

REVISED DRAFT

COMPREHENSIVE WASTEWATER REVENUE REQUIREMENT, COST OF SERVICE AND RATE DESIGN STUDY

B&V PROJECT NO. 192517

PREPARED FOR

Metropolitan Sewer District of Greater Cincinnati

5 DECEMBER 2016

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1 Introduction

The Metropolitan Sewer District of Greater Cincinnati and the Department of Sewers, City of Cincinnati was created through legislation, enacted April 10, 1968, by the Board of Hamilton County Commissioners and the City Council of Cincinnati. The legislation provided for consolidation of sanitary wastewater service embracing most of the political subdivisions of Hamilton County including the City of Cincinnati, and all unincorporated areas in the County. Warren County is a participant in the District on the basis of an agreement signed in 1970. The City of Cincinnati, through the Department of Sewers, is the sole and complete management agency of the Metropolitan Sewer District, hereinafter referred to as the District, for the Hamilton County “Commissioners.”

1.1 GENERAL BACKGROUND

The present wastewater system has been developed and constructed over the years in a continuing effort to improve water quality in area streams and provide better service to the metropolitan community. In order to comply with increasingly stringent state and federal environmental regulations, to provide for renewal and replacements, and to accommodate growth, the District has been required to construct major improvements to existing facilities which will enable the District to meet these requirements. A significant portion of the cost of these improvements in the past, which were required to meet the requirements of the Federal Clean Water Act, were partially financed through the receipt of U.S. Environmental Protection Agency (EPA) grants. Inasmuch as the federal grants program has been phased out, the local share of the District’s major capital improvement costs, especially those to correct future known capacity problems and to address special compliance project needs, are to be financed primarily through the issuance of municipal bonds.

In June of 2004, MSD entered into a Global Consent Decree with the U.S. EPA, U.S. Department of Justice, and the State of Ohio (“Regulators”) to significantly reduce the number of Sanitary Sewer Overflows, Combined Sewer Overflows, and Sewer-In-Basement issues. In June of 2006, the District submitted a Long Term Control Plan, intended to meet the requirements of the consent decree. Subsequently, the District and Regulators met regularly to negotiate a final Wet Weather Improvement Program (“WWIP”). On June 5, 2009, the District received conditional approval of its final Wet Weather Improvement Program. This study incorporates the impact of the consent decree as well as all other funding needs, including on-going asset management (i.e., renewal and replacement of the system). A phased approach was developed to implement the WWIP, with Phase 1 to be completed in 2018 and Phase 2 beginning in 2019.

Costs of operating, maintaining, and financing system improvements are met primarily from revenue derived from charges to users. Increased requirements due to new programs associated with the compliance of the consent decree, financing costs of major new facilities, and recognition of inflationary costs associated with day to day operation require more revenue than can be recovered under the schedule of rates implemented January 9, 2015.

Additional requirements of the EPA, related to federal grant funding of construction costs, require that the District comply with specific regulations regarding “user charges.” The system of user charges must be in accordance with the Federal Clean Water Act of 1977 (PL 95-217) as amended, and EPA rules and regulations. In order to comply with these requirements and to assure adequate revenue for system operation, maintenance, replacement (OM&R), and capital requirements, the

District authorized this comprehensive study of revenue, revenue requirements, cost of service, and development of charges for wastewater service.

1.2 PURPOSE

This report presents the results of an analysis of the costs of providing wastewater service in the District with projected revenue from the various classes of customers under existing rates.

Revenue shown for 2016 reflects the previously approved rate increase effective January 9, 2015. Revenue needs, including required system-wide revenue increases, are projected for years 2017-2021 that are estimated to provide adequate funds to meet the revenue requirements of the District in each year of the study period, and which will meet 5 year budget Capital Improvement Program (CIP). The CIP is driven by EPA requirements for Phase 1 and Phase 2 of the Long Term Control Plan with Phase 2 starting in 2019. The needs for annual revenue adjustments subsequent to 2016 have also been identified. It is important to note that while the CIP includes spending on consent decree projects, Phase 2 of the consent decree has not been developed and approved, and as such future spending, and therefore revenue needs, may vary, perhaps substantially, from what is projected in this study.

This report includes a summary of the evaluation of alternative rate structures recommended by the Hamilton County Rate Affordability Task Force, as outlined in the Task Force's May 13, 2016 report to the Board of County Commissioners.

1.3 SCOPE

Included in this report are the results of comprehensive studies of projected revenue under existing rates, revenue requirements, customer cost of service, and alternative rates for wastewater service.

The comparison of projected revenue requirements with projected revenue under existing rates is indicative of the degree of adequacy of the overall level of those rates to meet projected costs. The costs to be met during an initial period of adequacy are allocated to classes of customers and type of service, and rates adequate to meet those costs are designed. The proposed rates will provide sufficient revenue to meet system needs. Recognition is also given to meeting EPA user charge criteria related to the receipt of grant awards on construction projects.

1.4 HAMILTON COUNTY RATE AFFORDABILITY TASK FORCE RECOMMENDATIONS

As previously mentioned, this report provides a summary of analysis of certain recommendations outlined by the Hamilton County Rate Affordability Task Force. District staff and Black & Veatch met with County Administration to discuss the task force recommendations and how to best move forward with evaluation of all options. While certain recommendations fall within the scope of the Cost of Service Analysis and Rate Design Study, others do not and will require further study by the District and County Administration. Following are the recommendations outlined in the task force's May 13, 2016 report.

1.4.1 Billing and Rates: Structural Changes

Three recommendations were provided related to structural changes to the rate structure and the method in which customers are billed.

1.4.1.1 Monthly Billing

The task force recommended that all residential customers be moved to monthly billing. Subsequently, the Board of County Commissioners adopted a resolution instructing the move to monthly billing on October 1, or as soon as possible.

Greater Cincinnati Water Works (GCWW) provides billing services to approximately 90 percent of the District's service area. GCWW has recently implemented a new billing system, and is planning to move to monthly billing on or before January 1, 2018. Therefore, while there seems to be broad consensus to move to monthly billing, it will not be possible until GCWW's billing system is adjusted to accommodate monthly billing. Therefore, rate options for 2017 are based on quarterly billing. Rates based on monthly billing only have been provided for 2018 rates.

While GCWW plans to move to monthly billing, 10 percent of the District's customers are billed by other political jurisdictions. Based upon initial discussions with some of the jurisdictions, monthly billing may be difficult, or impossible to accommodate for the foreseeable future, or if implemented, would result in increased costs for the jurisdictions. Therefore, it may be necessary to develop an alternative rate structure that accommodates existing billing systems for these entities.

1.4.1.2 Reduce Volumetric Allocation

Currently, the minimum charge for quarterly customers includes 9 Ccf of volume allowance, and the minimum charge for monthly customers includes 5 Ccf of volume allowance. The task force recommended that under monthly rates, the minimum charge be based on 3 Ccf/month allowance. This option has been included in Option #3 (2018 Rates) in Section 6 of this report.

1.4.1.3 Eliminate Volumetric Allocation

The task force also recommended consideration of an alternative option whereby no volume allowance be included in the minimum charge. Instead, customers would be billed based on a service charge and be charge for all billed volume. This option has been included as Option #4 (2018 Rates) in Section 6 of this report.

1.4.2 Billing and Rates - Equity Changes

Two additional recommendations were provided related to structural changes to the rate structure for specific customer classes and/or types, as follows.

1.4.2.1 Multi-Family Billing

Currently, multi-family customers are billed a minimum charge based on the greater of either the meter size or number of units, whichever is greater. The task force recommended that the rate structure be changed to reflect meter size only. This is an option that has been evaluated in previous District rate studies and would be beneficial for several reasons, including:

- Improve equity
- Simplify billing

■ Eliminate the need to maintain data on number of units

While no multi-family customers would see an increase in bills based on this change, some customers would see a decrease in their bills. Analysis provided previously to the task force indicated that the District would see an approximate reduction of \$4 million in revenues from the multi-family customer class due to this change. Therefore, the impact of this change would result in adjustments to other rate components to recover all system costs.

This structure option has been discussed for some time, and there is broad support to make this change. However, it is our understanding that due to the implementation of GCWW's new billing system, this change could not be made immediately. Therefore, this rate structure change has been reflected in the calculation of 2018 rates (Options #3 and #4) discussed in Section 6 of this report.

1.4.2.2 Correction to Meter Size Billing

Within the service area, there are a small number of customers who currently have a larger meter size than would normally be required to serve them, in order to maintain adequate water pressure. These are generally customers with service a distance and/or elevation from the main line significant enough to warrant the larger line. The task force recommended that these customers be charged based on the size line they normally would have used if not for the shape/nature of their parcel. The Board of County Commissioners subsequently approved a rate resolution to implement this change.

Based on evaluation of existing data, it appears that it will be difficult to identify these customers. Further, it is uncertain at this time how GCWW would implement this change, as GCWW would presumably continue to bill customers based on actual meter size for water service. The District is currently working with GCWW to determine the best way to identify these customers and make necessary changes to the billing system to implement. While this adjustment would result in decreased revenues for the District, it is not possible at this time to quantify the impact and therefore has not been included in this study.

1.4.3 Inflow/Infiltration (Stormwater)

The task force recommended that consideration be made to recover infiltration/inflow (I/I) through as separate charge based on either impervious area, and included on customer bills, or through an assessment similar to the existing Hamilton County Stormwater District Assessment.

A “wet weather fee” of this type has been implemented by other utilities across the country, and would serve to recover the costs associated with wet weather in a manner more consistent with how such flows are contributed to the system. An analysis of this type of charge is complex and it is important that an appropriate schedule be developed to allow for the in-depth analysis of costs to be recovered through the fee, make necessary policy decisions, and develop the data and billing database necessary to successfully implement such a charge. In addition, substantial public outreach is recommended, as such a charge would require education, awareness, and planning for customers. A conceptual analysis of such a charge is being prepared as a separate document. No change in rates due to implementation of a wet weather fee has been included in this study.

1.4.4 Customer Assistance Programs

The final category of recommendations from the task force relate to the evaluation and potential development of a customer assistance program. The task force recommended the evaluation of the following options:

- Discount Program, whereby eligible customers would be provided a discounted rate
- Emergency Funding, whereby the District could provide a credit for eligible customers who demonstrate a verifiable hardship.

Neither the District nor GCWW currently have a customer assistance program. Development of such a program is complex and requires adequate time to develop and implement. Development of such a program is outside the scope of this cost of service and rate design study and therefore, has not been included in this report.

2 Summary of Findings

The findings of the report are summarized in this section. During the completion of this study, Black & Veatch has made certain assumptions with respect to conditions, events and circumstances which may occur in the future. The methodology utilized by Black & Veatch in performing the analyses follows generally accepted practices for such projections. While Black & Veatch believes the assumptions are reasonable and appropriate, and the projection methodology valid, actual results may differ materially from those projected, as influenced by the conditions, events and circumstances that actually occur that are unknown at this time and/or which are beyond the control of Black & Veatch.

The following summarizes the principal assumptions and findings from Black & Veatch's studies and the overall indicated revenue increases that will be required to support MSD operations.

1. The District is estimated to be currently serving approximately 227,000 customer accounts based on 2015 billing records. The projected number of customers, by customer class, is based on a detailed evaluation of past trends in the number of accounts as well as an evaluation of the impact of implementation of the capital improvement program, and associated necessary rate increases, on individual customer classes. The resulting projections reflect the assumption that the number of customers served by the District will remain unchanged during the study period.
2. The District has experienced a trend of declining volume per customer for many years, and this trend is expected to continue, at least in the near term, with the pace of reduction declining over time. As a result of an analysis of historical trends, this study incorporates an assumed decrease in billed volume per account as follows:
 - Single Family Residential:
 - 2016 = 3.0% decline over prior year
 - 2017 = 2.0% decline over prior year
 - 2018 = 1.5% decline over prior year
 - 2019 = 1.0% decline over prior year
 - 2020 = 0.5% decline over prior year
 - 2021 = 0.0% decline over prior year
 - Multi-family:
 - 2016 = 1.5% decline over prior year
 - 2017 = 1.0% decline over prior year
 - 2018 = 0.75% decline over prior year
 - 2019 = 0.5% decline over prior year
 - 2020 = 0.25% decline over prior year
 - 2021 = 0.0% decline over prior year
 - Commercial:
 - Held constant during the study period
 - Industrial:
 - Held constant during the study period
3. Revenues of the District required to meet the costs of providing wastewater service to customers is derived principally from sewerage service charges, excess strength surcharges, industrial

pretreatment, and septic tank disposal charges. Other revenue sources include the sale of permits and licenses, plan review and inspection fees, connection charges, interest earned from the investment of available funds and other miscellaneous sources. Future revenue levels are predicated on a no-growth scenario, declining volume per customer, and revenue derived from charges for service which are estimated to be approximately to \$281,029,000 in 2016 under present rates.

4. The study reflects a capital improvement program totaling \$1.097 billion for the period 2016 to 2021. These capital costs include some estimated costs for Phase 2 of the Long Term Control Plan starting in 2019. It is important to note, that once Phase 2 costs are finalized, required increases for 2017 and beyond could vary from those projected herein, depending on the size and timing of Phase 2 related projects. The District is budgeting for project contingency of \$62 million over the 2016-2021 projection period and is included in the Asset Management totals in Table 4-2. To finance the capital program, several funding sources are planned to be used including funds on hand, the sale of proposed revenue bonds, low interest loans, annual connection fees, net operating revenues, and interest earnings from the construction fund. It is projected that the District will be required to issue \$330 million in proposed revenue bonds and \$345.2 million in proposed low interest loans over the study period. It is important to note that the annual amount funded is equal to 50 percent of the prior year's CIP and 50 percent of the current year's CIP. This is to estimate the actual amount that will be spent each year.
5. The District's annual revenue requirements consist of operation and maintenance expenses, debt service payments for existing and proposed bonds, annual equipment purchases, and the necessity to generate sufficient excess net operating revenues to maintain desired debt service coverage levels. These annual revenue requirements are projected to increase over the study period. Operating expenses, as forecasted, are projected to escalate from \$109,545,000 to \$131,195,000 due to general inflationary increases as well as projection of increased operating costs due to implementation of the capital program. Debt service payments are projected to increase from \$108,869,000 to \$122,296,000 during the study period due to the issuance of additional long-term debt.
6. System-wide revenue increases, and ultimately rate increases to customers, are largely being driven by capital program requirements. Such capital projects include both those set forth in the WWIP as well as asset management projects, as committed to under the WWIP. As shown in Figure 2-1, operation and maintenance expenses and debt service requirements comprise approximately 76 percent of the District's total revenue requirements over the planning period. While operation and maintenance expenses are projected to increase due to inflation and the impact of the capital program on operations, debt service requirements are projected to increase substantially to provide funding for the capital program. Debt Service alone increases from approximately 36 percent of total revenue requirements in 2016 to approximately 42 percent of total revenue requirements in 2017. Debt Service then declines in 2018-2021 due to the retirement of a portion of outstanding debt. Total capital requirements, including the transfer to the Surplus fund, debt service, and equipment purchases, average 61 percent.

