM PASS
Locality	LAKEMOOR
Further Location details	
Upstream Manhole Number	D4NW35
Rim to Invert	
Grade to Invert	
Rim to Grade	
Downstream Manhole Number	D4NW34
Rim to Invert	
Grade to Invert	
Rim to Grade	
Use of Sewer	
Direction	Downstream
Flow Control	
Height	8
Width	
Shape	Circular
Material	PVC
Ln. Method	
Pipe Joint Length	
Total Length	
Length Surveyed	187.9
Year Laid	
Year Rehabilitated	
Tape / Media Number	
Purpose	
Sewer Category	
Pre-Cleaning	Jetting
Date Cleaned	
Weather	
Additional Information	

Distance (Feet)	Code: Group/ Descriptor	Code: Modifier/ severity	Continuous defect	Value: S/M/L	Value: 1st	Value: 2nd	Value: %	Joint	Circumferential Location: At / From	Circumferential Location: To	Image Ref.	Struct. Grade	O&M Grade	Remarks
0.0	AMH													Starting Manhole: D4NW35
0.0	MWL						5							
0.0	TF	A			4				11					
7.0	TF	A			4				2					
100.1	TF	A			4				11					
113.4	TF	A			4				2					
174.3	MWL						15							
187.7	MWL						5							
187.9	AMH													END OF SURVEY

	Structural								O & M								Overall							
Segment	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
20220328-D4NW35-D4NW34	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

Page 1 of 5

Generated on Monday, 3/28/2022 at 02:40 PM by the PipeTech® TV inspection system.

Figure 6. NMWRD 2022 Pipe Tech Scan Televising Report

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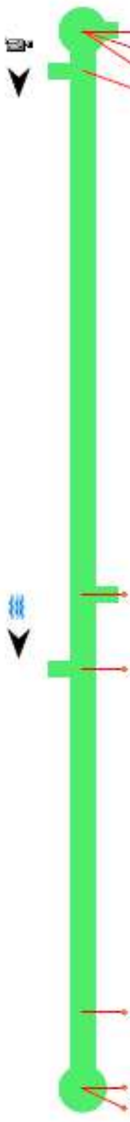
Upstream MH	Downstream MH	Size	Material	Total Length	City
D4NW35	D4NW34	8	Polyvinyl Chloride		LAKEMOOR

Surveyor's Name	Certificate Number	Street Address	Location Details
CHRIS MOLIDOR	U-1220-70400534	PILGRAM PASS	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream			20220328	13:49	187.9

Additional Information



Ftg.	Code	Description	Pct.	Position	Cont.	Comment
0.0	AMH	Access Point - Manhole				Starting Manhole: D4NW35
0.0	MWL	Water Level	5			
0.0	TFA	Tap, Factory Made: Active		11		
7.0	TFA	Tap, Factory Made: Active		2		
100.1	TFA	Tap, Factory Made: Active		11		
113.4	TFA	Tap, Factory Made: Active		2		
174.3	MWL	Water Level	15			
187.7	MWL	Water Level	5			
187.9	AMH	Access Point - Manhole				END OF SURVEY

Page 2 of 5

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Upstream MH	Downstream MH	Size	Material	Total Length	City
D4NW35	D4NW34	8	Polyvinyl Chloride		LAKEMOOR

Surveyor's Name	Certificate Number	Street Address	Location Details
CHRIS MOLIDOR	U-1220-70400534	PILGRAM PASS	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream			20220328	13:49	187.9

Additional Information

AMH - Access Point - Manhole @ 0.0 ft.
Starting Manhole: D4NW35

MWL - Water Level @ 0.0 ft.

TFA - Tap, Factory Made: Active @ 0.0 ft.

TFA - Tap, Factory Made: Active @ 7.0 ft.

Page 3 of 5

Generated on Monday, 3/28/2022 at 02:40 PM by the PipeTech® TV inspection system.

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Upstream MH	Downstream MH	Size	Material	Total Length	City
D4NW35	D4NW34	8	Polyvinyl Chloride		LAKEMOOR

Surveyor's Name	Certificate Number	Street Address	Location Details
CHRIS MOLIDOR	U-1220-70400534	PILGRAM PASS	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream			20220328	13:49	187.9

Additional Information

TFA - Tap, Factory Made: Active @ 100.1 ft.

TFA - Tap, Factory Made: Active @ 113.4 ft.

MWL - Water Level @ 174.3 ft.

MWL - Water Level @ 187.7 ft.

Page 4 of 5

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Upstream MH	Downstream MH	Size	Material	Total Length	City
D4NW35	D4NW34	8	Polyvinyl Chloride		LAKEMOOR

Surveyor's Name	Certificate Number	Street Address	Location Details
CHRIS MOLIDOR	U-1220-70400534	PILGRAM PASS	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream			20220328	13:49	187.9

Additional Information

AMH - Access Point - Manhole @ 187.9 ft.
END OF SURVEY

Page 5 of 5

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3.2.1 Sanitary Sewer Capacity

Under normal conditions (no major precipitation events or sewer obstructions), the District's sanitary sewer system does not typically experience backups or overflow events. Therefore, the sewer capacities appear to be adequate in design conditions and an updated, detailed review of the sewer capacities is not included in this edition of the CMOM plan. Note that the most recent detailed review of the sewer capacities is included in the District's 2014 Facility Plan, issued by Trotter and Associates, Inc. (TAI). The District will continue to be diligent in review of proposed sewer extensions/expansions to ensure the design capacities of existing and future sewers are sufficient for anticipated flows.

3.2.2 Sanitary Sewer Overflows

SSOs are typically linked to either improperly designed sewers or excess amounts of I/I. Addressing I/I is a cost-effective approach of reducing SSOs, rather than a costly sewer replacement program. Major precipitation events have historically resulted in no adverse effects on the ability to convey flow to the District WWTF. However, District operators who are on-call during large precipitation events typically monitor all lift stations to ensure the District is reacting in a quick manner, should there be concerns of an SSO.

3.2.3 Infiltration and Inflow

Infiltration is a result from groundwater seeping into sanitary sewers through cracks in the pipes or through weak points from poor construction. Inflow occurs when stormwater flows into sanitary sewers through unauthorized or faulty connections. Infiltration occurs in a more delayed manner due to the relatively long time that the water requires to percolate though the soil. The District utilizes a Wastewater Management Software called PipeTech SCAN developed by Peninsular Technologies to perform scheduled reviews of the NMWRD collection system. This software provides a suite of integrated inspection, maintenance and asset program management solutions to evaluate the District's sanitary sewer system. PipeTech SCAN provides a software program where District employees can review televising footage to determine sewer conditions. According to the 2020 asset condition evaluation performed via ICOM, only 2.4 percent of all District collection system infrastructure (manholes and pipe) were determined to be in "poor condition" signifying that I/I was a problem in a small percentage of the entire collection system. The District also performed smoke testing on most of the gravity mains within the entire collection system in 2016 and the general conclusion was that the District possesses a very tight system and minimal potential for I/I impacts on the system. This is also reaffirmed when comparing flow data on non-precipitation days versus days that receive precipitation. Due to the relatively young age of the collection system, vitrified clay sewer pipe does not exist within the system. As a result, the District has experienced very little root intrusion and minimal levels of I/I. For all future development, it is important for a District employee to be present at all sanitary sewer extensions, connections or disconnects to ensure tight connections and/or seals to ensure minimal I/I.

Section 4 - Measures and Activities

4.1 Goals of the CMOM Program

It is important when starting a new program, or even maintaining an existing one, to set realistic goals and ensure they are clearly communicated to all involved parties. The goals for Northern Moraine WRD's CMOM plan are as follows:

a. Manage, operate, and maintain collection system to provide uninterrupted sanitary sewer service for all users in the District service area.
b. Comply with all State and Federal regulations pertaining to the sanitary sewer system, including NPDES Permit special condition(s) related to the CMOM plan.
c. Implement programs and procedures to reduce and mitigate the impact of sanitary backups and SSOs in the sanitary sewer system.
d. Provide timely notification of SSOs to all persons with reasonable potential for exposure to pollutants.
e. Ensure new sewers are properly designed and installed per plans while also ensuring good recordkeeping in the form of record drawings.
f. Identification and prioritization of capacity and structural deficiencies in the sanitary sewer system, and implementation of cost-effective rehabilitation action on identified and prioritized structural or capacity deficiencies.
g. Receive, document, and respond to all user complaints or problems relating to the sanitary sewer system.
h. Develop a written summary of the CMOM plan and perform required program audits on an as-needed basis (or annual basis at a minimum).

4.2 Legal Authorities

Management who directly oversees the collection system should possess an understanding of the legal authority it possesses to create or enforce ordinances that will ensure the system's compliance with pertinent regulatory requirements. Sewer use ordinances, pretreatment ordinances, regulatory codes, contracts, and service agreements are forms of legal documents that communities can utilize for this purpose. The legal authority typically extends to residential, commercial, and industrial customers.

4.2.1 District Code

Northern Moraine WRD Ordinances, which are available on the District website (www.nmwrd.org), contain all applicable code relating to regulations, user responsibility and the authority of the District to enforce the regulations. Authority to administer, implement, and enforce the provisions of the sewer related ordinances is given to the District Manager, who in turn, can delegate such powers to other District personnel. A list of all District ordinances and a brief description are listed in *Table 7*.

Table 7. NMWRD Ordinances

Ordinance	Description
Standard Design Details	Ordinance detailing standard design requirements by the District.
07-09 Design Standards	Ordinance establishing construction/acceptance/maintenance procedures and standard specifications and requirements.
07-10 Performance & Maintenance Guarantees	Ordinance establishing performance and maintenance guarantees.
07-11 Retained Personnel Fees	Ordinance establishing fees and compensation to the District for retained personnel, engineering and plat review, engineering inspections and procedure to be followed for construction of sanitary sewer improvements.
07-12 Connection Fees with Amendments	Ordinance establishing charges for connection to the sewerage system owned by NMWRD.
09-03 Regulation of Use	Ordinance regulating, installation, operations, and enforcement of regulated associated with the use of sewer, drains, private sewage disposal, buildings sewers, and their discharges within NMWRD
14-02 Sewer Use Fees	Ordinance establishing sewer user service charges for users of the public sewerage works owned by NMWRD.
20-02 Special Connection Fees – Darrell Rd	Ordinance amending Ordinance No. 07-12.
23-02 Amending 14-02 Establishing New Rates	Ordinance amending Ordinance N0. 14-02.

4.2.2 Other Authorities

While the District Ordinances shall govern in most circumstances, there are other authorities that the District defers to as a supplemental governing code. The "*Standard Specifications for Water and Sewer Construction in Illinois*" (latest edition) and *"Standard Specifications for Road and Bridge Construction"* (latest edition) are among other guiding documents that are used to supplement District Ordinances.

4.3 Planned O&M Activities

A concise plan and schedule for handling operations and maintenance (O&M) for the sanitary sewers, lift stations, and other components of the collection system can save time and money for the District. Therefore, it is vital that the District outline a thorough O&M plan, and it is even more important to revisit, review, and adjust the O&M plans as performance and variables change over time. The District implemented weekly, monthly, quarterly, semi-annual, and annual O&M schedules for the collection system and will continue to do so in the future. It is important to adjust the routine O&M based on the most recent evaluations of the sewer system. A full collection system maintenance schedule is provided in *Appendix B.*

4.3.1 Previous O&M Activity

Historically, the District has done a thorough job of investigating and addressing issues via routine inspections and scheduled O&M. Preventative maintenance is the main approach to maintain a reliable system, however, when challenges present themselves, reactive maintenance is an important part of responsible O&M. Note the District stores historical O&M records in various formats (i.e. physical and digital) across many locations (i.e. District server, filing cabinets, etc.).

4.3.2 Planned Sanitary Sewer O&M

The District has established a 5-year cleaning and televising cycle broken down by drainage basin within NMWRD's Service Area. The schedule was developed for a five-year cycle where a portion of the collection system is thoroughly cleaned and televised every five years (i.e. 20% of the system is cleaned and televised every year). The schedule was developed by dividing the collection system into five equal groups that contain nearly equal quantities of the District collection system. The collection system jetting and televising schedule is provided in *Table 8*. Note that it was the District's intention to begin its in-house cleaning and televising in 2021. However, due to delays in the new televising van buildout, the schedule was adjusted to begin in 2022. The result is that the District intends to clean approximately 40% of the system by the end of 2023 and 20% for the next three (3) years after 2022. In the event that the District does not meet its percentage goal, that remaining cleaning/televising will be moved to the next year and the District will look to contract out services if the 5 year schedule cannot be completed with in-house staff.

Table 8. Routine Collection System Jetting & Televising Schedule

Cleaning/Televising Schedule*	Collection system within the following Basin(s)
2022	Northeastern & Partial Northwestern
2023	Partial Northwestern & Central
2024	Waterford
2025	Partial Near East & Eastern
2026	South Central & Southern & Partial Near East

4.3.3 Planned Lift Station O&M

The District continues to perform weekly, monthly, and annual lift station O&M that includes pump and valve inspections, jetting, and use of the District owned Vac to eliminate rag and grit buildup. The NMWRD lift station maintenance schedule is listed in *Table 9.*

Table 9. Routine Lift Station Maintenance Schedule

Maintenance Task	Weekly	Monthly	Annually
Lift Station Rounds/Inspections	x		
Spare parts Inspections		x	
Wet Well & Dry Well Inspections			x

In 2019, The District approved the proposed upgrades for Lakemoor Lift Stations 1-7. This project aims to improve all Lakemoor Lift Stations through various equipment upgrades. After this project was publically bid, the District made the decision to only focus on Lakemoor LS No. 1 and

Lakemoor LS No. 6 due to rising unit price costs. The remaining Lakemoor Lift Stations will be upgraded via in-house general contracting or via another grant funded public bid. Note that the Dsitrict is already progressing the upgrades at Lakemoor LS No. 3, Lakemoor LS No. 4, and Lakemoor LS No. 7 as of the most current version of this CMOM (6th Edition). The District is also working towards a future $16 million Darrell Road Interceptor project. Currently, all Lakemoor sanitary flows are conveyed through two (2) parallel forcemains along a 4-mile stretch and the Darrell Road Interceptor will provide a redundant, alternate route while also freeing up sewage capacity in the sewer systems located in the Northeastern and Northwestern drainage basins. Part of this Darrell Road Interceptor project will also include a lift station installation.

4.3.4 Planned Equipment O&M

Routine maintenance can extend the life of sanitary sewer equipment, so it is important to perform both preventative and reactive maintenance. The District documents all preventative maintenance as well as any correlating schedules or checklists detailing or ensuring preventative maintenance. This includes preventative maintenance to lift station equipment, bypass pumping equipment, and other sewer maintenance equipment. Documentation is stored in workorder submissions via the District's choice of a Computerized Maintenance Management System (CMMS) called UpKeep. See *Section 3.7* for more information relating to UpKeep. Note that the District also stores historical O&M records in various formats (i.e. physical and digital) across many locations (i.e. District server, filing cabinets, etc.).

4.4 Emergency O&M Activities

The District will inevitably encounter unplanned activities and emergencies over time. These activities can include response to a user complaint, failure of a lift station component, damage to a sanitary sewer, an SSO event or more. The following guidelines were created to deal with emergency O&M activities.

4.4.1 Notification of the Issue

It is important to have a system for logging an issue or evaluating customer complaints that will find and track the ultimate cause of the issue. NMWRD procedure is detailed below. This procedure would be similar for a user complaint, or an issue identified by District staff.

a. Calls are received by administrative staff during business hours or forwarded to the on-call operator during non-business hours.
b. During the call, administrative staff take detailed notes relating to the problem/complaint that includes problem location, contact information, and a brief description of the problem.
c. The administrative staff then contacts the Director of Operations (via phone call and e-mail) to respond to the problem/complaint during normal hours of operations. The Director of Operations then assigns the work to a District Operator. Note that complaints are forwarded to the on-call operator during non-business hours.
d. Operations staff responds and completes the service request form on a paper version that they will carry with them in their vehicle. The operator must fill in a description of what was observed and what response was made to alleviate the problem.
e. Operations staff then completes an electronic version of the service request form and submits it to the District Clerk where it is then saved on the District's server.

f. Operations staff coordinates with the Staff Engineer to track the location of the problem/complaint.

4.4.2 Treatment of the Issue

When a problem occurs, one or more personnel are dispatched to the problem areas. Personnel will treat the issue using the best practices, if possible. If the personnel cannot identify the problem source or effectively treat the problem, further analysis may be required, and this would be coordinated through the Director of Operations and District Manager.

4.4.3 Documentation

Documentation of all service requests and solutions are stored electronically. When an SSO occurs, the District must create a record of the event using the forms in the SSO notification reporting policy. If SSOs occur at more than one location during one precipitation event, a form must be filled out for each location at which an SSO occurred. Additionally, depending on the incident, the District may be required to communicate with third party entities (such as the IEPA).

4.5 Budgeting

The efficient and proper use of monetary funds is vital for the success of the CMOM plan. Section 3.5 will review the historical O&M budget, as well as review the O&M budget for future years of the CMOM plan.

4.5.1 Previous O&M Activity Budget

NMWRD maintains the Sewer O&M Collection Fund as part of the District's annual budget. The four most recent, complete fiscal years (May 1st – Apr. 30th) of Sewer O&M Collections Fund budget expenses, along with the budgeted amount for the upcoming fiscal year are provided in *Table 10* to identify patterns and expected, routine expenses that the District should expect to incur.

Table 10. Total Expense Comparison - Sewer O&M Collections Fund

Fiscal Year	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24 (APPROVED)
Annual Collections O&M Expenses	$372,955	$445,151	$269,168	$344,751	$370,400

The average NMWRD collection system annual expense value from the last four years is $358,006. Note that the District consolidated budgetary Funds at the end of the 2019-20 fiscal year which coincided with the 1st Edition of the CMOM plan. The 'Sewer O&M Collections" fund was consolidated into a new Fund named the 'O&M Fund' at the start of the 2020-21 fiscal year. Moving forward, expenses will still be budgeted for the operations and maintenance of the collection system, but the nomenclatures will be different for future budgets.

4.5.2 Planned O&M Activities Budget

A diligent staff will plan for future O&M activities by calculating estimates based on historical data. The staff will also consider asset degradation, future growth, socio-economic factors and more when budgeting for expected expenses related to maintaining a reliable sewer system. *Table 11* identifies the District's proposed budget for the next 5 years. Note that these proposed values are calculated from the APPROVED FY 2022-23 Proposed Budget ($327,880) with an additional 5% increase due to inflation for each subsequent year. These values will be reviewed and adjusted annually based on new information relating to the collection system.

Table 11. Proposed Budget Expenses – O&M Fund (Collections System)

Fiscal Year	FY 2024-25	FY 2025-26	FY 2026-27	FY 2027-28	FY 2028-29
Proposed Collections O&M Expenses	$344,274	$361,487	$379,562	$398,540	$418,467

There is not much variability in the proposed estimates aside from accounting for inflation.

4.5.3 Emergency O&M Activities Budget

Unexpected maintenance for the sanitary sewer system, lift stations, and other equipment are inevitable; it is prudent to know the resources that will be used to accommodate these sorts of funds. All emergency activity funds are included in the general O&M budget so there is not a specific contingency budget. If an emergency activity requires extra monetary aid, funds will be diverted from other categories in order to cover the emergency activity.

4.5.4 User Rate Analysis

User rates (i.e. system revenue) are important revenue sources that are used for collection system expenses. As such, it is important for the District to understand current user rates, along with anticipated user rates in futures years. Per the most recent user rate Ordinance, the current user rate is $44.75 for FY 2023-24. Note that the District has user rate increases that are ordained over the next two (2) fiscal years. For FY 2024-25, the user rate will increase to $47.00. The District expects to perform a user rate study in the next 1-2 years. At this time, the current level of funding from revenues is sufficient for routine O&M expenses for the District's collection system as determined by the District's financial consultant.

4.6 Employees, Training & Safety

An important component of the sanitary sewer system is the personnel that oversee and perform the maintenance on the system. Of course, it is vital that these employees are well trained in both the overall function and maintenance of the sanitary sewer system as well as job safety. Majority of the District Operators have received NASSCO certification in MACP, PACP and LACP for in-house sewer cleaning and televising. Sanitary sewer systems contain many potential hazards such as harmful gases and enclosed spaces, and necessary training must be enforced to ensure the safety and wellbeing of the employees. In 2022, the District contracted with Fehr Graham to produce a new Safety Program and the Dsitrict has now implemented the new safety program. Note that District Operators receive annual safety training (or as needed) to ensure a safe work environment.

4.6.1 Organizational Structure

A District organizational structure chart is provided below in *Figure 7*.

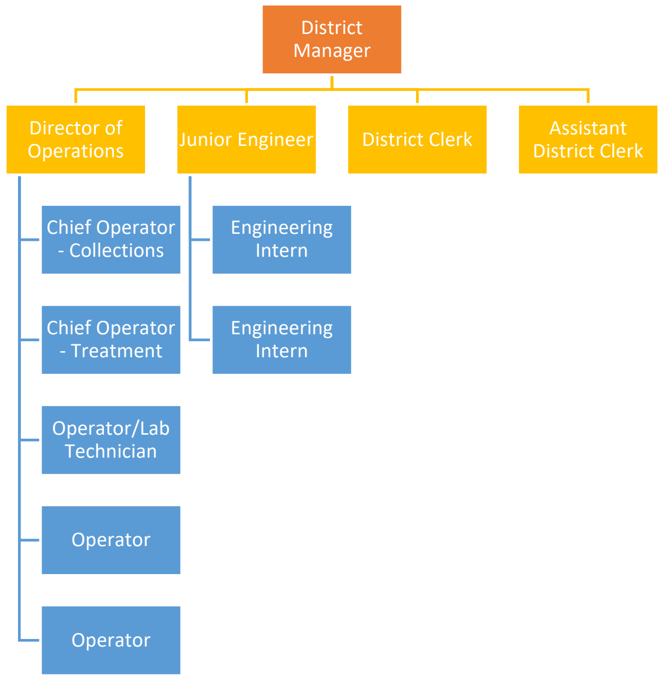

Figure 7. NMWRD Organizational Chart

4.6.2 Employees

The District currently employs ten (10) employees. The District also hires 1-2 engineering interns over the summer months. At the time of the last update, the District has retained two (2) summer engineering interns for a virtual internship throughout the fall. The District Manager directly oversees the Director of Operations, Junior Engineer, District Clerk and Assistant Clerk who all oversee additional employees. Due to the small size of NMWRD, each employee has additional responsibilities that may extend beyond what would be considered a “normal” workload. However, note that District Operators are mainly responsible for the operations and maintenance of the sanitary sewer system, including both the collections system and the wastewater treatment facility. The District currently employs five (5) full-time operators.

4.6.3 Employee Training

Employee training is vital to the success of the CMOM plan, as well as for the best management of the sanitary sewer system. NMWRD encourages all employees to pursue Operator Certification offered by the Illinois Environmental Protection Agency (IEPA) in addition to pursuing continued education to ensure that the entire staff is well versed in maintaining a reliable sewer system. The District provides ample training opportunities in the form of annual safety training and annual confined space entry training. Beyond annual training, the District enrolls District operators in various ‘Wastewater Operator Training’ courses offered by the Central States Water Environment Association (CSWEA). Note that the District’s approach to training for routine O&M and repairs includes onboard training when an operator is hired and on the job training. Lastly, all operational staff are required to review the CMOM plan on an annual basis to ensure that all staff is up to date on current CMOM policies and procedures.

4.6.4 Safety Equipment

All operators are provided with safety equipment for personal use. Similarly, the District also provides shared safety equipment that can be used by all employees. *Table 12* outlines NMWRD Collections System Safety Equipment.

Table 12. NMWRD Safety Equipment

Type	Equipment
Standard PPE	Hard Hat
	Safety Glasses
	Rubber Gloves
	High-Viz Clothing
	Steel-Toe Boots
	Ear Muffs/Plugs
Confined Space Entry	Air Monitor
	Electric Ventilation Fan/Hose
	Full-Body Harness
	Self-Retracting Lifeline / Rescue Winch with Shock Absorber
	Hip Waders
Environmental Controls	Barricades
	Safety Cones
	Warning Signs / Traffic Control Signs

4.7 Asset Management

The District manages its assets through documentation and routine maintenance. As previously discussed, the District utilizes a CMMS software named UpKeep. This software allows the District to store and track asset information, create work orders and provides a detailed look at the maintenance history of any asset within the collection system. The District currently uses UpKeep to manage mostly Lift Station assets and intends to manage the entire system in the near future. Note that the District discontinued the Asset Management Software, Cartegraph, in late 2022 due to personnel changes and lack of continuity / familiarity with the software. Since then, the District has reveted back to storing asset information in Upkeep and via spreadsheet documentation.

4.7.1 Asset Inventory

NMWRD collection system asset inventory that was previously stored in Cartegraph was exported when we discontinued the software for historical purposes. For this version of the CMOM plan, *Table 13* has been provided which details rolling stock assets relating to operating equipment used to maintain the NMWRD collection system.

