312 W Whitewater Street | Whitewater, WI 53190

Wastewater Facility Plan
Technical Memorandum 8
Recommended Plan

City of Whitewater
July 2014

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TABLE OF CONTENTS

Chapter I – Recommended Plan 2
1.1 Nutrient Management 2
1.2 Liquids Treatment 2
1.3 Building And Support Facilities 2
1.4 Overall Recommended Project 3
Chapter II – Financing 5
2.1 Clean Water Fund Program 5
2.2 Rates 5
Chapter III – Implementation Plan 8
3.1 Project Schedule 8

LIST OF TABLES

Table 1: Selected Building and Support Facilities Improvements 2
Table 2: Estimated Project Capital Costs 4

LIST OF FIGURES

Figure 1 Monthly Average Residential User Charge Impact 6
Figure 2 Monthly Average Residential User Charges for Wisconsin Communities of 5,000 to 50,000 People 7

APPENDICES

Appendix TM8-A: Recommended Plan Cost Estimates
Appendix TM8-B: User Charge Analysis

CHAPTER I – RECOMMENDED PLAN

1.1 NUTRIENT MANAGEMENT

TM 3 – Nutrient Management evaluated ways for the wastewater treatment facility to achieve compliance with its new low level phosphorous limit. The recommended alternative was to pursue the Clean Waters Healthy Economy variance path. This is an adaptive management type of approach to phosphorous pollution that will focus on improvements in the watershed rather than at that treatment plant. Under this program the City will need to contribute approximately $127,000 annually to the County for them to use in pursuing watershed phosphorous control. The City will comply with future low level phosphorus limits using the Clean Water, Healthy Economy Act if the Act is approved and implemented.

1.2 LIQUIDS TREATMENT

TM 6 – Liquids Treatment evaluated numerous alternatives for providing a new secondary treatment system. The recommended alternative was to construct Activated Sludge Option 3. This alternative was tied for the lowest overall present worth but offered the greatest flexibility. This alternative includes:

- New aeration basins designed for biological phosphorous removal
- Modifications to existing secondary clarifiers to serve as aeration basin volume
- Two new secondary clarifiers
- RAS pumping
- Secondary system control building
- WAS thickening equipment and building
- Associated civil, piping, HVAC, and mechanical components

1.3 BUILDING AND SUPPORT FACILITIES

TM 7 – Buildings and Support Facilities looked at numerous other potential improvements to the treatment facility outside of the secondary treatment system. The City determined that the improvements listed in Table 1 will be incorporated in the upgrade project that address the liquid treatment train.

Table 1: Selected Building and Support Facilities Improvements

Electrical Improvements
Single 480V Feeds
MCC Replacement
NFPA 820 Compliance
Administration Building Dry Well Separation and Ventilation
Administration Building Tunnel Separation
Primary Sludge Pump Building Ventilation
Administration Building Improvements
Lab Remodeling

Office Space Addition
Breakroom Addition
Map/CMOM Room Addition
Second Floor Elevator
New Women's Locker Room
Remodel Men's Locker Room
HVAC Controls and Equipment
Boiler Replacement and Room to House Boilers
Wet Well Ventilation Switch
Generator Improvements
10 ft Monorail Extension
Loading Dock Enclosure
Miscellaneous Plant Improvements
Access Roads
Site Lighting
Fiber Optic Network
Septage Receiving
Screening Improvements
Grit Handling
Scum Pumping
Sludge Pumping
Alum Feed Improvements
Filter Building Joists
Air Scour Blower
Filter Building HVAC Modifications
Final Effluent System
Post Aeration Blower VFDs
Post Aeration Blowers
Effluent Pipe Repair
Sewer Cleaning Debris Pad
Effluent Filter Flow Control Splitter Box
Sidestream Metering and Sampling
Vehicle Storage Building

1.4 Overall Recommended Project

The combined recommendations of TMs 3, 6, and 7 form the overall recommended plan. Costs presented in TM 6 were further refined to provide a better estimate of the overall project costs. These revised costs along with the estimated costs for the other recommended projects are included in Appendix TM8-A. The overall estimated capital costs are shown below in Table 2.