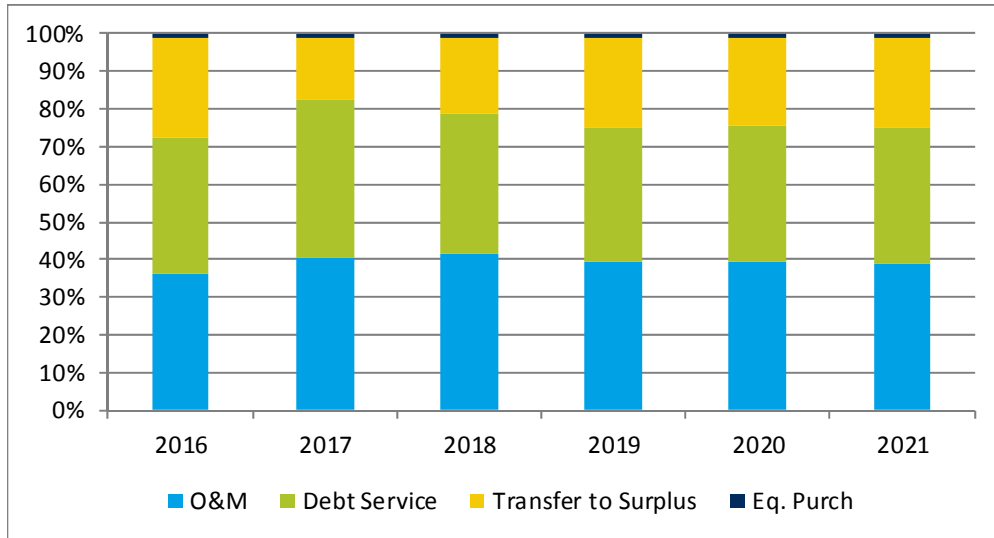


Figure 2-1 Breakdown of Annual Revenue Requirements

7. A 5.5 percent revenue increase effective in January 9, 2015, was approved by the Hamilton County Commissioners, and reflected a 6 percent increase in minimum charges and volume charges. Surcharge rates were held constant, resulting in the overall system-wide revenue increase of 5.5 percent. The same rates were applied to 2016 as no rate increase was approved by the Hamilton County Commissioners. The rates for 2015 were based on a 2014 analysis of system-wide revenue requirements, and incorporated in calculating projected wastewater revenues under existing rates. The Hamilton County Commissioners concluded the 2015 rates to be sufficient for 2016; however, the rates are indicated to be insufficient to recover the District’s future revenue requirements during the remainder of the proposed study period. As such, a series of subsequent annual revenue adjustments are indicated to be required, as follows:

- 2017 = 4.25 percent
- 2018 = 4.25 percent
- 2019 = 4.25 percent
- 2020 = 4.25 percent
- 2021 = 4.25 percent

As indicated, the projected system-wide revenue increase for 2017 is estimated to be 4.25 percent. The projected adjustments in the level of wastewater service charge revenues are projected to produce sufficient revenues to meet the District’s cash obligations or revenue requirements and provide adequate debt service coverage and minimum fund balances. The projected adjustments reflect the impact of on-going asset management (e.g., renewals and replacements) as well as Phase 1 and estimated Phase 2 (starting in 2019) costs of the Long Term Control Plan. It is important to note, that once Phase 2 costs are finalized, required increases for 2017 and beyond could vary from those projected herein, depending on the size and timing of Phase 2 related projects.

8. The total revenue requirements to be derived from charges for wastewater service are synonymous with, and are the definition of, the total cost of service. The District’s estimated

annual cost of service to be met from wastewater charges, totaling \$283,943,400 for the 2017 test year, or the period of adequacy for which the rates are to be in effect, consist of the operation and maintenance expenses, user charge replacements, and capital costs, as summarized in Table 2-1.

Table 2-1 Cost of Service Requirements – Test Year 2017

Line No.	Description	Test Year 2017
1	Operation and Maintenance Expense	\$107,746,800
2	User Charge Replacements	0
3	Capital Costs	176,146,600
4	Total Cost of Service to be Met from Rates	\$283,893,400

- Detailed cost of service studies were made for the 2017 test year to establish costs of providing wastewater service to the individual customer classes served. Such studies involved an analysis of costs by system function including those related to the volume, capacity, and strength of wastewater, and to customer billing and industrial pretreatment program requirements. A summary of the District’s allocated cost of service by these functional classifications is shown in Table 2-2.

Table 2-2 Summary of Functional Cost Components - 2017 Test Year

Line No.	Cost Component	Total Cost of Service
		\$
1	Volume Related Cost	33,278,122
2	Capacity Related Cost	159,414,564
3	Strength Related Cost	
4	Suspended Solids	28,210,071
5	BOD	33,927,239
6	TKN	3,480,626
7	Customer Cost	5,680,788
	Industrial Monitoring & Surveillance	
8	Surcharge	1,125,732
9	Pretreatment	2,225,707
10	Sewer Backup & Watershed Operations	16,550,552
11	Total Cost of Service	283,893,400

- A comparison of the resultant total cost of service allocated to each customer class based upon their respective service requirements with revenue under existing rates and the indicated revenue increase required from each class is shown in Table 2-3.

Table 2-3 Summary of Functional Cost Components – 2017 Test Year

Line No.	Customer Class	Revenue Under Existing Rates	Total Cost of Service	Adjusted Cost of Service	Indicated Revenue Increase Required	Indicated Revenue Adjustment
		\$	\$	\$	\$	%
1	Residential	117,555,128	122,369,568	132,202,999	14,647,871	12.46%
2	Commercial	48,696,048	49,829,846	52,807,798	4,111,750	8.44%
3	Industrial	31,853,741	28,187,288	28,938,946	(2,914,795)	-9.15%
4	Multifamily	52,230,296	48,089,854	51,077,366	(1,152,931)	-2.21%
5	Surcharge	20,192,310	15,070,486	15,070,486	(5,121,823)	-25.37%
6	Septic Tank Disposal	1,792,280	3,795,806	3,795,806	2,003,526	111.79%
7	Sewer Backup & Watershed Ops (a)	0	16,550,552	0		
8	Total	272,319,802	283,893,400	283,893,400	11,573,598	4.25%

(a) Sewer Backup Response Program and Watershed Operations costs are allocated to Residential, Commercial, and Multi Family classes based on number of connections

11. Based upon results from the detailed cost of service study for the 2017 test year, two (2) alternative rate schedules have been developed in such a manner as to achieve a system-wide revenue increase of 4.25 percent. For 2018, two(2) rate schedules have been developed in such a manner as to achieve a system-wide revenue increase of 4.25. Based upon review and discussion, it is anticipated that additional alternatives may be evaluated prior to adoption of a final 2017 rate schedule.

3 Revenue

The revenue for the District to meet costs of wastewater service is derived principally from sewerage service charges, excess strength surcharges, and septic tank disposal charges. Other revenue sources include pretreatment charges, the sale of permits and licenses, plan review and inspection charges, connection charges, interest earned from the investment of available funds and other miscellaneous sources. The level of future revenue is projected through an analysis of historical system growth in terms of number of customers, wastewater volume, and revenue derived from charges for service.

3.1 CUSTOMER GROWTH

Table 3-1 presents a summary of the historical and projected average number of customer accounts, billable wastewater flow volume, and overall average flow per account. Customer classification (i.e., residential, commercial, multi-family and industrial) is based upon data maintained by the Greater Cincinnati Water Works (GCWW).

The projected number of customers served by MSD, by customer class, is based on a detailed evaluation of past trends in the number of accounts as well as an evaluation of current economic conditions, the impact of implementation of the capital improvement program, and associated necessary rate increases, on individual customer classes. The resulting projections reflect no change in customer accounts during the study period.

The GCWW provides water service to residences and businesses in the City of Cincinnati and to areas outside the City in Hamilton County. As such, the GCWW bills approximately 90 percent of the District's wastewater customers, with the remaining 10 percent billed by other political subdivisions in the County.

Table 3-1 Historical and Projected Accounts

Line No.	Description	Historical		Projected					
		2014	2015	2016	2017	2018	2019	2020	2021
CWW									
Bi-Monthly Customers									
1	Residential	59	59	59	59	59	59	59	59
2	Commercial	0	0	0	0	0	0	0	0
3	Industrial	0	0	0	0	0	0	0	0
4	Multi-Family	0	0	0	0	0	0	0	0
5	Subtotal	59	59	59	59	59	59	59	59
Monthly									
6	Residential	18	17	17	17	17	17	17	17
7	Commercial	381	365	365	365	365	365	365	365
8	Industrial	283	280	280	280	280	280	280	280
9	Multi-Family	295	280	280	280	280	280	280	280
10	Resid-Pmt Plan	7,008	3,143	3,143	3,143	3,143	3,143	3,143	3,143
11	Subtotal	7,985	4,085	4,085	4,085	4,085	4,085	4,085	4,085
Quarterly									
12	Residential	160,809	164,870	164,870	164,870	164,870	164,870	164,870	164,870
13	Commercial	12,302	12,292	12,292	12,292	12,292	12,292	12,292	12,292
14	Industrial	130	131	131	131	131	131	131	131
15	Multi-Family	21,114	21,329	21,329	21,329	21,329	21,329	21,329	21,329
16	Subtotal	194,354	198,622	198,622	198,622	198,622	198,622	198,622	198,622
17	Total CWW	202,398	202,765	202,765	202,765	202,765	202,765	202,765	202,765
Political Bodies									
18	Residential	21,733	21,776	21,776	21,776	21,776	21,776	21,776	21,776
19	Commercial	2,377	2,382	2,382	2,382	2,382	2,382	2,382	2,382
20	Industrial	38	38	38	38	38	38	38	38
21	Warren Co.	1	1	1	1	1	1	1	1
22	Subtotal	24,149	24,197	24,197	24,197	24,197	24,197	24,197	24,197
23	Total	226,547	226,962	226,962	226,962	226,962	226,962	226,962	226,962

Table 3-2 presents a summary of the historical and projected billable wastewater flow volume. The projection of total billable wastewater volume requires an analysis of not only historical total billable volume, but also an analysis of billed volume per customer. This is necessary in order to fully reflect any change in customer behavior that could impact total billable volume. During this study, a detailed analysis of historical billing data was conducted. Based upon the analysis, it was determined that billed volume per customer continues to decline. This is a trend that has been occurring for many years, and is consistent with the trend being experienced by utilities across the United States. Several factors are likely contributing to a decline in billed volume per customer, including the installation of higher efficiency fixtures and appliances, and increased awareness of environmental concerns and resulting changes in behavior. Economic conditions can also have an impact on billed volume per customer, and current economic conditions likely also contribute to the magnitude of the recent decline.

Based on this analysis, volume per customer has been projected to continue to decline over the study period as follows:

- Single Family Residential:
 - 2016 = 3.0% decline over prior year
 - 2017 = 2.0% decline over prior year
 - 2018 = 1.5% decline over prior year
 - 2019 = 1.0% decline over prior year

- 2020 = 0.5% decline over prior year
- 2021 = 0.0% decline over prior year
- Multi-family:
 - 2016 = 1.5% decline over prior year
 - 2017 = 1.0% decline over prior year
 - 2018 = 0.75% decline over prior year
 - 2019 = 0.5% decline over prior year
 - 2020 = 0.25% decline over prior year
 - 2021 = 0.0% decline over prior year
- Commercial:
 - Held constant during the study period
- Industrial:
 - Held constant during the study period

As shown in Table 3-2, total water usage or billable wastewater volume is projected at 31,300,800 hundred cubic feet (Ccf) for 2017. As previously discussed, billable wastewater volume is projected to continuously decrease over the study period, reflecting no change in the number of customers and the above assumptions regarding volume per customer.

Table 3-2 Historical and Projected Billable Volumes

Line No.	Description	Historical					Projected				
		2014	2015	2016	2017	2018	2019	2020	2021	ccf	ccf
CWW											
Bi-Monthly Customers											
1	Residential	3,864	4,129	4,005	3,925	3,866	3,828	3,809	3,809	3,809	3,809
2	Commercial	0	0	0	0	0	0	0	0	0	
3	Industrial	0	0	0	0	0	0	0	0	0	
4	Multi-Family	0	0	0	0	0	0	0	0	0	
5	Subtotal	3,864	4,129	4,005	3,925	3,866	3,828	3,809	3,809	3,809	
Monthly											
6	Residential	142,748	139,534	135,348	132,641	130,651	129,345	128,698	128,698	128,698	
7	Commercial	1,620,327	1,494,849	1,494,849	1,494,849	1,494,849	1,494,849	1,494,849	1,494,849	1,494,849	
8	Industrial	5,248,856	5,137,797	5,137,797	5,137,797	5,137,797	5,137,797	5,137,797	5,137,797	5,137,797	
9	Multi-Family	1,880,142	1,925,560	1,896,677	1,877,710	1,863,627	1,854,309	1,849,673	1,849,673	1,849,673	
10	Resid-Pmt Plan	581,934	269,849	261,754	256,518	252,671	250,144	248,893	248,893	248,893	
10	Subtotal	9,474,006	8,967,589	8,926,424	8,899,515	8,879,595	8,866,444	8,859,911	8,859,911	8,859,911	
Quarterly											
11	Residential	9,754,215	10,007,274	9,707,056	9,512,915	9,370,221	9,276,519	9,230,136	9,230,136	9,230,136	
12	Commercial	4,076,080	4,177,552	4,177,552	4,177,552	4,177,552	4,177,552	4,177,552	4,177,552	4,177,552	
13	Industrial	514,434	557,315	557,315	557,315	557,315	557,315	557,315	557,315	557,315	
14	Multi-Family	4,856,213	4,916,532	4,842,784	4,794,356	4,758,399	4,734,607	4,722,770	4,722,770	4,722,770	
15	Subtotal	19,200,941	19,658,673	19,284,707	19,042,138	18,863,486	18,745,992	18,687,773	18,687,773	18,687,773	
16	Total CWW	28,678,811	28,630,391	28,215,136	27,945,579	27,746,948	27,616,264	27,551,492	27,551,492	27,551,492	
Political Bodies											
17	Residential	1,169,004	1,535,024	1,488,974	1,459,194	1,437,306	1,422,933	1,415,818	1,415,818	1,415,818	
18	Commercial	1,148,339	1,507,889	1,507,889	1,507,889	1,507,889	1,507,889	1,507,889	1,507,889	1,507,889	
19	Industrial	133,298	175,034	175,034	175,034	175,034	175,034	175,034	175,034	175,034	
20	Warren Co.	242,658	213,105	213,105	213,105	213,105	213,105	213,105	213,105	213,105	
21	Subtotal	2,693,299	3,431,053	3,385,003	3,355,223	3,333,335	3,318,962	3,311,848	3,311,848	3,311,848	
22	Total	31,372,110	32,061,445	31,600,139	31,300,802	31,080,283	30,935,226	30,863,340	30,863,340	30,863,340	

3.2 WASTEWATER REVENUE UNDER EXISTING RATES

The District primarily derives revenues from a schedule of wastewater rates that includes a minimum bill, a block quantity volume charge, an extra strength surcharge for excess pollutant customers, and septic tank disposal. A schedule of current rates is shown in Table 3-3.

Currently, the minimum charge per quarter includes the first 900 cubic feet (500 cubic feet for monthly bills) of contributed wastewater volume and is based upon the size of water service meter associated with the service. Two additional declining rate blocks are applied to those volumes exceeding the minimum. The Extra Strength Surcharges are applied to specific monitored and tested customers and apply rates per hundred cubic feet for the strength components Biochemical Oxygen Demand (BOD), Suspended Solids (SS) and Total Kjeldahl Nitrogen (TKN), each exceeding 300, 240 and 25 milligrams per liter (mg/l) respectively. All septic tanks are charged per 1,000 gallons based on the size of their tank and this charge reflects treatment of the average strength of BOD, SS, and TKN for all septic tank haulers.

In January 2015, the District implemented a 5.5 percent revenue increase as previously approved by the County Commissioners, reflecting a 6.0 percent increase in minimum charges and volume charges for all rates except for the Extra Strength Surcharges, which did not change from 2014. Revenues under these same rates are reflected in the 2016 total revenue from user charges.

The District's sewer service revenue is projected by applying the wastewater rate structure to the appropriate projected unit of measure for each customer class. These revenue projections are summarized in Table 3-4. Total projected sewer service revenue, from user rates, is expected to average \$249,783,100 for the 2016 to 2021 projection period.

Revenues from extra strength and industrial wastes are projected to contribute an additional \$20,192,000 and Septic Tank Disposal account for \$1,792,000 per year to the operating revenues under existing rates.

Other operating and non-operating revenues of the District consist of revenues derived from other fees including connection charges, plan review, and tap permits. As shown on Table 3-5, other operating revenue is projected to remain constant at \$4,783,000 per year throughout the study period, connection charges and tap fees is projected to remain constant at \$2,674,000 per year throughout the study period, and revenue from interest earnings on all funds is projected to average approximately \$4.1 million during the study period.