Table 13. Collection System Maintenance Assets

Asset Equipment	Capital Cost	Target Replace/Renew Year
2018 Ford F250	$35,000	2026
2019 Ford F450 Crane Truck	$85,000	2027
2006 Vactor Truck	$200,000	2026/2027
2005 Easement Machine	$12,500	2025
2006 Whisperwatt Generator	$15,000	2026
2000 Olympian Generator	$15,000	2025
2011 TV Trailer & Televising Equipment	$1,500	2024/2025
2020 Godwin Bypass Pump	$35,000	2045
2019 Ford Transit	$29,000	2034
2021 Ford Explorer	$36,000	2026
2022 Ford F-550	$44,000	2027

4.7.2 Level of Service

The District services assets on both a routine, preventative basis as well as reactive, as-needed basis. The District also considers the typical service life of an asset and renews (or replaces) assets as deemed necessary. The overall level of service at NMWRD will improve in future years as routine maintenance schedules are adjusted and/or created.

4.7.3 Critical Asset Identification

Critical asset identification is typically performed through routine, visual inspection performed by District operators. Identification can also come from public observations, alarming and more. At this time, the District has identified our 24 lift stations as critical assets.

4.7.4 Life Cycle Cost

The District possess a general form of a life cycle cost for all assets relating to the operations and maintenance of the District collections system in the form of a Capital Improvement Plan (CIP). The CIP is updated on an annual frequency.

4.7.5 Long-Term Funding Strategy

Long-term funding strategies for the NMWRD collection system O&M is key to sustaining a reliable and long-lasting collection system. Historically, the main source of funding for the O&M of the collection system comes from user fees. Per the District's financial consultant's most recent review of the District's finances, long term funding is sufficient for planned O&M activities.

Section 5 - Design and Performance Provisions

5.1 Updating the CMOM

It is mandated, based on the regulations set forth by the NPDES permit, that NMWRD monitors the effectiveness of the CMOM Program. This requires the District to frequently evaluate the system in order to assess if the CMOM plan is beneficial to the District and its users. The District will schedule an evaluation annually. Some of the tables within the CMOM are meant to be updated each year with the latest data in order to observe trends. As part of this CMOM plan, the employee(s) responsible for updating the District CMOM plan will be provided all relevant digital spreadsheet files, so they will be able to update tables and exhibits; thus tracking the District's progress over the years.

5.2 Auditing the CMOM

Updating the CMOM plan ensures that the CMOM has the most recent information while auditing the CMOM means making sure the CMOM is still relevant and may involve adding or removing sections of the plan. Updating CMOM plan metrics can be done by District employees who possess enough knowledge of the District's collection system. Auditing the CMOM plan should only be performed by District Management who possess a strong background in CMOM related activity and a comprehensive knowledge of the District's collection system and finances. *Table 14* provides a record of the update/audit revisions performed.

Table 14. CMOM Revision Table (TO BE UPDATED FOR ALL FUTURE REVISIONS TO THE CMOM PLAN)

CMOM Plan No.	Employee	Position	Date	Revisions Made
Ver. 1	Joe Lapastora	Staff Engineer	Mar. 26, 2020	First Edition
Ver. 2	Joe Lapastora	Staff Engineer	September 2020	Annual Updates
Ver. 3	Joe Lapastora	Staff Engineer	September 2021	Annual updates
Ver. 4	Joe Lapastora & Luke Markko	Staff Engineer & Superintendent	April 2022	Various updates per DWPC/FOS CMOM Review Checklist
Ver. 5	Joe Lapastora	Staff Engineer	June 2022	Post IEPA Inspection Updates
Ver. 6	Jasmin Bait & Joe Lapastora	Junior Engineer & Director of Operations	September 2023	Annual Updates

Section 6 - Overflow Response Plan

6.1 Introduction

This Overflow Response Plan (ORP) has been prepared as directed in NPDES Permit No. IL0031933 and is intended to ensure that Northern Moraine Wastewater Reclamation District personnel follow established guidelines in responding to, containing, cleaning and decontaminating sanitary sewer overflows and backups which may occur within NMWRD's service area.

6.2 SSO Detection and Notification

The processes that are employed to notify the District of an SSO occurrence include observation by the public, receipt of an alarm, or observation by District staff during the normal course of their work. Public observation is the most common way that the District is notified of blockages and SSOs. Contact information for reporting SSOs and backups is in the phone book and listed on the District's website: www.nmwrd.org. The direct line to NMWRD, regardless of time-of-day, is (847) 526-3300.

The District's regular working hours are Monday through Friday from 8:00 a.m. to 3:30 p.m., except holidays. When a report of an SSO or backup is made during normal work hours, NMWRD administrative staff receive the call, takes information from the caller, and dispatches the information to the District's Director of Operations who assigns an operator to address the problem.

When a report of an SSO or backup is made outside of normal work hours, the NMWRD on-call operator is notified directly. The on-call District operator is responsible for taking information from the caller and addressing the problem. The operator is instructed to notify management in the event of an SSO or backup.

6.3 SSO Response Procedures

The District operations staff is responsible for following safety procedures at all times. Special safety precautions must be observed when performing sewer work. There may be times when District personnel responding to a sewer system event are not familiar with potential safety hazards particular to sewer work. In such cases it is appropriate to take the time to discuss safety issues, consider the order of work, and check safety equipment before starting the job.

The first responder's priorities are:

- To follow safe work practices.
- To respond promptly with the appropriate equipment.
- To contain the overflow wherever feasible.
- To restore the flow as soon as practicable.
- To minimize public access to and/or contact with the overflowed sewage.
- To determine start time and document/photograph the incident, when possible.
- To promptly notify NMWRD Management in event of major SSO.
- To return the overflowed sewage to the sewer system.
- To restore the area to its original condition (or as close as possible).

6.4 Recovery & Cleanup

The recovery and clean-up phase begins when the flow has been restored and the overflowed sewage has been contained to a non-threatening level. The SSO recovery and clean-up procedures are:

- Quantify volume of overflowed sewage.
- Recover overflowed sewage (typically with a Vac Truck).
- Clean-up and disinfect.
- Notify impacted parties.

6.5 SSO Documentation & Reporting

All SSOs should be thoroughly investigated and documented in a specific, individual file for use in managing the sewer system and meeting established notification and reporting requirements. An IEPA "SSO or Bypass Notification Summary Report" shall accompany any SSO event, should it meet reportable circumstances. Reporting procedure is outlined in the first paragraph of the IEPA "SSO or Bypass Notification Summary Report." A sample IEPA "SSO or Bypass Notification Summary Report" is provided in *Appendix C.*

6.6 Equipment

This section provides a list of specialized equipment that is required to support this Overflow Response Plan. A detailed list of SSO response equipment used for SSO response is provided below.

- Closed Circuit Television (CCTV) Inspection Trailer – A CCTV Inspection Unit is required to determine the root cause for all SSOs from gravity sewers. This includes a televising trailer, Televising software and televising camera.
- Camera - A digital or disposable camera is required to record the conditions upon arrival, during clean up, and upon departure. District issued phone will suffice.
- Emergency Response Truck (Crane Truck) -- A utility body pickup truck is required to store and transport the equipment needed to effectively respond to sewer emergencies (backups). The equipment and tools should include containment and clean up materials.
- Global Positioning System (GPS) Unit -- A hand-held GPS unit (or cellular device capable of geospatial marking) may be required to determine the coordinates of SSOs. District issued phone with GIS app will suffice.
- Portable Generators, Portable Pumps, Piping, and Hoses -- The list of portable equipment that is required to support this plan is provided in *Table 6* of Section *3.1.4*.
- Combination Sewer Cleaning Truck -- A combination high velocity sewer cleaning truck with vacuum tank is required to clear blockages in gravity sewers, vacuum sewage, and wash down the impacted area following the SSO event.

6.7 SSO Response Training

This section provides information on the training that is required to support this Overflow Response Plan (ORP).

6.7.1 Annual Training

All District personnel who may have a role in responding to, reporting, and/or mitigating a sewer system overflow should receive training on the contents of this ORP. All new employees should receive training before they are placed in a position where they may have to respond. Current employees should receive annual refresher training on this plan and the procedures to be followed. New hires may be required to handle their first SSO with an experienced partner.

6.7.2 SSO Response Drills

Periodic training drills should be held to ensure that employees are current on the procedures, the equipment is in working order, and the required materials are readily available. The training drills should cover scenarios typically observed during sewer-related emergencies (e.g. mainline blockage, mainline failure, force main failure, pump station failure, and lateral blockage). The results and the observations during the drills should be recorded and action items should be tracked to ensure completion.

6.7.3 SSO Training Record Training

Records should be kept of all training that is provided in support of this plan. The records for all scheduled training courses and for each overflow emergency response training event and should include date, time, place, content, name of trainer(s), and names of attendees. These records are stored electronically on the District server.

6.7.4 Contractors Working on District Sewer Facilities

Any contractors that work or otherwise utilize the sewer system are required to comply with all legal requirements associated with SSO responses, be provided a copy of the District's ORP and have knowledge of the District's response procedures and requirements.

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 • (217) 782-3397
JB Pritzker, Governor   John J. Kim, Director

RECEIVED
OCT 21 2020
BY:

217/782-0610

October 15, 2020

Northern Moraine Wastewater Reclamation District
P.O. Box 240
Island Lake, Illinois 60042

Re: Northern Moraine Wastewater Reclamation District WWTP
NPDES Permit No. IL0031933
Bureau ID W1114540001
Modification of NPDES Permit (After Public Notice)

Gentlemen:

The Illinois Environmental Protection Agency has reviewed the request for modification of the above referenced NPDES Permit and issued a public notice based on that request. The final decision of the Agency is to modify the Permit as follows:

1. The Phosphorus Discharge Optimization Plan submittal date required by Special Condition 20 has been extended to March 26, 2021 as requested.

Enclosed is a copy of the modified Permit. You have the right to appeal this modification to the Illinois Pollution Control Board within a 35 day period following the modification date shown on the first page of the permit.

Pursuant to the Final NPDES Electronic Reporting Rule, all permittees must report DMRs electronically unless a waiver has been granted by the Agency. The Agency utilizes NetDMR, a web based application, which allows the submittal of electronic Discharge Monitoring Reports instead of paper Discharge Monitoring Reports (DMRs). More information regarding NetDMR can be found on the Agency website, https:www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/pages/quick-answer-guide.aspx. If your facility has received a waiver from the NetDMR program, a supply of preprinted paper DMR Forms will be sent to your facility. Additional information and instructions will accompany the preprinted DMRs. Please see the attachment regarding the electronic reporting.

Should you have questions concerning the Permit, please contact Frantz Altidor at 217/782-7395.

Sincerely,

Amy L. Dragovich

Amy L. Dragovich P.E.
Manager, Permit Section
Division of Water Pollution Control

ALD: FJA: 20050701

Attachments: Final Permit

cc: Records Unit
Des Plaines Region
Compliance Assurance Section
Billing
CMAP

4302 N. Main St., Rockford, IL 61103 (815) 987-7760
9511 Harrison St., Des Plaines, IL 60016 (847) 294-4000
595 S. State, Elgin, IL 60123 (847) 608-3131
2125 S. First St., Champaign, IL 61820 (217) 278-5800
2009 Mall St., Collinsville, IL 62234 (618) 346-5120
412 SW Washington St., Suite D, Peoria, IL 61602 (309) 671-3022
2309 W. Main St., Suite 116, Marion, IL 62959 (618) 993-7200
100 W. Randolph, Suite 4-500, Chicago, IL 60601

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Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

NPDES Permit No. IL0031933

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Modified (NPDES) Permit

Expiration Date: September 30, 2023

Issue Date: September 26, 2018
Effective Date: October 1, 2018
Modification Date: October 15, 2020

Name and Address of Permittee:
Northern Moraine Wastewater Reclamation District
P.O. Box 240
Island Lake, Illinois 60042-0240

Facility Name and Address:
Northern Moraine Wastewater Reclamation District WWTP
420 Timber Trail
Island Lake, Illinois 60042
(McHenry County)

Receiving Waters: Fox River

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the Effluent Limitations, Monitoring, and Reporting requirements; Special Conditions and Attachment H Standard Conditions attached herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Amy L. Dragovich
Amy L. Dragovich, P.E.
Manager, Permit Section
Division of Water Pollution Control

ALD:FJA:20050701

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Modifcation Date: October 15, 2020

NPDES Permit No. IL0031933

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Existing Plant)

Load limits computed based on a design average flow (DAF) of 2.0 MGD (design maximum flow (DMF) of 5.0 MGD).

From the modification date of this permit until the start of operation of the proposed 3.0 MGD STP or expiration date, whichever comes first, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS mg/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
$CBOD_5$**,****	334 (834)	667 (1668)		20	40		1 Day/Week	Composite
Suspended Solids****	417 (1043)	751 (1877)		25	45		1 Day/Week	Composite
pH	Shall be in the range of 6 to 9 Standard Units						1 Day/Week	Grab
Fecal Coliform	The monthly geometric mean shall not exceed 200 per 100 mL No more than 10% of the samples during the month shall exceed 400 per mL						3 Days/Week	Grab
Chlorine Residual						0.05	3 Days/Week	Grab
Ammonia Nitrogen: As (N)								
April-Oct.	25 (63)		42 (104)	1.5		2.5	3 Days/Week	Composite
Nov.-Feb.	62 (154)		82 (204)	3.7		4.9	3 Days/Week	Composite
March	25 (63)		60 (150)	1.5		3.6	3 Days/Week	Composite
Total Nitrogen (as N)	Monitor Only						1 Day/Week	Composite
Dissolved Phosphorus	Monitor Only						1 Day/Month	Composite
Nitrate/Nitrite	Monitor Only						1 Day/Month	Composite
Total Kjeldahl Nitrogen (TKN)	Monitor Only						1 Day/Month	Composite
Alkalinity	Monitor Only						1 Day/Month	Grab
Temperature	Monitor Only						1 Day/Month	Grab
			Annual Average			Annual Average		
Total Phosphorus (as P)***			17 (42)			1.0	1 Day/Week	Composite
				Monthly Average not Less than	Weekly Average, not less than	Daily Minimum		
Dissolved Oxygen March-July				N/A	6.0	5.0	3 Days/Week	Grab
August-February				5.5	4.0	3.5	3 Days/Week	Grab

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Existing Plant) (continued)

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 17.
****BOD_5 and Suspended Solids (85% removal required): In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this Permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent $CBOD_5$ concentration to determine the effluent BOD_5 concentration. Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a monthly geometric mean and a daily maximum value.

pH shall be reported on the DMR as minimum and maximum value.

Chlorine Residual shall be reported on the DMR as daily maximum value.

Ammonia Nitrogen shall be reported on the DMR as a daily maximum value.

Dissolved oxygen shall be reported on the DMR as a minimum value.

Total Phosphorus shall be reported on the DMR as a monthly average and daily maximum value.

The Annual Average, 12 month rolling average (calculated monthly), phosphorus limit shall be computed monthly. The Annual Average shall be calculated by adding the sum of the total phosphorus monitoring values from the previous 12 months of data expressed in milligrams/liter and divided by the number of samples collected. The Annual Average value for total phosphorus shall be reported on the DMR.

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Page 4

Modifcation Date: October 15, 2020

NPDES Permit No. IL0031933

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Proposed Plant)

Load limits computed based on a design average flow (DAF) of 3.0 MGD (design maximum flow (DMF) of 6.0 MGD).

From the completion and start of operation of the proposed plant expansion until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*				CONCENTRATION LIMITS mg/L					
Parameter	Annual Avg.	Monthly Avg.	Weekly Avg.	Daily Max.	Annual Avg.	Monthly Avg.	Weekly Avg.	Daily Max.	Sample Frequency	Sample Type
Flow (MGD)									Continuous	
CBOD₅**,*****	250 (500)	500 (1001)	1001 (2002)		10	20	40		3 Days/Week	Composite
Suspended Solids****	300 (600)	600 (1201)	1126 (2252)		12	25	45		3 Days/Week	Composite
pH	Shall be in the range of 6 to 9 Standard Units								3 Days/Week	Grab
Fecal Coliform	The monthly geometric mean shall not exceed 200 per 100 mL No more than 10% of the samples during the month shall exceed 400 per mL								3 Days/Week	Grab
Chlorine Residual								0.05	3 Days/Week	Grab
Ammonia Nitrogen: As (N)										
April-Oct.		38 (75)		63 (125)		1.5		2.5	3 Days/Week	Composite
Nov.-Feb.		93 (185)		123 (245)		3.7		4.9	3 Days/Week	Composite
March.		38 (75)		90 (180)		1.5		3.6	3 Days/Week	Composite
Total Phosphorus (as P)		25 (50)				1.0			3 Days/Week	Composite
Total Nitrogen (as N)***		Monitor Only							1 Day/Week	Composite
Dissolved Phosphorus		Monitor Only							1 Day/Month	Composite
Nitrate/Nitrite		Monitor Only							1 Day/Month	Composite
Total Kjeldahl Nitrogen (TKN)		Monitor Only							1 Day/Month	Composite
Alkalinity		Monitor Only							1 Day/Month	Grab
Temperature		Monitor Only							1 Day/Month	Grab
						Monthly Average not less than	Weekly Average not less than	Daily Minimum		
Dissolved Oxygen										
March-July						N/A	6.0	5.0	3 Days/Week	Grab
August-February						5.5	4.0	3.5	3 Days/Week	Grab

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Page 5 Modifcation Date: October 15, 2020

NPDES Permit No. IL0031933

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Proposed Plant) (Continued)

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 15.
****BOD_5 and Suspended Solids (85% removal required): In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this Permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent $CBOD_5$ concentration to determine the effluent BOD_5 concentration. Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a daily maximum value.

pH shall be reported on the DMR as minimum and maximum value.

Chlorine Residual shall be reported on the DMR as daily maximum value.

Dissolved oxygen shall be reported on the DMR as a minimum value.

Phosphorus shall be reported on the DMR as a monthly average and daily maximum value.

Total Nitrogen shall be reported on the DMR as a monthly average. Total Nitrogen is the sum total of Total Kjeldahl Nitrogen, Nitrate and Nitrite.

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

Parameter	Sample Frequency*	Sample Type
Flow (MGD)	Continuous	
BOD_5	1 Day/Week	Composite
Suspended Solids	1 Day/Week	Composite

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

*When the proposed plant becomes operational, influent monitoring sample frequency shall be increased to 3 days/week.

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

NPDES Permit No. IL0031933

Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws and regulations. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 1 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR § 122.63 and Without Public Notice.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302 and 303.

SPECIAL CONDITION 6. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) electronic forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR Form shall be submitted with no discharge indicated.

The Permittee is required to submit electronic DMRs (NetDMRs) instead of mailing paper DMRs to the IEPA unless a waiver has been granted by the Agency. More information, including registration information for the NetDMR program, can be obtained on the IEPA website, http://www.epa.state.il.us/water/net-dmr/index.html.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 25th day of the following month, unless otherwise specified by the permitting authority.

Permittees that have been granted a waiver shall mail Discharge Monitoring Reports with an original signature to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 7. The provisions of 40 CFR Section 122.41(m) & (n) are incorporated herein by reference.

SPECIAL CONDITION 8. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 9. The Permittee shall conduct semi-annual monitoring of the effluent and report concentrations (in mg/l) of the following listed parameters. Monitoring shall begin three (3) months from the effective date of this permit. The sample shall be a 24-hour effluent composite except as otherwise specifically provided below and the results shall be submitted on Discharge Monitoring Report Forms to IEPA unless otherwise specified by the IEPA. The parameters to be sampled and the minimum reporting limits to be attained are as follows:

STORET CODE	PARAMETER	Minimum reporting limit
01002	Arsenic	0.05 mg/L
01007	Barium	0.5 mg/L
01027	Cadmium	0.001 mg/L
01032	Chromium (hexavalent) (grab)	0.01 mg/L
01034	Chromium (total)	0.05 mg/L
01042	Copper	0.005 mg/L
00720	Cyanide (total) (grab)***	5.0 ug/L
00722	Cyanide (grab) (available**** or amenable to chlorination)***	5.0 ug/L
00951	Fluoride	0.1 mg/L
01045	Iron (total)	0.5 mg/L
01046	Iron (Dissolved)	0.5 mg/L
01051	Lead	0.05 mg/L
01055	Manganese	0.5 mg/L

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Special Conditions

71900	Mercury (grab)**	1.0 ng/L*
01067	Nickel	0.005 mg/L
00556	Oil (hexane soluble or equivalent) (Grab Sample only)	5.0 mg/L
32730	Phenols (grab)	0.005 mg/L
01147	Selenium	0.005 mg/L
01077	Silver (total)	0.003 mg/L
01092	Zinc	0.025 mg/L

Minimum Reporting Limits are defined as – (1) The minimum value below which data are documented as non-detects. (2) Three to ten times the method detection limit. (3) The minimum value of the calibration range.

All sample containers, preservative, holding times, analyses, method detection limit determinations and quality assurance/quality control requirements shall be in accordance with 40 CFR 136.

Unless otherwise indicated, concentrations refer to the total amount of the constituent present in all phases, whether solid, suspended or dissolved, elemental or combined, including all oxidation states.

*1.0 ng/L = 1 part per trillion.
**Utilize USEPA Method 1631E and the digestion procedure described in Section 11.1.1.2 of 1631E.
***Analysis for cyanide (available or amenable to chlorination) is only required if cyanide (total) is detected or more than the minimum reporting limit.
****US EPA Method OIA-1677.

If the Permittee has any new significant industrial users tributary to the Permittee's treatment facility, the Permittee shall provide a report briefly describing the permittee's pretreatment activities and a listing of the Permittee's significant industrial users. The list should specify which categorical pretreatment standards, if any, are applicable to each Industrial User. Such report shall be submitted within six (6) months of the commencement of any industrial user discharge to the Permittee's treatment facility to the following addresses:

U.S. Environmental Protection Agency
Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604
Attention: Water Assurance Branch Enforcement and Compliance

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance assurance Section, Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 10. The Permittee has undergone a Monitoring Reduction review and the influent and effluent sample frequency has been reduced for parameters due to sustained compliance. The IEPA may require that the influent and effluent sampling frequency for these parameters be increased without Public Notice. This provision does not limit EPA's authority to require additional monitoring, information or studies pursuant to Section 308 of the CWA.

SPECIAL CONDITION 11. During January of each year the Permittee shall submit annual fiscal data regarding sewerage system operations to the Illinois Environmental Protection Agency/Division of Water Pollution Control/Compliance Assurance Section. The Permittee may use any fiscal year period provided the period ends within twelve (12) months of the submission date.

Submission shall be on forms provided by IEPA titled "Fiscal Report Form For NPDES Permittees".

SPECIAL CONDITION 12. The Permittee shall conduct biomonitoring of the effluent from Discharge Number(s) 001.

Biomonitoring

A. Acute Toxicity - Standard definitive acute toxicity tests shall be run on at least two trophic levels of aquatic species (fish, invertebrate) representative of the aquatic community of the receiving stream. Testing must be consistent with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fifth Ed.) EPA/821-R-02-012. Unless substitute tests are pre-approved; the following tests are required:

   1. Fish - 96 hour static LC_{50} Bioassay using fathead minnows (Pimephales promelas).

   2. Invertebrate 48-hour static LC_{50} Bioassay using Ceriodaphnia.

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Page 9 Modifcation Date: October 15, 2020

NPDES Permit No. IL0031933

Special Conditions

B. Testing Frequency - The above tests shall be conducted using 24-hour composite samples unless otherwise authorized by the IEPA. Samples must be collected in the 18th, 15th, 12th, and 9th month prior to the expiration date of this Permit.

C. Reporting - Results shall be reported according to EPA/821-R-02-012, Section 12, Report Preparation, and shall be submitted to IEPA, Bureau of Water, Compliance Assurance Section within one week of receipt from the laboratory. Reports are due to the IEPA no later than the 16th, 13th, 10th, and 7th month prior to the expiration date of this Permit.

D. Toxicity - Should a bioassay result in toxicity to >20% of organisms test in the 100% effluent treatment, the IEPA may require, upon notification, six (6) additional rounds of monthly testing on the affected organism(s) to be initiated within 30 days of the toxic bioassay. Results shall be submitted to IEPA within (1) week of becoming available to the Permittee. Should any of the additional bioassays result in toxicity to ≥50% of organisms tested in the 100% effluent treatments, the Permittee shall immediately notify IEPA in writing of the test results.

E. Toxicity Reduction Evaluation and Identification - Should the biomonitoring program identify toxicity and result in notification by IEPA, the permittee shall develop a plan for toxicity reduction evaluation and identification. This plan shall be developed and implemented in accordance with Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833B-99/002, and shall include an evaluation to determine which chemicals have a potential for being discharged in the plant wastewater, a monitoring program to determine their presence or absence and to identify other compounds which are not being removed by treatment, and other measures as appropriate. The Permittee shall submit to the IEPA its plan within ninety (90) days following notification by the IEPA. The Permittee shall implement the plan within ninety (90) days of notification date of the permittee above or other such date as is received by letter from IEPA.

The IEPA may modify this Permit during its term to incorporate additional requirements or limitations based on the results of the biomonitoring. In addition, after review of the monitoring results and toxicity reduction evaluation, the IEPA may modify this Permit to include numerical limitations for specific toxic pollutants and additional whole effluent toxicity monitoring to confirm the results of the evaluation. Modifications under this condition shall follow public notice and opportunity for hearing.