Table 2: Estimated Project Capital Costs

	Estimated Capital Costs
Secondary Treatment System – Activated Sludge	$8,882,000
Electrical Improvements	$3,043,000
NFPA 820 Compliance	$378,000
Administration Building Improvements	$948,000
Miscellaneous Plant Improvements	$2,981,000
Total Capital Cost	**$16,232,000**
15% Engineering	$2,435,000
Total Initial Cost	**$18,667,000**

CHAPTER II – FINANCING

2.1 CLEAN WATER FUND PROGRAM

The majority of wastewater treatment facility projects in the State are funded through the Clean Water Fund Program (CWFP). This revolving fund loan program administered by the State provides low interest financing for projects. Currently, loans are financed at 75% of the market rate or approximately 2.625% for eligible project costs.

The City has already submitted an Intent to Apply and Priority Evaluation and Ranking forms to the CWFP for this project. This project received a Priority Score of 92.417, placing it 22nd on the 2015 State Project Priority List. The City is eligible for up to $500,000 in principal forgiveness grant funding through the CWFP. In the previous year, projects down to a priority score of 88 received some principal forgiveness. Not all the projects ranked ahead of the City's are likely to proceed, which puts this project in a favorable position to receive at least some principal forgiveness funding.

2.2 RATES

The City of Whitewater has been anticipating a major renovation of the wastewater treatment facility for some time. AppendixTM8- B contains a residential user charge analysis for a range of overall project costs. The utility will retire a $363,975 annual debt payment in 2017 that will help offset some of the project cost impact. The analysis includes $500,000 in principal forgiveness and financing the remainder through the CWFP at a 2.7% effective interest rate. The debt payments must be covered at 120% per the City's debt coverage bond covenant rather than the 110% level typically required by the CWFP. The results of this analysis along with the current average residential user charge are shown below in Figure 1.