Table 3-3 Existing Rates

Minimum Monthly Charge - \$/Bill - 2016

Line No.	Meter Size Inches	Number of Family Units	Quarterly Usage Cf	Quarterly Charge \$	Monthly Usage Cf	Monthly Charge \$
1	5/8"	1	900	\$ 117.35	500	\$ 57.11
2	3/4"	2-3	900	\$ 151.32	500	\$ 68.49
3	1"	4-5	900	\$ 207.44	500	\$ 88.14
4	1 1/2"	6-12	900	\$ 352.51	500	\$ 135.90
5	2"	13-20	900	\$ 499.33	500	\$ 187.29
6	3"	21-50	900	\$ 1,281.49	500	\$ 459.03
7	4"	51-115	900	\$ 2,122.30	500	\$ 760.08
8	6"	116-250	900	\$ 4,139.17	500	\$ 1,487.10
9	8"	Over 250	900	\$ 6,256.78	500	\$ 2,210.47
10	10"		900	\$ 8,360.75	500	\$ 2,970.50
11	12"		900	\$ 9,653.24	500	\$ 3,458.83

Volume Charge - \$/ccf - 2016

	Quarterly Cf	Monthly Cf	Rate \$
12 First (cf)	900	500	\$ 0
13 To (cf)	15,000	5,000	\$ 5.879
14 Over (cf)	15,000	5,000	\$ 4.701

Extra Strength Charges - \$ per mg/l per 1,000 cubic feet - 2016

	Rate \$
15 Suspended Solids (TSS)	\$ 0.002756
16 Biochemical Oxygen Demand (BOD)	\$ 0.004707
17 Nitrogen Oxygen Demand (TKN)	\$ 0.004122

Septic Tank Disposal - \$ per 1,000 gallons - 2016

	Rate \$
18 All Septic Tank Disposal Haulers	\$ 50.00

Table 3-4 Projected User Charge Revenues Under Existing Rates

Line No.	Description	Historical					Projected					
		2015	2016	2017	2018	2019	2020	2021				
		\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
CWW												
Bi-Monthly Customers												
1	Residential	45,777	45,599	45,485	45,400	45,345	45,318	45,318	45,318	45,318	45,318	45,318
2	Commercial	0	0	0	0	0	0	0	0	0	0	0
3	Industrial	0	0	0	0	0	0	0	0	0	0	0
4	Multi-Family	0	0	0	0	0	0	0	0	0	0	0
5	Subtotal	45,777	45,599	45,485	45,400	45,345	45,318	45,318	45,318	45,318	45,318	45,318
Monthly												
6	Residential	824,627	805,271	792,754	783,554	777,513	774,523	774,523	774,523	774,523	774,523	774,523
7	Commercial	8,282,406	8,282,406	8,282,406	8,282,406	8,282,406	8,282,406	8,282,406	8,282,406	8,282,406	8,282,406	8,282,406
8	Industrial	27,350,586	27,350,586	27,350,586	27,350,586	27,350,586	27,350,586	27,350,586	27,350,586	27,350,586	27,350,586	27,350,586
9	Multi-Family	11,428,078	11,293,237	11,204,692	11,138,947	11,095,446	11,073,804	11,073,804	11,073,804	11,073,804	11,073,804	11,073,804
10	Resid-Pmt Plan	2,766,041	2,748,248	2,736,742	2,728,285	2,722,732	2,719,983	2,719,983	2,719,983	2,719,983	2,719,983	2,719,983
11	Subtotal	50,651,739	50,479,749	50,367,181	50,283,779	50,228,683	50,201,302	50,201,302	50,201,302	50,201,302	50,201,302	50,201,302
Quarterly												
12	Residential	104,084,875	103,285,492	102,768,558	102,388,611	102,139,112	102,015,610	102,015,610	102,015,610	102,015,610	102,015,610	102,015,610
13	Commercial	32,897,635	32,897,635	32,897,635	32,897,635	32,897,635	32,897,635	32,897,635	32,897,635	32,897,635	32,897,635	32,897,635
14	Industrial	3,943,618	3,943,618	3,943,618	3,943,618	3,943,618	3,943,618	3,943,618	3,943,618	3,943,618	3,943,618	3,943,618
15	Multi-Family	41,585,650	41,247,594	41,025,604	40,860,777	40,751,716	40,697,458	40,697,458	40,697,458	40,697,458	40,697,458	40,697,458
16	Subtotal	182,511,779	181,374,340	180,635,415	180,090,641	179,732,082	179,554,322	179,554,322	179,554,322	179,554,322	179,554,322	179,554,322
17	Total CWW	233,209,295	231,899,689	231,048,081	230,419,821	230,006,110	229,800,942	229,800,942	229,800,942	229,800,942	229,800,942	229,800,942
Political Bodies												
18	Residential	10,275,953	10,275,953	10,275,953	10,275,953	10,275,953	10,275,953	10,275,953	10,275,953	10,275,953	10,275,953	10,275,953
19	Commercial	7,516,006	7,516,006	7,516,006	7,516,006	7,516,006	7,516,006	7,516,006	7,516,006	7,516,006	7,516,006	7,516,006
20	Industrial	559,536	559,536	559,536	559,536	559,536	559,536	559,536	559,536	559,536	559,536	559,536
21	Warren Co.	935,636	935,636	935,636	935,636	935,636	935,636	935,636	935,636	935,636	935,636	935,636
22	Subtotal	19,287,131	19,287,131	19,287,131	19,287,131	19,287,131	19,287,131	19,287,131	19,287,131	19,287,131	19,287,131	19,287,131
23	Total	252,496,426	251,186,820	250,335,212	249,706,952	249,293,241	249,088,073	249,088,073	249,088,073	249,088,073	249,088,073	249,088,073

Table 3-5 Operating and Non-Operating Revenue

Line No.	Description	Historical		Projected				
		2015	2016	2017	2018	2019	2020	2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
1	Sewerage Service Charge	252,549	251,187	250,335	249,707	249,293	249,088	249,088
2	Sewerage Surcharges	20,192	20,192	20,192	20,192	20,192	20,192	20,192
3	Septic Tank Disposal	1,792	1,792	1,792	1,792	1,792	1,792	1,792
4	Pretreatment Monitoring	401	401	401	401	401	401	401
5	Subtotal	274,934	273,572	272,721	272,093	271,679	271,474	271,474
6	Other Operating Revenue							
7	Rental Income	207	207	207	207	207	207	207
8	Tap Permits-Licenses	40	40	40	40	40	40	40
9	Inspection-Plan Review	195	195	195	195	195	195	195
10	Other (a)	6,101	4,341	4,341	4,341	4,341	4,341	4,341
11	Total Other Operating Revenue	6,544	4,783	4,783	4,783	4,783	4,783	4,783
12	Connection Fee Revenue (b)	2,674	2,674	2,674	2,674	2,674	2,674	2,674
13	Build American Bond Discount	4,125	4,125	4,125	4,125	4,125	4,125	4,125
14	Interest-Trust Accounts (c)	4,059	3,544	4,369	4,362	4,227	3,930	3,930
15	Total Revenue	292,336	288,698	288,672	288,037	287,488	286,985	286,986

- (a) Includes fines, assessments, purchasing agent sales, expense reimbursements, and other miscellaneous revenue sources.
- (b) Connection charges and tap-in fees are shown separate from other operating revenues as these funds are used as a source of financing for the District's capital improvement program. Projected revenues beginning in 1997 reflect an increase in connection fee charges.
- (c) Reflects interest income on operating, surplus, and trusteed accounts.

4 Revenue Requirements

The revenue required to adequately provide for the continued operation of the District must be sufficient to meet the cash requirements of operation and maintenance (O&M) of the system; principal, interest, and reserve payments on revenue and other bond indebtedness; and recurring annual capital expenditures for replacements, system betterments, and extensions not debt financed.

Operation and maintenance expenses are those expenditures necessary to transport and treat customers' wastes as well as maintain the system in good working order. Routine annual capital expenditures, which include equipment replacements, consist of recurring annual replacements, minor extensions, and betterments which are normally revenue financed. Other capital costs include principal and interest payments, bond covenant-required payments, and the costs of infrequent major capital improvements paid directly from annual operating revenues.

4.1 OPERATION AND MAINTENANCE EXPENSE

Table 4-1 presents a summary of actual and projected O&M expenditures for 2016 through 2021 by operating division. Major cost items for each division generally include personal services and employee fringe benefits; the cost of purchased electric power, gas and other treatment chemicals; and other contractual service and material costs.

Operation & maintenance expenditures for 2016 are based on the 2016 approved budget and expenditures for 2017 are based on the proposed 2017 budget submitted to the County in August 2016. Years 2018-2021 operation and maintenance expenditures are projected to increase based on assumed annual price escalation over the 2017 proposed budget. Benefits¹ are forecasted to increase at a rate of 4.48 percent per year during the study period. Chemical, gas/oil/fuel, and power costs² are projected to increase 3.12 percent per year. Personnel costs are forecasted to increase by 4 percent for 2018 and 2019 as approved by the City. All other operation and maintenance expense elements³ (including Personnel for 2020 and 2021) are assumed to increase at a rate of 2.30 percent per year to recognize the effects of inflation. Project encumbrance cancellations (shown on Table 4-1, Line 26) are estimated to be 5 percent annually, resulting in a reduction to the total budget compared to prior studies. As indicated in Table 4-1, annual operating and maintenance costs are projected to increase from \$109,545,000 in 2016 to \$131,195,000 in 2021.

¹ 25 year historical average escalation for Consumer Price Index (CPI), Cincinnati-Hamilton, OH-KY-IN, Medical Care.

² 25 year historical average escalation for Consumer Price Index (CPI), Cincinnati-Hamilton, OH-KY-IN, Fuel & Utilities.

³ 25 year historical average escalation for Consumer Price Index (CPI), Cincinnati-Hamilton, OH-KY-IN, All items.

Table 4-1 Projected Operation and Maintenance Expense

Line No.	Description	Historical (a)		Projected				
		2015	2016	2017	2018	2019	2020	2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
1	Office of the Director	9,028	7,858	7,657	7,869	8,087	8,285	8,488
2	Wastewater Administration							
3	Billing & Collecting	3,359	5,000	5,318	5,440	5,565	5,693	5,824
4	All Other	4,046	4,941	5,039	5,228	5,426	5,575	5,729
5	Total	7,405	9,941	10,356	10,668	10,991	11,268	11,553
6	Information Technology	5,322	6,185	7,142	7,356	7,578	7,771	7,969
7	Project/Business Development	3,044	2,840	3,209	3,335	3,466	3,568	3,673
8	Project Delivery	4,340	4,864	5,822	6,046	6,279	6,452	6,629
9	Wastewater Collection	20,626	21,020	20,863	21,534	22,228	22,810	23,409
10	Wastewater Treatment							
11	Superintendent	891	1,330	1,080	1,118	1,156	1,187	1,218
12	Mill Creek	17,527	21,125	20,354	21,006	21,680	22,288	22,915
13	Little Miami	5,616	6,364	7,165	7,386	7,615	7,818	8,026
14	Muddy Creek	2,806	3,594	4,086	4,218	4,355	4,473	4,595
15	Sycamore	1,552	2,193	2,514	2,592	2,673	2,746	2,821
16	Taylor Creek	1,551	1,781	1,969	2,032	2,096	2,153	2,212
17	Polk Run	1,381	1,716	1,718	1,773	1,830	1,880	1,930
18	MSD Pump Stations	0	1,601	1,401	1,435	1,470	1,506	1,543
19	Equipment Maintenance	7,313	7,786	7,821	8,102	8,393	8,623	8,859
20	Total Wastewater Treatment	38,636	47,489	48,109	49,662	51,269	52,674	54,119
21	Industrial Waste Management	5,038	7,075	7,605	7,873	8,151	8,373	8,602
22	Sewer Backup & Watershed Operations	7,197	11,633	13,335	13,681	14,035	14,371	14,716
23	Total O&M	100,635	118,905	124,099	128,025	132,085	135,572	139,157
24	Incremental Expenditures	0	0	0	400	2,009	2,355	2,810
25	Office Equipment & Motorized Vehicles	(3,888)	(3,414)	(3,482)	(3,562)	(3,644)	(3,728)	(3,813)
26	Projected Encumbrance Cancellation	0	(5,945)	(6,205)	(6,401)	(6,604)	(6,779)	(6,958)
27	Total Net O&M Expense	96,748	109,545	114,412	118,462	123,846	127,421	131,195

Note: Each department includes an allocated portion of the General Fund overhead
(a) Reflects actual cash expenditures.

4.2 CAPITAL IMPROVEMENT PROGRAM

The District has developed a multi-year capital improvement program (CIP) covering its anticipated commitments for the period from 2016 through 2021. These capital costs include estimated costs for Phase 2 of the Long Term Control Plan beginning in 2019. A summary of the capital improvement program, totaling \$1,096,750,000 is shown in Table 4-2. The approved capital program reflects spent or encumbered monies as well as the planned contract certifications for each year over the study period. For 2016, annual expenditures are based on the approved 2016 CIP budget. For years 2017-2021, annual expenditures are based on the proposed CIP budget submitted to the County in November 2016 including adjustments for estimated Phase 2 projects. It is important to note, that once Phase 2 costs are finalized, required increases for 2017 and beyond could vary from those projected herein, depending on the size and timing of Phase 2 related projects.

Table 4-2 Capital Improvement Program ^(a)

Line No.	Description	Projected					Total Cost	
		2016	2017	2018	2019	2020		2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Capital Projects								
1	WWIP Projects	85,194	216,807	37,403	55,449	51,917	55,560	502,330
2	Asset Management Projects	90,214	124,908	65,067	116,584	60,990	136,657	594,420
3	Total Approved Capital Program	175,408	341,715	102,470	172,033	112,907	192,217	1,096,750

(a) Reflects proposed annual certification of projects as developed by Metropolitan Sewer District staff. Annual project expenditures will deviate from scheduled certifications and includes program contingency.

4.2.1 Capital Improvement Program Financing Plan

Annual expenditures for the CIP are anticipated to be met from a combination of available funds on hand, interest earnings, connection fee revenues, and transfers from the Surplus Fund as shown in Table 4-3. It is important to note that the annual amount funded is equal to 50 percent of the prior year’s CIP and 50 percent of the current year’s CIP. This is to estimate the actual amount that will be spent each year. Connection fee revenue is anticipated to remain at 2016 levels throughout the study period, at \$2,674,000 per year, as shown in Line 2 of Table 4-3. Transfers from the Surplus Fund are the primary source of funding for the capital program and are anticipated to vary in each year of the study period as shown in Line 3 of Table 4-3, reflecting projected annual encumbrances in each year. Surplus Fund revenues include proceeds from revenue bonds and cash financed capital from the Operating Fund, as well as interest earnings on balances within the Surplus Account, Bond Reserve Fund and Replacement and Improvement Account. Interest on the average balance within Fund 704 is projected at a rate of one percent annually as indicated on Line 4 of Table 4-3.

Table 4-3 Capital Improvement Financing Plan (Fund 704)

Line No.	Description	Projected					
		2016	2017	2018	2019	2020	2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Source of Funds							
1	Beginning of Year Balance	(4,835)	27,850	29,854	30,486	30,964	31,228
2	Connection Fees	2,674	2,674	2,674	2,674	2,674	2,674
3	Transfer from / (to) Surplus Account	150,000	70,000	195,000	110,000	115,000	125,000
4	Interest Income	115	287	300	306	309	312
5	Total Source of Funds	147,953	100,811	227,829	143,466	148,948	159,213
Application of Funds							
6	Major Capital Improvements	120,103	70,957	197,343	112,502	117,720	127,812
7	Total Use of Funds	120,103	70,957	197,343	112,502	117,720	127,812
8	End of Year Balance	27,850	29,854	30,486	30,964	31,228	31,401

The application of funds summarized in Line 6 of Table 4-3 indicates the estimated total annual encumbrances, not including projects funded by OWDA/WPCLF loans, and represents the total amount required to be funded from revenue bonds and other cash sources. Because the cost of projects funded by low interest loans are reimbursed directly by loan programs at the time expenses are incurred, both the loan proceeds and associated capital costs are excluded from the determination of capital funding needs.

As previously discussed, Surplus Fund revenues are comprised of revenue bond proceeds, interest income, transfers from the Bond Reserve Account as allowed by the Bond Indenture, and transfers from the Operating Fund, as outlines in the Bond Indenture. Table 4-4 summarizes the sources of funding within the Surplus Fund, as well as the indicated transfer to the Construction Account (Fund 704). The actual Surplus Fund balance will vary substantially throughout the year based upon the need for transfers to the Construction Account. In addition, the County has historically cash financed the capital program, and issued debt on a recurring basis based on eligible projects completed in the preceding 18 month period (“Reimbursement financing”). In order to continue utilizing “Reimbursement Financing” and provide for flexibility concerning the timing of revenue bond issuances, the District has historically targeted a minimum beginning of year balance of \$215-220 million for the Surplus Fund to ensure adequate funding for the CIP. As a result of project and funding timing, 2016 balance reflects a \$215.3 million balance followed by a \$206.7 million in 2017(unencumbered). The fluctuation in the balance throughout the year and from year to year are both examples of the need to maintain a large beginning balance each year.