SPECIAL CONDITION 13. For the duration of this Permit, the Permittee shall determine the quantity of sludge produced by the treatment facility in dry tons or gallons with average percent total solids analysis. The Permittee shall maintain adequate records of the quantities of sludge produced and have said records available for IEPA inspection. The Permittee shall submit to the IEPA, at a minimum, a semi-annual summary report of the quantities of sludge generated and disposed of, in units of dry tons or gallons (average total percent solids) by different disposal methods including but not limited to application on farmland, application on reclamation land, landfilling, public distribution, dedicated land disposal, sod farms, storage lagoons or any other specified disposal method. Said reports shall be submitted to the IEPA by January 31 and July 31 of each year reporting the preceding January thru June and July thru December interval of sludge disposal operations.

Duty to Mitigate. The Permittee shall take all reasonable steps to minimize any sludge use or disposal in violation of this Permit.

Sludge monitoring must be conducted according to test procedures approved under 40 CFR 136 unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this Permit.

Planned Changes. The Permittee shall give notice to the IEPA on the semi-annual report of any changes in sludge use and disposal.

The Permittee shall retain records of all sludge monitoring, and reports required by the Sludge Permit as referenced in Standard Condition 25 for a period of at least five (5) years from the date of this Permit.

If the Permittee monitors any pollutant more frequently than required by the Sludge Permit, the results of this monitoring shall be included in the reporting of data submitted to the IEPA.

The Permittee shall comply with existing federal regulations governing sewage sludge use or disposal and shall comply with all existing applicable regulations in any jurisdiction in which the sewage sludge is actually used or disposed.

The Permittee shall comply with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish the standards for sewage sludge use or disposal even if the permit has not been modified to incorporate the requirement.

The Permittee shall ensure that the applicable requirements in 40 CFR Part 503 are met when the sewage sludge is applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator.
Monitoring reports for sludge shall be reported on the form titled "Sludge Management Reports" to the following address:

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Special Conditions

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 14. This Permit may be modified to include alternative or additional final effluent limitations pursuant to an approved Total Maximum Daily Load (TMDL) Study, an approved Implementation Plan, or an approved trading program.

SPECIAL CONDITION 15. The Permittee shall operate the facilities consistent with its design parameters for biological nutrient removal (BNR). Monitoring for Total Nitrogen is required to document the actual total nitrogen effluent concentration. The Permittee shall monitor the influent and effluent for total nitrogen once per week. The monitoring shall be a composite sample and the results reported as a monthly average and a daily maximum on the Permittee's Discharge Monitoring Forms.

SPECIAL CONDITION 16. The Permittee shall participate in the Fox River Study Group (FRSG) throughout the duration of this permit cycle. The Permittee shall work with other watershed members of the FRSG to determine the most cost effective means to remove dissolved oxygen (DO) impairment and offensive condition impairments in the Fox River to the extent feasible. The Permittee shall participate in the FRSG for the completion of the following tasks set out in the 2015 Fox River Implementation Plan (either by the permittee or through the FRSG) by the schedule dates set forth below:

A. The Permittee shall implement the recommendations of the 2015 Fox River Implementation Plan that are applicable to said Permittee during the term of this Permit.
B. The FRSG will conduct these activities during the term of the permit:
   1. Work with the Army Corps of Engineers and Illinois Department of Natural Resources to restart the Fox River Habitat & Connectivity Study.
   2. Collect continuous dissolved oxygen data and other water quality parameters at the Algonquin Bike Bridge from May through September 2018 to update the FRSG's water quality model.
   3. Analyze Fox River and Major Tributary Water Quality Data and Trends, for the period 1998-2016 by December 31, 2018.
   4. Update the Fox River DB database with newly collected data, by July 31, 2019.
   5. Amend the modelling and use the modified model to reevaluate water quality improvement scenarios, by August 31, 2019.
   6. Amend the Implementation Plan by December 31, 2022 based on the improved modelling and which will include proposed watershed improvement projects.
C. The Permittee shall submit an annual progress report on the activities identified in Item B above to the Agency by March 31 of each year. The Permittee may work cooperatively with the FRSG to prepare a single annual progress report that is common among FRSG permittees.
D. In its application for renewal of this permit, the Permittee shall consider and incorporate recommended FRSG activities listed in the Implementation Plan that the Permittee will implement during the next permit term.

SPECIAL CONDITION 17. A phosphorus limit of 1.0 mg/L (12-month rolling average, calculated monthly) shall become effective one and one-half (1 ½) years from the effective date of this Permit.

In order for the Permittee to achieve the above limit, it will be necessary to modify existing treatment facilities to include phosphorus removal, reduce phosphorus sources or explore other ways to prevent discharges that exceed the limit. The Permittee must implement the following compliance measures consistent with the schedule below:

A. Progress Report	6 months from effective date of permit
B. Achieve Annual Concentration and Loading Effluent Limitations for Total Phosphorus	May 1, 2019

Reporting shall be submitted on the NetDMR's on a monthly basis.

REPORTING

The Permittee shall submit reports for items A and B of the compliance schedule indicating: a) the date the item was completed, or b) that the item was not completed, the reasons for non-completion and the anticipated completion date to the Agency Compliance Section.

SPECIAL CONDITION 18. The Permittee shall, within 18 months of the effective date of this permit, prepare and submit to the Agency a Phosphorus Removal Feasibility Study (PRFS) that identifies the method, timeframe, and costs of reducing phosphorus levels in its discharge to a level consistently meeting a potential future effluent limit of 0.1 mg/L. The study shall evaluate the construction and O &

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Special Conditions

M costs of the application of this limit on a monthly, seasonal and annual average basis. The feasibility report shall also be shared with the Fox River Study Group. Previously submitted feasibility studies may be updated with supplemental treatment technologies necessary to achieve 0.1 mg/L.

SPECIAL CONDITION 19. An effluent limit of 0.5 mg/L Total Phosphorus 12-month rolling geometric mean (calculated monthly) (hereinafter Limit) will be applicable to the Permittee beginning January 1, 2030. The Agency may modify the permit if:

A. The Permittee demonstrates that the Limit is not technologically feasible; or
B. The Permittee demonstrates the Limit would result in substantial and widespread economic or social impact. Substantial and widespread economic impacts must be demonstrated using applicable USEPA guidance, including but not limited to any of the following documents:
   1. Interim Economic Guidance for Water Quality Standards, March 1995, EPA-823-95-002;
   2. Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development, February 1997, EPA-832—97-004;
   3. Financial Capability Assessment Framework for Municipal Clean Water Act Requirements, November 24, 2014; or
C. If the Implementation Plan determines that a greater phosphorus reduction is necessary and achievable before January 1, 2030, then the Permittee shall meet the phosphorus limit identified in the Implementation Plan in accordance with the schedule set out therein; or
D. If the Limit is demonstrated not to be technologically or economically feasible by January 1, 2030, but is feasible within a longer timeline, then the Limit shall be met as soon as feasible; or
E. If the Limit is demonstrated not to be technologically or economically achievable by the Permittee, then an effluent limit that is achievable by the Permittee must be met as soon as feasible and shall not exceed 0.6 mg/L Total Phosphorus 12-month rolling geometric mean (calculated monthly).

The Agency will modify the NPDES permit if necessary. Any permit modification will be public noticed and made available for public review and comment prior to issuance of any permit modification. No date deadline extension or effluent limitation modification will be effective until it is included in a modified or Modified NPDES permit.

SPECIAL CONDITION 20. The Permittee shall develop and submit to the Agency a Phosphorus Discharge Optimization Plan shall be submitted by March 26, 2021. The plan shall include a schedule for the implementation of these optimization measures. Annual progress reports on the optimization of the existing treatment facilities shall be submitted to the Agency by May 1 of each year beginning 12 months from the modified date of the permit. In developing the plan, the Permittee shall evaluate a range of measures for reducing phosphorus discharges from the treatment plant, including possible source reduction measures, operational improvements, and minor facility modifications that will optimize reductions in phosphorus discharges from the wastewater treatment facility. The Permittee's evaluation shall include, but not be limited to, an evaluation of the following optimization measures:

A. WWTF influent reduction measures.
   1. Evaluate the phosphorus reduction potential of users.
   2. Determine which sources have the greatest opportunity for reducing phosphorus (i.e., industrial, commercial, institutional, municipal and others).
      a. Determine whether known sources (i.e., restaurant and food preparation) can adopt phosphorus minimization and water conservation plans.
      b. Evaluate implementation of local limits on influent sources of excessive phosphorus.
B. WWTF effluent reduction measures.
   1. Reduce phosphorus discharges by optimizing existing treatment processes.
      a. Adjust the solids retention time for either nitrification, denitrification, or biological phosphorus removal.
      b. Adjust aeration rates to reduce dissolved oxygen and promote simultaneous nitrification-denitrification.
      c. Add baffles to existing units to improve microorganism conditions by creating divided anaerobic, anoxic, and aerobic zones.
      d. Change aeration settings in plug flow basins by turning off air or mixers at the inlet side of the basin system.
      e. Minimize impact on recycle streams by improving aeration within holding tanks.
      f. Reconfigure flow through existing basins to enhance biological nutrient removal.
      g. Increase volatile fatty acids for biological phosphorus removal.

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Special Conditions

SPECIAL CONDITION 21. The Permittee shall notify the IEPA in writing once the treatment plant expansion has been completed. A letter stating the date that the expansion was completed shall be sent to the following address within fourteen (14) days of the expansion becoming operational:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 22. The Permittee shall monitor the wastewater effluent for Total Phosphorus, Dissolved Phosphorus, Nitrate/Nitrite, Total Kjeldahl Nitrogen (TKN), Ammonia, Total Nitrogen (calculated), Alkalinity and Temperature at least once a month beginning on the effective date of this permit. The Permittee shall monitor the wastewater influent for Total Phosphorus at least once a month. The results shall be submitted on electronic Discharge Monitoring Report Forms (NetDMRs) to IEPA unless otherwise specified by the IEPA.

SPECIAL CONDITION 23. The Permittee shall work towards the goals of achieving no discharges from sanitary sewer overflows or basement back-ups and ensuring that overflows or back-ups, when they do occur do not cause or contribute to violations of applicable standards or cause impairment in any adjacent receiving water. Overflows from sanitary sewers are expressly prohibited by this permit and by Ill. Adm. Code 306.304. As part of the process to ultimately achieve compliance through the elimination of and mitigating the adverse impacts of any such overflows if they do occur, the Permittee shall (A) identify and report to IEPA all SSOs that do occur, and (B) develop, implement and submit to the IEPA a Capacity, Management, Operations, and Maintenance (CMOM) plan which includes an Asset Management strategy within Eighteen (18) months of the effective date of this Permit or review and revise any existing plan accordingly. The Permittee shall modify the Plan to incorporate any comments that it receives from IEPA and shall implement the modified plan as soon as possible. The Permittee should work as appropriate, in consultation with affected authorities at the local, county, and/or state level to develop the plan components involving third party notification of overflow events. The Permittee may be required to construct additional sewage transport and/or treatment facilities in future permits or other enforceable documents should the implemented CMOM plan indicate that the Permittee's facilities are not capable of conveying and treating the flow for which they are designed.

The CMOM plan shall include the following elements:

A. Measures and Activities:

1. A complete map and system inventory for the collection system owned and operated by the Permittee;
2. Organizational structure; budgeting; training of personnel; legal authorities; schedules for maintenance, sewer system cleaning, and preventative rehabilitation; checklists, and mechanisms to ensure that preventative maintenance is performed on equipment owned and operated by the Permittee;
3. Documentation of unplanned maintenance;
4. An assessment of the capacity of the collection and treatment system owned and operated by the Permittee at critical junctions and immediately upstream of locations where overflows and backups occur or are likely to occur; use flow monitoring and/or sewer hydraulic modeling, as necessary;
5. Identification and prioritization of structural deficiencies in the system owned and operated by the Permittee. Include preventative maintenance programs to prevent and/or eliminate collection system blockages from roots or grease, and prevent corrosion or negative effects of hydrogen sulfide which may be generated within collection system;
6. Operational control, including documented system control procedures, scheduled inspections and testing, list of scheduled frequency of cleaning (and televising as necessary) of sewers;
7. The Permittee shall develop and implement an Asset Management strategy to ensure the long-term sustainability of the collection system. Asset Management shall be used to assist the Permittee in making decisions on when it is most appropriate to repair, replace or rehabilitate particular assets and develop long-term funding strategies; and
8. Asset Management shall include but is not limited to the following elements:
   a. Asset Inventory and State of the Asset;
   b. Level of Service;
   c. Critical Asset Identification;
   d. Life Cycle Cost; and
   e. Long-Term Funding Strategy.

B. Design and Performance Provisions:

1. Monitor the effectiveness of CMOM;
2. Upgrade the elements of the CMOM plan as necessary; and
3. Maintain a summary of CMOM activities.

Special Conditions

C. Overflow Response Plan:

1. Know where overflows and back-ups within the facilities owned and operated by the Permittee occur;
2. Respond to each overflow or back-up to determine additional actions such as clean up; and
3. Locations where basement back-ups and/or sanitary sewer overflows occur shall be evaluated as soon as practicable for excessive inflow/infiltration, obstructions or other causes of overflows or back-ups as set forth in the System Evaluation Plan.
4. Identify the root cause of the overflow or basement backup, and document to files;
5. Identify actions or remediation efforts to reduce risk of reoccurrence of these overflows or basement backups in the future, and document to files.

D. System Evaluation Plan:

1. Summary of existing SSO and Excessive I/I areas in the system and sources of contribution;
2. Evaluate plans to reduce I/I and eliminate SSOs;
3. Evaluate the effectiveness and performance in efforts to reduce excessive I/I in the collection system;
4. Special provisions for Pump Stations and force mains and other unique system components; and
5. Construction plans and schedules for correction.

E. Reporting and Monitoring Requirements:

1. Program for SSO detection and reporting; and
2. Program for tracking and reporting basement back-ups, including general public complaints.

F. Third Party Notice Plan:

1. Describes how, under various overflow scenarios, the public, as well as other entities, would be notified of overflows within the Permittee's system that may endanger public health, safety or welfare;
2. Identifies overflows within the Permittee's system that would be reported, giving consideration to various types of events including events with potential widespread impacts;
3. Identifies who shall receive the notification;
4. Identifies the specific information that would be reported including actions that will be taken to respond to the overflow;
5. Includes a description of the lines of communication; and
6. Includes the identities and contact information of responsible POTW officials and local, county, and/or state level officials.

For additional information concerning USEPA CMOM guidance and Asset Management please refer to the following web site addresses.
http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf and
http://water.epa.gov/type/watersheds/wastewater/upload/guide_smallsystems_assetmanagement_bestpratices.pdf

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Attachment H

Standard Conditions

Definitions

Act means the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

Agency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) means Pub. L 92-500, as amended. 33 U.S.C. 1251 et seq.

NPDES (National Pollutant Discharge Elimination System) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 of the Clean Water Act.

USEPA means the United States Environmental Protection Agency.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum Daily Discharge Limitation (daily maximum) means the highest allowable daily discharge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

Grab Sample means an individual sample of at least 100 milliliters collected at a randomly-selected time over a period not exceeding 15 minutes.

24-Hour Composite Sample means a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

8-Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour period.

Flow Proportional Composite Sample means a combination of sample aliquots of at least 100 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

(1) **Duty to comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.

(2) **Duty to reapply.** If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.

(3) **Need to halt or reduce activity not a defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(4) **Duty to mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

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

(6) **Permit actions.** This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62 and 40 CFR 122.63. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(7) **Property rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

(8) **Duty to provide information.** The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency upon request, copies of records required to be kept by this permit.

(9) **Inspection and entry.** The permittee shall allow an authorized representative of the Agency or USEPA (including an authorized contractor acting as a representative of the Agency or USEPA), upon the presentation of credentials and other documents as may be required by law, to:

(a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Page 15

must be kept under the conditions of this permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.

(10) **Monitoring and records**.

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of this permit, measurement, report or application. Records related to the permittee's sewage sludge use and disposal activities shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503). This period may be extended by request of the Agency or USEPA at any time.

(c) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The individual(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

(d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Where no test procedure under 40 CFR Part 136 has been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

(11) **Signatory requirement**. All applications, reports or information submitted to the Agency shall be signed and certified.

(a) **Application**. All permit applications shall be signed as follows:

(1) For a corporation: by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation:

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

(b) **Reports**. All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a); and

(2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and

(3) The written authorization is submitted to the Agency.

(c) **Changes of Authorization**. If an authorization under (b) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of (b) must be submitted to the Agency prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) **Certification**. Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(12) **Reporting requirements**.

(a) **Planned changes**. The permittee shall give notice to the Agency as soon as possible of any planned physical alterations or additions to the permitted facility.
Notice is required when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source pursuant to 40 CFR 122.29 (b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements pursuant to 40 CFR 122.42 (a)(1).

(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

(b) **Anticipated noncompliance**. The permittee shall give advance notice to the Agency of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(c) **Transfers**. This permit is not transferable to any person except after notice to the Agency.

(d) **Compliance schedules**. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(e) **Monitoring reports**. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR).

(2) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR 136 or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

(3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Agency in the permit.

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

Page 16

(f) **Twenty-four hour reporting**. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24-hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and time; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported within 24-hours:

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit.

(2) Any upset which exceeds any effluent limitation in the permit.

(3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit or any pollutant which may endanger health or the environment.

The Agency may waive the written report on a case-by-case basis if the oral report has been received within 24-hours.

(g) **Other noncompliance**. The permittee shall report all instances of noncompliance not reported under paragraphs (12) (d), (e), or (f), at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (12) (f).

(h) **Other information**. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Agency, it shall promptly submit such facts or information.

(13) **Bypass**.

(a) Definitions.

(1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

(2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(b) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (13)(c) and (13)(d).

(c) Notice.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph (12)(f) (24-hour notice).

(d) Prohibition of bypass.

(1) Bypass is prohibited, and the Agency may take enforcement action against a permittee for bypass, unless:

(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(iii) The permittee submitted notices as required under paragraph (13)(c).

(2) The Agency may approve an anticipated bypass, after considering its adverse effects, if the Agency determines that it will meet the three conditions listed above in paragraph (13)(d)(1).

(14) **Upset**.

(a) Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(b) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (14)(c) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(c) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated; and

(3) The permittee submitted notice of the upset as required in paragraph (12)(f)(2) (24-hour notice).

(4) The permittee complied with any remedial measures required under paragraph (4).

(d) Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

(15) **Transfer of permits**. Permits may be transferred by modification or automatic transfer as described below:

(a) Transfers by modification. Except as provided in paragraph (b), a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued pursuant to 40 CFR 122.62 (b) (2), or a minor modification made pursuant to 40 CFR 122.63 (d), to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

(b) Automatic transfers. As an alternative to transfers under paragraph (a), any NPDES permit may be automatically transferred to a new permittee if:
   (1) The current permittee notifies the Agency at least 30 days in advance of the proposed transfer date;
   (2) The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage and liability between the existing and new permittees; and
   (3) The Agency does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement.

(16) All manufacturing, commercial, mining, and silvicultural dischargers must notify the Agency as soon as they know or have reason to believe:
   (a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant identified under Section 307 of the Clean Water Act which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:
      (1) One hundred micrograms per liter (100 ug/l);
      (2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6 dinitrophenol; and one milligram per liter (1 mg/l) for antimony.
      (3) Five (5) times the maximum concentration value reported for that pollutant in the NPDES permit application; or
      (4) The level established by the Agency in this permit.
   (b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the NPDES permit application.

(17) All Publicly Owned Treatment Works (POTWs) must provide adequate notice to the Agency of the following:
   (a) Any new introduction of pollutants into that POTW from an indirect discharge which would be subject to Sections 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and
   (b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
   (c) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

(18) If the permit is issued to a publicly owned or publicly regulated treatment works, the permittee shall require any industrial user of such treatment works to comply with federal requirements concerning:
   (a) User charges pursuant to Section 204 (b) of the Clean Water Act, and applicable regulations appearing in 40 CFR 35;
   (b) Toxic pollutant effluent standards and pretreatment standards pursuant to Section 307 of the Clean Water Act; and
   (c) Inspection, monitoring and entry pursuant to Section 308 of the Clean Water Act.

(19) If an applicable standard or limitation is promulgated under Section 301(b)(2)(C) and (D), 304(b)(2), or 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in the permit, or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked, and reissued to conform to that effluent standard or limitation.

(20) Any authorization to construct issued to the permittee pursuant to 35 Ill. Adm. Code 309.154 is hereby incorporated by reference as a condition of this permit.

(21) The permittee shall not make any false statement, representation or certification in any application, record, report, plan or other document submitted to the Agency or the USEPA, or required to be maintained under this permit.

(22) The Clean Water Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $25,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both.
Additional penalties for violating these sections of the Clean Water Act are identified in 40 CFR 122.41 (a)(2) and (3).

(23) The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

(24) The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

(25) Collected screening, slurries, sludges, and other solids shall be disposed of in such a manner as to prevent entry of those wastes (or runoff from the wastes) into waters of the State. The proper authorization for such disposal shall be obtained from the Agency and is incorporated as part hereof by reference.

(26) In case of conflict between these standard conditions and any other condition(s) included in this permit, the other condition(s) shall govern.

(27) The permittee shall comply with, in addition to the requirements of the permit, all applicable provisions of 35 Ill. Adm. Code, Subtitle C, Subtitle D, Subtitle E, and all applicable orders of the Board or any court with jurisdiction.

(28) The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit is held invalid, the remaining provisions of this permit shall continue in full force and effect.

(Rev. 7-9-2010 bah)

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

United States Environmental Protection Agency | Office of Enforcement and Compliance Assurance | September 2015

Final NPDES Electronic Reporting Rule

On 24 September 2015, Administrator Gina McCarthy signed the final National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule for publication in the Federal Register. The publication of this rule is the latest step in an extensive multi-year outreach effort with EPA's state, tribal and territorial partners. This rule will replace most paper-based Clean Water Act (CWA) NPDES permitting and compliance monitoring reporting requirements with electronic reporting.

Purpose of the Final Rule

This final rule is designed to save authorized state, tribe, or territorial NPDES programs considerable resources, make reporting easier for NPDES-regulated entities, streamline permit renewals, ensure full exchange of basic NPDES permit data between states and EPA, improve environmental decision-making, and better protect human health and the environment.

This final rule requires that NPDES regulated entities electronically submit the following permit and compliance monitoring information instead of using paper reports:

- Discharge Monitoring Reports (DMRs);
- Notices of Intent to discharge in compliance with a general permit; and
- Program reports.

Authorized NPDES programs will also electronically submit NPDES program data to EPA to ensure that there is consistent and complete reporting nationwide, and to expedite the collection and processing of the data, thereby making it more accurate and timely. Importantly, while the rule changes the method by which information is provided (i.e., electronic rather than paper-based), it does not increase the amount of information required from NPDES regulated entities facilities under existing regulations.

Overview of Benefits

EPA anticipates that the final rule will save significant resources for states, tribes, and territories as well as EPA and NPDES permittees, while resulting in a more complete, accurate, and nationally-consistent set of data about the NPDES program. With full implementation (5 years after the effective date), the anticipated savings are:

- Authorized State NPDES programs: $22.6 million annually,
- NPDES regulated entities: $0.5 million annually, and
- EPA: $1.2 million annually.

1

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

As an example demonstrating the benefits of electronic reporting is the State of Ohio's electronic reporting program for Discharge Monitoring Reports, which has a 99.9 percent adoption rate. This program has increased data quality and improved environmental protection, while also saving significant time and resources (e.g., Ohio was able to shift resources from five full-time staff to less than one to support the DMR program). The benefits of this final rule should allow NPDES-authorized programs in states, tribes, and territories to shift precious resources from data management activities to those more targeted to solving water quality issues.

Separate from this rulemaking, to promote transparency and accountability, EPA intends to make this more complete set of data available to the public, providing communities and citizens with information on facility and government performance. This can serve to elevate the importance of permitting and compliance information and environmental performance within regulated entities, providing opportunities for them to quickly address any potential environmental problems.

The final rule will also lighten the reporting burden currently placed on the states. Upon successful implementation, the final rule would provide states with regulatory relief from reporting associated with the Quarterly Non-Compliance Report, the Annual Non-Compliance Report, the Semi-Annual Statistical Summary Report, and the biosolids information required to be submitted to EPA annually by states.

Implementation

EPA will phase in the requirements of the rule over a five year period following the effective date of the final rule.

Phase 1 – One year after effective date of final rule

In Phase 1, EPA will begin to electronically receive information from authorized states, tribes, and territories regarding inspections, violation determinations, and enforcement actions. EPA, states, tribes, and territories will electronically receive Discharge Monitoring Report (DMR) information from NPDES permittees – the largest volume of data for the NPDES program. Also included in Phase 1 are the Sewage Sludge/Biosolids Annual Program Reports for the 42 states where EPA implements the Federal Biosolids Program.

Additionally, one year after the effective date of the final rule, authorized NPDES programs will submit an implementation plan for meeting the Phase 2 data requirements for EPA to review.