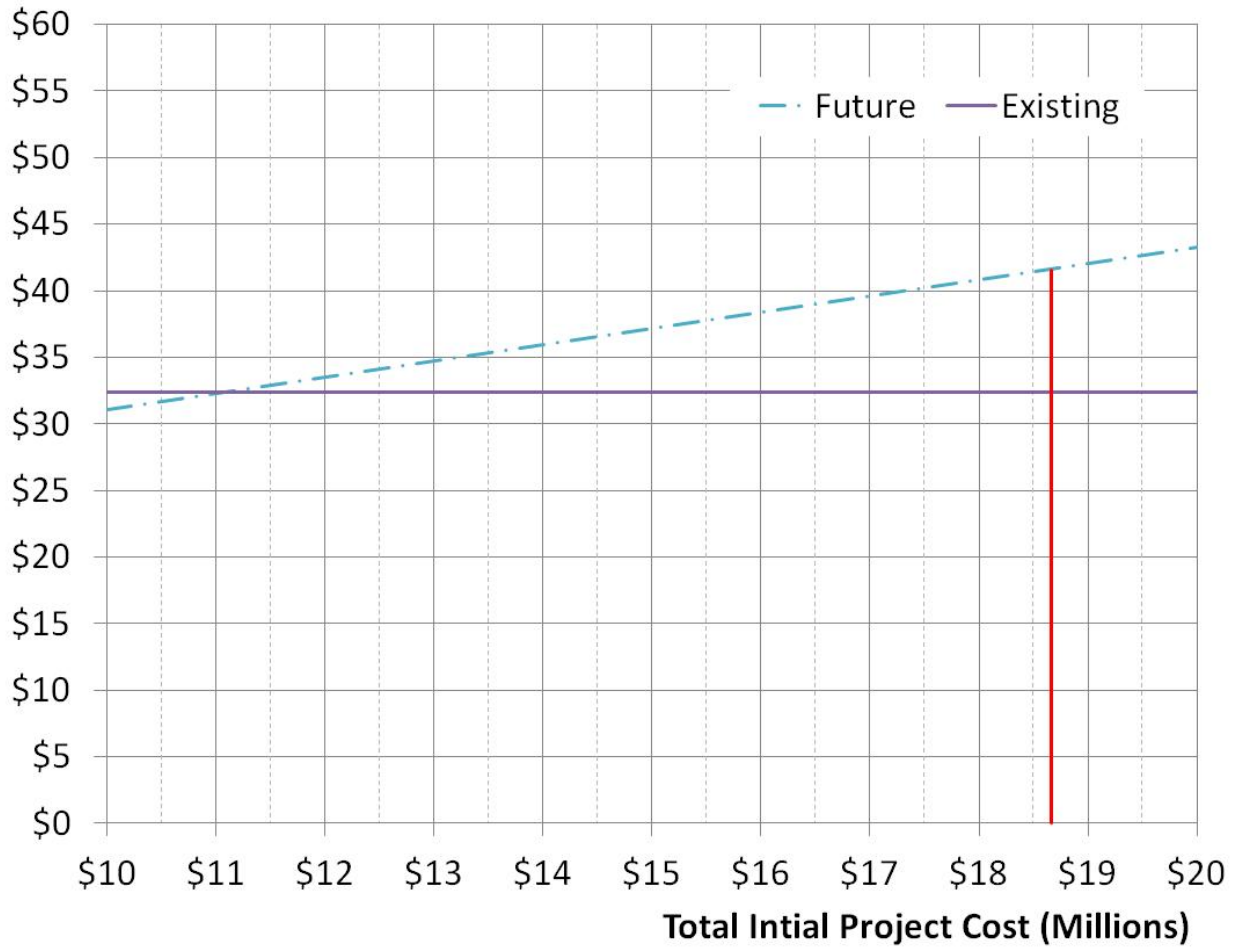

Figure 1 Monthly Average Residential User Charge Impact

Assuming this new debt to cover the estimated total initial cost of $18,667,000, the average residential user rate is expected to increase from $32/month to $42/month. Figure 2 shows how Whitewater's typical residential user charge relates to other communities with populations between 5,000 and 50,000 people, both before and after the project.