Table 4-4 Surplus Fund

Line No.	Description	Projected					
		2016	2017	2018	2019	2020	2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Sources and Uses of Funds							
1	Beginning of Year Balance	269,438	185,155	302,170	259,065	246,144	237,565
2	Revenue Bond Proceeds	0	137,857	91,905	0	27,571	45,952
3	Interest Income	2,220	2,896	2,681	2,447	2,331	2,291
4	Transfer from / (to) Bond Reserve Account	(16,161)	842	932	18,732	799	1,250
5	Transfer from / (to) Operating Account	79,658	45,419	56,378	75,900	75,719	79,892
6	Transfer to Contingency Fund	0	0	0	0	0	0
7	Transfer to Construction Account	(150,000)	(70,000)	(195,000)	(110,000)	(115,000)	(125,000)
8	End of Year Balance	185,155	302,170	259,065	246,144	237,565	241,950

4.2.2 Debt Service Requirements

A summary of the District’s existing and proposed debt service requirements is shown in Table 4-5. Existing debt service requirements are related to the 2006A, 2007A, 2009A, 2009B, 2010A, 2010B, 2013A, 2013B, 2014A, and 2015A Series revenue bonds; separate Ohio Water Development Authority (OWDA) contract loans, and a capital lease for the Wastewater Engineering Building.

Debt service requirements on the proposed revenue bond issues required during the study period are based upon equal annual principal and interest payments over a period of 25 years at an estimated net effective interest rate of 5.0 percent. Bonds are assumed to be issued on July 1 of each year 2017 through 2021.

As shown in Table 4-5, \$330 million in revenue bonds and \$345 million in low interest loans are projected over the planning period. Debt service payments on low interest loans are assumed to begin two years after issuance.

Table 4-5 Existing and Projected Long-Term Debt Service

Line No.	Description	Issue Amount \$1,000	Projected					
			2016	2017	2018	2019	2020	2021
1	Existing Revenue Bonds		77,952	78,500	60,734	60,735	60,274	60,313
	Proposed Revenue Bonds							
2	2016 Series	0	0	0	0	0	0	0
3	2017 Series	150,000		7,982	10,643	10,643	10,643	10,643
4	2018 Series	100,000			2,956	7,095	7,095	7,095
5	2019 Series	0				0	0	0
6	2020 Series	30,000					887	2,129
7	2021 Series	50,000						1,478
8	Total Revenue Bonds	330,000	77,952	86,482	74,334	78,473	78,899	81,658
9	Existing Other Debt (a)		30,568	31,315	31,182	30,096	23,084	23,021
	Proposed Other Debt (a)							
10	2016 Series	55,708	0	0	226	2,709	2,709	2,709
11	2017 Series	189,500		0	0	1,061	12,737	12,737
12	2018 Series	25,000			0	0	140	1,680
13	2019 Series	25,000				0	0	140
14	2020 Series	25,000					0	0
15	2021 Series	25,000						0
16	Total Other Debt	345,208	30,568	31,315	31,408	33,866	38,670	40,288
17	Total Debt Service		108,519	117,797	105,742	112,340	117,569	121,946

(a) Includes OWDA, OPWC, WPCLF bonds, and Note Proceeds.

4.3 REVENUE REQUIREMENT LEVELS

There are three approaches to establishing utility revenue requirements. The first approach identifies the cash requirements of utilities – operation and maintenance expense, principal and interest to satisfy debt service requirements of bonds or loan programs, capital improvements funded from revenues, and deposits to reserve funds. The second addresses the utilities’ financial statements. Operation and maintenance expenses and bond or loan generated debt service interest are the same as in the cash approach. However, the financial statements recognize depreciation of existing assets instead of actual cash spent on capital related items. The third approach addresses covenants that the utilities have made to bond holders, financing agents, or mandated policies in regards to minimum reserve balances. The financial plan presented herein was developed to satisfy annual revenue requirements based on the cash needs of the utility and to sustain appropriate fund balances and coverage requirements.

The pro forma operation statement or cash flow analysis presented in Table 4-6 provides a basis for evaluation of the adequacy of revenues under existing rates to meet the projected revenue requirements of the District for the period 2016 through 2021. Revenue under existing rates, as shown in Line 2, reflect calculated revenue under rates effective January 9, 2015. The indicated increased revenue levels shown on Lines 3 through 7 of Table 4-6 are based on the effective dates and magnitude of required revenue adjustments considered necessary to meet the revenue requirement obligations of the District as well as required revenue bond coverage provisions. The effective amount of increased revenues shown during the first year of each annual rate adjustment includes an allowance for the effect of bill proration and billing lag on revenues to be received.

Total revenue requirements are summarized on Line 22 of Table 4-6. The ending balance/deficit available shown on Line 23 is the projected Operating Reserve end-of-year cash balance from the annual operation of the Utility. Operating reserve requirements are listed on Line 25 and are needed to maintain the mandated two month's expenditures requirement in the Operating Fund. Funds in excess of this requirement are assumed to be transferred to the Surplus Fund, as shown in Line 21.

Presented at the bottom of Table 4-6 is an analysis of the District's ability to provide adequate debt service coverage on revenue bonds and total debt service obligations. The District's current revenue bond rate covenant requires that system net revenues (total revenue less operation and maintenance expense) be sufficient to provide at least 125 percent coverage of the annual revenue bond debt service requirements due each year, and 110 percent coverage of total debt service obligations. The revenue increases projected in this study reflect the level of funding necessary to recover all annual expenditures and maintain revenue bond debt coverage at the District's stated policy level of 150 percent or higher. While the existing revenue bond rate covenant requires a minimum of 125 percent for revenue bond debt coverage, the current District policy is for bond debt coverage to be equal to or greater than 150 percent, and is established to help maintain stability of the District's financial condition while implementing the anticipated size of the final Wet Weather Improvement Program. It is important to note that the projected adjustments include the District's projected capital needs to address on-going system replacement and completion of Phase 1 of the Long Term Control Plan. It also includes assumptions related to annual capital expenditures for Phase 2 of the Long Term Control Plan beginning in 2019. As the District and County continue to develop the requirements, and associated costs, of the Long-Term Control Plan, the evaluation of revenue needs should continue to be evaluated to understand the impact of changes on future revenue.

As shown in Table 4-6, debt service coverage remains above District policy in all years of the study period. While it may appear that projected revenue increases could be reduced and still meet policy levels for debt service coverage, it should be noted that the District continues to plan for how to best complete the Long Term Control Plan, with significant capital obligations (estimated at \$2.015 billion in 2006\$ for years 2019 and beyond). This will require future revenue increases and increased debt. At the same time, annual debt service paid through District rates is currently approximately 36 percent of total revenues. As new debt is issued to fund the capital program, it is expected that the District's debt obligation will grow, and depending on the total length of the WWIP schedule, it could grow substantially. It is important, therefore, for the District's financial condition to remain strong to avoid significant future revenue increases and a potentially untenable debt load.

Table 4-6 Estimated Revenues and Revenue Requirements under Increased Rates ^(a)

Line No.	Description	Projected					
		2016	2017	2018	2019	2020	2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Revenues:							
1	Revenue from Rates:						
2	Revenue from Existing Rates	273,171	272,320	271,692	271,278	271,073	271,073
	Increased Revenue						
3	1/1/17 - 4.25%		10,609	11,547	11,529	11,521	11,521
4	1/1/18 - 4.25%			11,034	12,019	12,010	12,010
5	1/1/19 - 4.25%				11,486	12,521	12,521
6	1/1/20 - 4.25%					11,965	13,053
7	1/1/21 - 4.25%						12,474
6	Total Revenue from Rates	273,171	282,929	294,273	306,312	319,089	332,650
8	Other Operating Revenues	4,783	4,783	4,783	4,783	4,783	4,783
9	Pretreatment Monitoring	401	401	401	401	401	401
10	Non Operating Revenues	4,828	4,756	4,875	4,938	4,924	4,936
11	Total Operating Revenues	283,184	292,869	304,332	316,434	329,197	342,771
Revenue Requirements:							
12	O&M Expenses	109,545	114,412	118,462	123,846	127,421	131,195
13	Debt Service Requirements						
14	Existing Revenue Bonds	77,952	78,500	60,734	60,735	60,274	60,313
15	Proposed Revenue Bonds	0	7,982	13,599	17,738	18,625	21,345
16	Total Revenue Bonds	77,952	86,482	74,334	78,473	78,899	81,658
17	Other Existing Debt Obligations	30,568	31,315	31,182	30,096	23,084	23,021
18	Other New Debt Obligations	0	0	226	3,770	15,586	17,267
19	Total Debt Service	108,519	117,797	105,742	112,340	117,569	121,946
20	Annual Equipment Purchases	3,414	3,482	3,562	3,644	3,728	3,813
21	Transfer to Surplus Account	79,658	45,419	56,378	75,900	75,719	79,892
22	Total Revenue Requirements	301,137	281,110	284,144	315,730	324,437	336,846
23	Annual Net Balance	(17,953)	11,759	20,188	704	4,760	5,925
24	Cumulative Annual Balance	63,427	75,186	95,373	96,077	100,838	106,762
25	Minimum Required Operating Balance	18,007	18,807	19,473	20,358	20,946	21,566
Debt Service Coverage:							
26	Net Revenue from Operations	173,638	178,457	185,870	192,588	201,776	211,576
27	Transfer to Surplus Account (b)	0	0	0	0	0	0
28	Connection Fee Revenue	2,674	2,674	2,674	2,674	2,674	2,674
29	Other Interest Income (c)	2,840	3,738	3,613	3,414	3,131	3,119
30	Revenue Available for Coverage	179,153	184,869	192,156	198,676	207,581	217,368
Debt Service Coverage for:							
31	Revenue Bonds	230%	214%	259%	253%	263%	266%
32	Minimum Required	125%	125%	125%	125%	125%	125%
33	MSD Policy	150%	150%	150%	150%	150%	150%
34	Total Debt Service	165%	157%	182%	177%	177%	178%
35	Minimum Required	110%	110%	110%	110%	110%	110%
36	MSD Policy	130%	130%	130%	130%	130%	130%

- (a) Beginning of year account balances at December 2014 represent unencumbered funds available to meet ongoing obligations of the sewer system.
- (b) Equal to one-half of calculated transfer to Surplus Fund, based on current year revenues and expenses. Assumes approval of change to Trust Indenture to eliminate the inclusion of one-half of the calculated transfer to the Surplus Fund in the calculation of debt service coverage.
- (c) Includes interest earnings on cash invested in the Bond Reserve and Surplus Fund accounts.

As shown in Figure 4-1, operation and maintenance expenses and debt service requirements average approximately 76 percent of the District’s total revenue requirements over the planning period. Other requirements include annual equipment purchases and generation of sufficient amounts of net revenues to meet required revenue bond coverage provisions, which is used to provide cash financing of capital improvements.

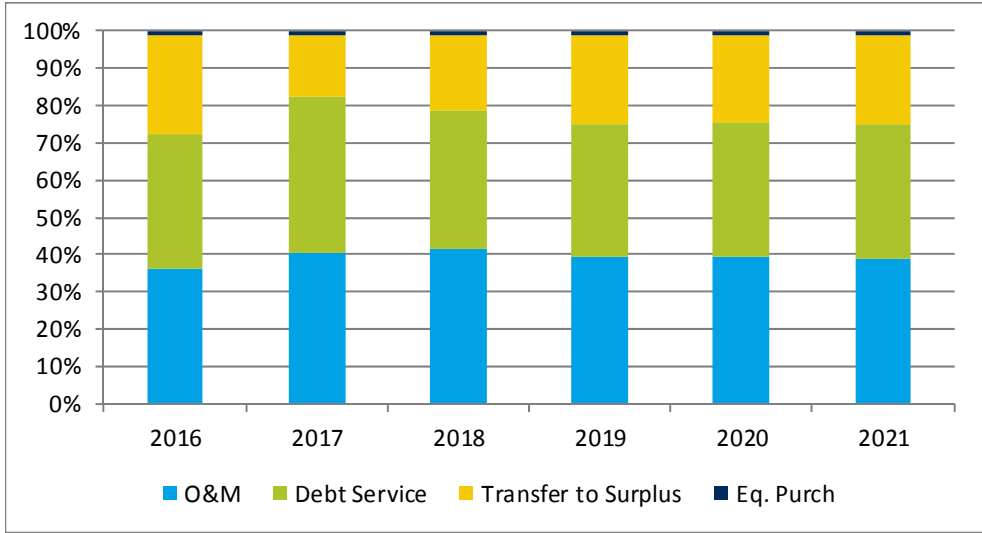


Figure 4-1 Breakdown of Annual Revenue Requirements

Over the planning period, the total revenue requirements of the District are expected to increase, primarily due to the implementation of the capital program. As shown in Figure 4-2, operation and maintenance expenses are projected to increase due to inflation and the impact of the capital program on operations, and debt service costs and funds transferred to the Surplus Fund (to be used for capital funding) are expected to also increase over the study period.

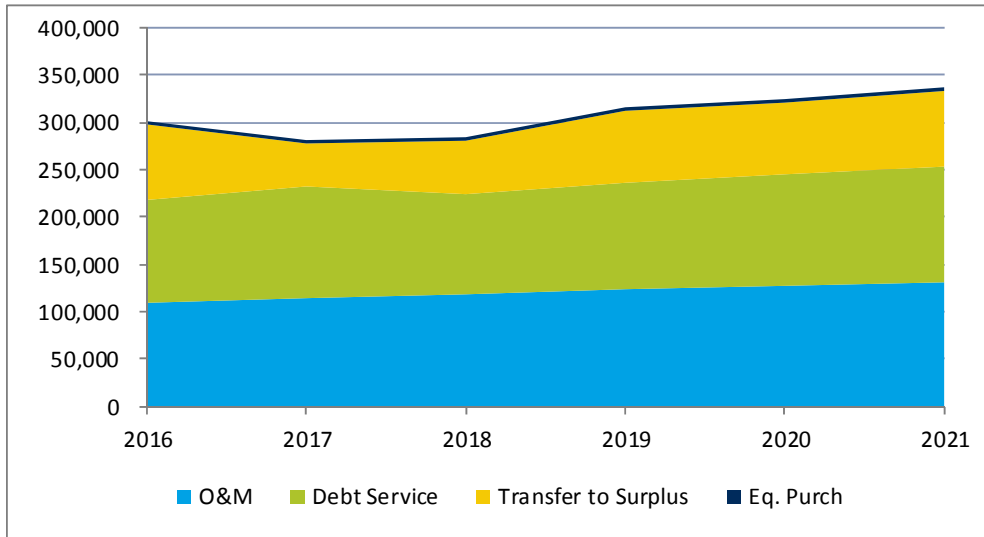


Figure 4-2 Summary of Annual Revenue Requirements

5 Cost of Service Allocation

The revenue requirements to be derived from rates and charges for wastewater service are synonymous with the definition of the cost of service. In developing equitable rate structures, revenue requirements are allocable to the various customer classifications according to the service rendered. Allocations of these requirements to customer classes should take into account the quantity of wastewater contributed, peak rates of wastewater flow, strength of wastewater, number of customers, and other relevant factors. Cost of service considerations must also recognize EPA rules and regulations required under the Federal Clean Water Act, as amended, relating to “user charges” as subsequently discussed.

EPA user charge requirements mandated under the Federal Clean Water Act, which the District must comply with, cover only the O&M expense portion, including replacements, of the total costs. These costs are often referred to as OM&R. The O&M expenses, shown on Line 10, Column 1 of Table 5-1, represent the net expense of the District to be met from user charges and include a portion of the cost burden associated with equipment replacements needed to maintain the expected service life of individual property units as defined by EPA. While the District has established accounting procedures to separately identify equipment replacements once incurred, the District’s budgetary system for forecasting expenditures does not specifically identify equipment replacement costs separately. The total of the net O&M expense amount of \$107,747,000 comprise the total OM&R cost element considered subject to EPA user charge requirements as used in these cost analyses and shown in subsequent tables.

Capital costs consist of debt service on existing and proposed bonds, and additional funding related to capital improvement program requirements. The total annual capital costs for 2016, to be recovered through wastewater charges as shown in column 2 of Table 5-1, is estimated to be \$176,147,000.

The total cost of service to be met from wastewater charges is estimated to be \$283,893,000 as shown on Line 11, Column 3 of Table 5-1.