Phase 2—Five years after effective date of final rule

For Phase 2, EPA and authorized state NPDES programs have five years to begin electronically collecting, managing, and sharing the remaining set of NPDES program information. This information includes: general permit reports (e.g. Notice of Intent to be covered (NOI); Notice of Termination (NOT); No Exposure Certification (NOE); Low Erosivity Waiver and Other Waivers from Stormwater Controls (LEW)); Sewage Sludge/Biosolids Annual Program Report (where the state is

2

Appendix A – Northern Moraine WRD NPDES Permit No. IL0031933

the authorized NPDES biosolids program); and all other remaining NPDES program reports. These program reports include:

- Sewage Sludge/Biosolids Annual Program Reports [40 CFR 503] (for the 8 states that implement the Federal Biosolids Program)
- Concentrated Animal Feeding Operation (CAFO) Annual Program Reports [40 CFR 122.42(e)(4)]
- Municipal Separate Storm Sewer System (MS4) Program Reports [40 CFR 122.34(g)(3) and 122.42(c)]
- Pretreatment Program Reports [40 CFR 403.12(i)]
- Significant Industrial User Compliance Reports in Municipalities Without Approved Pretreatment Programs [40 CFR 403.12(e) and (h)]
- Sewer Overflow/Bypass Event Reports [40 CFR 122.41(l)(4), (l)(6) and (7), (m)(3)]
- CWA Section 316(b) Annual Reports [40 CFR 125 Subpart J]

How the final rule addresses comments

In response to concerns about implementation raised during the comment periods, the final rule provides authorized NPDES programs more flexibility to implement the final rule by providing them up to three additional years to electronically collect, manage, and share their data. Authorized NDPES Programs will also have more flexibility in how they can grant electronic reporting waivers.

Further Information

For additional information, please contact Messrs. John Dombrowski, Director, Enforcement Targeting and Data Division (202-566-0742) or Carey A. Johnston (202-566-1014), Office of Compliance (mail code 2222A), Environmental Protection Agency, 1200 Pennsylvania Avenue, N.W., Washington, DC, 20460; e-mail addresses: dombrowkski.john@epa.gov or johnston.carey@epa.gov.

Useful Final Rule Link:

Email sign up for outreach events
https://public.govdelivery.com/accounts/USAEPAOECA/subscriber/new?

Appendix B – Planned O&M

Lift Stations

- **Weekly**
  - Visual Inspection of above and below grade components.
  - Record Utilities Consumption, Equipment Runtimes and Flows (*Availability of each varies from station to station).*
  - Test Run Pumps
  - Test Alarming Systems
- **Monthly**
  - Spare parts inspection and PM *(ie. rotate impellers on spare pumps).*
- **Annually**
  - Pull and Inspect Pumps
  - Clean and Inspect Wet Well
  - Inspect Dry Well Components
  - Generator PM *(if equipped).*

Low Pressure System (Port Barrington)

- **Continuous**
  - Replace grinder pumps at individual residences as needed.
  - Replace pump control component at individual residences as needed.
  - Maintain inventory of grinder pumps, and control components.

Gravity Mains

- **Annually**
  - Clean and televise 20% of gravity mains as described in Section 3.3.2 Planned Sanitary Sewer O&M of NMWRD CMOM plan with an annual focus on cleaning problem areas as they are determined.

Force Mains

- **Annually**
  - Inspection of force main air relief and cleanout structures.
- **Continuous**
  - Pig pipelines as needed.

Appendix C – Sanitary Sewer Overflow or Bypass Notification Summary Report

Illinois Environmental Protection Agency

Bureau of Water • 1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276

Sanitary Sewer Overflow or Bypass Notification Summary Report

Print Form

Reset Form

- Within 24 hours of the occurrence, notify the Illinois EPA regional wastewater staff by telephone, FAX, email or voice mail, if staff are unavailable.
- Within 5 days of the occurrence, provide a written report describing the overflow or bypass, including all information requested on this form. The permittee is required to submit this form or other equivalent written notification to the Illinois EPA at:

Bureau of Water/Compliance Assurance Section - MC #19
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

NOTE: You may complete this form online, save a copy locally, print, sign and submit it to the BOW/CAS MC #19, at the above address. You may also print the form before completing it by hand, signing and submitting it.

Failure to notify the Illinois EPA as specified may result in fines up to $10,000 for each day of violation.

Instructions: Use this form to report all unscheduled sanitary sewer overflow or bypass occurrences. Attach additional information as necessary to explain or document the overflow or bypass. For the purpose of this report, an overflow or bypass is defined as the discharge of untreated sewage from the sanitary sewer collection system to a surface water and/or ground due to circumstances such as those identified by the check boxes in the overflow or bypass details section of this form.

Use one form per occurrence. A single occurrence may be more than one day if the circumstances causing the overflow or bypass results in a discharge duration of more than 24 hours. If there is a stop and restart of the overflow or bypass within 24 hours, but it is caused by the same circumstances, report it as one occurrence. If the discharges are separated by more than 24 hours, they should be reported as separate occurrences.

24 Hour Notification Information

Permittee (Municipality or Facility Name): ____________ Permit Number: ____________ Person Representing Permittee Who Contacted IEPA: ____________

Date: ______ Time: ______ AM ☐ PM ☐ IEPA Office Contacted: ____________ Name of IEPA Employee Contacted: ____________

Sanitary Sewer Overflow or Bypass Details

Date and Duration of Overflow or Bypass Occurrence (complete a separate form for each occurrence):

Start Date: ______ Time: ______ AM ☐ PM ☐ Duration of the overflow or bypass (hours and minutes): ____________

Estimated Volume of Wastewater Discharged (gallons): ______ WWTP Flow During bypass (report in MGD): Not applicable for a collection system SSO. ______ Location of the Overflow or Bypass: ____________

Circumstances Causing the Overflow or Bypass (check all that apply)

WPC 733
11/2011

☐ Rain ☐ Power Outage ☐ Equipment Failure ☐ Other (explain below)

☐ Snow Melt ☐ Broken Sewer ☐ Widespread Flooding

Provide a narrative description to further explain why the overflow or bypass occurred. For example, describe what equipment failed. What caused the power outage, or what plugged the sewer. Flooding should only be indicated, as a cause if there is significant flooding that is caused by high river, stream, or lake water levels, not just localized high water in the street.

Appendix C – Sanitary Sewer Overflow or Bypass Notification Summary Report

Wet Weather (if applicable)

Date(s) and Duration of Rainfall:

Start Date:	Time:	AM PM	End Date:	Time:	AM PM	Amount of Rainfall (inches)	Amount of Snow Melt (inches)
________	________	☐ ☐	________	________	☐ ☐	________	________

Contributing Soil Conditions (saturated, frozen, soil type)

____

Where Did the Discharge from the Overflow or Bypass Go? (check all that apply)

Provide the name of the local receiving water that the wastewater enters, which could be a nearby stream, river, lake, or wetland. If discharge does not enter directly into surface water, but indirectly by way of a ditch or storm sewer, trace the path of the ditch or storm sewer to find the receiving water.

☐ Runs on ground and absorbs into the soil

☐ Ditch: Name of surface water it drains to: ______________________________

☐ Storm Sewer: Name of surface water it drains to: ______________________________

☐ Surface water direct discharge: ______________________________

☐ Basement Back-ups, (Number & use (i.e.residential, commercial) of buildings affected): ______________

☐ Other, describe: ______________________________

Actions to Correct This Occurrence and Prevent Future Owerflows or Bypasses

Describe what actions were taken to minimize the volume of wastewater discharged from the overflow or bypass reported on this form. Also describe what actions are planned to prevent or minimize future overflows or bypassess. Illinois law and NPDES permits prohibit overflows or bypasses, unless certain specified conditions are met. Sanitary sewer overflows and bypasses may be the subject of enforcement action.

Report Completed By

Contact Person: ______________________________

Street Address: ______________________________

PO Box: ______________

City: ______________ State: ______

Zip Code: ____________ Phone: ____________

County: ______________________________

Authorized Representative Contact Information

Contact Person: ______________________________

Title: ______________________________

Street Address: ______________________________

PO Box: ______________

City: ______________ State: ______

Zip Code: ____________ Phone: ____________

County: ______________________________

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Authorized Representative Name (Print) ______________________________

Title ______________________________

______________________________ ______________________________

Authorized Representative Signature Date

APPENDIX C – DARRELL ROAD COLLECTION SYSTEM PROJECTS COST ESTIMATES

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Phase 1A: Headworks SUMMARY				
GENERAL CONDITIONS				$1,228,000
HEADWORKS				$2,817,870
POTABLE WATER WELL SYSTEM				$172,900
SEPTAGE RECEIVING STATION				$289,000
ELECTRICAL UTILITY ALLOWANCE (UTILITY POLE & OVERHEAD WIRE)				$50,000
UNFORESEEN SUBSURFACE CONDITIONS ALLOWANCE				$10,000
CONSTRUCTION SUB-TOTAL				**$4,567,770**
CONTINGENCY @ 25%				$914,000
CONSTRUCTION TOTAL				**$5,481,770**
DESIGN ENGINEERING				$163,200
CONSTRUCTION ENGINEERING @ 7.5%				$412,000
TOTAL CAPITAL COSTS - PHASE 1A				**$6,060,000**

GENERAL CONDITIONS				
Description	**Quantity**	**Unit**	**Unit Price (2025)**	**Total**
PART-TIME SUPERVISION	12	Mo.	$14,000	$168,000
RECORD DRAWINGS	1	LS	$5,000	$5,000
MOBILIZATION/DEMOBILIZATION	1	LS	$35,000	$35,000
BYPASS PUMPING	1	LS	$47,000	$47,000
Bond & Insurance @ 2.5%	1	LS	$89,000	$89,000
Overhead and Profit @ 25%	1	LS	$884,000	$884,000
TOTAL GENERAL CONDITIONS				**$1,228,000**

HEADWORKS				
Description	**Quantity**	**Unit**	**Unit Price (2025)**	**Total**
SITEWORK				
SANITARY SEWER/STORM SEWER/STRUCTURE DEMOLITION	1	LS	$18,000	$18,000
EXCAVATION/DISPOSAL	1130	CY	$100	$113,000
BACKFILL	270	CY	$100	$27,000
REMOVE/RELOCATE POWER POLE	0	LS	$5,000	$0
6-FT CONSTRUCTION FENCE	240	LF	$30	$7,200
FENCE REMOVAL	240	LF	$20	$4,800
FENCE REPLACEMENT	240	LF	$120	$28,800
SIDEWALK REMOVAL	1700	SF	$10	$17,000
SIDEWALK REPLACEMENT	1260	SF	$20	$25,200
PAVEMENT REMOVAL	287	SY	$20	$5,740
PAVEMENT - REPLACEMENT-EAST SIDE OF HEADWORKS	379	SY	$120	$45,480
CONCRETE SLAB FOR DUMPSTER	0	CY	$350	$0
STORM SEWER SYSTEM				
STORM SEWER INLETS, 3' DIA	3	EA	$5,000	$15,000
STORM MANHOLE, 4' DIA	1	EA	$12,000	$12,000
12" RCP, CL IV PIPE	165	LF	$160	$26,400
12" PIPING INSTALLATION	10	EA	$470	$4,700
SANITARY SEWER SYSTEMS				
PRECAST CONCRETE MANHOLES, 6' DIA, 9' DEEP	2	EA	$18,000	$36,000
PRECAST CONCRETE MANHOLES, 6' DIA, 10' DEEP	1	EA	$18,000	$18,000
42" RAW SEWAGE, PVC, 8-12' FEET DEPTH	265	LF	$730	$193,450
42" DIP WALL PIPE	1	EA	$7,000	$7,000
30" RAW SEWAGE, PVC	70	LF	$690	$48,300
30" SANITARY, DIP, MJ	18	LF	$2,000	$36,000
30" DIP WALL PIPE, MJ/PE	2	EA	$4,000	$8,000
30" DIP 90 BEND, MJ	1	EA	$27,000	$27,000
15" SANITARY SEWER, PVC, SDR-26	100	LF	$350	$35,000
8" SANITARY DRAIN, PVC, SDR-26	102	LF	$280	$28,560
8" SANITARY DRAIN, DIP, MJ	14	LF	$280	$3,920
8"x4" DIP WYE, MJ	1	EA	$1,600	$1,600
8" DIP 45 DEGREE BEND, PVC	8	EA	$350	$2,800
4" SANITARY FORCEMAIN, PVC	85	LF	$150	$12,750
4" SANITARY DRAIN, DIP, MJ	40	LF	$220	$8,800
4" DIP 45 BEND, MJ	4	EA	$320	$1,280
4" PVC 45 BEND	1	EA	$180	$180
1.5" CU FOR NPW TO WC-1001	100	LF	$40	$4,000

Description	Quantity	Unit	Unit Price (2025)	Total
TREE PROTECTION	1	EA	$350	$350
SILT FENCE	775	LF	$20	$15,500
LANDSCAPING	1	LS	$6,000	$6,000
RESTORATION	1	LS	$24,000	$24,000
DEWATERING	1	LS	$58,000	$58,000
SITE ELECTRICAL	1	LS	$12,000	$12,000
HEADWORKS				
STRUCTURAL				
BASE SLAB	30	CY	$1,800	$54,000
CONCRETE WALLS	133	CY	$2,400	$319,200
CHANNEL SLAB	40	CY	$1,800	$72,000
TROUGH SLAB	5	CY	$1,800	$9,000
TROUGH WALLS	3	CY	$2,400	$7,200
F/FLOOR SLAB	26	CY	$2,400	$62,400
DUMPSTER AREA FOOTING AND SLAB, SW CORNER FTG	16	CY	$1,800	$28,800
MONTANA FLUME AND GROUTED CHANNEL SECTION	8	CY	$1,800	$14,400
GRATING	30	SF	$50	$1,500
PLATING	85	SF	$60	$5,100
FRP BUILDING	1	EA	$105,000	$105,000
BUILDING INSTALLATION	1	LS	$17,000	$17,000
JIB CRANE	2	EA	$35,000	$70,000
JIB CRANE INSTALLATION	2	EA	$12,000	$24,000
ACCESS HATCHES, 3' X 3'	2	EA	$5,800	$11,600
ACCESS HATCHES INSTALLATION	2	EA	$1,200	$2,400
PROCESS				
DEMOLITION - SCREENS, ELECTRIC, PIPE, ETC.	1	LS	$24,000	$24,000
PIPE				
PIPE PAINT	1	LS	$5,800	$5,800
3/4" NPW PIPING	80	LF	$40	$3,200
1-1/4" NPW PIPING	30	LF	$50	$1,500
3/4" NPW SOLENOIDS	2	EA	$530	$1,060
12" DIP RAW SEWAGE, FL	10	LF	$490	$4,900
12" DIP WALL PIPE, FL	4	EA	$2,000	$8,000
12"X 8" ECCENTRIC REDUCER, FL	4	EA	$1,300	$5,200
12" PLUG VALVE	4	EA	$7,500	$30,000
12" DIP FLARED, FL	4	EA	$2,200	$8,800
TRANSPACTOR	1	EA	$105,000	$105,000
TRANSPACTOR - INSTALLATION	1	EA	$32,000	$32,000
MANUAL BAR SCREEN - NEW SCREEN	1	EA	$201,000	$201,000
MANUAL BAR SCREEN - INSTALLATION, NEW	1	EA	$51,000	$51,000
MANUAL BAR SCREEN - MODIFIED SCREEN	1	EA	$134,000	$134,000
MANUAL BAR SCREEN - INSTALLATION, MODIFIED	1	EA	$34,000	$34,000
SLIDE GATE - 4' WIDE X 3.5' PLATE W/ ACTUATOR, 316SS	4	EA	$24,000	$96,000
SLIDE GATE - 4' WIDE X 3.5' PLATE - INSTALLATION, 316SS	4	EA	$7,000	$28,000
ELECTRICAL & CONTROLS				
MECHANICAL SCREENING EQUIPMENT & CONTROL PANEL	2	EA	$29,000	$58,000
SLIDE GATE - 4' W X 3.5' H, ACTUATOR	4	EA	$18,000	$72,000
CONVEYOR/COMPACTOR & CONTROL PANEL	1	EA	$18,000	$18,000
HOIST AND TROLLEY	1	EA	$12,000	$12,000
CONDUIT & WIRE	2000	LF	$30	$60,000
ULTRASONIC LEVEL TRANSDUCERS	4	EA	$2,900	$11,600
CIRCUIT BREAKERS FOR SLIDE GATES	4	EA	$2,900	$11,600
NEMA 4X PULL BOXES	2	EA	$2,900	$5,800
CORING, TERMINATIONS	1	LS	$24,000	$24,000
CONTROLS, SCADA INTEGRATION	1	LS	$29,000	$29,000
TOTAL HEADWORKS				**$2,817,870**

POTABLE WATER WELL SYSTEM				
Description	**Quantity**	**Unit**	**Unit Price (2025$)**	**Total**
POTABLE WATER WELL SYSTEM				
DRILLING AND CASING NEW WELL WITH PUMP SYSTEM	1	LS	$113,400	$113,400
NEW POTABLE WATER BOOSTER PUMP	1	EA	$1,500	$1,500
EQUIPMENT RELOCATION				
LABOR	1	LS	$48,000	$48,000
MATERIAL	1	LS	$10,000	$10,000
TOTAL POTABLE WATER WELL SYSTEM				**$172,900**

SEPTAGE RECEIVING STATION				
Description	**Quantity**	**Unit**	**Unit Price (2025$)**	**Total**
SEPTAGE RECEIVING STATION				
SEPTAGE ACCEPTANCE PLANT EQUIPMENT AND CONTROL PANEL	1	LS	$194,000	$194,000
INSTALLATION	1	LS	$95,000	$95,000
TOTAL SEPTAGE RECEIVING STATION				**$289,000**

Phase 1B: Treatment Plant Interceptor SUMMARY					
Description					**Total Cost**
CONSTRUCTION TOTAL					$6,170,000
DESIGN ENGINEERING - COMPLETED					$0
CONSTRUCTION ENGINEERING @ 7.5%					$470,000
TOTAL CAPITAL COSTS - PHASE 1B					**$6,640,000**
Description	**Quantity**	**Unit**	**Unit Price (2022)**	**Unit Price (2024)**	**2024 Total**
42" SANITARY SEWERS, 8-12' DEPTH	857	LF	$400	$500	$ 428,500.00
42" SANITARY SEWERS, 12-16' DEPTH	560	LF	$450	$500	$ 280,000.00
42" SANITARY SEWERS, 16-20' DEPTH	806	LF	$550	$700	$ 564,200.00
42" SANITARY SEWERS, 20-24' DEPTH	588	LF	$650	$800	$ 470,400.00
42" SANITARY SEWERS, 24-28' DEPTH	1632	LF	$750	$900	$ 1,468,800.00
8" SANITARY SEWER, PVC (SDR 26)	450	LF	$200	$300	$ 135,000.00
6" SANITARY SEWER, PVC	359	LF	$120	$200	$ 71,800.00
SANITARY MANHOLES, 6' DIA., 8-12' DEPTH	5	EA	$8,000	$8,800	$ 44,000.00
SANITARY MANHOLES, 6' DIA., 16-20' DEPTH	4	EA	$16,000	$17,500	$ 70,000.00
SANITARY MANHOLES, 6' DIA., 20-24' DEPTH	4	EA	$19,000	$20,800	$ 83,200.00
SANITARY MANHOLES, 6' DIA., 24-28' DEPTH	5	EA	$24,000	$26,300	$ 131,500.00
SANITARY DROP MANHOLES, 6' DIA., 16-20' DEPTH	1	EA	$25,000	$27,300	$ 27,300.00
SANITARY DROP MANHOLES, 6' DIA., 20-24' DEPTH	1	EA	$35,000	$38,300	$ 38,300.00
SANITARY MANHOLE, 4' DIA, 8-12' DEPTH	5	EA	$5,500	$6,100	$ 30,500.00
JACK & BORE, 60" DIA. STEEL CASING	111	LF	$3,500	$3,900	$ 432,900.00
REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL	500	CY	$75	$100	$ 50,000.00
TEMPORARY CONSTRUCTION ENTRANCE	1115	SY	$20	$30	$ 33,450.00
REMOVE EXISTING SEPTIC TANK	4	EA	$5,000	$5,500	$ 22,000.00
EXPLORATORY TRENCH	100	LF	$50	$60	$ 6,000.00
DEWATERING	1	LS	$500,000	$546,000	$ 546,000.00
TREE REMOVAL (ACRES)	1.83	Acres	$15,000	$16,400	$ 30,012.00
SEEDING, CLASS 2A W/ EXCELSIOR BLANKET	0.51	Acres	$25,000	$27,300	$ 13,923.00
SEEDING, CLASS 4B W/ EXCELSIOR BLANKET	5.72	Acres	$30,000	$32,800	$ 187,616.00
TOPSOIL RESPREAD	6.23	Acres	$30,000	$32,800	$ 204,344.00
EROSION CONTROL BARRIER	9652	LF	$4	$10	$ 96,520.00
AGGREGATE SHOULDER/SURFACE COURSE TY. B,6	634	SY	$25	$30	$ 19,020.00
PAVEMENT REMOVAL AND REPLACEMENT	1654	SY	$100	$200	$ 330,800.00
HMA SURFACE REMOVAL (BUTT JOINT)	72	SY	$40	$50	$ 3,600.00
SIDEWALK REMOVAL AND REPLACEMENT	145	SF	$35	$40	$ 5,800.00
TRAFFIC CONTROL AND PROTECTION	1	LS	$100,000	$109,200	$ 109,200.00
TREE PROTECTION	7	EA	$750	$900	$ 6,300.00
WOOD RAIL FENCE	1416	LF	$30	$40	$ 56,640.00
REMOVE AND REINSTALL EXISTING FENCE	334	LF	$35	$40	$ 13,360.00
TRENCH BACKFILL (1' ABOVE PIPE TO SUBGRADE)	3020	CY	$40	$50	$ 151,000.00

Phase 2: 16-inch Force Main from Lakemoor Lift Station 7 to Route 176 SUMMARY				
Description				**2024 Total Cost**
CONSTRUCTION SUBTOTAL				$ 8,487,024.00
GENERAL CONDITIONS				$ 1,061,702.40
CONTINGENCY @ 15%				$ 1,273,053.60
CONSTRUCTION TOTAL				**$ 10,821,780.00**
DESIGN ENGINEERING @ 7.5%				$ 812,000.00
CONSTRUCTION ENGINEERING @ 7.5%				$ 812,000.00
TOTAL CAPITAL COSTS - PHASE 3				**$ 12,450,000.00**
GENERAL CONDITIONS				
Bond & Insurance @ 2.5%				$ 213,000.00
Overhead and Profit @ 10%				$ 848,702.40
TOTAL GENERAL CONDITIONS				**$ 1,061,702.40**
FORCE MAIN				
Description	**Quantity**	**Unit**	**2024 Unit Price**	**2024 Total Cost**
16-inch Sanitary Force Main	20,520	LF	$234	$ 4,808,722.46
Directional Drill 16-inch Diameter HDPE	3,800	LF	$348	$ 1,323,722.40
Jack and Bore 30-inch	500	LF	$728	$ 364,182.00
Unsuitable Material Removal	350	CY	$127	$ 44,335.20
Temporary Construction Entrance	1	EA	$15,429	$ 15,428.65
Exploratory Trench	1	LS	$51,403	$ 51,403.50
Dewatering	1	LS	$1,027,943	$ 1,027,943.28
Seeding, Class II w/ Excelsior Blanket	20	Acres	$5,143	$ 102,857.66
Topsoil Respread	50	Acres	$2,204	$ 110,204.64
Restoration	50	Acres	$1,469	$ 73,469.76
Erosion Control Barrier	25,000	LF	$5	$ 126,672.00
Construction Fence	10,000	LF	$3	$ 25,334.40
Traffic Control and Protection	1	LS	$191,072	$ 191,072.04
Trench Backfill	3,500	CY	$63	$ 221,676.00
TOTAL FORCE MAIN				**8,487,024**