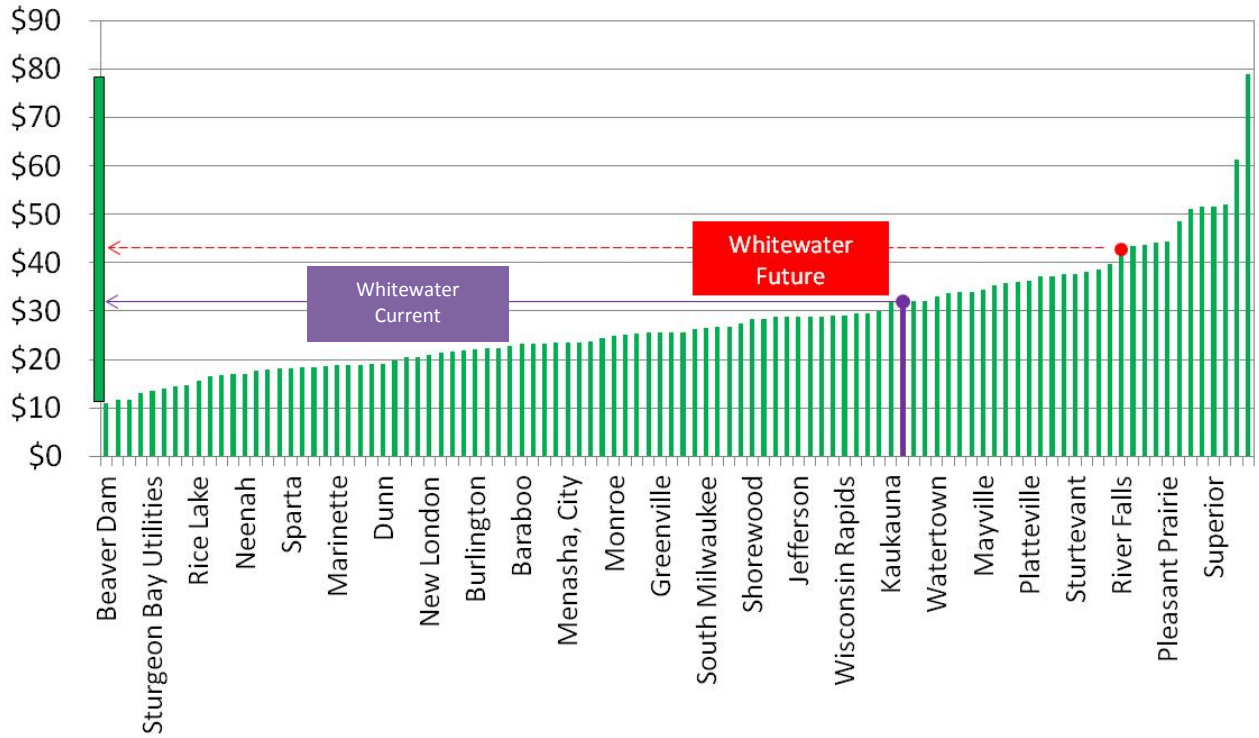

Figure 2 Monthly Average Residential User Charges for Wisconsin Communities of 5,000 to 50,000 People

CHAPTER III – IMPLEMENTATION PLAN

3.1 PROJECT SCHEDULE

In order to receive principal forgiveness, a CWFP application with reviewable plans and specifications must be submitted to the State by September 30, 2014. The proposed project schedule is:

- Submit Facility Plan to WDNR - July 2014
- Submit CWFP Materials – September 2014
    - CWF Application
    - Reviewable Plans and Specifications
- Bidding – May 2015
- Construction – July 2015 through July 2017

Appendix TM8-A
Recommended Plan Cost Estimates

City of Whitewater
Wastewater Facility Plan
Recommended Plan - Overall Project Estimated Capital Cost
19-Jun-14