Table 5-1 Cost of Service to be Recovered from Rates - Test Year 2017

Line No.	Description	O&M Expense \$1,000	Capital Costs \$1,000	Total \$1,000
Revenue Requirements:				
1	Operation and Maintenance Expense	114,412		114,412
2	User Charge Replacements			0
3	Debt Service Requirements		117,797	117,797
4	Capital Outlay (a)		3,482	3,482
4	Total	114,412	121,279	235,691
Less Other Revenue Sources:				
5	Surplus Fund Transfer and Change in Operating Balance		57,178	57,178
6	Other Operating Revenue	(4,783)		(4,783)
7	Pretreatment Monitoring	(401)		(401)
8	Nonoperating Revenue	(1,858)	(2,898)	(4,756)
9	Annualized Revenue Adjustments (b)	377	588	965
10	Total	(6,665)	54,868	48,203
11	Total Cost of Service	107,747	176,147	283,893

- (a) Revenue financed capital outlay has been reduced by an amount necessary to fund indicated user charge replacements as required under federal rules and regulations of the Clean Water Act.
- (b) Represents effect of partial year rate adjustment and billing lag following an increase in revenues.

5.1 FUNCTIONAL COST COMPONENTS

In developing an equitable rate structure, revenue requirements are allocated to the various customer classifications according to the cost of service rendered. Customers are classified to reflect groups of customers with similar service requirements who can be served at similar cost. Each class represents a particular type of service requirement or load on the System in terms of customer related infiltration/inflow (I/I), volume related I/I, flow, BOD strength, SS strength, TKN strength, and number of customers served.

As a basis for allocating costs of service among customer classes, costs are first allocated to functional cost components, then allocated to cost categories, and subsequently distributed to customer classes. In this study there are five primary cost components: (1) flow, or volume costs, (2) capacity costs, (3) wastewater strength costs, (4) customer costs, and (5) directly assigned costs.

Volume costs are those which vary directly with the quantity of wastewater contributed and include capital costs related to investment in system facilities which are sized on the basis of wastewater volume, O&M expense related to those facilities, and the expense of volume related treatment chemicals and electric power associated with the volume of wastewater treated.

Capacity related costs include capital costs related to investment in system facilities which are sized on the basis of maximum rates of wastewater flow and the operation and maintenance expense related to those facilities.

Wastewater strength costs consist of the operation and maintenance expense and capital costs related to system facilities which are designed principally on the basis of the quantity of pollutants in the wastewater. Strength costs are further separated into components varying with SS, BOD, and TKN loadings.

Customer costs are those costs which tend to vary in proportion to the number of customers served. These include customer related billing and collection expense.

Pretreatment costs are those costs required for the administration, monitoring, and enforcement of the District's industrial waste monitoring and pretreatment program. These costs vary in proportion to the number of businesses and industries subject to categorical pretreatment standards, and to the degree in which these businesses must be monitored to insure compliance with wastewater discharge requirements. These costs are directly assigned to those customers that incur the cost.

5.2 ALLOCATION TO COST COMPONENTS

Each element of cost is allocated to functional cost components on the basis of the parameter or parameters having the most significant influence on the magnitude of that element of cost. O&M expense items are allocated directly to appropriate cost components, while the allocation of capital and replacement costs is based upon a detailed allocation of related capital investment. The separation of costs into functional components provides a means for distributing such costs to the various classes of customers on the basis of their respective responsibilities for each particular type of service.

In the allocation of O&M expense and investment, costs are allocated directly to cost components to the extent possible. General and administrative cost elements are then allocated on the basis of the allocation of other costs to which they are most nearly related.

5.2.1 Plant Investment, Replacement, and Capital Costs

The estimated test year plant investment in wastewater facilities consists of plant in service as of December 31, 2015, construction work in progress, and the estimated cost of capital improvements through 2015. Allocation of the existing and planned investment in wastewater facilities to functional cost components is shown in Table 5-2.

Table 5-2 Allocation of Plant Investment to Functional Cost Components – Test Year 2017

Line No.	Description	Total	Volume	Capacity	Wastewater Strength			Sewer Backup & Watershed Ops
					SS	BOD	TKN	
		\$	\$	\$	\$	\$	\$	\$
Plant in Service:								
1	Major Treatment							
2	Preliminary Treatment	16,843,166	0	16,843,166	0	0	0	0
3	Primary Sedimentation	7,201,304	7,201,304	0	0	0	0	0
4	Pumping	7,117,213	0	7,117,213	0	0	0	0
5	Power	1,141,017	1,141,017	0	0	0	0	0
6	Aeration Basins	9,898,654	4,949,327	0	0	4,652,367	296,960	0
7	Aeration Equipment	5,765,563	0	0	0	5,189,007	576,556	0
8	Secondary Sedimentation	18,232,515	18,232,515	0	0	0	0	0
9	Chlorination/Disinfection	18,756,790	18,756,790	0	0	0	0	0
10	Sludge Handling/Treatment	37,118,913	0	0	18,559,457	17,445,889	1,113,567	0
11	Sludge Dewatering/Disposal	116,881,076	0	0	58,440,538	54,934,106	3,506,432	0
12	Outfall	5,349,422	0	5,349,422	0	0	0	0
13	General Treatment	62,593,802	12,801,486	7,474,871	19,855,075	21,059,037	1,403,334	0
14	Total Major Plant	306,899,435	63,082,439	36,784,673	96,855,069	103,280,405	6,896,849	0
15	Minor Treatment Plants	35,999,161	7,531,283	4,397,565	11,681,003	12,389,310	0	0
16	Laboratory	5,745,723	1,175,097	686,147	1,822,573	1,933,089	128,817	0
17	Collection System	642,479,546	0	642,479,546	0	0	0	0
18	Pumping & Lift Stations	33,383,590	0	33,383,590	0	0	0	0
19	General & Administrative	79,358,922	5,681,634	53,626,547	8,812,201	9,346,551	556,539	1,335,450
20	Sewer Backup & Watershed Ops	16,583,034	0	0	0	0	0	16,583,034
21	Total Plant in Service	1,120,449,411	77,470,453	771,358,068	119,170,846	126,949,355	7,582,205	17,918,483
Less								
22	Grants	(5,318,952)	(1,238,181)	(1,487,313)	(934,770)	(1,543,741)	(114,946)	(335)
23	Sewer Backup & Watershed Ops	(16,583,034)	0	(50,346,491)	0	0	0	0
25	Total Net Investment	1,098,547,425	76,232,272	719,524,263	118,236,076	125,405,614	7,467,259	17,918,149
26	CWIP (Work in Progress)	410,368,683	79,843,578	292,929,913	15,480,177	20,220,379	1,540,506	354,130
27	Net Investment Plus CWIP	1,475,152,316	156,075,851	1,012,454,176	133,716,253	145,625,992	9,007,765	18,272,279

The investment in existing plant and capital additions is allocated to cost components on a design or cost causative basis recognizing the principal function governing the design of the facility. For example, raw wastewater pumping and preliminary treatment facilities are basically designed to meet peak hydraulic flow requirements and are allocated to the capacity cost function. Primary and secondary clarifiers, aeration and chlorination basins, are designed in relation to the volume of wastewater flow and detention time and are allocated to the volume cost component. Equipment for aeration facilities are generally designed in accordance with the BOD and TKN strength loadings. Since the sludge which is removed from the wastewater in the treatment process results from the reduction of suspended solids, BOD, and TKN concentrations, the costs associated with sludge handling and disposal facilities are allocated proportionately between the strength cost components.

The investment for general elements of the treatment plant, such as garage and shop facilities, is included in treatment general plant and is allocated in relation to total treatment plant investment in other facilities. The allocation of major treatment plant investment to functional cost components, as shown on Line 14 of Table 5-2 is the sum of the respective allocations of the investment for each individual major treatment plant facility using the methods discussed above.

The investment in other treatment facilities, representing several package and smaller treatment plants, is allocated to cost components based upon estimated functional requirements of the major plants. Collection system facilities including pump and lift stations are basically designed to meet peak hydraulic flow requirements; therefore, the investment in these facilities is allocated entirely to the capacity related cost component. The investment in general plant facilities, including vehicles, furniture, and miscellaneous equipment not directly allocable to a specific cost function, is allocated in relation to the total investment in other system facilities.

The resulting allocation of total net investment shown on Line 27 of Table 5-2 is the basis for recovery of the test year 2017 capital cost of \$176,147,000.

5.3 ALLOCATION OF OPERATION AND MAINTENANCE EXPENSE

Projected operation and maintenance expense for the test year is allocated to cost components in generally the same manner as plant investment. The results of the allocation are shown in Table 5-3.

Treatment plant O&M expenses; excluding electric power, natural gas, and chemical costs, are allocated to the volume, capacity, SS, BOD, TKN, surcharge, and pretreatment related cost components based upon the estimated operating expense associated with each function. Electric power expense for raw wastewater pumping and preliminary treatment, and the cost of chemicals are allocated to the volume component. Costs for sludge handling and disposal are allocated to SS, BOD, and TKN components reflecting the functions for which these costs were incurred. Operation supervision, equipment maintenance, and laboratory expense are allocated on the basis of other allocated treatment operation and maintenance expense less power and chemical costs.

Expenses for the maintenance and repair of the wastewater collection system are allocated to the capacity cost function. Capital projects and engineering related expenses are allocated on the basis of the projected investment in total capital additions. Expenses associated with the industrial waste activities for the laboratory, extra strength surcharge, pretreatment monitoring and surveillance, and septic tank disposal are allocated to cost components in direct proportion to the estimated expense associated with each. Billing and collection expense is allocated to the customer related cost function. General expenses related to Administration and the Director's Office are allocated among cost components in proportion to the total of all other expense, less power, natural gas, and chemical costs.

The total 2017 O&M expense is projected to be \$114,412,000, as shown on Line 23 of Table 5-3.

5.4 SUMMARY OF ALLOCATION TO FUNCTIONAL COST COMPONENTS

Table 5-4 presents a summary of the test year cost of service consisting of the previous allocation of operating expense, replacement, and capital costs to functional cost components.

Table 5-3 Allocation of Operation and Maintenance Expense to Functional Cost Components - Test Year 2017

Line No.	Description	Wastewater Strength										Sewer Backup & Watershed Ops		
		Total	Volume	Capacity	SS	BOD	TKN	Cust./Bill.	Surcharge	Pretreatment	Watershed Ops			
Wastewater Treatment:														
1	Office of the Director - 410	7,656,779	878,123	2,830,543	815,526	982,469	159,201	476,649	94,455	220,395	1,199,419			
2	Wastewater Engineering - 420	3,209,414	233,034	2,180,706	353,050	374,313	22,699	0	0	0	45,612			
3	Project Delivery - 421	5,821,947	452,497	3,934,039	636,909	675,268	40,950	0	0	0	82,285			
4	Wastewater Administration - 430	10,356,160	577,847	1,862,632	536,655	646,511	104,762	5,631,293	62,156	145,030	789,275			
5	Information Technology - 431	7,141,687	819,049	2,640,125	760,663	916,375	148,491	444,583	88,101	205,568	1,118,731			
6	Wastewater Treatment - 441	1,080,112	278,003	261,221	237,407	277,069	26,413	0	0	0	0			
7	Wastewater Treatment - 442 (Mill Creek)	20,353,890	4,954,091	2,320,043	5,377,257	6,816,693	885,806	0	0	0	0			
8	Wastewater Treatment - 443 (Little Miami)	7,164,654	1,827,607	1,097,456	1,686,919	2,254,393	298,279	0	0	0	0			
9	Wastewater Treatment - 444 (Muddy Creek)	4,086,451	1,598,654	1,242,588	412,099	833,110	0	0	0	0	0			
10	Wastewater Treatment - 445 (Sycamore)	2,513,995	842,276	743,871	299,639	628,208	0	0	0	0	0			
11	Wastewater Treatment - 446 (Colerain/Taylor Creek)	1,968,993	594,101	576,522	166,797	631,573	0	0	0	0	0			
12	Wastewater Treatment - 447 (Polk Run)	1,718,384	567,498	535,758	157,085	458,043	0	0	0	0	0			
13	MSD Pump Stations - 448	1,400,872	0	1,400,872	0	0	0	0	0	0	0			
14	Wastewater Treatment - 449 (Equipment Main.)	7,821,388	2,052,542	1,878,723	1,707,451	1,992,707	189,964	0	0	0	0			
15	Wastewater Collection - 450	20,863,429	121,948	20,741,481	0	0	0	0	0	0	0			
16	Industrial Waste - 460	7,605,259	931,398	0	878,140	1,405,023	878,140	0	1,053,768	2,458,791	0			
17	Sewer Backup & Watershed Operations - 470 & 480	13,335,460	0	0	0	0	0	0	0	0	13,335,460			
18	Total O&M Expense	124,098,877	16,728,669	44,246,581	14,025,595	18,891,756	2,754,706	6,552,525	1,298,479	3,029,785	16,570,782			
19	Plus: Incremental O&M Expenses	0	0	0	0	0	0	0	0	0	0			
20	Less: Office Equipment & Motorized Vehicles	(3,481,936)	(399,328)	(1,287,195)	(370,862)	(446,780)	(72,397)	(216,757)	(42,954)	(100,225)	(545,438)			
21	Less: Force Accounts	0	0	0	0	0	0	0	0	0	0			
22	Less: Projected Encumbrance Cancellation	(6,204,944)	(840,037)	(2,209,976)	(702,446)	(948,872)	(137,987)	(325,933)	(64,588)	(150,706)	(824,398)			
23	Total Net O&M Expenditures	114,411,997	15,489,304	40,749,409	12,952,288	17,496,104	2,544,321	6,009,834	1,190,937	2,778,853	15,200,946			

Table 5-4 Summary of Allocation to Functional Cost Components – Test Year 2017

Line No.	Cost Component	Operating Expense	Capital Costs	Total Cost of Service
		\$	\$	\$
1	Volume Related Cost	14,641,246	18,636,876	33,278,122
2	Capacity Related Cost	38,518,329	120,896,235	159,414,564
3	Strength Related Cost			
4	Suspended Solids	12,243,134	15,966,936	28,210,071
5	BOD	16,538,171	17,389,068	33,927,239
6	TKN	2,405,017	1,075,609	3,480,626
7	Customer Cost	5,680,788	0	5,680,788
	Industrial Monitoring & Surveillance			
8	Surcharge	1,125,732	0	1,125,732
9	Pretreatment	2,225,707	0	2,225,707
10	Sewer Backup & Watershed Operations	14,368,675	2,181,876	16,550,552
11	Total Cost of Service	107,746,800	176,146,600	283,893,400

5.5 DISTRIBUTION OF COSTS TO CUSTOMER CLASSES

The total cost responsibility of each class of service may be established by developing unit costs of service for each cost function and assigning those costs to the customer classes based on the respective service requirements of each class.

5.5.1 Customer Classifications

Wastewater customers have been separated into several principal categories including residential, commercial, industrial, multifamily, surcharge, septic tank disposal, and sewer-in-basement. Each class represents a particular type of service requirement or load on the system in terms of wastewater volume, capacity, strength, number of customers served, and direct cost responsibility. The individual customers are billed on either a quarterly or monthly billing period.

As previously discussed, residential, multi-family, commercial and industrial customer classification is based upon information provided in GCWW billing data. The surcharge category represents customers billed for excess strength waste discharges to the wastewater system. The septic tank disposal category represents customers billed per thousand gallons for excess strength waste related to septic haulers that dispose of waste at a receiving station at the wastewater treatment plant.

5.5.2 Units of Service

The determination of customer class responsibility for costs of service requires that each general customer class be allocated a portion of the volume, capacity, strength, and customer costs of service according to its respective service requirements, and that all costs directly associated with a specific customer class be allocated to that class.

Volume related costs vary with and are allocated on the basis of the volume of wastewater conveyed and treated by the wastewater system. Capacity related costs are those associated with providing maximum capacity for the conveyance of wastewater, and are distributed to customer classes on the

basis of estimated maximum rates of wastewater flow. Strength costs are related to the function of reducing wastewater SS, BOD, and TKN concentrations and are allocated to customer classes in proportion to respective strength loadings. Customer costs, which consist of billing and collection costs, are allocated on the basis of the number of customer equivalent bills.

The estimated test year service requirements or units of service for the various customer classes are shown in Table 5-5. Estimates of annual wastewater volume and number of bills are based on projections of the number of wastewater customers and their corresponding water use, adjusted to exclude exempted water used but not discharged to the wastewater system. Historical data and information regarding wastewater customers and water use were provided from utility records. An analysis of wastewater bills rendered during a recent period was used as a basis for estimating the wastewater volume of each customer class during the test year.

Wastewater collected and treated by the District consists of two elements: (1) contributed sanitary wastewater flow, and (2) infiltration/ inflow (I/I) of ground water and stormwater runoff into the sewers. Contributed wastewater flow is that portion of the annual water use or other discharge of each customer class which enters the sanitary wastewater system. Estimates of the contributed volume of each class is generally based upon wastewater billing records that exclude estimated water use not reaching the wastewater system, such as that used for lawn sprinkling and car washing or included in manufactured products.