Phase 3: Lift Station 7 Upgrades - Future SUMMARY				
CONSTRUCTION SUBTOTAL				$ 3,061,662.24
GENERAL CONDITIONS				$ 384,000.00
CONTINGENCY @ 15%				$ 459,249.34
CONSTRUCTION TOTAL				**$ 3,904,911.58**
DESIGN ENGINEERING @ 7.5%				$ 293,000.00
CONSTRUCTION ENGINEERING @ 7.5%				$ 293,000.00
TOTAL CAPITAL COSTS - PHASE 4				**$ 4,491,000.00**
GENERAL CONDITIONS				
Bond & Insurance @ 2.5%				$ 77,000.00
Overhead and Profit @ 10%				$ 307,000.00
TOTAL GENERAL CONDITIONS				**$ 384,000.00**
SITE WORK				
Description	**Quantity**	**Unit**	**Unit Price 2024**	**2024 Total**
Bituminous Pavement	350	SY	$152	$ 53,202.24
Aggregate Base Course, 12-inch	350	SY	$38	$ 13,300.56
Fencing	250	LF	$76	$ 19,000.80
Gate	1	EA	$4,079	$ 4,078.84
Seeding & Landscape	1	LS	$11,755	$ 11,755.16
TOTAL SITE WORK			**$16,100**	**$ 101,337.60**
TRIPLEX LIFT STATION				
Description	**Quantity**	**Unit**	**Unit Price 2024**	**2024 Total**
Dewatering	1	LS	$220,283	$ 220,282.61
Excavation	1	LS	$256,992	$ 256,992.15
Cast-in-Place Wet Well and Valve Vault	393	CY	$1,469	$ 577,472.31
Access Hatch	13	EA	$7,347	$ 95,510.69
Sewage Grinder	2	EA	$124,823	$ 249,645.18
Immersible Pumps	3	EA	$110,141	$ 330,423.91
Pressure Transducer	1	EA	$5,878	$ 5,877.58
Float Control System	1	EA	$11,755	$ 11,755.16
Valves and Piping	1	LS	$224,627	$ 224,627.46
Magnetic Flowmeter	3	EA	$17,633	$ 52,898.23
TOTAL LIFT STATION			**$980,948**	**$ 2,025,485.28**
CONTROL BUILDING & GENERATOR				
Description	**Quantity**	**Unit**	**Unit Price 2024**	**2024 Total**
Generator and Control Building	1	LS	$220,283	$ 220,282.61
Paint Walls	1	LS	$5,143	$ 5,142.88
Standby Generator	1	EA	$189,476	$ 189,475.98
Motor Control Center	1	EA	$66,085	$ 66,084.78
Variable Frequency Drives	3	EA	$51,403	$ 154,210.49
Programable Logic Controller	1	EA	$22,028	$ 22,028.26
Automatic Transfer Switch	1	EA	$44,057	$ 44,056.52
SCADA	1	EA	$36,722	$ 36,722.21
HVAC	1	EA	$58,750	$ 58,750.47
Electrical Conduit, Piping & Wire	1	LS	$73,432	$ 73,431.76
Windows	4	EA	$1,469	$ 5,877.58
Double Doors	5	EA	$11,755	$ 58,775.81
TOTAL CONTROL BLDG & GENERATOR			**$780,604**	**$ 934,839.36**

Appendix D – Lift Station Capacity Analysis – Existing Conditions

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Lift Station	2022 Run Time (Hours)	2022 Average Pumped Flow (gpd)	2022 Average Pumped Flow from Upstream Basins (gpd)	Average Daily Flow in Basin (gpd)	Peaking Factor in Basin	Peak Flow in Basin (gpm)	Firm Capacity Upstream Lift Stations (gpm)	Lift Station Peak Flow (gpm)	Current Design Firm Capacity (gpm)	Actual Pumping Rate	Surplus (Deficient) Pumping Capacity at Design Pump Capacity (gpm)	Surplus (Deficient) Pumping Capacity at Actual Pumping Rate (gpm)
Lakemoor L.S. 1	2,517	186,174	73,213	112,962	4.50	353	540	893	450	Not tested	(443)	Not Available
Lakemoor L.S. 2	200	7,181	-	7,181	4.50	22		22	270	218	248	196
Lakemoor L.S. 3	1,754	66,031	54,437	11,594	4.50	36	540	576	270	229	(306)	(347)
Lakemoor L.S. 4	1,397	54,437	41,475	12,962	4.50	41	270	311	270	237	(41)	(74)
Lakemoor L.S. 5	2,138	41,475	-	41,475	4.50	130		130	270	118	140	(12)
Lakemoor L.S. 6	2,125	175,348	-	175,348	4.50	548		548	502	Not tested	(46)	Not Available
Lakemoor L.S. 7	1,511	141,808	187,886	(46,078)	4.50	-144	708	564	800	571	236	7
Clearwater	525	11,511	-	11,511	4.50	36		36	30	133.5	(6)	98
Burr Oak	314	2,555	-	2,555	4.50	8		8	90	49.5	82	42
Deer Grove	60	5,232	-	5,232	4.50	16		16	532	532	516	516
Fern	1,673	115,245	-	115,245	4.50	360		360	576	419	216	59
Hale 1	544	26,574	-	26,574	4.50	83		83	363	297	280	214
Hale 2	1,076	38,824	-	38,824	4.50	121		121	238	219.5	117	98
Holiday Hills	N/A	N/A	-	-	4.50	0		0	1347	Not tested	1,347	Not Available
Prairie Woods	755	28,129	28,976	(847)	4.50	-3	284	281	265	226.5	(16)	(55)
Rawson Bridge	843	61,961	5,232	56,729	4.50	177	532	709	740	447	31	(262)
Rolling Oaks	2,136	39,329	28,129	11,200	4.50	35	265	300	115	112	(185)	(188)
South Shore	2,163	42,665	2,555	40,110	4.50	125	90	215	235	120	20	(95)
Treatment Plant	652	19,924	-	19,924	4.50	62		62	225	186	163	124
Walnut Glen	736	28,976	-	28,976	4.50	91		91	284	239.5	193	149
Waterford	1,697	136,653	65,398	71,255	4.50	223	601	824	850	490	26	(334)
Water’s Edge	564	2,733	-	2,733	4.50	9		9	100	29.5	91	21
Westridge	559	31,392	2,733	28,659	4.50	90	100	190	236	341.5	46	152
Woodman’s	424	12,538	-	12,538	4.50	39		39	206	180	167	141

APPENDIX E – WWTP PROCESS FLOW DIAGRAM

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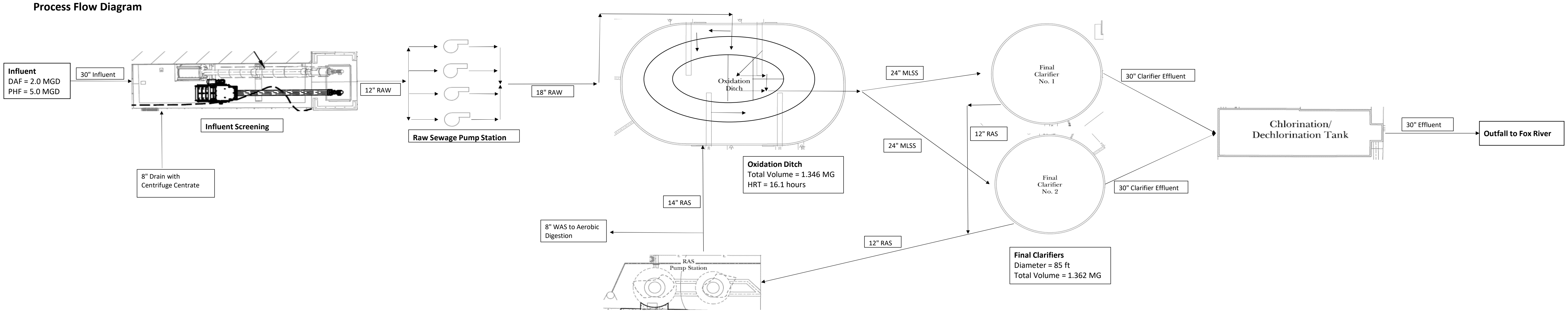
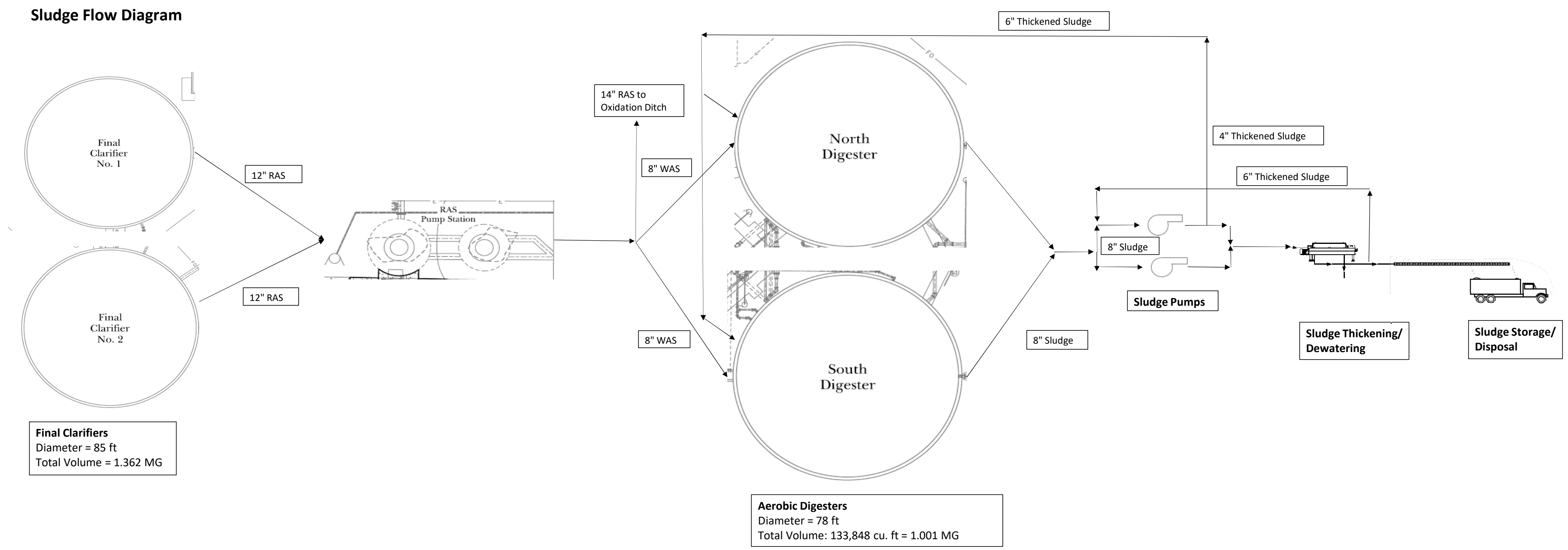
Northern Moraine Wastewater Reclamation District WWTP
NPDES Permit No. IL0031933

Process Flow Diagram



Sludge Flow Diagram



APPENDIX F – WWTP PHASE II EXPANSION PROJECT COST ESTIMATE

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NMWRD WWTP Phase II Expansion Cost

SUMMARY

DESCRIPTION	2024 Cost
GENERAL CONDITIONS	$4,726,100.00
SITE WORK	$3,190,400.00
HEADWORKS	$ -
RAW SEWAGE PUMP STATION	$3,539,100.00
OXIDATION DITCH	$2,642,300.00
RAS/WAS PUMP STATION AND STRUCTURE	$2,097,800.00
CLARIFIERS	$ -
TERTIARY FILTER/UV DISINFECTION BUILDING	$3,490,400.00
AEROBIC DIGESTION	$ -
SLUDGE HANDLING	$2,472,700.00
SLUDGE STORAGE BARN	$1,630,500.00
FLEET MAINTENANCE GARAGE	$ -
OPERATIONS BLDG	$ -
ADMINISTRATION BLDG	$ -
CONSTRUCTION SUB-TOTAL	**$23,789,300.00**
CONTINGENCY (20%)	$4,757,900.00
ESTIMATED CONSTRUCTION COST	**$28,547,200.00**
DESIGN ENGINEERING @ 7.5%	$ 2,141,100.00
CONSTRUCTION ENGINEERING @ 7.5%	$ 2,141,100.00
TOTAL PROBABLE PROJECT COST	**$32,829,400.00**
IEPA Loan Contingency @ 3%	$985,000.00
IEPA Loan Construction Period Interest @ 1.5%	$493,000.00
TOTAL LOAN AMOUNT	**$34,308,000.00**

Description		Quantity	Unit	2024 Unit Price	2024 Total Cost
General Conditions					
	Mobilization	1		$75,000.00	$75,000.00
	Dumpsters	13	Each	$1,100.00	$14,300.00
	Job Trailer	12	Mo.	$2,200.00	$26,400.00
	Eng Trailer	12	Mo.	$2,200.00	$26,400.00
	Supervision & Surveying	12	Mo.	$22,000.00	$264,000.00
	Surveying	1	Each	$0.00	$0.00
	Record Drawing	1	Each	$20,000.00	$20,000.00
	Allowances			$0.00	$0.00
	Bonds & Insurance	1	Each	$478,000.00	$478,000.00
	Overhead & Profit	1	Each	$3,822,000.00	$3,822,000.00
	TOTAL GENERAL CONDITIONS				**$4,726,100.00**
Site Work					
	Top Soil Stripping & Stockpile	521	Cu.Yd.	$3.48	$1,814.17
	Top Soil Re-spread	521	Cu.Yd.	$5.80	$3,023.62
	Demo Sludge Drying Beds	1400	Cu.Yd.	$27.86	$38,999.52
	Sidewalk	6000	Sq. Ft.	$13.93	$83,570.40
	Retaining Wall	500	Sq. Ft.	$27.86	$13,928.40
	Gabians	500	Sq. Ft.	$23.21	$11,607.00
	Concrete Steps	50	Each	$58.04	$2,901.75
	Bit Surface 1 1/2"	331	Ton	$232.14	$76,838.34
	Bit Base 2 1/2"	552	Ton	$232.14	$128,141.28
	Bit Prime Coat	1800	Gal.	$6.96	$12,535.56
	10" Agg Base	7777	Sq. Yds.	$20.89	$162,481.75
	Geotextile Fabric	7777	Sq. Yd.	$2.32	$18,053.53
	Pavement Removal	3384	Sq. Yd.	$9.29	$31,422.47
	Sidewalk Removal	500	Sq. Yd.	$9.29	$4,642.80
	Storm Sewer Removal	200	Lin. Ft.	$46.43	$9,285.60
	36" FES Removal	2	Each	$232.14	$464.28
	Drainage Structure Removal	2	Each	$2,321.40	$4,642.80
	Tree Removal	50	In. Dia.	$27.86	$1,392.84
	Seeding	1.5	Acre	$5,571.36	$8,357.04
	Planting	66	Each	$928.56	$61,284.96
	Earthwork	20570	Cu.Yd.	$34.82	$716,267.97
	Stone	0	Sq.Yd.	$13.93	$0.00
	Straw Bales	20	Each	$18.57	$371.42
	Silt Fence	2000	Lin. Ft.	$9.29	$18,571.20
	Rip Rap	360	Sq Yd	$34.82	$12,535.56
	Filter Fabric	360	Sq Yd	$2.32	$835.70
	Fence Remove and Replace	400	Lin. Ft.	$37.14	$14,856.96
	Chain Link Gate Removal	1	Each	$464.28	$464.28
	Electrical Duct Bank Relocation	1100	Lin. Ft.	$464.28	$510,708.00
	Lights Poles	6	Each	$10,446.30	$62,677.80
	Electrical Service	1	Lump Sum	$37,142.40	$37,142.40
	Fiber Optic Cable	1000	Lin. Ft.	$27.86	$27,856.80
	Electric Entrance Gate	1	Lump Sum	$46,428.00	$46,428.00
	Piping			$0.00	$0.00
	18" Raw Sewage Force Main	500	Lin. Ft.	$417.85	$208,926.00
	8" Water Main	2400	Lin. Ft.	$139.28	$334,281.60
	4" NPW	900	Lin.Ft.	$92.86	$83,570.40
	1" NPW	200	Lin.Ft.	$92.86	$18,571.20

Description		Quantity	Unit	2024 Unit Price	2024 Total Cost
	Yard Hydrant	2	Each	$928.56	$1,857.12
	1" valve Box	2	Each	$510.71	$1,021.42
	1 1/2" Cu Water Service	204	Lin. Ft.	$46.43	$9,471.31
	6" Sanitary Service	40	Lin.Ft.	$116.07	$4,642.80
	8" Gravity Deep	400	Lin.Ft.	$185.71	$74,284.80
	6" x 8" wye	1	Each	$464.28	$464.28
	Manhole Type A	3	Each	$5,803.50	$17,410.50
	Grease Trap	1	Each	$4,178.52	$4,178.52
	4" DIP Drain	20	Lin. Ft.	$69.64	$1,392.84
	8" DIP Drain	28	Lin. Ft.	$185.71	$5,199.94
	18" DIP RAS	200	Lin.Ft.	$278.57	$55,713.60
	6" DIP WAS	600	Lin.Ft.	$139.28	$83,570.40
	30" Gravity Conc.	0	Lin.Ft.	$301.78	$0.00
	3" FM PVC	0	Lin.Ft.	$27.86	$0.00
	Manhole Adjustment	5	Each	$696.42	$3,482.10
	6" Downspout Connection	0	Each	$696.42	$0.00
	6" PVC	0	Lin. Ft.	$104.46	$0.00
	10" PVC	0	Lin. Ft.	$127.68	$0.00
	12" PVC	0	Lin. Ft.	$150.89	$0.00
	8" RCP	10	Lin.Ft.	$92.86	$928.56
	12" RCP	200	Lin.Ft.	$116.07	$23,214.00
	36" RCP	200	Lin.Ft.	$162.50	$32,499.60
	Inlet	5	Each	$2,321.40	$11,607.00
	Catch Basin	1	Each	$2,785.68	$2,785.68
	Special Structure	1	Each	$10,446.30	$10,446.30
	12" FES	1	Each	$1,857.12	$1,857.12
	36" FES	2	Each	$2,785.68	$5,571.36
	Trench Backfill	187	Yd.	$27.86	$5,209.22
	Fittings	9200	Lb.	$6.96	$64,070.64
	TOTAL SITEWORK				**$3,190,332.52**
Headworks					
	Sanitary Sewer Demolition	1	Lump Sum	$5,571.36	
	Water Service Relocation	80	Lin Ft	$55.71	
	Architectural/Structural			$0.00	
	Concrete Removal	5	Cy. Yd.	$348.21	
	Concrete Walls	140	Cu. Yd	$1,160.70	
	Concrete Slab	130	Cu. Yd	$1,160.70	
	Spancrete Roof	1800	Sq. Ft.	$16.25	
	Epoxy Flooring	1400	Sq. Ft.	$16.25	
	Epoxy Base	170	Lin. Ft	$27.86	
	Motorized Roll Door	1	Each	$20,892.60	
	Man Door	1	Each	$5,803.50	
	Stairway	1	Lump Sum	$29,017.50	
	Roofing	1800	Sq. Ft.	$20.89	
	Metal Roof	1000	Sq. Ft.	$18.57	
	Brick/Block Wall	1560	Sq. Ft.	$37.14	
	Grating	500	Sq.Ft.	$69.64	
	Plate	100	Sq.Ft.	$70.80	
	Paint	2900	Sq.Ft.	$3.48	
	Pipe Paint	1	Lump Sum	$5,803.50	
	Pipe			$0.00	
	3/4" NPW Piping	100	Lin.Ft.	$34.82	
	2" NPW Piping	20	Lin.Ft.	$34.82	
	3/4" NPW Solenoids	6	Each	$638.39	
	Fine Screen	1	Each	$313,389.00	
	Screen Installation	1	Lump Sum	$19,731.90	
	Coarse Screen	1	Each	$9,285.60	
	Septage Receiving Unit	1	Each	$429,459.00	
	Mechanical	1	Lump Sum	$81,249.00	
	H- Crane	1	Each	$41,785.20	
	Lighting	1	Lump Sum	$34,821.00	
	Electrical	1	Lump Sum	$139,284.00	
	TOTAL HEADWORKS				**$0.00**
Raw Sewage Pump Station					
	Pipe Demolition	1	Lump Sum	$4,642.80	$4,642.80
	Epoxy Flooring	680	Sq. Ft.	$16.25	$11,049.86
	Epoxy Base	105	Lin. Ft	$27.86	$2,924.96
	Immersible Pumps	4	Each	$62,677.80	$250,711.20
	Install Pumps	4	Each	$5,571.36	$22,285.44
	Relocate Valves	12	Each	$2,785.68	$33,428.16
	12" spools	24	Each	$1,857.12	$44,570.88
	Variable Frequency Drives	4	Each	$27,856.80	$111,427.20
	MCC Modifications	0	Lump Sum	$37,142.40	$0.00
	Electrical	1	Lump Sum	$58,035.00	$58,035.00
	TOTAL RAW SEWAGE PUMP STATION				**$539,075.51**
Oxidation Ditch					
	Excavation	12600	Cu. Yds.	$34.82	$438,744.60
	Support 14" RAS	1	Each	$4,642.80	$4,642.80

Description		Quantity	Unit	2024 Unit Price	2024 Total Cost
	Support 18" Raw	1	Each	$2,321.40	$2,321.40
	Demolish 2" NPW	150	Lin. Ft.	$23.21	$3,482.10
	Demolish 8" WAS	150	Lin. Ft.	$46.43	$6,964.20
	Concrete			$0.00	$0.00
	Exterior Wall	377	Cu.Yds.	$1,160.70	$437,583.90
	Drive Pit	16	Cu.Yds.	$1,160.70	$18,571.20
	Slab	516	Cu.Yds.	$1,160.70	$598,921.20
	Walkway	24	Cu.Yds.	$1,160.70	$27,856.80
	Stair	20	Cu.Yds.	$1,160.70	$23,214.00
	Hand Rail	700	Lin.Ft.	$60.36	$42,249.48
	Equipment	1	Lump Sum	$464,280.00	$464,280.00
	Equipment Installation	1	Lump Sum	$55,713.60	$55,713.60
	Slide Gates	2	Each	$19,731.90	$39,463.80
	8" Drain & Mud Valves Mods	1	Lump Sum	$18,571.20	$18,571.20
	18" Raw Pipe Mods	1	Lump Sum	$27,856.80	$27,856.80
	14" RAS Mods	1	Lump Sum	$23,214.00	$23,214.00
	D.O. Probes & Installation	6	Each	$11,607.00	$69,642.00
	BNR Process Controls	1	Lump Sum	$27,856.80	$27,856.80
	ORP Probes	2	Each	$9,285.60	$18,571.20
	MCC2A/ VFD's & Installation	4	Each	$27,856.80	$111,427.20
	RTU 2	1	Each	$41,785.20	$41,785.20
	Electrical	1	Lump Sum	$139,284.00	$139,284.00
	TOTAL OXIDATION DITCH				**$2,642,217.48**
RAS/WAS PS & Div Structure					
	Structural				
	Concrete Slab	195	Cu.Yds.	$1,160.70	$226,336.50
	Concrete Wall	342	Cu.Yds.	$1,160.70	$396,959.40
	Grout	185	Cu.Yds.	$928.56	$171,783.60
	Excavation	4200	Cu.Yds.	$34.82	$146,248.20
	Dewatering	1	Lump Sum	$23,214.00	$23,214.00
	Access Hatch	2	Each	$19,731.90	$39,463.80
	Plating	300	Sq. Ft.	$0.00	$0.00
	Grating	300	Sqft	$69.64	$20,892.60
	Brick/ Block	1680	Sq.Ft.	$51.07	$85,798.94
	Roof			$0.00	$0.00
	Spancrete	625	Sq.Ft.	$18.57	$11,607.00
	Standing Seam Roof	66	SQ	$232.14	$15,321.24
	Truss	500	Sq.Ft.	$3.95	$1,973.19
	Sheeting	500	Sq. Ft.	$0.56	$278.57
	Insulation	500	Sq.Ft.	$1.28	$638.39
	Window	6	Each	$1,741.05	$10,446.30
	Door	1	Each	$3,714.24	$3,714.24
	Lintel & Sill	28	Lin.Ft.	$32.50	$909.99
	Paint	880	Sq.Ft.	$0.93	$817.13
	Pipe Paint	1825	Sq.Ft.	$3.48	$6,354.83
	Pipe			$0.00	$0.00
	MLSS Gates	2	Each	$19,731.90	$39,463.80
	24" DIP MLSS	120	Lin. Feet	$325.00	$38,999.52
	24" DIP Fittings	14	Each	$2,785.68	$38,999.52
	10" Check Valve	4	Each	$2,901.75	$11,607.00
	10" Plug Valve	4	Each	$2,785.68	$11,142.72
	4" Air Release Valve	4	Each	$3,946.38	$15,785.52
	10" RAS	160	Lin.Ft.	$185.71	$29,713.92
	10" Fittings	16	Each	$1,392.84	$22,285.44
	16" RAS	20	Lin.Ft.	$301.78	$6,035.64
	16" Fittings	4	Each	$1,857.12	$7,428.48
	6" Check Valve	3	Each	$1,973.19	$5,919.57
	6" Plug Valve	3	Each	$1,857.12	$5,571.36
	2" Air Release Valve	3	Each	$2,785.68	$8,357.04
	6" WAS	120	Lin.Ft.	$162.50	$19,499.76
	6" Fittings	12	Each	$928.56	$11,142.72
	8" WAS	20	Lin.Ft.	$185.71	$3,714.24
	8" Fittings	4	Each	$1,160.70	$4,642.80
	Electrical	1	Lump Sum	$185,712.00	$185,712.00
	MCC	1	Lump Sum	$81,249.00	$81,249.00
	SCADA	1	Lump Sum	$41,785.20	$41,785.20
	Mechanical	1	Lump Sum	$32,499.60	$32,499.60
	Pump Equipment	1	Lump Sum	$243,747.00	$243,747.00
	Pump Installation	1	Lump Sum	$69,642.00	$69,642.00
	TOTAL RAS/WAS PUMP STATION				**$2,097,701.77**
Clarifiers					
	Pipe				
	1" NPW Spray Bars	100	Lin.Ft.	$69.64	
	TOTAL CLARIFIERS				$ -
Tertiary Filter/UV Building					
	Excavation	640	Cu. Yds.	$40.50	$25,920.00
	Backfill	220	Cu. Yds.	$40.50	$8,910.00
	Concrete				