Item	Unit	Quantity	Unit Price	Material Labor	Equip	OHP Material Labor	OHP Equip	Contingency Material Labor	Contingency Equip	Global %	Total Line Item	Total Construction
Secondary Treatment System - Activated Sludge											**8,882,428**	**8,882,000**
Diffusers	SF	7,125	17.5	124,688	0	25%	10%	30%	10%		193,266	
Blowers	LS	1	56,943	56,943	379,620	25%	10%	30%	10%		543,806	
Secondary Clarifier Equipment	LS	1	42,600	42,600	284,000	25%	10%	30%	10%		406,830	
Selector Zone Mixers	LS	1	13,500	13,500	90,000	25%	10%	30%	10%		128,925	
IMLR Pumps	LS	1	9,000	9,000	60,000	25%	10%	30%	10%		85,950	
RAS Pumps	LS	1	13,500	13,500	90,000	25%	10%	30%	10%		128,925	
Sludge Thickening Equipment	LS	1	15,000	15,000	100,000	25%	10%	30%	10%		143,250	
Polymer Feed Equipment	LS	1	1,800	1,800	12,000	25%	10%	30%	10%		17,190	
Thickened Sludge Pump	LS	1	6,000	6,000	40,000	25%	10%	30%	10%		57,300	
WAS Pumps	LS	1	2,400	2,400	16,000	25%	10%	30%	10%		22,920	
Earthwork: Dewatering	LS	1	57,197	57,197	0	25%	10%	30%	10%		88,655	
Earthwork: Excavation	CY	22,879	10	228,788	0	25%	10%	30%	10%		354,621	
Concrete: Base Slab	CY	488	330	161,111	0	25%	10%	30%	10%		249,722	
Concrete: Walls	CY	1,056	800	844,922	0	25%	10%	30%	10%		1,309,629	
Metals: Aluminum Handrail	FT	330	53	17,490	0	25%	10%	30%	10%		27,110	
Metals: Aluminum Stairway	RISERS	49	414	20,286	0	25%	10%	30%	10%		31,443	
Metals: Baffles and Weirs	SF	1,200	70	83,981	0	25%	10%	30%	10%		130,171	
Building: One Story Brick and Block Process Bldg	SF	2,250	125	281,250	0	25%	10%	30%	10%		435,938	
Building: One Story Brick and Block Thickening Bldg	SF	1,921	125	240,125	0	25%	10%	30%	10%		372,194	
Demolition: Structure	CF	635,998	1	445,198	0	25%	10%	30%	10%		690,057	
Demolition: Mechanical	LS	1	100,000	100,000	0	25%	10%	30%	10%		155,000	
WAS Holding Tank	LS	1	60,000	60,000	0	25%	10%	30%	10%		93,000	
WAS Diffusers	SF	784	18	13,720	0	25%	10%	30%	10%		21,266	
WAS Blower	LS	1	0	0	20,000	25%	10%	30%	10%		24,000	
GBT Feed Pumps	LS	1	0	0	15,000	25%	10%	30%	10%		18,000	
Disciplines												
Civil										7.0%	621,770	
Process-Mechanical										8.0%	710,594	
Electrical										10.0%	888,243	
Instrumentation and Control										5.0%	444,121	
Plumbing										1.5%	133,236	
HVAC										4.0%	355,297	
Electrical Improvements												**3,043,000**
New Switch Gear Building, Single 480V Feeds, Duct Bank, Grounding	LS	1	1,065,100	1,065,100	413,000	25%	10%	15%	15%		2,007,390	
MCC Replacement	LS	1	740,000	740,000	0	25%	10%	15%	15%		1,036,000	
NFPA 820 Compliance												**378,000**
Administration Building Dry Well Separation Ventilation	LS	1	100,000	100,000	0	25%	10%	30%	15%		155,000	
Administration Building Tunnel Separation	LS	1	44,000	44,000	0	25%	10%	30%	15%		68,200	
