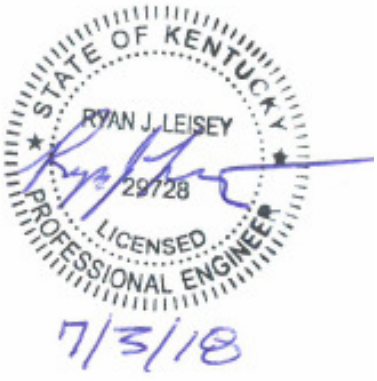
Warren County Water District
Sewer Division
Warren County, Kentucky

PRELIMINARY ENGINEERING REPORT

PLUM SPRINGS AREA SEWER REHABILITATION

Warren County
Water District

July 3rd, 2018



Prepared by
Engineering Staff
Warren County Water District

Contents

Project Planning

Warren County Water District, Sewer Division (The District) provides sewer collections service to Warren County, KY and a portion of the City of Bowling Green outside the service area of Bowling Green Municipal Utilities. In addition, The District serves the 6th-class cities of Plum Springs, Oakland, and Smiths Grove, located within Warren County.

Warren County is environmentally diverse with the major surface water resources of the Barren River, Green River, and Drakes Creek. Much of Warren County has karst topography which makes a robust sewer system vital to sustainable growth. With this project consisting of rehabilitation of existing facilities, there will be no significant environmental impact.

Warren County has consistently experienced 2% population growth annually over the past twenty years. In recent years the sewer system has been growing at a rate close to 10% annually.

Warren County Water District strives to engage with the community on a continuous basis through social media, traditional media, community involvement, and project specific public meetings. With this project involving rehabilitation of existing facilities and no new service area, public interest has been limited.

Existing Facilities

The District's existing sewer system currently includes approximately 178 miles of sewer lines with gravity sewers as large as 24 inches in diameter and 59 pumping stations to transport wastewater where gravity sewers are not practical. There are approximately 6,000 residential and 550 commercial sewer customers. These customers generate an average wastewater flow of

approximately 2,300,000 gallons per day (gpd). The District's wastewater is discharged into the Bowling Green Municipal Utilities' (BGMU) sewer system at 6 separate points of connection for transport to the wastewater treatment plant (WWTP). BGMU's WWTP has a capacity of 12.0 million gallons per day (MGD) with provisions to increase the capacity to 15.0 MGD in the future. The WWTP has ample capacity to receive wastewater from existing customers.

The portion of the gravity sewer to be rehabilitated as part of this project was installed in the late 1960's and early 1970's. The gravity sewer is constructed of concrete and clay pipe. The concrete pipe has deteriorated due to exposure to hydrogen-sulfide gas and the clay pipe has deteriorated due to cracking and root intrusion. These sections of gravity sewer have reached the end of their useful life. This project will rehabilitate the sewer in order to maintain service to the existing customers.

The Sewer Division is financially sound but has recently experienced consistent negative net income months due to the effects of increased inflow and infiltration from deteriorating infrastructure.

The District has applied to Rural Development (RD) for funds to rehabilitate the portion of the sewer in the 6th-class City of Plum Springs in order to maintain service to existing customers. Flows from approximately 600 acres of developed land in Warren County pass through this section of gravity sewer. The sewer from Plum Springs and the above-mentioned portion of Warren County flows into another section of gravity sewer, that needs rehabilitation, within the city limits of Bowling Green. The portion of the project in the City of Bowling Green will be financed by other means. This project will be designed and built in compliance with the American Iron and Steel (AIS) provision of the Title VII Consolidated Appropriations Act of 2017.

The information provided in this report more fully describes the proposed project, the need for the improvements, and supplies appropriate financial summaries.

Need for Project

The sewer rehabilitation project referred to as Plum Springs Area Sewer Rehabilitation and as illustrated on the enclosed project area map (Exhibit A) is greatly needed to alleviate a serious potential failure of the sewer system. The concrete gravity sewer is 50 years old and has experienced significant degradation from hydrogen-sulfide gas. One 200-foot section collapsed in 2014 and had to be replaced as an emergency repair. The clay sewer has numerous cracks and experiences regular flow restriction problems due to root intrusion. The cracked sewer lines also allow significant quantities of inflow and infiltration.

This area of the County has recently seen increased development interest in both residential and commercial projects. An expectation of 10% annual growth in the number of sewer connections on this part of the sewer system is realistic.

Alternatives Considered

Four (4) primary alternatives were considered for this project. A cost-benefit analysis was utilized to select the proposed project scope and construction technique:

1. Full replacement of the existing area sewer with traditional construction techniques. This alternative would result in a marginally longer useful life but would require an initial capital investment of approximately 250%.