Description	Quantity	Unit	2024 Unit Price	2024 Total Cost
Building Slabs & Footings	222	Cu. Yds.	$1,012.50	$224,775.00
Building Walls	212	Cu. Yds.	$1,620.00	$343,440.00
Elevated Slabs above Intermed. Channel	7.007453704	Cu. Yds.	$1,620.00	$11,352.08
Pre-Cast Slabs	3670	Sq. Ft.	$29.70	$108,999.00
Stairs and Elevated Stoops	2	Each	$13,500.00	$27,000.00
Step Footings	5	Cu. Yds.	$1,620.00	$8,100.00
Architectural			$0.00	$0.00
Brick/ Block	3660	Sq. Ft.	$33.75	$123,525.00
Interior Block	1400	Sq. Ft.	$27.00	$37,800.00
Architectural Pre-cast Concrete		Sq. Ft.	$101.25	$0.00
Manufacturered Stone	1050	Sq. Ft.	$47.25	$49,612.50
Louvers	10	Sq. Ft.	$81.00	$810.00
Exterior 8'-Wide Double Door	2	Each	$9,450.00	$18,900.00
Exterior Single Door	3	Each	$5,400.00	$16,200.00
Lintels & Sills	40	Lin. Ft.	$33.75	$1,350.00
Liquid Water Repellent	4710	Sq. Ft.	$2.03	$9,537.75
Architectural (continued)			$0.00	$0.00
Aluminum Facia	270	Lin. Ft.	$8.10	$2,187.00
Firestopping	1	Lump Sum	$1,687.50	$1,687.50
Bollards	0	Each	$810.00	$0.00
Roof	0	SQ	$168.75	$0.00
Faux Roof to Match Operations	1	Lump Sum	$33,750.00	$33,750.00
Paint	6460	Sq. Ft.	$3.38	$21,802.50
Pipe Paint	1	Lump Sum	$4,050.00	$4,050.00
Flooring	0	Sq. Ft.	$14.85	$0.00
Chemical-Resistant Coating	637	Sq. Ft.	$20.25	$12,899.25
Fire Extinguishers	4	Each	$945.00	$3,780.00
Grating	980	Sq. Ft.	$47.25	$46,305.00
Fiberglass Grating	1	Lump Sum	$16,200.00	$16,200.00
FRP Deck	684	Sq. Ft.	$67.50	$46,170.00
FRP Deck Access Panels	3	Each	$2,700.00	$8,100.00
Access Hatch for Bypass Channel	1	Each	$6,750.00	$6,750.00
Aluminum Stairs	1	Each	$20,250.00	$20,250.00
FRP Drain	1	Each	$405.00	$405.00
Concrete Catch Basin	1	Sq. Yds.	$1,350.00	$1,350.00
Tertiary Filters				
Filter Units	2	Each	$388,125.00	$776,250.00
Filter Installation	2	Each	$16,200.00	$32,400.00
4" DIP Drain	0	Lin. Ft.	$128.25	$0.00
4" Plug Valves	0	Each	$1,012.50	$0.00
4" Fittings	0	Each	$675.00	$0.00
6" DIP FL Sleeve - Short	3	Each	$540.00	$1,620.00
6" DIP MJ 45s	2	Each	$675.00	$1,350.00
6" DIP MJ 90s	1	Each	$864.00	$864.00
6" DIP FL 90s	4	Each	$864.00	$3,456.00
6" DIP MJ Tees	2	Each	$1,161.00	$2,322.00
6" DIP Filter Backwash	100	Lin. Ft.	$222.75	$22,275.00
20" DIP FL Sleeve - Short	0	Each	$2,700.00	$0.00
20" DIP 90s	0	Each	$4,522.50	$0.00
20" DIP Effluent/Bypass Spools	0	Each	$1,242.00	$0.00
20" DIP Filter Bypass	0	Lin. Ft.	$837.00	$0.00
20" Butterfly Valves	0	Each	$33,750.00	$0.00
24" DIP FL Sleeve - Short	0	Each	$3,375.00	$0.00
24" DIP 90s	0	Each	$7,742.25	$0.00
24" DIP Influent Spools	0	Each	$1,377.00	$0.00
30" DIP Final Clarifier Effluent	10	Lin. Ft.	$972.00	$9,720.00
30" MJ DIP 11.25s	2	Each	$4,050.00	$8,100.00
30" DIP MJ 90s	1	Each	$6,750.00	$6,750.00
30" DIP MJ/FE Wall Pipe	1	Each	$4,050.00	$4,050.00
12" DIP Filter Backwash		Lin. Ft.	$438.75	$0.00
12" CISP MJ Filtrate	40	Lin. Ft.	$162.00	$6,480.00
12" CISP MJ 90s	8	Each	$1,080.00	$8,640.00
12" CISP MJ 45s	2	Each	$810.00	$1,620.00
12" CISP MJ Wyes	4	Each	$1,350.00	$5,400.00
12" FIP Clean Out Cap	1	Each	$270.00	$270.00
Slide Gate for Filter Bypass	1	Each	$20,250.00	$20,250.00
Slide Gate for Filter Bldg. Bypass	1	Each	$20,250.00	$20,250.00
Slide Gate for Filter Isolation	3	Each	$20,250.00	$60,750.00
Slide Gate for UV Isolation	2	Each	$20,250.00	$40,500.00
Installation of Slide Gates	7	Each	$6,750.00	$47,250.00
Pipe Weirs for Filter Hydraulic Break	3	Each	$1,620.00	$4,860.00
6" Mud Valves	4	Each	$5,400.00	$21,600.00
Mud Valve Installation	4	Each	$675.00	$2,700.00
UV Equipment	1	Lump Sum	$330,372.00	$330,372.00
UV Equipment Installation	1	Lump Sum	$67,500.00	$67,500.00
UV Maintenance Rack	1	Lump Sum	$1,350.00	
Mechanical				
MOD & Louver	2	Each	$4,320.00	$8,640.00
Water Heater	2	Each	$6,750.00	$13,500.00
Emergency Shower / Eye Wash Station	2	Each	$6,750.00	$13,500.00

Description		Quantity	Unit	2024 Unit Price	2024 Total Cost
	Emergency Eye Wash Station	1	Each	$2,700.00	$2,700.00
	Unit Heater	1	Each	$4,050.00	$4,050.00
	Ductwork	160	Lin. Ft.	$202.50	$32,400.00
	Hose bibbs	3	Each	$270.00	$810.00
	Freeze proof hose bibb	1	Each	$270.00	$270.00
	FRP Duct Work (in Chem Room)	30	Lin. Ft.	$270.00	$8,100.00
	1" CU Water	100	Lin. Ft.	$40.50	$4,050.00
	Air Handling Unit	1	Each	$33,750.00	$33,750.00
	6" Floor Drains	1	Each	$135.00	$135.00
	Exhaust Fans	3	Each	$5,400.00	$16,200.00
	Positive Pressurization Unit	1	Each	$20,250.00	$20,250.00
	Dehumidifier - Large	1	Each	$6,750.00	$6,750.00
	Dehumidifier - Small	1	Each	$4,050.00	$4,050.00
	Electrical				
	Auto Valves	0	Lump Sum	$1,620.00	$0.00
	Pinch Valve	1	Each	$6,750.00	$6,750.00
	Blowers	0	Lump Sum	$2,025.00	$0.00
	Compressor	0	Lump Sum	$1,620.00	$0.00
	Lighting	30	Each	$810.00	$24,300.00
	UV (Equipment and Labor)	1	Lot	$33,750.00	$33,750.00
	Filters (Equipment and Labor)	2	Lot	$33,750.00	$67,500.00
	MCC Sections	0	Each	$20,250.00	$0.00
	480V Panelboard	1	Each	$8,775.00	$8,775.00
	120V/208V Transformer	1	Each	$4,050.00	$4,050.00
	Lighting Transformer	1	Each	$2,025.00	$2,025.00
	Conduit & Wire	2000	Lin. Ft.	$54.00	$108,000.00
	Lights	25	Each	$675.00	$16,875.00
	Key Scan System	1	Lump Sum	$22,950.00	$22,950.00
	Networking IT Panel	1	Each	$6,750.00	$6,750.00
	Networking cable and conduit	800	LF	$54.00	$43,200.00
	Go/No-Go Lights and Devices	1	Lump Sum	$13,500.00	$13,500.00
	Fire Alarm, FACP and Installation/Test	1	Lump Sum	$31,050.00	$31,050.00
	Lightning Protection	1	Lump Sum	$27,000.00	$27,000.00
	Instrumentation & Control			$0.00	$0.00
	TP/TN Analyzer	1	Each	$54,000.00	$54,000.00
	Solitax		Each	$20,250.00	$0.00
	Nitritax		Each	$29,700.00	$0.00
	Phosphax		Each	$35,100.00	$0.00
	Filtrax		Each	$20,250.00	$0.00
	Controllers		Each	$5,400.00	$0.00
	Primary Element Installation	1	Lump Sum	$27,000.00	$27,000.00
	HCL Gas Detector	1	Each	$6,750.00	$6,750.00
	WAS Magnetic Flow Meters	0	Each	$10,800.00	$0.00
	WAS Magnetic Flow Meter Installation	0	Each	$2,700.00	$0.00
	PLC & Programming	1	Lump Sum	$67,500.00	$67,500.00
	TOTAL Tertiary Filter/UV Disinfection Building				**$3,490,396.58**
Aerobic Digestion					
	Excavation	2700	Cu. Yds.	$27.86	
	Temp Pumping	1	Lump Sum	$46,428.00	
	Shut Down / Start-up	1	Lump Sum	$46,428.00	
	Demolish Steel Interior Walls	1	Lump Sum	$27,856.80	
	Demolish Sludge Pipe	1	Lump Sum	$27,856.80	
	Pump Out and Clean Digesters	1	Lump Sum	$32,499.60	
	Demolition of Existing Aeration	1	Lump Sum	$32,499.60	
	Repair Wall Penetrations	1	Lump Sum	$4,642.80	
	Dumpsters	6	Each	$928.56	
	Steel Stairs	3	Lump Sum	$17,410.50	
	Grating	4100	Lump Sum	$30.18	
	Paint	1350	Sq.Ft.	$2.32	
	Pipe Paint	1	Lump Sum	$34,821.00	
	Concrete Membrane Tanks Walls	284	Cu. Yds	$1,044.63	
	Concrete Membrane Tanks Slabs	310	Cu. Yds	$1,044.63	
	Concrete walls in Digester	245	Cu. Yds	$1,044.63	
	Concrete Walkway	58	Cu. Yds	$1,044.63	
	Concrete for Jib	8	Cu. Yds	$1,102.67	
	Aluminum Covers	2	Each	$266,961.00	
	Brick/ Block	2400	Sq.Ft.	$51.07	
	Roof			$0.00	
	Spancrete	2000	Sq.Ft.	$18.57	
	Standing Seam Roof	200	SQ	$232.14	
	Truss	600	Sq.Ft.	$3.95	
	Sheeting	600	Sq. Ft.	$0.56	
	Insulation	600	Sq.Ft.	$1.28	
	Window	2	Each	$1,741.05	
	Door	2	Each	$3,714.24	
	Lintel & Sill	28	Lin.Ft.	$32.50	
	Paint	4400	Sq.Ft.	$3.48	
	Pipe Paint	2000	Sq.Ft.	$3.48	
	Plating	270	Sq. Ft.	$92.86	
	60 Hp PD Blowers	4	Each	$53,392.20	
	25 Hp PD Blowers	4	Each	$31,338.90	

	Description	Quantity	Unit	2024 Unit Price	2024 Total Cost
	Install PD Blowers	8	Each	$16,249.80	
	Digester Membrane Thickening	1	Lump Sum	$348,210.00	
	Membrane Installation	1	Lump Sum	$92,856.00	
	Membrane Cleaning System	1	Lump Sum	$104,463.00	
	Cleaning System Installation	1	Lump Sum	$34,821.00	
	Sludge Storage Diffusers	1	Lump Sum	$55,713.60	
	Stairway to Sludge Storage	1	Lump Sum	$11,607.00	
	Level Transducer for sludge storage tank	1	Each	$12,535.56	
	Extend Vents through ceiling	2	Each	$5,803.50	
	Extend overflow in south west digester	1	Each	$5,803.50	
	Thickened Sludge Flushing Connection	1	Lump Sum	$8,124.90	
	6" Air Lift Pump	1	Lump Sum	$19,731.90	
	Install Air Lift Pump	1	Lump Sum	$3,249.96	
	Submersible Mixer	4	each	$27,856.80	
	Install Mixer	4	Lump Sum	$2,785.68	
	Permeate Pump System	1	Lump Sum	$76,606.20	
	Pump Installation	1	Lump Sum	$23,214.00	
	D.O. Probes & Installation	4	Each	$15,089.10	
	1" Hypochlorite Piping	100	Lin. Ft.	$46.43	
	1" Valves	12	Each	$255.35	
	2" Permeate Piping	100	Lin. Ft	$46.43	
	2" Permeate Valves	14	Each	$383.03	
	2" Mag Meter	1	Each	$5,571.36	
	3/4" Gas Piping	100	Lin. Ft.	$60.36	
	8" Welded Stainless Air Header	400	Lin. Ft.	$278.57	
	4" Welded Stainless Air Header	100	Lin. Ft.	$185.71	
	Air Butterfly Valves	16	Each	$1,624.98	
	Sludge transfer Pump	3	Each	$37,142.40	
	Install Sludge Pumps	3	Each	$9,285.60	
	3" Mag Meter	1	Each	$10,446.30	
	6" Sludge Line	250	Lin. Ft.	$162.50	
	6" Fittings	12	Each	$661.60	
	8" Sludge Piping	500	Lin. Ft.	$185.71	
	8" Plug Valve	8	Lin.Ft.	$1,973.19	
	8" Mag meter & Vault	2	Each	$29,017.50	
	8" Telescoping Valve	2	Each	$4,642.80	
	8" Fitting	26	Each	$754.46	
	Fine Screen	2	Each	$16,249.80	
	Screen Installation	1	Lump Sum	$4,642.80	
	Corse Bubble Aeration Equipment	1	Lump Sum	$615,171.00	
	Coarse Aeration Installation	1	Lump Sum	$61,517.10	
	Membrane Controls	1	Lump Sum	$139,284.00	
	Exhaust Fan	1	Each	$19,731.90	
	Intake Louver	1	Each	$10,446.30	
	Ductwork	80	Lin Ft	$92.86	
	Gas Fired Makeup Air	1	Each	$27,856.80	
	Starter Panel	1	Lump Sum	$27,856.80	
	MCC	1	Lump Sum	$92,856.00	
	Electrical	1	Lump Sum	$185,712.00	
	TOTAL AEROBIC DIGESTION				$ -
Sludge Handling					
	CENTRIFUGE				
	Demo of existing centrifuge	1	LS	$24,000.00	$24,000.00
	NEW CENTRISYS CS21-4 2PH CENTRIFUGE	1	LS	$1,129,000.00	$1,129,000.00
	INSTALLATION OF NEW CENTRIFUGE	2	LS	$225,800.00	$451,600.00
	HARDWARE AND MISC. FOR INSTALLATION	1	LS	$1,000.00	$1,000.00
	TROLLEY BEAMS & INSTALLATION	1	LS	$40,000.00	$40,000.00
	SLUDGE FEED PUMPS				
	Demo and Disposal of Existing Feed Pumps	1	LS	$15,000.00	$15,000.00
	CENTRIFUGE FEED PUMPS	1	LS	$99,687.50	$99,687.50
	CENTRIFUGE FEED PUMP INSTALLATION	2	LS	$19,937.50	$39,875.00
	POLYMER UNITS				
	Demo of existing polymer system	1	LS	$2,500.00	$2,500.00
	VELODYNE VELOBLEND VM-10P-2400-RP-2A-A-2	2	EA	$59,770.00	$119,540.00
	INSTALLATION OF NEW POLYMER FEED UNIT	2	LS	$8,000.00	$16,000.00
	BALL VALVES	5	EA	$250.00	$1,250.00
	Polymer Piping	1	LS	$10,000.00	$10,000.00
	Piping				
	Demo and Disposal of Existing Piping	1	LS	$15,000.00	$15,000.00
	Piping Modifications for centrifuges	1	LS	$100,000.00	$100,000.00
	Seal Water Piping for Pumps	1	LS	$10,000.00	$10,000.00
	Drain Hoses and Fittings	2	LS	$5,000.00	$10,000.00
	NPW Piping for Washwater	1	LS	$15,000.00	$15,000.00
	Sludge Conveyor				
	Serpentix Model P-2 Pathwinder Conveyor and Enclosure	1	LS	$157,900.00	$157,900.00
	Installation of New Conveyor and Enclosure	1	LS	$31,580.00	$31,580.00

	Description	Quantity	Unit	2024 Unit Price	2024 Total Cost
	Hardware and Misc. for Installation	1	LS	$1,000.00	$1,000.00
	Structural				
	Concrete Pads for Feed Pumps	6	CY	$1,500.00	$9,000.00
	Concrete Pads for Polymer Units	1	CY	$1,500.00	$1,500.00
	Concrete Piers for Centrifuges	4	CY	$1,800.00	$7,200.00
	Architectural				
	Removal of Existing Platform/Railings	1	LS	$10,000.00	$10,000.00
	Installatiopn of New Platform/Railings	2	LS	$19,000.00	$38,000.00
	Electrical				
	Installation of New Electric for Centrifuges	2	LS	$24,000.00	$48,000.00
	Installation of New Electric for Sludge Feed Pumps	2	LS	$16,000.00	$32,000.00
	Installation of New Electric for Polymer Units	2	LS	$16,000.00	$32,000.00
	Installation of New Electric for Conveyor	1	LS	$5,000.00	$5,000.00
	3 Ton Electric Trolley Hoist	2	EA	$12,000.00	$24,000.00
	TOTAL SLUDGE HANDLING				**$2,472,632.50**
Sludge Storage Barn					
	Excavation	1250	Cu. Yd.	$27.86	$34,821.00
	Architectural/Structural				
	Concrete Walls	277	Cu Yd	$1,102.67	$305,438.21
	Concrete Slab	370	Cu Yd	$696.42	$257,675.40
	Granular Fill	740	Cu Yd	$58.04	$42,945.90
	Vapor Barrier	10000	Sq. Ft.	$0.58	$5,803.50
	Metal Building	1	Lump Sum	$812,490.00	$812,490.00
	Garage Door	4	Each	$27,856.80	$111,427.20
	Trench Drains	120	Lin. Ft.	$116.07	$13,928.40
	Air Handling Unit	1	Lump Sum	$13,231.98	$13,231.98
	20x30 duct	27	Lin. Ft	$185.71	$5,014.22
	Louver	1	Each	$1,276.77	$1,276.77
	Lighting	18	Each	$487.49	$8,774.89
	Conduit	312	Lin. Ft	$37.14	$11,588.43
	220 Outlet	1	Each	$1,392.84	$1,392.84
	120V Transformer	1	Lump Sum	$1,392.84	$1,392.84
	Lighting Panels	1	Lump Sum	$3,249.96	$3,249.96
	TOTAL SLUDGE STORAGE BARN				**$1,630,451.54**
Fleet Maintenance Garage					
	Excavation	1250	Cu. Yd.	$27.86	
	Architectural/Structural				
	Concrete Walls	277	Cu Yd	$1,102.67	
	Concrete Slab	370	Cu Yd	$696.42	
	Granular Fill	740	Cu Yd	$58.04	
	Vapor Barrier	10000	Sq. Ft.	$0.58	
	Metal Building	1	Lump Sum	$812,490.00	
	Window	10	Each	$1,741.05	
	Exterior Single Door	2	Each	$3,714.24	
	Garage Door	4	Each	$27,856.80	
	Door Hardware	2	Lump Sum	$4,642.80	
	Wash Bay Block Walls	800	Sq.Ft.	$27.86	
	Lintels & Sills	60	Lin.Ft.	$32.50	
	Water Service & Hose Bib	1	Lump Sum	$2,089.26	
	Insulation	10000	Sq.Ft.	$1.28	
	Paint	3000	Sq.Ft.	$2.32	
	Storage Racks	1	Lump Sum	$27,856.80	
	Power Washer	1	Lump Sum	$10,446.30	
	Toll Benchs	1	Lump Sum	$27,856.80	
	Truck Lift	1	Lump Sum	$37,142.40	
	Trench Drains	120	Lin. Ft.	$116.07	
	2" Water Service	200	Lin. Ft.	$55.71	
	Water Meter	1	Lump Sum	$2,785.68	
	Utility Sink	2	Lump Sum	$1,741.05	
	6" Sewer Service	120	Lin. Ft.	$69.64	
	3" Vent	100	Lin. Ft.	$46.43	
	Air Handling Unit	2	Lump Sum	$13,231.98	
	20x30 duct	80	Lin. Ft	$185.71	
	Louver	2	Each	$1,276.77	
	Radiant Heat System	1	Lump Sum	$46,428.00	
	Lighting	40	Each	$487.49	
	Conduit	600	Lin. Ft	$37.14	
	220 Outlet	2	Each	$1,392.84	
	120V Transformer	1	Lump Sum	$1,392.84	
	Lighting Panels	1	Lump Sum	$6,499.92	
	TOTAL GARAGE				$ -

Description		Quantity	Unit	2024 Unit Price	2024 Total Cost
Operations Building					
	Architectural/Structural				
	Flooring	3200	Sq. Ft.	$18.57	
	Man Door	8	Each	$5,803.50	
	Handicap Door	1	Each	$12,767.70	
	Windows	12	Each	$1,741.05	
	Interior Block	1200	Sq. Ft.	$27.86	
	Interior Frame Walls	1200	Sq. Ft.	$18.57	
	Paint	12000	Sq.Ft.	$3.48	
	Pipe			$0.00	
	3/4" Potable Water	50	Lin.Ft.	$34.82	
	Water Heater	1	Each	$2,321.40	
	Water Treatment System	1	Each	$19,731.90	
	Cabinets	1	Lump Sum	$32,499.60	
	Mechanical	1	Lump Sum	$34,821.00	
	Lighting	1	Lump Sum	$34,821.00	
	Electrical	1	Lump Sum	$58,035.00	
	Computer System	1	LS	$383,031.00	
	TOTAL OPERATIONS BUILDING				$ -
Administration Building					
	Architectural/Structural				
	Concrete Walls	100	Cu. Yd	$1,160.70	
	Concrete Slab	100	Cu. Yd	$1,160.70	
	Spancrete Roof	4200	Sq. Ft.	$16.25	
	Roofing	4200	Sq. Ft.	$20.89	
	Metal Roof	1500	Sq. Ft.	$18.57	
	Flooring	4200	Sq. Ft.	$18.57	
	Man Door	10	Each	$5,803.50	
	Handicap Door	3	Each	$12,767.70	
	Brick/Block Wall	3600	Sq. Ft.	$37.14	
	Interior Block	3600	Sq. Ft.	$27.86	
	Interior Frame Walls	7200	Sq. Ft.	$18.57	
	Paint	18800	Sq.Ft.	$3.48	
	Pipe			$0.00	
	3/4" Potable Water	150	Lin.Ft.	$34.82	
	6" Sanitary	100	Lin.Ft.	$46.43	
	3" Vent	50	Lin.Ft.	$34.82	
	Water Heater	1	Each	$2,321.40	
	Water Treatment System	1	Each	$19,731.90	
	Cabinets	1	Lump Sum	$32,499.60	
	Board Room Furniture	1	Lump Sum	$51,070.80	
	Office Funiture	1	Lump Sum	$41,785.20	
	Mechanical	1	Lump Sum	$81,249.00	
	Lighting	1	Lump Sum	$34,821.00	
	Electrical	1	Lump Sum	$58,035.00	
	Computer System	1	LS	$46,428.00	
	TOTAL ADMINISTRATION BUILDING				$ -

APPENDIX G – FISCAL MODEL SCENARIO COMPUTATIONS

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Baseline Model (Current User Fee)

Northern Moraine WRD					
Wastewater Facility Plan	Inflation	4%	*match CCI*		
Rate Determination	Additional Acounts/yr	25		Additional Metered Accounts/yr	1%
	Annual Rate Increase	7%			