Primary Sludge Pump Building Ventilation	LS	1	50,000	50,000	0	25%	10%	30%	15%		77,500	
Secondary Sludge Pump Building Ventilation	LS	1	50,000	50,000	0	25%	10%	30%	15%		77,500	
Administration Building Improvements												**948,000**
Lab Remodel: HVAC Remodel + Window Costs	SF	650	50	32,500	0	25%	10%	30%	15%		50,375	
Office Space Addition: Remodel Cost	SF	250	90	22,500	0	25%	10%	30%	15%		34,875	
Breakroom Addition: Remodel Cost	SF	500	90	45,000	0	25%	10%	30%	15%		69,750	
Map/CMOM Room Addition: Remodel Cost	SF	250	90	22,500	0	25%	10%	30%	15%		34,875	
Second Floor Elevator	LS	1	100,000	100,000	0	25%	10%	30%	15%		155,000	
New Women's Locker Room: New Structure Cost	SF	425	150	63,750	0	25%	10%	30%	15%		98,813	
Remodel Men's Locker Room: Remodel Cost	SF	425	90	38,250	0	25%	10%	30%	15%		59,288	
HVAC Controls	LS	1	100,000	100,000	0	25%	10%	30%	15%		155,000	
Boiler Replacement and Room to House Boilers	SF	300	90	27,000	100,000	25%	10%	30%	15%		166,850	
Wet Well Ventilation Switch	LS	1	3,000	3,000	0	25%	10%	30%	15%		4,650	
Generator Improvements	LS	1	60,000	60,000	0	25%	10%	30%	15%		93,000	
10 ft Monorail Extension	LF	85	30	2,550	0	25%	10%	30%	15%		3,953	
Loading Dock Enclosure	LS	1	13,980	13,980	0	25%	10%	30%	15%		21,669	
Miscellaneous Plant Improvements												**2,981,000**
Access Roads	LS	1	286,939	286,939	0	25%	10%	30%	15%		444,755	
Site Lighting	EA	22	4,150	91,300	0	25%	10%	30%	15%		141,515	
Fiber Optic Network	FT	2,500	10	25,000	0	25%	10%	30%	15%		38,750	
Septage Receiving	LS	1	135,000	135,000	0	25%	10%	30%	15%		209,250	
Screening Improvements	LS	1	77,000	77,000	385,000	25%	10%	30%	15%		600,600	
Grit Handling	LS	1	25,000	25,000	125,000	25%	10%	30%	15%		195,000	
Scum Pumping	LS	1	40,000	40,000	0	25%	10%	30%	15%		62,000	
Sludge Pumping	LS	1	20,000	20,000	100,000	25%	10%	30%	15%		156,000	
Alum Feed Improvements	LS	1	18,000	18,000	0	25%	10%	30%	15%		27,900	
Filter Building Joists	LS	1	90,500	90,500	0	25%	10%	30%	15%		140,275	
Air Scour Blower	LS	1	15,000	15,000	75,000	25%	10%	30%	15%		117,000	
Filter Building HVAC Modifications	LS	1	30,000	30,000	0	25%	10%	30%	15%		46,500	
Final Effluent System	LS	1	15,000	15,000	0	25%	10%	30%	15%		23,250	
Postaeration Blower VFDs	LS	1	12,000	12,000	0	25%	10%	30%	15%		18,600	
Postaeration Blowers	LS	1	10,800	10,800	54,000	25%	10%	30%	15%		84,240	
Effluent Pipe Repair	LF	50	100	5,000	0	25%	10%	30%	15%		7,750	
Bypass Flow Metering	LS	1	35,000	35,000	0	25%	10%	30%	15%		54,250	
Sewer Cleaning Debris Pad	LS	1	40,000	40,000	0	25%	10%	30%	15%		62,000	
Effluent Filter Flow Control Splitter Box	LS	1	175,000	175,000	0	25%	10%	30%	15%		271,250	
Sidestream Metering and Sampling	LS	1	45,000	45,000	0	25%	10%	30%	15%		69,750	
Vehicle Storage Building	SF	2,720	50	136,000	0	25%	10%	30%	15%		210,800	