2. Replacement of the existing area sewer with traditional construction techniques utilizing smaller gravity mains where possible. This alternative would result in a marginally longer useful life but would require an initial capital investment of approximately 200% and reduce system capacity.
3. Slip-line and grout with a smaller diameter gravity main where possible. This alternative would result in a marginally longer useful life but would require an initial capital investment of approximately 150% and reduce system capacity.
4. Cured-In-Place Pipe (CIPP) rehabilitation of the existing sewer area.

Selection of an Alternative

The various alternatives were estimated and compared for useful project life. Environmental impact and inconvenience to the local community was also considered. Weighing all the variables resulted in CIPP being the clear choice for the project.

Proposed Project (Recommended Alternative)

The CIPP alternative was selected due to the cost benefit analysis which showed it to be the most economical solution with minimal reduction in useful life. This technology also results in the least environmental impact and maintains the capacity of the existing sewer system. The proposed project consists of the utilization of Cured-In-Place Pipe (CIPP) to rehabilitate the existing gravity sewer. 3,650 feet of 21” concrete gravity sewer, 1,356 feet of 12” clay gravity sewer, and 2,100 feet of 8” clay gravity sewer will be rehabilitated in Plum Springs. 2,770 feet of 24”, an additional 9,110 feet of 21”, 1,350 feet of 15”, 1,750 feet of 12”, and 4,500 feet of 8” will be rehabilitated in the surrounding area. The existing services will be grouted to prevent infiltration of ground water into the sewer

system. The bid form will included unit prices for point repairs, manhole rehabilitation, and manhole coating as contingency items. Additional footage of 8" will be rehabilitated if funding is available. A package style lift station will also be replaced if there are excess funds available. The Project Budget, which includes estimates of various costs and funding sources for the project, is presented on the next page. The Project Budget is followed by a detailed Construction Estimate.

PROJECT BUDGET
PLUM SPRINGS AREA SEWER REHABILITATION PROJECT
WARREN COUNTY WATER DISTRICT

PROJECT COSTS:

1. Construction		
a. Plum Springs Area	$563,000	
b. Inside City Area	1,931,000	
		$2,494,000
2. Engineering		
a. Design & General Engr. During Construction	121,000	
b. Inspection	80,000	
		201,000
3. Administrative Expenses		20,000
4. Easement and Site Acquisition		10,000
6. Legal Costs		11,600
7. Interest During Construction		70,000
8. Contingency		249,400
TOTAL PROJECT COST		$3,056,000

PROJECT FUNDING:

1. RD Loan	$645,000
2. KRWFC Bond	2,000,000
3. District Funds	411,000
TOTAL FUNDING	$3,056,000

PLUM SPRINGS AREA SEWER REHABILITATION
CONSTRUCTION ESTIMATE

ITEM	DESCRIPTION	QTY.	UNITS	UNIT PRICE	TOTAL
	PLUM SPRINGS				
1	21" CIPP	3,650	LF	$90	$328,500
2	12" CIPP	1,354	LF	$50	$67,700
3	8" CIPP	2,100	LF	$30	$63,000
4	Service Grouting	54	EA	$500	$27,000
5	Standard 4' Dia. Manhole	3	EA	$5,000	$15,000
6	Manhole Barrell Extension	30	VF	$200	$6,000
7	Manhole Coating	42	VF	$400	$16,800
8	21" Sewer Main Point Repair	2	EA	$8,000	$16,000
9	12" Sewer Main Point Repair	1	EA	$5,000	$5,000
10	8" Sewer Main Point Repair	2	EA	$3,000	$6,000
11	Lateral Point Repair	6	EA	$2,000	$12,000
	Plum Springs Sub-Total				$563,000
	BOWLING GREEN				
12	24" CIPP	2,770	LF	$105	$290,850
13	21" CIPP	9,110	LF	$90	$819,900
14	15" CIPP	1,351	LF	$80	$108,080
15	12" CIPP	1,750	LF	$50	$87,500
16	8" CIPP	13,559	LF	$30	$406,770
17	Service Grouting	175	EA	$500	$87,500
18	Standard 4' Dia. Manhole	2	EA	$5,000	$10,000
19	Manhole Barrell Extension	30	VF	$200	$6,000
20	Manhole Coating	66	VF	$400	$26,400
21	24" Sewer Main Point Repair	1	EA	$10,000	$10,000
22	21" Sewer Main Point Repair	3	EA	$8,000	$24,000
23	15" Sewer Main Point Repair	1	EA	$7,000	$7,000
24	12" Sewer Main Point Repair	1	EA	$5,000	$5,000
25	8" Sewer Main Point Repair	4	EA	$3,000	$12,000
26	Lateral Point Repair	10	EA	$2,000	$20,000
27	Final Cleanup	1	LS	$10,000	$10,000
	Bowling Green Sub-Total				$1,931,000
	TOTAL CONSTRUCTION ESTIMATE				$2,494,000

Household Income Information

Qualifications for funding from RD are based in part on the median income level of the households affected by the project. An examination of U.S. Census data indicates that the median household income in Plum Springs is $40,833. The median household income in Warren County is $43,954.