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Operation and Maintenance Expenses											
Administration	$ 1,125,507.00	$ 1,170,527.28	$ 1,217,348.37	$ 1,266,042.31	$ 1,316,684.00	$ 1,369,351.36	$ 1,424,125.41	$ 1,481,090.43	$ 1,540,334.05	$ 1,601,947.41	$ 1,666,025.30
Collections	$ 626,750.00	$ 651,820.00	$ 677,892.80	$ 705,008.51	$ 733,208.85	$ 762,537.21	$ 793,038.69	$ 824,760.24	$ 857,750.65	$ 892,060.68	$ 927,743.11
Treatment	$ 862,090.00	$ 896,573.60	$ 932,436.54	$ 969,734.01	$ 1,008,523.37	$ 1,048,864.30	$ 1,090,818.87	$ 1,134,451.63	$ 1,179,829.69	$ 1,227,022.88	$ 1,276,103.80
Expenses Sub-Total	**$ 2,614,347.00**	**$ 2,718,920.88**	**$ 2,827,677.72**	**$ 2,940,784.82**	**$ 3,058,416.22**	**$ 3,180,752.87**	**$ 3,307,982.98**	**$ 3,440,302.30**	**$ 3,577,914.39**	**$ 3,721,030.97**	**$ 3,869,872.21**
Existing Debt Service											
Bond Principal, Interest & Fees[2]	$ 455,954.00	$ 452,824.00	$ 454,541.00	$ 456,058.00	$ 457,371.00	$ 453,534.00	$ 454,545.00	$ -	$ -	$ -	$ -
Holiday Hills Phase 1 (L175824)	$ 296,870.00	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64
Existing Debt Service Sub-Total	**$ 752,824.00**	**$ 722,630.64**	**$ 724,347.64**	**$ 725,864.64**	**$ 727,177.64**	**$ 723,340.64**	**$ 724,351.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**
Future Expenses/Debt Service - Replacement											
Aerobic Digester Blower Replacement	$ 770,000.00										
WWTF Oxidation Ditch Gate Replacement	$ 340,000.00										
Generator Replacement	$ 550,000.00										
Laboratory Equipment Remodel	$ 80,000.00										
Final Clarifier No. 2 Rehabilitation					$ 1,090,000.00						
UV Disinfection Project											
WWTF Fleet Maintenance Garage							$ 2,510,000.00				
Garage and Personnel Building Remodel	$ 600,000.00										
Replacement WWTF	**$ 2,340,000.00**	**$ -**	**$ -**	**$ -**	**$ 1,090,000.00**	**$ -**	**$ 2,510,000.00**	**$ -**	**$ -**	**$ -**	**$ -**
Replacement LS											
Replacement Collection System											
TOTAL Replacement	**$ 2,340,000.00**	**$ -**	**$ -**	**$ -**	**$ 1,090,000.00**	**$ -**	**$ 2,510,000.00**	**$ -**	**$ -**	**$ -**	**$ -**
Depreciation											
Collection System[1]											
Lift Stations[1]											
WWTF[1]											
Depreciation Sub-Total	**$ 1,440,162.00**	**$ 1,483,366.86**	**$ 1,527,867.87**	**$ 1,573,703.90**	**$ 1,620,915.02**	**$ 1,669,542.47**	**$ 1,719,628.74**	**$ 1,771,217.61**	**$ 1,824,354.13**	**$ 1,879,084.76**	**$ 1,935,457.30**
TOTAL Depreciation/Replacement	**$ 2,340,000.00**	**$ 1,483,366.86**	**$ 1,527,867.87**	**$ 1,573,703.90**	**$ 1,620,915.02**	**$ 1,669,542.47**	**$ 2,510,000.00**	**$ 1,771,217.61**	**$ 1,824,354.13**	**$ 1,879,084.76**	**$ 1,935,457.30**
Future Expenses/Debt Service - Capital											
Solar Array Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Sewer Extension	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -
Capital Sub-Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Expenses Accrual	**$ 5,707,171.00**	**$ 4,924,918.38**	**$ 5,079,893.22**	**$ 5,240,353.37**	**$ 5,406,508.88**	**$ 5,573,635.97**	**$ 6,542,334.62**	**$ 5,481,326.55**	**$ 5,672,075.17**	**$ 5,869,922.36**	**$ 6,075,136.15**
Total Expenses Cash[5]	**$ 4,267,009.00**	**$ 3,441,551.52**	**$ 3,552,025.36**	**$ 3,666,649.46**	**$ 3,785,593.86**	**$ 3,904,093.51**	**$ 4,822,705.88**	**$ 3,710,108.94**	**$ 3,847,721.03**	**$ 3,990,837.61**	**$ 4,139,678.85**
Solar Array Project	$ 3,260,000.00										
Holiday Hills Sewer Extension		**$ 2,059,752.00**	$ 2,285,124.00	$ 2,285,124.00							
Revenue											
Sewer Fees (Budgeted)	$ 3,187,200										
Accounts (Metered)	95	96	97	98	99	100	101	103	105	107	109
Accounts Unmetered	5200	5225	5250	5275	5300	5325	5350	5375	5400	5425	5450
Flat Residential Sewer Rate	$47.00	$50.06	$53.31	$56.77	$60.46	$64.39	$68.58	$73.04	$77.78	$82.84	$88.23
Metered Nonresidential Sewer Rate/1000 gal	$4.70	$5.01	$5.33	$5.68	$6.05	$6.44	$6.86	$7.30	$7.78	$8.28	$8.82
Sewer Fees (Metered)	$ 171,550	$ 218,413	$ 230,660	$ 243,680	$ 257,521	$ 272,238	$ 287,888	$ 304,902	$ 322,975	$ 342,173	$ 362,571
Sewer Fees (Unmetered)	$ 3,015,650	$3,138,449	$3,358,440	$3,593,771	$3,845,505	$4,114,781	$4,402,816	$4,710,910	$5,040,455	$5,392,937	$5,769,945
Annual Rate Increase[4]	***0%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***
Base Charge (Proposed)		***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***
Cost of Meter Use Base Charge (Proposed)		***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***
Sewer User Fees	$ 3,187,200.00	$ 3,356,861	$ 3,589,101	$ 3,837,451	$ 4,103,027	$ 4,387,020	$ 4,690,704	$ 5,015,813	$ 5,363,429	$ 5,735,110	$ 6,132,516
Hauled Waste Income	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00
Other Income	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00
Grant: Holiday Hills FY 25 CDS											
Grant: Holiday Hills FY24 CDS											
Grant: Generator Replacement											
Total Revenue	**$ 3,493,700.00**	**$ 3,663,361.25**	**$ 3,895,600.52**	**$ 4,143,950.69**	**$ 4,409,526.52**	**$ 4,693,519.64**	**$ 4,997,203.83**	**$ 5,322,312.61**	**$ 5,669,929.32**	**$ 6,041,609.57**	**$ 6,439,016.07**
Annual Balance (Accrual)	$ (2,213,471.00)	($1,261,557.13)	($1,184,292.70)	($1,096,402.68)	($996,982.36)	($880,116.33)	($1,545,130.79)	($159,013.94)	($2,145.84)	$171,687.21	$363,879.93
Cumulative Balance (Accrual)	$ 576,763.00	($684,794.13)	($1,869,086.83)	($2,965,489.51)	($3,962,471.86)	($4,842,588.19)	($6,387,718.99)	($6,546,732.93)	($6,548,878.77)	($6,377,191.56)	($6,013,311.63)

	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Operation and Maintenance Expenses												
Administration	$ 1,732,666.32	$ 1,801,972.97	$ 1,874,051.89	$ 1,949,013.96	$ 2,026,974.52	$ 2,108,053.50	$ 2,192,375.64	$ 2,280,070.67	$ 2,371,273.50	$ 2,466,124.44	$ 2,564,769.41	$ 2,667,360.19
Collections	$ 964,852.83	$ 1,003,446.94	$ 1,043,584.82	$ 1,085,328.21	$ 1,128,741.34	$ 1,173,891.00	$ 1,220,846.64	$ 1,269,680.50	$ 1,320,467.72	$ 1,373,286.43	$ 1,428,217.89	$ 1,485,346.60
Treatment	$ 1,327,147.95	$ 1,380,233.87	$ 1,435,443.22	$ 1,492,860.95	$ 1,552,575.39	$ 1,614,678.40	$ 1,679,265.54	$ 1,746,436.16	$ 1,816,293.61	$ 1,888,945.35	$ 1,964,503.16	$ 2,043,083.29
Expenses Sub-Total	**$ 4,024,667.09**	**$ 4,185,653.78**	**$ 4,353,079.93**	**$ 4,527,203.13**	**$ 4,708,291.25**	**$ 4,896,622.90**	**$ 5,092,487.82**	**$ 5,296,187.33**	**$ 5,508,034.82**	**$ 5,728,356.22**	**$ 5,957,490.46**	**$ 6,195,790.08**
Existing Debt Service												
Bond Principal, Interest & Fees[2]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Phase 1 (L175824)	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ -	$ -
Existing Debt Service Sub-Total	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ -**	**$ -**
Future Expenses/Debt Service - Replacement												
Replacement WWTF	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
TOTAL Replacement	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Depreciation Sub-Total	**$ 1,993,521.02**	**$ 2,053,326.65**	**$ 2,114,926.45**	**$ 2,178,374.24**	**$ 2,243,725.47**	**$ 2,311,037.23**	**$ 2,380,368.35**	**$ 2,451,779.40**	**$ 2,525,332.78**	**$ 2,601,092.77**	**$ 2,679,125.55**	**$ 2,759,499.32**
TOTAL Depreciation/Replacement	**$ 1,993,521.02**	**$ 2,053,326.65**	**$ 2,114,926.45**	**$ 2,178,374.24**	**$ 2,243,725.47**	**$ 2,311,037.23**	**$ 2,380,368.35**	**$ 2,451,779.40**	**$ 2,525,332.78**	**$ 2,601,092.77**	**$ 2,679,125.55**	**$ 2,759,499.32**
Solar Array Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Sewer Extension	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Capital Sub-Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Expenses Accrual	**$ 6,287,994.75**	**$ 6,508,787.07**	**$ 6,737,813.02**	**$ 6,975,384.01**	**$ 7,221,823.36**	**$ 7,477,466.78**	**$ 7,742,662.81**	**$ 8,017,773.37**	**$ 8,303,174.25**	**$ 8,599,255.62**	**$ 8,636,616.02**	**$ 8,955,289.40**
Total Expenses Cash[5]	**$ 4,294,473.73**	**$ 4,455,460.42**	**$ 4,622,886.57**	**$ 4,797,009.77**	**$ 4,978,097.89**	**$ 5,166,429.54**	**$ 5,362,294.46**	**$ 5,565,993.97**	**$ 5,777,841.46**	**$ 5,998,162.86**	**$ 5,957,490.46**	**$ 6,195,790.08**
Revenue												
Accounts Unmetered	5475	5500	5525	5550	5575	5600	5625	5650	5675	5700	5725	5750
Flat Residential Sewer Rate	$93.96	$100.07	$106.57	$113.50	$120.88	$128.73	$137.10	$146.01	$155.50	$165.61	$176.38	$187.84
Metered Nonresidential Sewer Rate/1000 gal	$9.40	$10.01	$10.66	$11.35	$12.09	$12.87	$13.71	$14.60	$15.55	$16.56	$17.64	$18.78
Sewer Fees (Metered)	$ 342,954	$ 365,246	$ 388,987	$ 414,272	$ 441,199	$ 469,877	$ 500,419	$ 532,947	$ 567,588	$ 604,481	$ 643,773	$ 685,618
Sewer Fees (Unmetered)	$6,173,180	$6,604,457	$7,065,718	$7,559,039	$8,086,640	$8,650,891	$9,254,330	$9,899,665	$10,589,794	$11,327,814	$12,117,035	$12,960,994
Annual Rate Increase[4]	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***	***7%***
Base Charge (Proposed)	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***	***$ 20.00***
Cost of Meter Use Base Charge (Proposed)	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***	***$ 11.00***
Sewer User Fees	$ 6,516,134	$ 6,969,703	$ 7,454,705	$ 7,973,311	$ 8,527,839	$ 9,120,769	$ 9,754,749	$ 10,432,611	$ 11,157,382	$ 11,932,295	$ 12,760,807	$ 13,646,612
Hauled Waste Income	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00
Other Income	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00
Total Revenue	**$ 6,822,634.03**	**$ 7,276,203.00**	**$ 7,761,205.27**	**$ 8,279,810.84**	**$ 8,834,339.00**	**$ 9,427,268.59**	**$ 10,061,248.90**	**$ 10,739,111.40**	**$ 11,463,882.22**	**$ 12,238,795.46**	**$ 13,067,307.48**	**$ 13,953,112.12**
Annual Balance (Accrual)	$534,639.28	$767,415.93	$1,023,392.25	$1,304,426.83	$1,612,515.64	$1,949,801.81	$2,318,586.09	$2,721,338.03	$3,160,707.97	$3,639,539.84	$4,430,691.47	$4,997,822.72
Cumulative Balance (Accrual)	($5,478,672.36)	($4,711,256.42)	($3,687,864.17)	($2,383,437.34)	($770,921.70)	$1,178,880.11	$3,497,466.20	$6,218,804.23	$9,379,512.21	$13,019,052.05	$17,449,743.51	$22,447,566.23

Baseline Model (Current User Fee)

Northern Moraine WRD
Wastewater Facility Plan
Rate Determination

Inflation	4% *match CCI*
Additional Acounts/yr	25
Annual Rate Increase	12%

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Operation and Maintenance Expenses											
Administration	$ 1,125,507.00	$ 1,170,527.28	$ 1,217,348.37	$ 1,266,042.31	$ 1,316,684.00	$ 1,369,351.36	$ 1,424,125.41	$ 1,481,090.43	$ 1,540,334.05	$ 1,601,947.41	$ 1,666,025.30
Collections	$ 626,750.00	$ 651,820.00	$ 677,892.80	$ 705,008.51	$ 733,208.85	$ 762,537.21	$ 793,038.69	$ 824,760.24	$ 857,750.65	$ 892,060.68	$ 927,743.11
Treatment	$ 862,090.00	$ 896,573.60	$ 932,436.54	$ 969,734.01	$ 1,008,523.37	$ 1,048,864.30	$ 1,090,818.87	$ 1,134,451.63	$ 1,179,829.69	$ 1,227,022.88	$ 1,276,103.80
Expenses Sub-Total	**$ 2,614,347.00**	**$ 2,718,920.88**	**$ 2,827,677.72**	**$ 2,940,784.82**	**$ 3,058,416.22**	**$ 3,180,752.87**	**$ 3,307,982.98**	**$ 3,440,302.30**	**$ 3,577,914.39**	**$ 3,721,030.97**	**$ 3,869,872.21**
Existing Debt Service											
Bond Principal, Interest & Fees[2]	$ 455,954.00	$ 452,824.00	$ 454,541.00	$ 456,058.00	$ 457,371.00	$ 453,534.00	$ 454,545.00	$ -	$ -	$ -	$ -
Holiday Hills Phase 1 (L175824)	$ 296,870.00	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64
Existing Debt Service Sub-Total	**$ 752,824.00**	**$ 722,630.64**	**$ 724,347.64**	**$ 725,864.64**	**$ 727,177.64**	**$ 723,340.64**	**$ 724,351.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**
Future Expenses/Debt Service - Replacement											
Aerobic Digester Blower Replacement	$ 770,000.00										
WWTF Oxidation Ditch Gate Replacement	$ 340,000.00										
Generator Replacement	$ 550,000.00										
Laboratory Equipment Remodel	$ 80,000.00										
Final Clarifier No. 2 Rehabilitation					$ 1,090,000.00						
UV Disinfection Project											
WWTF Fleet Maintenance Garage							$ 2,510,000.00				
Garage and Personnel Building Remodel	$ 600,000.00										
Replacement WWTF	**$ 2,340,000.00**	**$ -**	**$ -**	**$ -**	**$ 1,090,000.00**	**$ -**	**$ 2,510,000.00**	**$ -**	**$ -**	**$ -**	**$ -**
Replacement LS											
Replacement Collection System											
Future Expenses - Replacement Sub Total	**$ 2,340,000.00**	**$ -**	**$ -**	**$ -**	**$ 1,090,000.00**	**$ -**	**$ 2,510,000.00**	**$ -**	**$ -**	**$ -**	**$ -**
Full Replacement											
Collection System[1]	$ 1,491,000.00	$ 1,550,640.00	$ 1,612,665.60	$ 1,677,172.22	$ 1,744,259.11	$ 1,814,029.48	$ 1,886,590.66	$ 1,962,054.28	$ 2,040,536.45	$ 2,122,157.91	$ 2,207,044.23
Lift Stations[1]	$ 740,700.00	$ 770,328.00	$ 801,141.12	$ 833,186.76	$ 866,514.24	$ 901,174.80	$ 937,221.80	$ 974,710.67	$ 1,013,699.10	$ 1,054,247.06	$ 1,096,416.94
WWTF[1]	$ 1,500,000.00	$ 1,560,000.00	$ 1,622,400.00	$ 1,687,296.00	$ 1,754,787.84	$ 1,824,979.35	$ 1,897,978.53	$ 1,973,897.67	$ 2,052,853.58	$ 2,134,967.72	$ 2,220,366.43
Full Replacement Sub-Total	**$ 3,731,700.00**	**$ 3,880,968.00**	**$ 4,036,206.72**	**$ 4,197,654.99**	**$ 4,365,561.19**	**$ 4,540,183.64**	**$ 4,721,790.98**	**$ 4,910,662.62**	**$ 5,107,089.13**	**$ 5,311,372.69**	**$ 5,523,827.60**
Total Collection System	**$ 1,491,000.00**	**$ 1,550,640.00**	**$ 1,612,665.60**	**$ 1,677,172.22**	**$ 1,744,259.11**	**$ 1,814,029.48**	**$ 1,886,590.66**	**$ 1,962,054.28**	**$ 2,040,536.45**	**$ 2,122,157.91**	**$ 2,207,044.23**
Total Lift Stations	**$ 740,700.00**	**$ 770,328.00**	**$ 801,141.12**	**$ 833,186.76**	**$ 866,514.24**	**$ 901,174.80**	**$ 937,221.80**	**$ 974,710.67**	**$ 1,013,699.10**	**$ 1,054,247.06**	**$ 1,096,416.94**
Total WWTF	**$ 2,340,000.00**	**$ 1,560,000.00**	**$ 1,622,400.00**	**$ 1,687,296.00**	**$ 1,754,787.84**	**$ 1,824,979.35**	**$ 2,510,000.00**	**$ 1,973,897.67**	**$ 2,052,853.58**	**$ 2,134,967.72**	**$ 2,220,366.43**
TOTAL Replacement	**$ 3,731,700.00**	**$ 3,880,968.00**	**$ 4,036,206.72**	**$ 4,197,654.99**	**$ 4,365,561.19**	**$ 4,540,183.64**	**$ 4,721,790.98**	**$ 4,910,662.62**	**$ 5,107,089.13**	**$ 5,311,372.69**	**$ 5,523,827.60**
Future Expenses/Debt Service - Capital											
Solar Array Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Sewer Extension	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -
Capital Sub-Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Expenses Accrual	**$ 7,098,871.00**	**$ 7,322,519.52**	**$ 7,588,232.08**	**$ 7,864,304.45**	**$ 8,151,155.05**	**$ 8,444,277.14**	**$ 8,754,125.60**	**$ 8,620,771.56**	**$ 8,954,810.16**	**$ 9,302,210.30**	**$ 9,663,506.44**
Total Expenses Cash[5]	**$ 3,367,171.00**	**$ 3,441,551.52**	**$ 3,552,025.36**	**$ 3,666,649.46**	**$ 3,785,593.86**	**$ 3,904,093.51**	**$ 4,032,334.62**	**$ 3,710,108.94**	**$ 3,847,721.03**	**$ 3,990,837.61**	**$ 4,139,678.85**
Solar Array Project	$ 3,260,000.00										
Holiday Hills Sewer Extension		**$ 2,059,752.00**	$ 2,285,124.00	$ 2,285,124.00							
Revenue											
Sewer Fees (Budgeted)	$ 3,187,200										
Accounts	5295	5320									
Accounts Unmetered	5200	5225	5250	5275	5300	5325	5350	5375	5400	5425	5450
Flat Residential Sewer Rate	$47.00	$52.64	$58.96	$66.03	$73.96	$82.83	$92.77	$103.90	$116.37	$130.33	$145.97
Metered Residential Sewer Rate/1000 gal	$4.70	$5.26	$5.90	$6.60	$7.40	$8.28	$9.28	$10.39	$11.64	$13.03	$14.60
Sewer Fees (Metered)	$ 171,550	$ 192,136	$ 215,192	$ 241,015	$ 269,937	$ 302,330	$ 338,609	$ 379,242	$ 424,751	$ 475,722	$ 532,808
Sewer Fees (Unmetered)	$ 3,015,650	$3,300,528	$3,714,278	$4,179,801	$4,703,564	$5,292,841	$5,955,813	$6,701,681	$7,540,793	$8,484,789	$9,546,756
Annual Rate Increase[4]	*0%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*
Sewer User Fees	$ 3,187,200.00	$ 3,492,664	$ 3,929,471	$ 4,420,817	$ 4,973,501	$ 5,595,170	$ 6,294,422	$ 7,080,923	$ 7,965,545	$ 8,960,511	$ 10,079,564
Hauled Waste Income	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00
Other Income	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00
Grant: Holiday Hills FY 25 CDS											
Grant: Holiday Hills FY24 CDS											
Grant: Generator Replacement											
Total Revenue	**$ 3,493,700.00**	**$ 3,799,164.00**	**$ 4,235,970.72**	**$ 4,727,316.69**	**$ 5,280,001.32**	**$ 5,901,670.49**	**$ 6,600,921.85**	**$ 7,387,423.08**	**$ 8,272,044.93**	**$ 9,267,010.74**	**$ 10,386,064.48**
Annual Balance (Accrual)	$ (3,605,171.00)	($3,523,355.52)	($3,352,261.36)	($3,136,987.76)	($2,871,153.73)	($2,542,606.65)	($2,153,203.75)	($1,233,348.48)	($682,765.22)	($35,199.56)	$722,558.04
Cumulative Balance (Accrual)	$ (814,937.00)	($4,338,292.52)	($7,690,553.88)	($10,827,541.64)	($13,698,695.36)	($16,241,302.01)	($18,394,505.76)	($19,627,854.24)	($20,310,619.46)	($20,345,819.03)	($19,623,260.99)