Table 5-5 Estimated Units of Service – Test Year 2017

Line No.	Description	Residential	Commercial	Industrial	Multi Family	Surcharge	Septic Tank Disposal	Sewer Backup & Watershed Ops	Total
1	Wastewater Volume - 1,000 Ccf								
2	Contributed Wastewater Volume	11,578	7,180	5,870	6,672				31,301
3	Infiltration/Inflow	30,109	10,623	4,485	10,421				55,638
4	Total	41,687	17,804	10,355	17,093				86,939
5	Wastewater Capacity Flow Rate - Ccf/day								
6	Contributed Wastewater Volume	47,582	29,508	24,123	27,420				128,633
7	Infiltration/Inflow	247,466	87,315	36,859	85,654				457,294
8	Total	295,048	116,823	60,982	113,074				585,927
	Wastewater Strength - 1,000 pounds								
9	Suspended Solids	38,294	18,726	12,690	17,744	4,106	6,254		97,814
10	BOD	21,097	11,325	8,343	10,643	23,405	4,243		79,056
11	TKN	2,961	1,335	828	1,275	1,096	388		7,883
	Customer Billing Units								
12	Equivalent Bills	784,860	63,080	4,360	88,660	1,104			942,064
13	Sewer Backup & Watershed Operations							332,310	332,310

Ccf - Hundred cubic feet
Ccf/day - Hundred cubic feet per day

Based on an evaluation of historical plant loading data, it is estimated that the amount of flow entering the sewers through I/I will average 65 percent of the total wastewater flow reaching the treatment plants. Each customer class should bear its proportionate share of the costs associated with I/I as the wastewater system must be adequate to convey and process the total flow. Recognizing that the major cost responsibility for I/I is allocable on an individual connection basis, three-fourths of the I/I volume is allocated to customer classes based on estimated customer equivalent connections with the remaining one-fourth allocated on the basis of contributed volume.

The responsibility for collection system capacity cost varies with the estimated peak flow rates of contributed wastewater and infiltration attributable to each customer class. Infiltration/inflow is estimated to comprise 75 percent of the total peak flow.

The SS, BOD, and TKN responsibility of each customer class is based on estimated average domestic strength concentrations and contributed wastewater volume for each class. Average SS, BOD, and TKN concentrations of contributed domestic sewage are estimated to be 270 mg/l, 201 mg/l, and 15 mg/l, respectively. Average SS, BOD, and TKN concentrations of septic tank disposal are estimated to be 20,913 mg/l, 14,190 mg/l, and 1,296 mg/l, respectively. An average I/I strength allowance of 100 mg/l, 35 mg/l and 10 mg/l for SS, BOD and TKN respectively was also used to balance total wastewater loadings contributed by normal and excess strength users with the total wastewater loadings received at the treatment plants.

Suspended solids, BOD, and TKN strengths in excess of normal domestic limits are assigned to a surcharge classification, and are shown separately in Table 5-5. The estimates of excess strength quantities for surcharge customers are based on extra strength data provided by historical surcharge billings of the District.

The annual number of equivalent bills applicable to each class of wastewater service is based upon the respective number of bills rendered and estimated ratios of average billing and collection costs of various sized meters to that of a 5/8 inch meter.

5.6 COST OF SERVICE ALLOCATIONS

The costs of service are distributed to the various customer classes by applying the unit costs of service to respective service requirements. The test year unit cost of service for each functional cost component is based on the total cost divided by the applicable units of service as shown in Table 5-6. The total unit costs of service applied to the respective requirements for each customer class results in the total cost of service for each customer class.

5.7 ADEQUACY OF EXISTING RATES TO MEET COST OF SERVICE

Presented in Table 5-7 is a comparison of the allocated cost of service and revenue under existing rates by individual customer class and for the system in total.

The indicated revenue increase required over existing rates for each domestic user class (residential, commercial, industrial and multifamily) indicates where emphasis should be directed in the subsequent rate design of sewer service charges. Pretreatment related fees will need to be modified to recover the total costs of the District's industrial pretreatment program.

The \$11,574,000, or 4.25 percent, overall increase in the level of wastewater service revenues is considered necessary to meet the projected revenue requirements for the 2017 test year (includes necessary adjustment to reflect delays in billing due to quarterly billing cycle). This overall level of revenue needs to be produced by the proposed rates developed and presented in subsequent sections of this report.

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Table 5-6 Unit Costs of Service and Customer Class Allocation – Test Year 2017

Line No.	Description	Total \$	Volume \$	Capacity \$	Wastewater Strength			Billing \$	Industrial Monitoring & Surveillance \$	Sewer Backup & Watershed Ops \$
					SS \$	BOD \$	TKN \$			
Cost of Service:										
1	Operation & Maintenance Expense	107,746,800	14,641,246	38,518,329	12,243,134	16,538,171	2,405,017	5,680,788	3,351,439	14,368,675
2	Replacement Costs	0	0	0	0	0	0	0	0	0
3	Subtotal	107,746,800	14,641,246	38,518,329	12,243,134	16,538,171	2,405,017	5,680,788	3,351,439	14,368,675
3	Other Capital Costs	176,146,600	18,636,876	120,896,235	15,966,936	17,389,068	1,075,609	0	0	2,181,876
4	Total Cost of Service	283,893,400	33,278,122	159,414,564	28,210,071	33,927,239	3,480,626	5,680,788	3,351,439	16,550,552
Units of Service:										
5	Total Units		86,938,503 Ccf	585,927 Ccf/day	97,814 1,000 lbs.	79,056 1,000 lbs.	7,883 1,000 lbs.	942,064 Eq. Bills		332,310 Connections
Unit Cost of Service:										
6	Operation & Maintenance Expense		0.1684	65.7391	125.1679	209.1955	305.1027	6.0302		43.24
7	Replacement Costs		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.00
8	Subtotal		0.1684	65.7391	125.1679	209.1955	305.1027	6.0302		43.24
9	Other Capital Costs		0.2144	206.3333	163.2382	219.9587	136.4528	0.0000		6.57
10	Total Unit Cost of Service		0.3828	272.0724	288.4061	429.1542	441.5554	6.0302		49.80
Allocation to Customer Classes:										
Residential										
11	Units of Service		41,686,835	295,048	38,294	21,097	2,961	784,860		
12	OM&R Costs	41,259,455	7,020,448	19,396,198	4,793,178	4,413,398	903,409	4,732,825		
13	Other Capital Costs	81,110,113	8,936,344	60,878,219	6,251,044	4,640,469	404,037	0		
14	Total	122,369,568	15,956,792	80,274,417	11,044,223	9,053,867	1,307,446	4,732,825		
Commercial										
15	Units of Service		17,803,569	116,823	18,726	11,325	1,335	63,080		
16	OM&R Costs	16,178,854	2,998,285	7,679,842	2,343,894	2,369,139	407,312	380,382		
17	Other Capital Costs	33,650,992	3,816,524	24,104,472	3,056,799	2,491,032	182,164	0		
18	Total	49,829,846	6,814,810	31,784,314	5,400,692	4,860,172	589,476	380,382		
Industrial										
19	Units of Service		10,354,738	60,982	12,690	8,343	828	4,360		
20	OM&R Costs	9,365,352	1,743,833	4,008,903	1,588,380	1,745,318	252,625	26,291		
21	Other Capital Costs	18,821,937	2,219,730	12,582,616	2,071,493	1,835,116	112,983	0		
22	Total	28,187,288	3,963,563	16,591,519	3,659,873	3,580,434	365,608	26,291		
Multifamily										
23	Units of Service		17,093,360	113,074	17,744	10,643	1,275	88,660		
24	OM&R Costs	15,683,151	2,878,680	7,433,386	2,220,979	2,226,468	389,006	534,633		
25	Other Capital Costs	32,406,703	3,664,278	23,330,928	2,896,499	2,341,021	173,977	0		
26	Total	48,089,854	6,542,957	30,764,314	5,117,478	4,567,488	562,983	534,633		
Surcharge										
27	Units of Service				4,106	23,405	1,096	1,104		
28	OM&R Costs	6,876,893			513,939	4,896,164	334,401	6,657	1,125,732	
29	Other Capital Costs	5,967,886			670,256	5,148,074	149,556	0		
30	Total	12,844,779			1,184,195	10,044,237	483,957	6,657	1,125,732	
Industrial Pretreatment (a)										
31	Units of Service									
32	OM&R Costs	2,225,707							2,225,707	
33	Other Capital Costs	0								
34	Total	2,225,707							2,225,707	
Septic Tank Disposal										
35	Units of Service				6,254	4,243	388			
36	OM&R Costs	1,788,713			782,764	887,685	118,264			
37	Other Capital Costs	2,007,093			1,020,845	933,356	52,892			
38	Total	3,795,806			1,803,609	1,821,041	171,156			
Sewer Backup & Watershed Operations										
39	Units of Service									332,310
40	OM&R Costs	14,368,675								14,368,675
41	Other Capital Costs	2,181,876								2,181,876
42	Total	16,550,552								16,550,552
43	Total Cost of Service	283,893,400	33,278,122	159,414,564	28,210,071	33,927,239	3,480,626	5,680,788	3,351,439	16,550,552

Ccf - 100 cubic feet
Ccf/day - Hundred cubic feet per day

(a) Industrial Pretreatment is net revenue received for Pretreatment Monitoring (Table 3-5 Line 4).

Table 5-7 Comparison of Allocated Cost of Service with Revenues under Existing Rates - Test Year 2017

Line No.	Cost Component	Revenue Under Existing Rates	Total Cost of Service	Adjusted Cost of Service	Indicated Revenue Increase Required	Indicated Revenue Adjustment
		\$	\$	\$	\$	%
1	Residential	117,555,128	122,369,568	132,202,999	\$ 14,647,871	12.46%
2	Commercial	48,696,048	49,829,846	52,807,798	\$ 4,111,750	8.44%
3	Industrial	31,853,741	28,187,288	28,938,946	\$ (2,914,795)	-9.15%
4	Multifamily	52,230,296	48,089,854	51,077,366	\$ (1,152,931)	-2.21%
5	Surcharge	20,192,310	15,070,486	15,070,486	\$ (5,121,823)	-25.37%
6	Septic Tank Disposal	1,792,280	3,795,806	3,795,806	\$ 2,003,526	111.79%
7	Sewer Backup & Watershed Ops	0	16,550,552	0	0	
8	Total	272,319,802	283,893,400	283,893,400	11,573,598	4.25%

6 Proposed Wastewater Rate Adjustments

The initial consideration in the derivation of rate schedules for utility service is the establishment of equitable charges to the customers commensurate with the cost of providing that service. While the cost of service allocations to customer classes should not be construed as literal or exact determinations, they offer a guide to the necessity for, and the extent of, rate adjustments. Practical considerations sometimes modify rate adjustments by taking into account additional factors such as the extent of change from previous rate levels, existing contracts, and past local policies and practices.

6.1 EXISTING RATES

A summary of the existing sewer rates was presented earlier in Table 3-3 of the Revenue Requirements chapter. The existing schedule of sewerage service charges provides for a monthly or quarterly minimum charge depending on a customer's meter size or number of family unit equivalents and a commodity charge. The minimum charge includes a corresponding usage allowance of either 500 cubic feet per month or 900 cubic feet per quarter. For usage above the minimum allowance a commodity charge is assessed.

For residential customers consisting of one and two family units, the quarterly service charges are applicable to metered water use during the current billing period or a winter quarter billing period, whichever is less. The winter period represents the quarterly billing period most closely corresponding to usage during the months of October through April. All non-residential customers are billed on the basis of actual water used throughout the year with consideration given to either water used but not discharged to the wastewater system, or wastewater contributed from other sources such as wells or other water suppliers.

A sewerage surcharge is levied on customers contributing quantities of high strength wastes to the wastewater system. The existing surcharge is attributable to a customer's strength concentrations of suspended solids, BOD, and TKN in excess of the range of normal strength wastewater. Strength wastewater limits are presently defined by the District Cost of Service Rates as not exceeding 300 mg/l of suspended solids, 240 mg/l of BOD, and 25 mg/l of TKN. The existing sewerage surcharge rates, as shown in Table 4-3, are expressed as unit charges per hundred cubic feet (Ccf) for each mg/l of strength above the normal limits. To the extent that the strength of any pollutant parameter is less than 80 percent of the corresponding value for normal strength wastewater limits contributed by customers and described in the units of service section, a credit is allowed as an offset against surcharges otherwise due.

The existing fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant.

6.2 PROPOSED WASTEWATER RATE ADJUSTMENTS

The overall level of revenue requirements and cost of service allocations described in this report provide information for adjusting wastewater rates. The preceding cost of service allocation sections of the report illustrates the changes needed to recover costs of service from customer classes served

and provide the total level of revenue required. This section presents options for recovering the required revenue from customers.

One of the Hamilton County Rate Affordability Task Force recommendations is a move to monthly billing. Greater Cincinnati Water Works (GCWW), providing billing services to approximately 90 percent of the District’s service area, has recently implemented a new billing system and is in the process of making changes to allow for monthly billing. However, they have indicated that this will occur on or before January 1, 2018, and is not possible to implement as of January 2017. Therefore, rate options for 2017 are based on quarterly billing and the existing rate structure (Options 1 and 2). Rates based on all customers moving to monthly billing have been provided for 2018 rates (Options 3 and 4). In addition, 2018 rates reflect a change to billing multi-family customers solely based on meter size (elimination of “the greater of either the meter size or number of units).

6.2.1 Option 1: 2017 - Cost of Service

Table 6-1 presents a schedule of sewerage service charges, designed using based on the existing rate structure, and reflects rates necessary to recover cost of service by customer class. Table 6-2 presents the schedule of sewerage surcharges, based on cost of service

Table 6-1 Sewerage Service Charges – Option 1 - Test Year 2017

Minimum Charge

The minimum charge shall be based on the size of the water meter used to serve the premises, or the size of the premise served, as determined by the number of units therein, whichever results in the larger minimum charge.

The minimum charge shall include the allowance for the first 500 cubic feet of water used in the case of monthly bills; and the first 900 cubic feet of water used, in the case of quarterly bills.

The minimum charge rates shall be as follows:

Meter Size Inches	Number of Family Units	Quarterly Bills		Monthly Bills	
		OM&R	Total	OM&R	Total
5/8"	1	\$ 45.75	\$ 120.51	\$ 22.10	\$ 52.35
3/4"	2-3	\$ 59.35	\$ 159.50	\$ 26.63	\$ 65.34
1"	4-5	\$ 78.38	\$ 214.08	\$ 32.98	\$ 83.54
1 1/2"	6-12	\$ 132.76	\$ 370.02	\$ 51.11	\$ 135.52
2"	13-20	\$ 187.15	\$ 525.96	\$ 69.23	\$ 187.50
3"	21-50	\$ 426.44	\$ 1,212.12	\$ 149.00	\$ 416.22
4"	51-115	\$ 698.36	\$ 1,991.84	\$ 239.64	\$ 676.12
6"	116-250	\$ 1,378.15	\$ 3,941.13	\$ 466.23	\$ 1,325.89
8"	Over 250	\$ 2,057.95	\$ 5,890.43	\$ 692.83	\$ 1,975.66
10"		\$ 2,737.75	\$ 7,839.73	\$ 919.43	\$ 2,625.42
12"		\$ 3,145.63	\$ 9,009.31	\$ 1,055.39	\$ 3,015.28

Commodity Charge

The commodity charge shall be based on the quantity of water used on the premises served as same is measured by a water meter or meters therein used, which meters must be acceptable to the Municipality that collects such charge.

The commodity charges for each 100 cubic feet (Ccf) consumed are as follows:

	Minimum	
	OM&R	Total
First 500 cubic feet per month; or 900 cubic feet per quarter -		
Next 4,500 cubic feet per month; or 14,100 cubic feet per quarter -	\$ 1.381	\$ 7.771 /Ccf
Over 5,000 cubic feet per month; or 15,000 cubic feet per quarter -	\$ 1.381	\$ 4.045 /Ccf

Basis of Charge

For residential water service accounts (one and two family residences) a quarterly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the quarterly billing period most closely corresponding to usage during the months of October through April. Said charges shall be payable with each bill rendered throughout the year.

All non-residential customers shall be charged based upon the water used during a billing period that is subject to a sewerage charge. The District will consider applications, fully supported, for adjustment due to nonsewered water use. All well water and water reaching the system from other sources will be considered in the basis for charge.