Total Capital Cost	**16,232,000**
15 % Engineering	**2,435,000**
Total Initial Cost	**18,667,000**

Appendix TM8-B
User Charge Analysis

Estimated Rate Increase in 2017 To Fund Capital Upgrade Project: Based on 2014 Rates and Expenses - 120% All Debt

Revenue from Rates	$2,370,188	$2,370,188	$2,370,188	$2,370,188	$2,370,188	$2,370,188	$2,370,188	$2,370,188	$2,370,188	$2,370,188	$2,370,188
Operating Expenses	-$1,342,542	-$1,342,541	-$1,342,540	-$1,342,539	-$1,342,538	-$1,342,537	-$1,342,536	-$1,342,535	-$1,342,534	-$1,342,533	-$1,342,532
Available for Debt	$1,027,646	$1,027,647	$1,027,648	$1,027,649	$1,027,650	$1,027,651	$1,027,652	$1,027,653	$1,027,654	$1,027,655	$1,027,656
Debt Retired in 2017	$363,975	$363,975	$363,975	$363,975	$363,975	$363,975	$363,975	$363,975	$363,975	$363,975	$363,975
Available for Debt after 2017 Debt Retirement	$1,391,621	$1,391,622	$1,391,623	$1,391,624	$1,391,625	$1,391,626	$1,391,627	$1,391,628	$1,391,629	$1,391,630	$1,391,631
Existing Debt to Remain after 2017 Retirement	-$345,593	-$345,593	-$345,593	-$345,593	-$345,593	-$345,593	-$345,593	-$345,593	-$345,593	-$345,593	-$345,593
20% of CWF Debt	-$46,142	-$46,142	-$46,142	-$46,142	-$46,142	-$46,142	-$46,142	-$46,142	-$46,142	-$46,142	-$46,142
20% of Bond Debt	-$22,977	-$22,977	-$22,977	-$22,977	-$22,977	-$22,977	-$22,977	-$22,977	-$22,977	-$22,977	-$22,977
Revenue Required for Existing Debt that Remains after 2017 Debt Retirement	-$414,712	-$414,712	-$414,712	-$414,712	-$414,712	-$414,712	-$414,712	-$414,712	-$414,712	-$414,712	-$414,712
Available for Upgrade Project Costs after 2017 Debt Retirement: Debt Service, Replacement Fund, Operating Cost Change	$976,909	$976,910	$976,911	$976,912	$976,913	$976,914	$976,915	$976,916	$976,917	$976,918	$976,919
Replacement Fund (20% of Upgrade, 5.5% Annually)	-$110,000	-$121,000	-$132,000	-$143,000	-$154,000	-$165,000	-$176,000	-$187,000	-$198,000	-$209,000	-$220,000
Operating Costs	-$25,000	-$25,000	-$25,000	-$25,000	-$25,000	-$25,000	-$25,000	-$25,000	-$25,000	-$25,000	-$25,000
Available for Upgrade Project Debt after 2017 Debt Retirement	$841,909	$830,910	$819,911	$808,912	$797,913	$786,914	$775,915	$764,916	$753,917	$742,918	$731,919
Capital Upgrade Project	**$10,000,000**	**$11,000,000**	**$12,000,000**	**$13,000,000**	**$14,000,000**	**$15,000,000**	**$16,000,000**	**$17,000,000**	**$18,000,000**	**$19,000,000**	**$20,000,000**
Principal Forgiveness	**-$500,000**	**-$500,000**	**-$500,000**	**-$500,000**	**-$500,000**	**-$500,000**	**-$500,000**	**-$500,000**	**-$500,000**	**-$500,000**	**-$500,000**
Capital Funded with CWF	**$9,500,000**	**$10,500,000**	**$11,500,000**	**$12,500,000**	**$13,500,000**	**$14,500,000**	**$15,500,000**	**$16,500,000**	**$17,500,000**	**$18,500,000**	**$19,500,000**
Debt Service for Capital Upgrade Funded with CWF (95% Parallel Cost Ratio…2.7% Effective Rate…Ignores Septage Receiving)	-$620,970	-$686,335	-$751,700	-$817,066	-$882,431	-$947,796	-$1,013,161	-$1,078,527	-$1,143,892	-$1,209,257	-$1,274,622
20% Debt Coverage (Bond Requirement)	-$124,194	-$137,267	-$150,340	-$163,413	-$176,486	-$189,559	-$202,632	-$215,705	-$228,778	-$241,851	-$254,924
Revenue Required for Upgrade Debt Service	-$745,164	-$823,602	-$902,041	-$980,479	-$1,058,917	-$1,137,355	-$1,215,794	-$1,294,232	-$1,372,670	-$1,451,109	-$1,529,547
Shortfall	$96,745	$7,308	-$82,130	-$171,567	-$261,004	-$350,441	-$439,879	-$529,316	-$618,753	-$708,191	-$797,628
Required Rate Increase to Fund Upgrade Project: Debt Service, Replacement Fund, Operating Cost Increase/Decrease	-4%	0%	3%	7%	11%	15%	19%	22%	26%	30%	34%
Typical Monthly Bill for Residential User ($9.28 + $6.38/1000 gallons)	$32	$32	$32	$32	$32	$32	$32	$32	$32	$32	$32
Monthly Increase for Typical Residential User	-$1.3	-$0.1	$1.1	$2.3	$3.6	$4.8	$6.0	$7.2	$8.5	$9.7	$10.9
Monthly Bill for Typical Residential User	$ 31.1	$ 32.3	$ 33.5	$ 34.8	$ 36.0	$ 37.2	$ 38.4	$ 39.6	$ 40.9	$ 42.1	$ 43.3
Annual Bill for Typical Residential User	373	388	402	417	432	446	461	476	490	505	520

Note: Calculations above ignore operating cost increases/decreases unrelated to the capital project, inflation, and annual cash reserve requirements.