	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Operation and Maintenance Expenses												
Administration	$ 1,732,666.32	$ 1,801,972.97	$ 1,874,051.89	$ 1,949,013.96	$ 2,026,974.52	$ 2,108,053.50	$ 2,192,375.64	$ 2,280,070.67	$ 2,371,273.50	$ 2,466,124.44	$ 2,564,769.41	$ 2,667,360.19
Collections	$ 964,852.83	$ 1,003,446.94	$ 1,043,584.82	$ 1,085,328.21	$ 1,128,741.34	$ 1,173,891.00	$ 1,220,846.64	$ 1,269,680.50	$ 1,320,467.72	$ 1,373,286.43	$ 1,428,217.89	$ 1,485,346.60
Treatment	$ 1,327,147.95	$ 1,380,233.87	$ 1,435,443.22	$ 1,492,860.95	$ 1,552,575.39	$ 1,614,678.40	$ 1,679,265.54	$ 1,746,436.16	$ 1,816,293.61	$ 1,888,945.35	$ 1,964,503.16	$ 2,043,083.29
Expenses Sub-Total	**$ 4,024,667.09**	**$ 4,185,653.78**	**$ 4,353,079.93**	**$ 4,527,203.13**	**$ 4,708,291.25**	**$ 4,896,622.90**	**$ 5,092,487.82**	**$ 5,296,187.33**	**$ 5,508,034.82**	**$ 5,728,356.22**	**$ 5,957,490.46**	**$ 6,195,790.08**
Existing Debt Service												
Bond Principal, Interest & Fees[2]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Phase 1 (L175824)	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ -	$ -
Existing Debt Service Sub-Total	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ -**	**$ -**
Replacement WWTF	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Future Expenses - Replacement Sub Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Full Replacement												
Collection System[1]	$ 2,295,326.00	$ 2,387,139.04	$ 2,482,624.60	$ 2,581,929.58	$ 2,685,206.77	$ 2,792,615.04	$ 2,904,319.64	$ 3,020,492.42	$ 3,141,312.12	$ 3,266,964.61	$ 3,397,643.19	$ 3,533,548.92
Lift Stations[1]	$ 1,140,273.62	$ 1,185,884.56	$ 1,233,319.95	$ 1,282,652.74	$ 1,333,958.85	$ 1,387,317.21	$ 1,442,809.90	$ 1,500,522.29	$ 1,560,543.18	$ 1,622,964.91	$ 1,687,883.51	$ 1,755,398.85
WWTF[1]	$ 2,309,181.08	$ 2,401,548.33	$ 2,497,610.26	$ 2,597,514.67	$ 2,701,415.26	$ 2,809,471.87	$ 2,921,850.74	$ 3,038,724.77	$ 3,160,273.76	$ 3,286,684.71	$ 3,418,152.10	$ 3,554,878.19
Full Replacement Sub-Total	**$ 5,744,780.70**	**$ 5,974,571.93**	**$ 6,213,554.81**	**$ 6,462,097.00**	**$ 6,720,580.88**	**$ 6,989,404.11**	**$ 7,268,980.28**	**$ 7,559,739.49**	**$ 7,862,129.07**	**$ 8,176,614.23**	**$ 8,503,678.80**	**$ 8,843,825.95**
Total Collection System	**$ 2,295,326.00**	**$ 2,387,139.04**	**$ 2,482,624.60**	**$ 2,581,929.58**	**$ 2,685,206.77**	**$ 2,792,615.04**	**$ 2,904,319.64**	**$ 3,020,492.42**	**$ 3,141,312.12**	**$ 3,266,964.61**	**$ 3,397,643.19**	**$ 3,533,548.92**
Total Lift Stations	**$ 1,140,273.62**	**$ 1,185,884.56**	**$ 1,233,319.95**	**$ 1,282,652.74**	**$ 1,333,958.85**	**$ 1,387,317.21**	**$ 1,442,809.90**	**$ 1,500,522.29**	**$ 1,560,543.18**	**$ 1,622,964.91**	**$ 1,687,883.51**	**$ 1,755,398.85**
Total WWTF	**$ 2,309,181.08**	**$ 2,401,548.33**	**$ 2,497,610.26**	**$ 2,597,514.67**	**$ 2,701,415.26**	**$ 2,809,471.87**	**$ 2,921,850.74**	**$ 3,038,724.77**	**$ 3,160,273.76**	**$ 3,286,684.71**	**$ 3,418,152.10**	**$ 3,554,878.19**
TOTAL Replacement	**$ 5,744,780.70**	**$ 5,974,571.93**	**$ 6,213,554.81**	**$ 6,462,097.00**	**$ 6,720,580.88**	**$ 6,989,404.11**	**$ 7,268,980.28**	**$ 7,559,739.49**	**$ 7,862,129.07**	**$ 8,176,614.23**	**$ 8,503,678.80**	**$ 8,843,825.95**
Future Expenses/Debt Service - Capital												
Solar Array Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Sewer Extension	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Capital Sub-Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Expenses Accrual	**$ 10,039,254.44**	**$ 10,430,032.35**	**$ 10,836,441.38**	**$ 11,259,106.77**	**$ 11,698,678.77**	**$ 12,155,833.66**	**$ 12,631,274.74**	**$ 13,125,733.46**	**$ 13,639,970.53**	**$ 14,174,777.09**	**$ 14,461,169.27**	**$ 15,039,616.04**
Total Expenses Cash[5]	**$ 4,294,473.73**	**$ 4,455,460.42**	**$ 4,622,886.57**	**$ 4,797,009.77**	**$ 4,978,097.89**	**$ 5,166,429.54**	**$ 5,362,294.46**	**$ 5,565,993.97**	**$ 5,777,841.46**	**$ 5,998,162.86**	**$ 5,957,490.46**	**$ 6,195,790.08**
Revenue												
Accounts Unmetered	5475	5500	5525	5550	5575	5600	5625	5650	5675	5700	5725	5750
Flat Residential Sewer Rate	$163.49	$183.11	$205.08	$229.69	$257.26	$288.13	$322.70	$361.43	$404.80	$453.38	$507.78	$568.71
Metered Residential Sewer Rate/1000 gal	$16.35	$18.31	$20.51	$22.97	$25.73	$28.81	$32.27	$36.14	$40.48	$45.34	$50.78	$56.87
Sewer Fees (Metered)	$ 596,745	$ 668,355	$ 748,557	$ 838,384	$ 938,990	$ 1,051,669	$ 1,177,869	$ 1,319,214	$ 1,477,519	$ 1,654,822	$ 1,853,400	$ 2,075,808
Sewer Fees (Unmetered)	$10,741,415	$12,085,318	$13,597,081	$15,297,639	$17,210,533	$19,362,235	$21,782,515	$24,504,845	$27,566,866	$31,010,903	$34,884,546	$39,241,306
Annual Rate Increase[4]	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*
Sewer User Fees	$ 11,338,160	$ 12,753,672	$ 14,345,638	$ 16,136,023	$ 18,149,523	$ 20,413,904	$ 22,960,384	$ 25,824,059	$ 29,044,386	$ 32,665,725	$ 36,737,946	$ 41,317,114
Hauled Waste Income	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00
Other Income	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00
Total Revenue	**$ 11,644,659.78**	**$ 13,060,172.21**	**$ 14,652,138.13**	**$ 16,442,522.99**	**$ 18,456,023.02**	**$ 20,720,404.34**	**$ 23,266,884.03**	**$ 26,130,558.63**	**$ 29,350,885.61**	**$ 32,972,224.62**	**$ 37,044,445.83**	**$ 41,623,613.70**
Annual Balance (Accrual)	$1,605,405.34	$2,630,139.86	$3,815,696.75	$5,183,416.22	$6,757,344.25	$8,564,570.68	$10,635,609.30	$13,004,825.17	$15,710,915.08	$18,797,447.53	$22,583,276.56	$26,583,997.67
Cumulative Balance (Accrual)	($18,017,855.65)	($15,387,715.78)	($11,572,019.03)	($6,388,602.81)	$368,741.44	$8,933,312.12	$19,568,921.42	$32,573,746.59	$48,284,661.67	$67,082,109.20	$89,665,385.76	$116,249,383.43

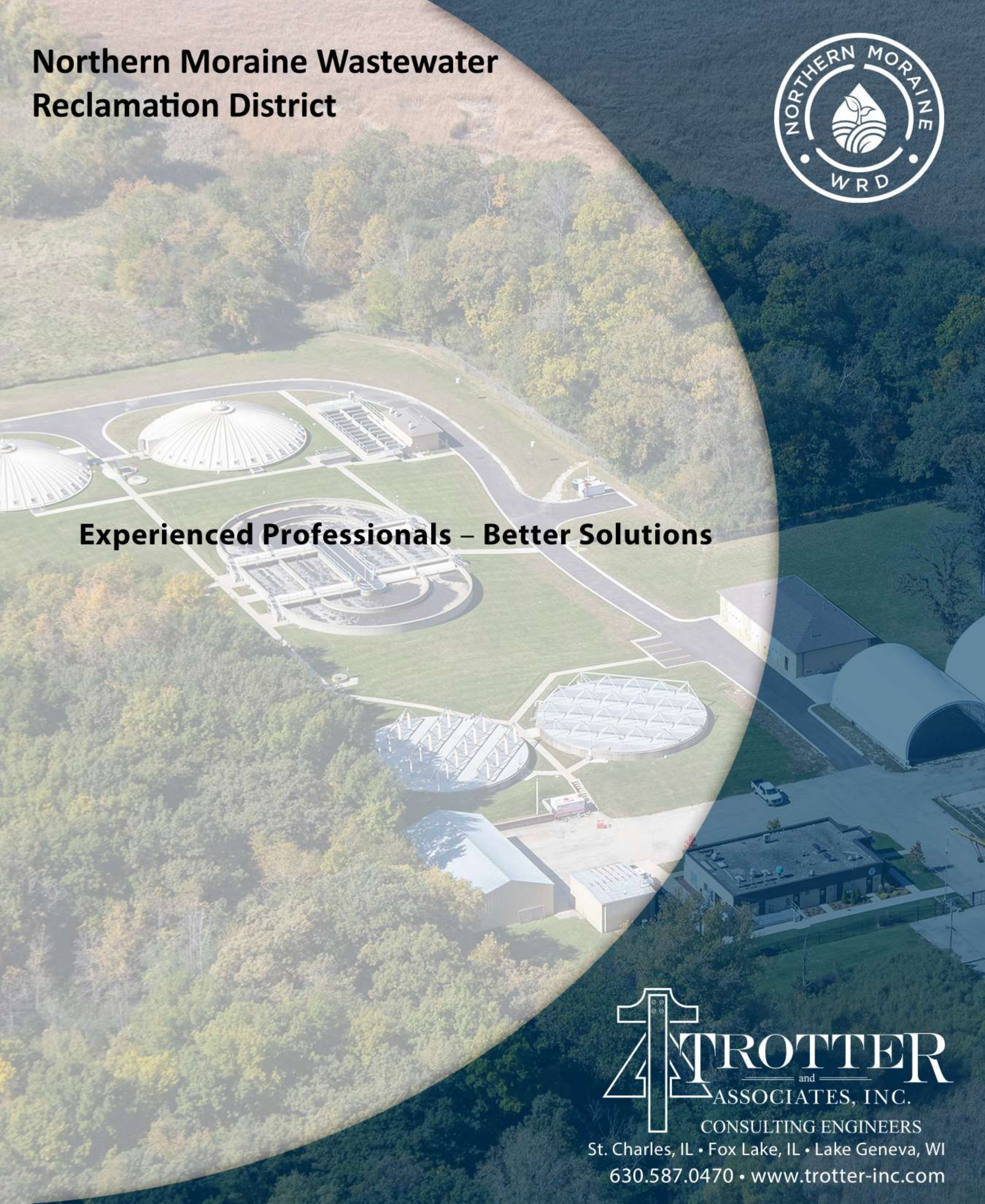
Baseline Model (Current User Fee)

Northern Moraine WRD			
Wastewater Facility Plan	Inflation	4%	*match CCI*
Rate Determination	Additional Acounts/yr	25	
	Annual Rate Increase	5%	

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Operation and Maintenance Expenses											
Administration	$ 1,125,507.00	$ 1,170,527.28	$ 1,217,348.37	$ 1,266,042.31	$ 1,316,684.00	$ 1,369,351.36	$ 1,424,125.41	$ 1,481,090.43	$ 1,540,334.05	$ 1,601,947.41	$ 1,666,025.30
Collections	$ 626,750.00	$ 651,820.00	$ 677,892.80	$ 705,008.51	$ 733,208.85	$ 762,537.21	$ 793,038.69	$ 824,760.24	$ 857,750.65	$ 892,060.68	$ 927,743.11
Treatment	$ 862,090.00	$ 896,573.60	$ 932,436.54	$ 969,734.01	$ 1,008,523.37	$ 1,048,864.30	$ 1,090,818.87	$ 1,134,451.63	$ 1,179,829.69	$ 1,227,022.88	$ 1,276,103.80
Expenses Sub-Total	**$ 2,614,347.00**	**$ 2,718,920.88**	**$ 2,827,677.72**	**$ 2,940,784.82**	**$ 3,058,416.22**	**$ 3,180,752.87**	**$ 3,307,982.98**	**$ 3,440,302.30**	**$ 3,577,914.39**	**$ 3,721,030.97**	**$ 3,869,872.21**
Existing Debt Service											
Bond Principal, Interest & Fees[2]	$ 455,954.00	$ 452,824.00	$ 454,541.00	$ 456,058.00	$ 457,371.00	$ 453,534.00	$ 454,545.00	$ -	$ -	$ -	$ -
Holiday Hills Phase 1 (L175824)	$ 296,870.00	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64
Existing Debt Service Sub-Total	**$ 752,824.00**	**$ 722,630.64**	**$ 724,347.64**	**$ 725,864.64**	**$ 727,177.64**	**$ 723,340.64**	**$ 724,351.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**
Future Expenses/Debt Service - Replacement											
Aerobic Digester Blower Replacement	$ 770,000.00										
WWTF Oxidation Ditch Gate Replacement	$ 340,000.00										
Generator Replacement	$ 550,000.00										
Laboratory Equipment Remodel	$ 80,000.00										
Final Clarifier No. 2 Rehabilitation					$ 1,090,000.00						
UV Disinfection Project											
WWTF Fleet Maintenance Garage							$ 2,510,000.00				
Garage and Personnel Building Remodel	$ 600,000.00										
Replacement WWTF	**$ 2,340,000.00**	**$ -**	**$ -**	**$ -**	**$ 1,090,000.00**	**$ -**	**$ 2,510,000.00**	**$ -**	**$ -**	**$ -**	**$ -**
Replacement LS											
Replacement Collection System											
Future Expenses - Replacement Sub Total	**$ 2,340,000.00**	**$ -**	**$ -**	**$ -**	**$ 1,090,000.00**	**$ -**	**$ 2,510,000.00**	**$ -**	**$ -**	**$ -**	**$ -**
Full Replacement											
Collection System[1]	$ 300,000.00	$ 312,000.00	$ 324,480.00	$ 337,459.20	$ 350,957.57	$ 364,995.87	$ 379,595.71	$ 394,779.53	$ 410,570.72	$ 426,993.54	$ 444,073.29
Lift Stations[1]	$ 300,000.00	$ 312,000.00	$ 324,480.00	$ 337,459.20	$ 350,957.57	$ 364,995.87	$ 379,595.71	$ 394,779.53	$ 410,570.72	$ 426,993.54	$ 444,073.29
WWTF[1]	$ 300,000.00	$ 312,000.00	$ 324,480.00	$ 337,459.20	$ 350,957.57	$ 364,995.87	$ 379,595.71	$ 394,779.53	$ 410,570.72	$ 426,993.54	$ 444,073.29
Full Replacement Sub-Total	**$ 900,000.00**	**$ 936,000.00**	**$ 973,440.00**	**$ 1,012,377.60**	**$ 1,052,872.70**	**$ 1,094,987.61**	**$ 1,138,787.12**	**$ 1,184,338.60**	**$ 1,231,712.15**	**$ 1,280,980.63**	**$ 1,332,219.86**
Total Collection System	**$ 300,000.00**	**$ 312,000.00**	**$ 324,480.00**	**$ 337,459.20**	**$ 350,957.57**	**$ 364,995.87**	**$ 379,595.71**	**$ 394,779.53**	**$ 410,570.72**	**$ 426,993.54**	**$ 444,073.29**
Total Lift Stations	**$ 300,000.00**	**$ 312,000.00**	**$ 324,480.00**	**$ 337,459.20**	**$ 350,957.57**	**$ 364,995.87**	**$ 379,595.71**	**$ 394,779.53**	**$ 410,570.72**	**$ 426,993.54**	**$ 444,073.29**
Total WWTF	**$ 2,340,000.00**	**$ 312,000.00**	**$ 324,480.00**	**$ 337,459.20**	**$ 1,090,000.00**	**$ 364,995.87**	**$ 2,510,000.00**	**$ 394,779.53**	**$ 410,570.72**	**$ 426,993.54**	**$ 444,073.29**
TOTAL Replacement	**$ 2,340,000.00**	**$ 936,000.00**	**$ 973,440.00**	**$ 1,012,377.60**	**$ 1,090,000.00**	**$ 1,094,987.61**	**$ 2,510,000.00**	**$ 1,184,338.60**	**$ 1,231,712.15**	**$ 1,280,980.63**	**$ 1,332,219.86**
Future Expenses/Debt Service - Capital											
Solar Array Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Sewer Extension	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -
Capital Sub-Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Expenses Accrual	**$ 5,707,171.00**	**$ 4,377,551.52**	**$ 4,525,465.36**	**$ 4,679,027.06**	**$ 4,875,593.86**	**$ 4,999,081.12**	**$ 6,542,334.62**	**$ 4,894,447.54**	**$ 5,079,433.18**	**$ 5,271,818.24**	**$ 5,471,898.70**
Total Expenses Cash[5]	**$ 4,807,171.00**	**$ 3,441,551.52**	**$ 3,552,025.36**	**$ 3,666,649.46**	**$ 3,822,721.15**	**$ 3,904,093.51**	**$ 5,403,547.50**	**$ 3,710,108.94**	**$ 3,847,721.03**	**$ 3,990,837.61**	**$ 4,139,678.85**
Solar Array Project	$ 3,260,000.00										
Holiday Hills Sewer Extension		**$ 2,059,752.00**	$ 2,285,124.00	$ 2,285,124.00							
Revenue											
Sewer Fees (Budgeted)	$ 3,187,200										
Accounts	5295	5320									
Accounts Unmetered	5200	5225	5250	5275	5300	5325	5350	5375	5400	5425	5450
Flat Residential Sewer Rate	$47.00	$49.35	$51.82	$54.41	$57.13	$59.99	$62.98	$66.13	$69.44	$72.91	$76.56
Metered Residential Sewer Rate/1000 gal	$4.70	$4.94	$5.18	$5.44	$5.71	$6.00	$6.30	$6.61	$6.94	$7.29	$7.66
Sewer Fees (Metered)	$ 171,550	$ 180,128	$ 189,134	$ 198,591	$ 208,520	$ 218,946	$ 229,893	$ 241,388	$ 253,457	$ 266,130	$ 279,437
Sewer Fees (Unmetered)	$ 3,015,650	$3,094,245	$3,264,503	$3,444,050	$3,633,391	$3,833,056	$4,043,605	$4,265,625	$4,499,738	$4,746,599	$5,006,896
Annual Rate Increase[4]	***0%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***
Sewer User Fees	$ 3,187,200.00	$ 3,274,373	$ 3,453,636	$ 3,642,641	$ 3,841,911	$ 4,052,003	$ 4,273,498	$ 4,507,013	$ 4,753,196	$ 5,012,729	$ 5,286,333
Hauled Waste Income	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00
Other Income	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00
Grant: Holiday Hills FY 25 CDS											
Grant: Holiday Hills FY24 CDS											
Grant: Generator Replacement											
Total Revenue	**$ 3,493,700.00**	**$ 3,580,872.50**	**$ 3,760,136.38**	**$ 3,949,140.71**	**$ 4,148,411.38**	**$ 4,358,502.52**	**$ 4,579,997.99**	**$ 4,813,513.01**	**$ 5,059,695.78**	**$ 5,319,229.30**	**$ 5,592,833.18**
Annual Balance (Accrual)	$ (2,213,471.00)	($796,679.02)	($765,328.98)	($729,886.36)	($727,182.48)	($640,578.60)	($1,962,336.63)	($80,934.53)	($19,737.40)	$47,411.06	$120,934.48
Cumulative Balance (Accrual)	$ 576,763.00	($219,916.02)	($985,245.00)	($1,715,131.36)	($2,442,313.83)	($3,082,892.43)	($5,045,229.06)	($5,126,163.59)	($5,145,900.99)	($5,098,489.93)	($4,977,555.45)

	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Operation and Maintenance Expenses												
Administration	$ 1,732,666.32	$ 1,801,972.97	$ 1,874,051.89	$ 1,949,013.96	$ 2,026,974.52	$ 2,108,053.50	$ 2,192,375.64	$ 2,280,070.67	$ 2,371,273.50	$ 2,466,124.44	$ 2,564,769.41	$ 2,667,360.19
Collections	$ 964,852.83	$ 1,003,446.94	$ 1,043,584.82	$ 1,085,328.21	$ 1,128,741.34	$ 1,173,891.00	$ 1,220,846.64	$ 1,269,680.50	$ 1,320,467.72	$ 1,373,286.43	$ 1,428,217.89	$ 1,485,346.60
Treatment	$ 1,327,147.95	$ 1,380,233.87	$ 1,435,443.22	$ 1,492,860.95	$ 1,552,575.39	$ 1,614,678.40	$ 1,679,265.54	$ 1,746,436.16	$ 1,816,293.61	$ 1,888,945.35	$ 1,964,503.16	$ 2,043,083.29
Expenses Sub-Total	**$ 4,024,667.09**	**$ 4,185,653.78**	**$ 4,353,079.93**	**$ 4,527,203.13**	**$ 4,708,291.25**	**$ 4,896,622.90**	**$ 5,092,487.82**	**$ 5,296,187.33**	**$ 5,508,034.82**	**$ 5,728,356.22**	**$ 5,957,490.46**	**$ 6,195,790.08**
Existing Debt Service												
Bond Principal, Interest & Fees[2]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Phase 1 (L175824)	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ 269,806.64	$ -	$ -
Existing Debt Service Sub-Total	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ 269,806.64**	**$ -**	**$ -**
Future Expenses/Debt Service - Replacement												
Aerobic Digester Blower Replacement												
WWTF Oxidation Ditch Gate Replacement												
Generator Replacement												
Laboratory Equipment Remodel												
Final Clarifier No. 2 Rehabilitation												
UV Disinfection Project												
WWTF Fleet Maintenance Garage												
Garage and Personnel Building Remodel												
Replacement WWTF	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Replacement LS												
Replacement Collection System												
Future Expenses - Replacement Sub Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Full Replacement												
Collection System[1]	$ 461,836.22	$ 480,309.67	$ 499,522.05	$ 519,502.93	$ 540,283.05	$ 561,894.37	$ 584,370.15	$ 607,744.95	$ 632,054.75	$ 657,336.94	$ 683,630.42	$ 710,975.64
Lift Stations[1]	$ 461,836.22	$ 480,309.67	$ 499,522.05	$ 519,502.93	$ 540,283.05	$ 561,894.37	$ 584,370.15	$ 607,744.95	$ 632,054.75	$ 657,336.94	$ 683,630.42	$ 710,975.64
WWTF[1]	$ 461,836.22	$ 480,309.67	$ 499,522.05	$ 519,502.93	$ 540,283.05	$ 561,894.37	$ 584,370.15	$ 607,744.95	$ 632,054.75	$ 657,336.94	$ 683,630.42	$ 710,975.64
Full Replacement Sub-Total	**$ 1,385,508.65**	**$ 1,440,929.00**	**$ 1,498,566.16**	**$ 1,558,508.80**	**$ 1,620,849.15**	**$ 1,685,683.12**	**$ 1,753,110.45**	**$ 1,823,234.86**	**$ 1,896,164.26**	**$ 1,972,010.83**	**$ 2,050,891.26**	**$ 2,132,926.91**
Total Collection System	**$ 461,836.22**	**$ 480,309.67**	**$ 499,522.05**	**$ 519,502.93**	**$ 540,283.05**	**$ 561,894.37**	**$ 584,370.15**	**$ 607,744.95**	**$ 632,054.75**	**$ 657,336.94**	**$ 683,630.42**	**$ 710,975.64**
Total Lift Stations	**$ 461,836.22**	**$ 480,309.67**	**$ 499,522.05**	**$ 519,502.93**	**$ 540,283.05**	**$ 561,894.37**	**$ 584,370.15**	**$ 607,744.95**	**$ 632,054.75**	**$ 657,336.94**	**$ 683,630.42**	**$ 710,975.64**
Total WWTF	**$ 461,836.22**	**$ 480,309.67**	**$ 499,522.05**	**$ 519,502.93**	**$ 540,283.05**	**$ 561,894.37**	**$ 584,370.15**	**$ 607,744.95**	**$ 632,054.75**	**$ 657,336.94**	**$ 683,630.42**	**$ 710,975.64**
TOTAL Replacement	**$ 1,385,508.65**	**$ 1,440,929.00**	**$ 1,498,566.16**	**$ 1,558,508.80**	**$ 1,620,849.15**	**$ 1,685,683.12**	**$ 1,753,110.45**	**$ 1,823,234.86**	**$ 1,896,164.26**	**$ 1,972,010.83**	**$ 2,050,891.26**	**$ 2,132,926.91**
Future Expenses/Debt Service - Capital												
Solar Array Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Holiday Hills Sewer Extension	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Capital Sub-Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Expenses Accrual	**$ 5,679,982.38**	**$ 5,896,389.41**	**$ 6,121,452.73**	**$ 6,355,518.57**	**$ 6,598,947.05**	**$ 6,852,112.66**	**$ 7,115,404.90**	**$ 7,389,228.83**	**$ 7,674,005.72**	**$ 7,970,173.68**	**$ 8,008,381.73**	**$ 8,328,717.00**
Total Expenses Cash[5]	**$ 4,294,473.73**	**$ 4,455,460.42**	**$ 4,622,886.57**	**$ 4,797,009.77**	**$ 4,978,097.89**	**$ 5,166,429.54**	**$ 5,362,294.46**	**$ 5,565,993.97**	**$ 5,777,841.46**	**$ 5,998,162.86**	**$ 5,957,490.46**	**$ 6,195,790.08**
Solar Array Project												
Holiday Hills Sewer Extension												
Revenue												
Sewer Fees (Budgeted)												
Accounts												
Accounts Unmetered	5475	5500	5525	5550	5575	5600	5625	5650	5675	5700	5725	5750
Flat Residential Sewer Rate	$80.39	$84.41	$88.63	$93.06	$97.71	$102.60	$107.72	$113.11	$118.77	$124.70	$130.94	$137.49
Metered Residential Sewer Rate/1000 gal	$8.04	$8.44	$8.86	$9.31	$9.77	$10.26	$10.77	$11.31	$11.88	$12.47	$13.09	$13.75
Sewer Fees (Metered)	$ 293,409	$ 308,079	$ 323,483	$ 339,657	$ 356,640	$ 374,472	$ 393,196	$ 412,856	$ 433,498	$ 455,173	$ 477,932	$ 501,828
Sewer Fees (Unmetered)	$5,281,357	$5,570,746	$5,875,871	$6,197,582	$6,536,774	$6,894,391	$7,271,428	$7,668,933	$8,088,009	$8,529,821	$8,995,595	$9,486,621
Annual Rate Increase[4]	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***	***5%***
Sewer User Fees	$ 5,574,766	$ 5,878,825	$ 6,199,354	$ 6,537,239	$ 6,893,414	$ 7,268,863	$ 7,664,624	$ 8,081,788	$ 8,521,508	$ 8,984,995	$ 9,473,526	$ 9,988,449
Hauled Waste Income	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00	$ 105,000.00
Other Income	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00	$ 201,500.00
Grant: Holiday Hills FY 25 CDS												
Grant: Holiday Hills FY24 CDS												
Grant: Generator Replacement												
Total Revenue	**$ 5,881,265.62**	**$ 6,185,325.48**	**$ 6,505,854.40**	**$ 6,843,739.16**	**$ 7,199,914.00**	**$ 7,575,363.24**	**$ 7,971,123.86**	**$ 8,388,288.38**	**$ 8,828,007.80**	**$ 9,291,494.68**	**$ 9,780,026.49**	**$ 10,294,948.99**
Annual Balance (Accrual)	$201,283.24	$288,936.06	$384,401.68	$488,220.59	$600,966.96	$723,250.57	$855,718.95	$999,059.55	$1,154,002.08	$1,321,321.00	$1,771,644.76	$1,966,232.00
Cumulative Balance (Accrual)	($4,776,272.22)	($4,487,336.15)	($4,102,934.48)	($3,614,713.89)	($3,013,746.93)	($2,290,496.36)	($1,434,777.40)	($435,717.86)	$718,284.22	$2,039,605.22	$3,811,249.98	$5,777,481.98

Northern Moraine Wastewater Reclamation District



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