Financial Considerations and Proposed Sewer Rates

The methodology used in developing The District's existing rate schedule was taken from the American Water Works Association, Manual M-1, Water Rates, Section 5, "Rate Design for Small Utilities", published by the AWWA in 2000. Basic philosophy and methodology presented in other sections of that manual were also incorporated into the rate design.

It was determined that with the additional debt service resulting from the proposed project, a rate increase averaging 11.62 percent is required. This increase will also allow an adequate margin for depreciation funds to be accumulated for system maintenance, minor improvements, and special programs.

As the District's facilities continue to age and more facilities are added, the need for expenditures on maintenance and upkeep is expected to increase. Examples of major upcoming expenditures from depreciation funds include lift station replacement and additional sewer rehabilitation projects. These are only a couple examples of the many uses of depreciation funds that are required for system upkeep. Therefore, it is very

important for The District to implement sewer rates that result in sufficient revenue so that these funds will be available.

The schedule of sewer rates recommended in conjunction with this project is shown on the following page. Following the rate schedule is the Proforma Adjustment which shows the estimated revenues (which include the rate increase) and expenses for the first full year of operation after the completion of The Plum Springs Area Sewer Rehabilitation project. Exhibit “A” is a map of the Plum Springs Area Sewer Rehabilitation project.

PROPOSED SEWER RATE SCHEDULE
WARREN COUNTY WATER DISTRICT
(Includes Average 11.62% Rate Adjustment)

MONTHLY GENERAL SERVICE SEWER RATES

5/8 x 3/4 Inch Meter

First	2,000 gallons	*$11.27 Minimum Bill
Next	6,000 gallons	4.80 per 1,000 gallons
Next	12,000 gallons	3.65 per 1,000 gallons
Next	80,000 gallons	3.35 per 1,000 gallons
Over	100,000 gallons	2.85 per 1,000 gallons

*The $11.27 minimum bill shown above applies only to 5/8" x 3/4" meters.
The minimum bills listed below apply to all other meter sizes.

Meter Size	Minimum bill	
1 inch	$25.65	Includes the first 5,000 gallons
1-1/2 inch	47.18	Includes the first 10,000 gallons
2 inch	68.47	Includes the first 16,000 gallons
3 inch	144.13	Includes the first 30,000 gallons
4 inch	177.04	Includes the first 50,000 gallons
6 inch	334.32	Includes the first 100,000 gallons

The rates to be charged for water used in excess of the minimum usage amount are the same regardless of meter size. All rates are subject to a 10 percent penalty if paid after the due date.

MONTHLY SEWER RATES
FOR USERS INSIDE THE CITY OF SMITHS GROVE

5/8 x 3/4 Inch Meter

First	2,000 gallons	*$17.99 Minimum Bill
Next	6,000 gallons	4.97 per 1,000 gallons
Next	12,000 gallons	4.77 per 1,000 gallons
Next	80,000 gallons	4.14 per 1,000 gallons
Over	100,000 gallons	3.73 per 1,000 gallons

*The $17.99 minimum bill shown above applies only to 5/8" x 3/4" meters. The minimum bills listed below apply to all other meter sizes.

Meter Size	Minimum bill	
1 inch	$32.92	Includes the first 5,000 gallons
1-1/2 inch	57.37	Includes the first 10,000 gallons
2 inch	84.92	Includes the first 16,000 gallons
3 inch	146.40	Includes the first 30,000 gallons
4 inch	229.17	Includes the first 50,000 gallons
6 inch	436.08	Includes the first 100,000 gallons

The rates to be charged for water used in excess of the minimum usage amount are the same regardless of meter size. All rates are subject to a 10 percent penalty if paid after the due date.