Table 6-2 Sewerage Surcharges and Septic Tank Disposal Charges – Option 1 - Test Year 2017

Proposed Sewerage Surcharges - Test Year 2017

For customers having high strength waste discharge, the surcharge, which is in addition to other sewerage service charges, shall be computed on the following basis:

Suspended Solids (TSS)	\$ 0.002256	per 100 cubic feet for each mg/l of SS strength above 300 mg/l
Biochemical Oxygen Demand (BOD)	\$ 0.003441	per 100 cubic feet for each mg/l of BOD strength above 240 mg/l
Nitrogen Oxygen Demand (TKN)	\$ 0.003868	per 100 cubic feet for each mg/l of Total Kjeldahl Nitrogen (TKN) strength above 25 mg/l.

Provision

Provided, however, that to the extent the strength of a pollutant is less than eighty percent (80%) of the corresponding value for normal strength sewage, a credit shall be allowed as an offset against surcharge otherwise due, the credit shall be calculated by multiplying the above specified surcharge rate for the pollutant in question times the difference between actual pollutant concentration in mg/l and eighty percent (80%) of the corresponding value for normal sewage. No credit shall be allowed in excess of surcharge otherwise due.

Suspended Solids (TSS)	\$ 0.3615	per pound of excess strength
Biochemical Oxygen Demand (BOD)	\$ 0.5514	per pound of excess strength
Nitrogen Oxygen Demand (TKN)	\$ 0.6199	per pound of excess strength

Proposed Septic Tank Disposal Charge - Test Year 2017

The fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant. Each septic hauler shall pay the following cost per thousand gallons per load.

All Haulers	\$ 105.89	per 1,000 gallons
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6.2.1.1 Revenue Recovery under Option 1 Rates

As previously discussed, the Option 1 rate schedule would recover the necessary 4.25 percent increase in revenue required by the utility, while achieving cost of service for each customer class, based on the existing rate structure, as shown in Table 6-3. It is important to note that because the existing rate schedule is the same for all customer classes, it is not possible to achieve 100 percent cost recovery by customer class.

Table 6-3 Comparison of Allocated Cost of Service with Revenue under Option 1 Rates

Line No.	Customer Class	Total Adjusted Cost of Service \$	Revenue Under Existing Rates \$	Revenue Under Proposed Rates \$	Cost of Service Recovery Under Proposed Rates %
1	Residential	132,202,999	117,555,128	128,649,975	97.31%
2	Commercial	52,807,798	48,696,048	52,040,077	98.55%
3	Industrial	28,938,946	31,853,741	28,366,369	98.02%
4	Multifamily	51,077,366	52,230,296	55,970,942	109.58%
5	Surcharge	15,070,486	20,192,310	15,070,230	100.00%
6	Septic Tank Disposal	3,795,806	1,792,280	3,795,806	100.00%
7	Total	283,893,400	272,319,802	283,893,400	100.00%

6.2.1.2 Typical Bills under Option 1

A comparison of typical bills under the proposed schedule of sewerage service charge rates with those under existing rates is shown in Table 6-4.

Table 6-4 Typical Customer Sewer Bills under Existing and Option 1 Rates

Meter Size Inches	Usage Ccf	Existing	Proposed 2017		
		Bill \$	Bill \$	Increase \$	Increase %
Quarterly					
5/8"	0	117.35	120.51	3.16	2.69%
5/8"	3	117.35	120.51	3.16	2.69%
5/8"	6	117.35	120.51	3.16	2.69%
5/8"	9	117.35	120.51	3.16	2.69%
5/8"	12	134.99	143.82	8.84	6.55%
5/8"	18	170.26	190.45	20.19	11.86%
5/8"	20	182.02	205.99	23.97	13.17%
5/8"	25	211.41	244.85	33.43	15.81%
3/4"	30	274.78	322.69	47.91	17.44%
3/4"	50	392.36	478.11	85.75	21.86%
1"	75	595.45	726.96	131.51	22.09%
1"	100	742.43	921.24	178.81	24.08%
1 1/2"	150	1,181.45	1,465.73	284.28	24.06%
2"	200	1,563.32	1,823.91	260.59	16.67%
2"	300	2,033.42	2,228.40	194.98	9.59%
3"	500	3,755.78	3,723.54	(32.24)	-0.86%
3"	1,000	6,106.28	5,745.99	(360.29)	-5.90%
4"	5,000	25,751.09	22,705.31	(3,045.78)	-11.83%
6"	10,000	51,272.96	44,879.10	(6,393.86)	-12.47%
8"	20,000	100,400.57	87,277.40	(13,123.17)	-13.07%
10"	20,000	102,504.54	89,226.70	(13,277.84)	-12.95%
12"	20,000	103,797.03	90,396.28	(13,400.75)	-12.91%
Monthly					
5/8"	0	57.11	52.35	(4.76)	-8.33%
5/8"	3	57.11	52.35	(4.76)	-8.33%
5/8"	6	62.99	60.12	(2.87)	-4.55%
5/8"	9	80.63	83.43	2.81	3.48%
5/8"	12	98.26	106.75	8.48	8.63%
5/8"	18	133.54	153.37	19.84	14.85%
5/8"	20	145.30	168.91	23.62	16.26%
5/8"	25	174.69	207.77	33.08	18.94%
3/4"	30	215.47	259.61	44.15	20.49%
3/4"	50	333.05	415.03	81.99	24.62%
1"	75	470.22	534.36	64.14	13.64%
1"	100	587.75	635.48	47.73	8.12%
1 1/2"	150	870.56	889.70	19.15	2.20%
2"	200	1,157.00	1,143.93	(13.07)	-1.13%
2"	300	1,627.10	1,548.42	(78.68)	-4.84%
3"	500	2,839.04	2,586.12	(252.92)	-8.91%
3"	1,000	5,189.54	4,608.57	(580.97)	-11.19%
4"	5,000	24,294.59	21,048.07	(3,246.52)	-13.36%
6"	10,000	48,526.61	41,922.34	(6,604.27)	-13.61%
8"	20,000	96,259.98	83,021.11	(13,238.87)	-13.75%
10"	20,000	97,020.01	83,670.87	(13,349.14)	-13.76%
12"	20,000	97,508.34	84,060.73	(13,447.61)	-13.79%

6.2.1.3 Hauled Waste Disposal

The District provides for the disposal of septic waste and other waste hauled directly to District facilities. The cost of service analysis summarized in Section 5 provides for the allocated cost of all hauled waste, resulting in the average cost of service rate of \$105.89 as shown in Table 6-2 above. In addition to the determination of the average cost of service rate, Black & Veatch analyzed hauled waste by type, in order to determine cost of service based rates that should be considered to improve equity.

The fee for hauled waste is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant. Each hauler currently pays 5 cents per gallon, or \$50.00 per 1,000 gallons regardless of the type of waste delivered to the receiving facility at the District's treatment plant. However, there are different types of waste delivered, with significant variation in the strength of waste and therefore cost required to treat the waste.

In conducting the cost of service analysis, hauled waste was categorized as:

- Grease
- Industrial
- Sanitary
- Sludge

Based on cost of service analysis described in this section, the unit costs of service were utilized to determine cost of service-based rates for hauled waste, by type of waste delivered. The resulting cost of service based rates are as follows:

- Grease: \$220.91 per 1,000 gallons
- Industrial: \$95.14 per 1,000 gallons
- Sanitary: \$33.41 per 1,000 gallons
- Sludge: \$42.11 per 1,000 gallons

Such rates should be considered in lieu of the average cost of service rate for the class of \$105.89 per 1,000 gallons shown in Table 6-2. As discussed further in Section 7, development of a plan to “phase-in” such rates would allow time for impacted customers to adjust to the new rate structure, while moving toward cost of service recovery of costs.

6.2.2 Option 2: 2017 - “Across-the-Board” Increase; Hold Sewerage Surcharges at Existing Rates

Table 6-5 presents a schedule of sewerage service charges that is designed using the existing rate structure and reflects an increase of 4.59 percent for all rates, except sewerage surcharges, which are held constant at current rates. This results in an overall system increase of 4.25 percent. Table 6-6 presents the schedule of sewerage surcharges which reflect no change over those implemented in January 2016.

Table 6-5 Sewerage Service Charges – Option 2 - Test Year 2017

Minimum Charge

The minimum charge shall be based on the size of the water meter used to serve the premises, or the size of the premise served, as determined by the number of units therein, whichever results in the larger minimum charge.

The minimum charge shall include the allowance for the first 500 cubic feet of water used in the case of monthly bills; and the first 900 cubic feet of water used, in the case of quarterly bills.

The minimum charge rates shall be as follows:

Meter Size Inches	Number of Family Units	Quarterly Bills		Monthly Bills	
		OM&R	Total	OM&R	Total
5/8"	1	\$ 68.43	\$ 122.74	\$ 35.44	\$ 59.73
3/4"	2-3	\$ 86.06	\$ 158.27	\$ 41.30	\$ 71.63
1"	4-5	\$ 121.08	\$ 216.96	\$ 52.48	\$ 92.19
1 ½"	6-12	\$ 201.08	\$ 368.69	\$ 78.79	\$ 142.14
2"	13-20	\$ 283.50	\$ 522.25	\$ 107.52	\$ 195.89
3"	21-50	\$ 636.17	\$ 1,340.31	\$ 223.91	\$ 480.10
4"	51-115	\$ 1,054.27	\$ 2,219.71	\$ 373.51	\$ 794.97
6"	116-250	\$ 2,075.30	\$ 4,329.16	\$ 723.29	\$ 1,555.36
8"	Over 250	\$ 3,096.39	\$ 6,543.97	\$ 1,073.14	\$ 2,311.93
10"		\$ 4,141.64	\$ 8,744.51	\$ 1,447.17	\$ 3,106.85
12"		\$ 4,793.05	\$ 10,096.32	\$ 1,695.80	\$ 3,617.59

Commodity Charge

The commodity charge shall be based on the quantity of water used on the premises served as same is measured by a water meter or meters therein used, which meters must be acceptable to the Municipality that collects such charge.

The commodity charges for each 100 cubic feet (Ccf) consumed are as follows:

	Minimum	
	OM&R	Total
First 500 cubic feet per month; or 900 cubic feet per quarter -		
Next 4,500 cubic feet per month; or 14,100 cubic feet per quarter -	\$ 2.575	\$ 6.149 /Ccf
Over 5,000 cubic feet per month; or 15,000 cubic feet per quarter -	\$ 2.575	\$ 4.917 /Ccf

Basis of Charge

For residential water service accounts (one and two family residences) a quarterly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the quarterly billing period most closely corresponding to usage during the months of October through April. Said charges shall be payable with each bill rendered throughout the year.

All non-residential customers shall be charged based upon the water used during a billing period that is subject to a sewerage charge. The District will consider applications, fully supported, for adjustment due to nonsewered water use. All well water and water reaching the system from other sources will be considered in the basis for charge.

Table 6-6 Sewerage Surcharges and Septic Tank Disposal Charges – Option 2 - Test Year 2017

Proposed Sewerage Surcharges - Test Year 2017

For customers having high strength waste discharge, the surcharge, which is in addition to other sewerage service charges, shall be computed on the following basis:

Suspended Solids (TSS)	\$ 0.002756	per 100 cubic feet for each mg/l of SS strength above 300 mg/l
Biochemical Oxygen Demand (BOD)	\$ 0.004707	per 100 cubic feet for each mg/l of BOD strength above 240 mg/l
Nitrogen Oxygen Demand (TKN)	\$ 0.004122	per 100 cubic feet for each mg/l of Total Kjeldahl Nitrogen (TKN) strength above 25 mg/l.

Provision

Provided, however, that to the extent the strength of a pollutant is less than eighty percent (80%) of the corresponding value for normal strength sewage, a credit shall be allowed as an offset against surcharge otherwise due, the credit shall be calculated by multiplying the above specified surcharge rate for the pollutant in question times the difference between actual pollutant concentration in mg/l and eighty percent (80%) of the corresponding value for normal sewage. No credit shall be allowed in excess of surcharge otherwise due.

Suspended Solids (TSS)	\$ 0.4417	per pound of excess strength
Biochemical Oxygen Demand (BOD)	\$ 0.7543	per pound of excess strength
Nitrogen Oxygen Demand (TKN)	\$ 0.6606	per pound of excess strength

Proposed Septic Tank Disposal Charge - Test Year 2017

The fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant. Each septic hauler shall pay the following cost per thousand gallons per load.

All Haulers	\$ 52.30	per 1,000 gallons
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6.2.2.1 Revenue Recovery under Option 2 Rates

As previously discussed, the Option 2 rate schedule would increase all rates 4.59 percent, except sewerage surcharge rates, over those implemented in January 2016. This results in an overall system increase of 4.25 percent. The rates result in the cost recovery compared with cost of service, by customer class, shown in Table 6-7.

Table 6-7 Comparison of Allocated Cost of Service with Revenue under Option 2 Rates

Line No.	Customer Class	Total Adjusted Cost of Service \$	Revenue Under Existing Rates \$	Revenue Under Proposed Rates \$	Cost of Service Recovery Under Proposed Rates %
1	Residential	132,202,999	117,555,128	122,954,199	93.00%
2	Commercial	52,807,798	48,696,048	50,932,358	96.45%
3	Industrial	28,938,946	31,853,741	33,317,074	115.13%
4	Multifamily	51,077,366	52,230,296	54,628,982	106.95%
5	Surcharge	15,070,486	20,192,310	20,192,310	133.99%
6	Septic Tank Disposal	3,795,806	1,792,280	1,874,728	49.39%
7	Total	283,893,400	272,319,802	283,899,651	100.00%

6.2.2.2 Typical Bills under Option 2

A comparison of typical bills under the proposed schedule of sewerage service charge rates with those under existing rates is shown in Table 6-8.

Table 6-8 Typical Customer Sewer Bills under Existing and Option 2 Rates

Meter Size Inches	Usage Ccf	Existing	Proposed 2017		
		Bill \$	Bill \$	Increase \$	Increase %
Quarterly					
5/8"	0	117.35	122.74	5.39	4.59%
5/8"	3	117.35	122.74	5.39	4.59%
5/8"	6	117.35	122.74	5.39	4.59%
5/8"	9	117.35	122.74	5.39	4.59%
5/8"	12	134.99	141.19	6.20	4.59%
5/8"	18	170.26	178.08	7.82	4.59%
5/8"	20	182.02	190.38	8.36	4.59%
5/8"	25	211.41	221.12	9.71	4.59%
3/4"	30	274.78	287.40	12.62	4.59%
3/4"	50	392.36	410.38	18.02	4.59%
1"	75	595.45	622.79	27.34	4.59%
1"	100	742.43	776.52	34.09	4.59%
1 ½"	150	1,181.45	1,235.70	54.25	4.59%
2"	200	1,563.32	1,635.11	71.79	4.59%
2"	300	2,033.42	2,126.81	93.39	4.59%
3"	500	3,755.78	3,928.27	172.49	4.59%
3"	1,000	6,106.28	6,386.77	280.49	4.59%
4"	5,000	25,751.09	26,934.17	1,183.08	4.59%
6"	10,000	51,272.96	53,628.62	2,355.66	4.59%
8"	20,000	100,400.57	105,013.43	4,612.86	4.59%
10"	20,000	102,504.54	107,213.97	4,709.43	4.59%
12"	20,000	103,797.03	108,565.78	4,768.75	4.59%
Monthly					
5/8"	0	57.11	59.73	2.62	4.59%
5/8"	3	57.11	59.73	2.62	4.59%
5/8"	6	62.99	65.88	2.89	4.59%
5/8"	9	80.63	84.33	3.70	4.59%
5/8"	12	98.26	102.77	4.51	4.59%
5/8"	18	133.54	139.67	6.13	4.59%
5/8"	20	145.30	151.97	6.67	4.59%
5/8"	25	174.69	182.71	8.02	4.59%
3/4"	30	215.47	225.36	9.89	4.59%
3/4"	50	333.05	348.34	15.29	4.59%
1"	75	470.22	491.82	21.60	4.59%
1"	100	587.75	614.75	27.00	4.59%
1 ½"	150	870.56	910.55	39.99	4.59%
2"	200	1,157.00	1,210.15	53.15	4.59%
2"	300	1,627.10	1,701.85	74.75	4.59%
3"	500	2,839.04	2,969.46	130.42	4.59%
3"	1,000	5,189.54	5,427.96	238.42	4.59%
4"	5,000	24,294.59	25,410.83	1,116.24	4.59%
6"	10,000	48,526.61	50,756.22	2,229.61	4.59%
8"	20,000	96,259.98	100,682.79	4,422.81	4.59%
10"	20,000	97,020.01	101,477.71	4,457.70	4.59%
12"	20,000	97,508.34	101,988.45	4,480.11	4.59%

6.2.3 Option 3: 2018 - “Across the Board Increase” for Commodity and Septic Hauler Rates; Adjust Current Quarterly Service Charge Rate to Recover Remaining Revenue; No Change to Sewerage Surcharges

Table 6-9 presents a schedule of sewerage service charges that is designed based on:

- All customers being billed monthly
- The service charge for multi-family customers based on actual meter size only
- The minimum charge per month includes the first 300 cubic feet of contributed wastewater volume per month

In this option, the commodity rate and septic tank disposal were increased by 4.59 percent, over Option 2, to represent the average increase needed to recover the system-wide increase of 4.25 percent. Surcharge rates were held constant, allowing surcharge rates to continue to move toward cost of service. The minimum charges were then adjusted to recover 100 percent of the District’s costs for 2018. This results in an overall system increase of 4.25 percent in 2018. Table 6-10 presents the schedule of sewerage surcharges and septic tank disposal charges.