PROFORMA ADJUSTMENT
PLUM SPRINGS AREA SEWER REHABILITATION
WARREN COUNTY WATER DISTRICT

	EXISTING SYSTEM	CHANGES ON EXISTING SYSTEM	CHANGES DUE TO PROJECT	TOTAL FUTURE SYSTEM AFTER PROJECT
OPERATING REVENUE:				
METERED & OTHER				
Meter Sales Revenue	$3,724,777	$432,870 (1)	$0	$4,157,647
Forfeited Discounts	40,056	0	0	40,056
Misc. Service Revenue	25,635	0	0	25,635
Other Water Revenue	600	0	0	600
Income-Interest	52,938	0	0	52,938
Disposition Gain/Losses.	17,692	0	0	17,692
TOTAL OPERATING REVENUE	$3,861,698	$432,870	$0	$4,294,568
OPERATING EXPENSE:				
Salaries and Wages	$166,606	$131,206 (2)	$0	$297,812
Commissioner Fees	15,000	0	0	15,000
Employee Overhead	112,563	90,532 (2)	0	203,095
Sewage Disposal	2,171,687	0	0	2,171,687
Purchased Power	121,000	0	0	121,000
Chemicals	30,841	0	0	30,841
Materials & Supplies	14,229	0	0	14,229
Cont. Services-Engr	0	0	0	0
Cont. Services-Accounting	12,500	0	0	12,500
Cont. Services-Legal	2,661	0	0	2,661
Cont. Services-Other	87,600	0	0	87,600
Rental of Building & Utilities	0	0	0	0
Equipment Expense	13,766	10,841 (2)	0	24,607
Insurance-Gen'l Liability	10,528	0	0	10,528
Insurance-Other	2,354	0	0	2,354
Regulatory Expense	7,733	0	0	7,733
Bad Debt Expense	908	0	0	908
Misc. Expense	6,175	0	0	6,175
TOTAL OPERATING EXPENSE	$2,776,151	$232,580	$0	$3,008,731
OTHER EXPENSES				
Depreciation	$995,465	$0	$61,120 (5)	$1,056,585
Misc. Non-Operating Income	0	(127,706) (3)	0	(127,706)
Misc. Non Operating Expense	0	0	0	0
OPED Expense	964	0	0	964
Unamortized Debt Expense	139	0	0	139
TOTAL OTHER EXPENSES	$996,568	($127,706)	$61,120	$929,982
PRINCIPAL & INTEREST EXPENSE:				
Existing Principal - Other	$165,924	($75,357) (4)	$0	$90,567
Existing Interest - Other	63,002	(14,472) (4)	0	48,531
Existing Principal - RDA	20,000	2,500 (4)	0	22,500
Existing Interest - RDA	22,455	(2,869) (4)	0	19,586
New Principal - KRWFC	0	0	35,660 (6)	35,660
New Interest - KRWFC	0	0	80,000 (6)	80,000
New Principal - RDA	0	0	7,286 (7)	7,286
New Interest - RDA	0	0	21,560 (7)	21,560
TOTAL PRINCIPAL & INTEREST	$271,381	($90,197)	$144,506	$325,689
TOTAL EXPENSES	$4,044,100	($90,566)	$205,626	$4,264,402
NET UTILITY OPERATING INCOME	($182,402)	$523,436	($205,626)	$30,166

NOTES:
(1) Proposed rate increase
(2) Proposed addition of three employees for Inflow & Infiltration reduction crew including benefits & equipment
(3) Principal & Interest recovered through agreement with Warren Fiscal Court & SICRA fees
(4) Change in principal & interest payments between Test Period and first full year of operation (2020)
(5) Depreciation of proposed improvements (50 years)
(6) Principal & interest payment on KRWFC Bonds (30 Years)
(7) Principal & interest payment on RD loan (40 years)

Conclusions and Recommendations

The sewer rehabilitation project referred to as Plum Springs Area Sewer Rehabilitation and as illustrated on the enclosed map (Exhibit A) is greatly needed to alleviate a serious potential failure of the sewer system. The concrete gravity sewer is 50 years old and has experienced significant degradation from hydrogen-sulfide gas. The clay sewer has numerous cracks and experiences regular problems due to root intrusion.

The proposed project to directly serve approximately 44 existing households in the Plum Springs area and indirectly serve approximately 1,500 existing households and businesses is economically feasible with a 11.6 percent average general rate increase, a $645,000 loan from RD, $411,000 in District depreciation reserve funds, and an additional $2,000,000 from Kentucky Rural Water Finance Corporation. The District's rate structure will also be adjusted to prevent the District from taking a loss on large usage customers. Due to changes in the wholesale rates paid to BGMU since 2011, the District's existing rate structure does not recover the full cost to serve higher volume customers. The proposed rate structure provides for proper cost recovery.