Table 6-9 Sewerage Service Charges – Option 3 - Test Year 2018

Minimum Charge

The minimum charge shall be based on the size of the water meter used to serve the premises, or the size of the premise served.

The minimum charge shall include the allowance for the first 300 cubic feet of water used for monthly bills.

The minimum charge rates shall be as follows:

Meter Size Inches	Monthly Bills	
	OM&R	Total
5/8"	\$ 24.67	\$ 44.26
3/4"	\$ 31.03	\$ 57.07
1"	\$ 43.66	\$ 78.23
1 ½"	\$ 72.50	\$ 132.93
2"	\$ 102.22	\$ 188.30
3"	\$ 229.38	\$ 483.26
4"	\$ 380.13	\$ 800.34
6"	\$ 748.27	\$ 1,560.92
8"	\$ 1,116.43	\$ 2,359.49
10"	\$ 1,493.31	\$ 3,152.92
12"	\$ 1,728.18	\$ 3,640.33

Commodity Charge

The commodity charge shall be based on the quantity of water used on the premises served as same is measured by a water meter or meters therein used, which meters must be acceptable to the Municipality that collects such charge.

The commodity charges for each 100 cubic feet (Ccf) consumed are as follows:

	Minimum	
	OM&R	Total
First 300 cubic feet per month -		
Next 4,700 cubic feet per month -	\$ 2.693	\$ 6.431 /Ccf
Over 5,000 cubic feet per month -	\$ 2.693	\$ 5.143 /Ccf

Basis of Charge

For residential water service accounts (one and two family residences) a monthly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the monthly billing period most closely corresponding to usage during the months of October through April. Said charges shall be payable with each bill rendered throughout the year.

All non-residential customers shall be charged based upon the water used during a billing period that is subject to a sewerage charge. The District will consider applications, fully supported, for adjustment due to nonsewered water use. All well water and water reaching the system from other sources will be considered in the basis for charge.

Table 6-10 Sewerage Surcharges and Septic Tank Disposal Charges – Option 3 - Test Year 2018

Proposed Sewerage Surcharges - Test Year 2018

For customers having high strength waste discharge, the surcharge, which is in addition to other sewerage service charges, shall be computed on the following basis:

Suspended Solids (TSS)	\$ 0.002756	per 100 cubic feet for each mg/l of SS strength above 300 mg/l
Biochemical Oxygen Demand (BOD)	\$ 0.004707	per 100 cubic feet for each mg/l of BOD strength above 240 mg/l
Nitrogen Oxygen Demand (TKN)	\$ 0.004122	per 100 cubic feet for each mg/l of Total Kjeldahl Nitrogen (TKN) strength above 25 mg/l.

Provision

Provided, however, that to the extent the strength of a pollutant is less than eighty percent (80%) of the corresponding value for normal strength sewage, a credit shall be allowed as an offset against surcharge otherwise due, the credit shall be calculated by multiplying the above specified surcharge rate for the pollutant in question times the difference between actual pollutant concentration in mg/l and eighty percent (80%) of the corresponding value for normal sewage. No credit shall be allowed in excess of surcharge otherwise due.

Suspended Solids (TSS)	\$ 0.4417	per pound of excess strength
Biochemical Oxygen Demand (BOD)	\$ 0.7543	per pound of excess strength
Nitrogen Oxygen Demand (TKN)	\$ 0.6606	per pound of excess strength

Proposed Septic Tank Disposal Charge - Test Year 2018

The fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant. Each septic hauler shall pay the following cost per thousand gallons per load.

All Haulers	\$ 54.70	per 1,000 gallons
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6.2.3.1 Revenue Recovery under Option 3 Rates

As previously discussed, the Option 3 rates for the minimum charge rates were designed to move to monthly billing while keeping the commodity rate at approximately an across the board increase over Option 2 (2017 rates) by 4.59 percent. The minimum charge was then adjusted to recover 100 percent of the District’s costs for 2018. The sewerage surcharge rates were held at current levels and the septic tank disposal rates were increased by 4.59 percent over Option 2. This results in an overall system increase of 4.25 percent. The resulting revenue recovery by customer class is indicated in Table 6-11.

Table 6-11 Comparison of Allocated Cost of Service with Revenue under Option 3 Rates

Line No.	Customer Class	Total Adjusted Cost of Service \$	Revenue Under Option 2 Rates \$	Revenue Under Proposed Rates \$	Cost of Service Recovery Under Proposed Rates %
1	Residential	141,161,408	122,538,246	131,099,484	92.87%
2	Commercial	56,238,342	50,932,358	53,940,687	95.91%
3	Industrial	30,436,137	33,317,074	34,807,969	114.36%
4	Multifamily	48,412,479	54,387,818	53,277,812	110.05%
5	Surcharge	15,233,871	20,192,310	20,192,310	132.55%
6	Septic Tank Disposal	3,793,763	1,874,728	1,960,778	51.68%
7	Total	295,276,000	283,242,534	295,279,041	100.00%

6.2.3.2 Typical Bills under Option 3

A comparison of typical bills under the Option 3 schedule of sewerage service charge rates with those under Option 2 (2017) rates is shown in Table 6-12.

Table 6-12 Typical Customer Sewer Bills under Proposed Option 2 (2017) and Option 3 Rates

Meter Size	Usage	Option 2	Proposed 2018		
		Bill	Bill	Increase	Increase
Inches	Ccf	\$	\$	\$	%
Former Quarterly Shown Monthly for Comparison Only					
5/8"	0	40.91	44.26	3.35	8.18%
5/8"	1	40.91	44.26	3.35	8.18%
5/8"	2	40.91	44.26	3.35	8.18%
5/8"	3	40.91	44.26	3.35	8.18%
5/8"	4	47.06	50.69	3.63	7.71%
5/8"	6	59.36	63.55	4.19	7.06%
5/8"	7	65.51	69.98	4.47	6.83%
5/8"	8	71.66	76.42	4.76	6.64%
3/4"	10	95.80	102.09	6.29	6.56%
3/4"	15	126.54	134.24	7.70	6.08%
1"	25	207.60	219.71	12.11	5.84%
1"	30	238.34	251.87	13.52	5.67%
1 1/2"	50	411.90	435.19	23.29	5.65%
2"	60	512.26	541.99	29.73	5.80%
2"	100	708.94	747.71	38.77	5.47%
3"	150	1,227.47	1,299.82	72.34	5.89%
3"	300	1,965.02	2,071.27	106.24	5.41%
4"	1,600	8,650.26	9,074.25	423.99	4.90%
6"	3,300	17,712.31	18,577.93	865.62	4.89%
8"	6,600	34,676.68	36,348.40	1,671.72	4.82%
10"	6,600	35,410.19	37,141.83	1,731.64	4.89%
12"	6,600	35,860.79	37,629.24	1,768.44	4.93%
Former Monthly for Comparison Only					
5/8"	0	59.73	44.26	(15.47)	-25.90%
5/8"	3	59.73	44.26	(15.47)	-25.90%
5/8"	6	65.88	63.55	(2.33)	-3.53%
5/8"	9	84.33	82.85	(1.48)	-1.76%
5/8"	12	102.77	102.14	(0.63)	-0.62%
5/8"	18	139.67	140.73	1.06	0.76%
5/8"	20	151.97	153.59	1.62	1.07%
5/8"	25	182.71	185.74	3.03	1.66%
3/4"	30	225.36	230.71	5.35	2.37%
3/4"	50	348.34	359.33	10.99	3.16%
1"	75	491.82	509.06	17.24	3.51%
1"	100	614.75	637.64	22.89	3.72%
1 1/2"	150	910.55	949.49	38.94	4.28%
2"	200	1,210.15	1,262.01	51.86	4.29%
2"	300	1,701.85	1,776.31	74.46	4.38%
3"	500	2,969.46	3,099.87	130.41	4.39%
3"	1,000	5,427.96	5,671.37	243.41	4.48%
4"	5,000	25,410.83	26,560.45	1,149.62	4.52%
6"	10,000	50,756.22	53,036.03	2,279.81	4.49%
8"	20,000	100,682.79	105,264.60	4,581.81	4.55%
10"	20,000	101,477.71	106,058.03	4,580.32	4.51%
12"	20,000	101,988.45	106,545.44	4,556.99	4.47%

6.2.4 Option 4: 2018 - Option 3 Adjusted to Eliminate Minimum Allowance

Table 6-13 presents a schedule of sewerage service charges, designed using the same rate structure as Option 3, but with no minimum volume allowance component in the base charges.

Under this rate structure, customers would pay a service charge plus a volume charge for all billed volume, and is based on:

- All customers being billed monthly
- The service charge for multi-family customers based on actual meter size only
- No minimum charge allowance included in the base fee.

In developing this scenario, the service charge is reduced from that calculated for Option 3 by an amount equal to the final volume block rate (\$5.413/Ccf) times 3 Ccf. With no volume allowance in the base charge, customer bills are calculated based on assessing a volume charge to all billed volume, with volume previously included in the minimum charge billed at the first block rate (\$5.783/Ccf). Under this rate structure, customers with billed volume less than the minimum allowance will experience a decrease in their bill (as shown in Table 6-12). Customers at the average residential bill, based on 17 Ccf/quarter or just under 6 Ccf/month, would experience an increase of 7.93 percent.

Table 6-14 presents the schedule of sewerage surcharges and septic tank disposal charges.

Table 6-13 Sewerage Service Charges – Option 4 - Test Year 2018

Minimum Charge

The minimum charge shall be based on the size of the water meter used to serve the premises, or the size of the premise served.

The minimum charge rates shall be as follows:

Meter Size Inches	Monthly Bills	
	OM&R	Total
5/8"	\$ 16.59	\$ 28.83
3/4"	\$ 22.95	\$ 41.64
1"	\$ 35.58	\$ 62.80
1 ½"	\$ 64.42	\$ 117.50
2"	\$ 94.14	\$ 172.87
3"	\$ 221.30	\$ 467.83
4"	\$ 372.05	\$ 784.91
6"	\$ 740.19	\$ 1,545.49
8"	\$ 1,108.35	\$ 2,344.06
10"	\$ 1,485.23	\$ 3,137.49
12"	\$ 1,720.10	\$ 3,624.90

Commodity Charge

The commodity charge shall be based on the quantity of water used on the premises served as same is measured by a water meter or meters therein used, which meters must be acceptable to the Municipality that collects such charge.

The commodity charges for each 100 cubic feet (Ccf) consumed are as follows:

	Minimum	
	OM&R	Total
First 5,000 cubic feet per month -	\$ 2.459	\$ 5.873 /Ccf
Over 5,000 cubic feet per month -	\$ 2.693	\$ 5.143 /Ccf

Basis of Charge

For residential water service accounts (one and two family residences) a monthly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the monthly billing period most closely corresponding to usage during the months of October through April. Said charges shall be payable with each bill rendered throughout the year.

All non-residential customers shall be charged based upon the water used during a billing period that is subject to a sewerage charge. The District will consider applications, fully supported, for adjustment due to nonsewered water use. All well water and water reaching the system from other sources will be considered in the basis for charge.

Table 6-14 Sewerage Surcharges and Septic Tank Disposal Charges – Option 4 - Test Year 2018

Proposed Sewerage Surcharges - Test Year 2018

For customers having high strength waste discharge, the surcharge, which is in addition to other sewerage service charges, shall be computed on the following basis:

Suspended Solids (TSS)	\$ 0.002756	per 100 cubic feet for each mg/l of SS strength above 300 mg/l
Biochemical Oxygen Demand (BOD)	\$ 0.004707	per 100 cubic feet for each mg/l of BOD strength above 240 mg/l
Nitrogen Oxygen Demand (TKN)	\$ 0.004122	per 100 cubic feet for each mg/l of Total Kjeldahl Nitrogen (TKN) strength above 25 mg/l.

Provision

Provided, however, that to the extent the strength of a pollutant is less than eighty percent (80%) of the corresponding value for normal strength sewage, a credit shall be allowed as an offset against surcharge otherwise due, the credit shall be calculated by multiplying the above specified surcharge rate for the pollutant in question times the difference between actual pollutant concentration in mg/l and eighty percent (80%)

of the corresponding value for normal sewage. No credit shall be allowed in excess of surcharge otherwise due.

Suspended Solids (TSS)	\$ 0.4417	per pound of excess strength
Biochemical Oxygen Demand (BOD)	\$ 0.7543	per pound of excess strength
Nitrogen Oxygen Demand (TKN)	\$ 0.6606	per pound of excess strength

Proposed Septic Tank Disposal Charge - Test Year 2018

The fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant. Each septic hauler shall pay the following cost per thousand gallons per load.

All Haulers	\$ 54.70	per 1,000 gallons
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6.2.4.1 Revenue Recovery under Option 4 Rates

As previously discussed, the Option 4 rate schedule would recover the necessary 4.25 percent increase in revenue required by the utility, while removing the minimum volume component. The resulting revenue recovery by customer class is indicated in Table 6-15.

Table 6-15 Comparison of Allocated Cost of Service with Revenue under Option 4 Rates

Line No.	Customer Class	Total Adjusted Cost of Service \$	Revenue Under Options 2 Rates \$	Revenue Under Proposed Rates \$	Cost of Service Recovery Under Proposed Rates %
1	Residential	141,161,408	122,538,246	131,824,917	93.39%
2	Commercial	56,238,342	50,932,358	58,218,378	103.52%
3	Industrial	30,436,137	33,317,074	35,376,820	116.23%
4	Multifamily	48,412,479	54,387,818	47,777,185	98.69%
5	Surcharge	15,233,871	20,192,310	20,192,310	132.55%
6	Septic Tank Disposal	3,793,763	1,874,728	1,960,778	51.68%
7	Total	295,276,000	283,242,534	295,350,388	100.03%

6.2.4.2 Typical Bills under Option 4

A comparison of typical bills under the Option 4 schedule of sewerage service charge rates with those under Option 2 rates is shown in Table 6-16.

Table 6-16 Typical Customer Sewer Bills under Existing and Option 3 Rates

Meter Size Inches	Usage Ccf	Option 2	Proposed 2018		
		Bill \$	Bill \$	Increase \$	Increase %
Former Quarterly Shown Monthly for Comparison Only					
5/8"	0	40.91	28.83	(12.08)	-29.53%
5/8"	1	40.91	34.70	(6.21)	-15.18%
5/8"	2	40.91	40.58	(0.34)	-0.82%
5/8"	3	40.91	46.45	5.54	13.53%
5/8"	4	47.06	52.32	5.26	11.18%
5/8"	6	59.36	64.07	4.71	7.93%
5/8"	7	65.51	69.94	4.43	6.76%
5/8"	8	71.66	75.81	4.16	5.80%
3/4"	10	95.80	100.37	4.57	4.77%
3/4"	15	126.54	129.74	3.19	2.52%
1"	25	207.60	209.63	2.03	0.98%
1"	30	238.34	238.99	0.65	0.27%
1 1/2"	50	411.90	411.15	(0.75)	-0.18%
2"	60	512.26	517.95	5.69	1.11%
2"	100	708.94	723.67	14.73	2.08%
3"	150	1,227.47	1,275.78	48.31	3.94%
3"	300	1,965.02	2,047.23	82.21	4.18%
4"	1,600	8,650.26	9,050.21	399.95	4.62%
6"	3,300	17,712.31	18,553.89	841.58	4.75%
8"	6,600	34,676.68	36,324.36	1,647.68	4.75%
10"	6,600	35,410.19	37,117.79	1,707.60	4.82%
12"	6,600	35,860.79	37,605.20	1,744.41	4.86%
Former Monthly for Comparison Only					
5/8"	0	59.73	28.83	(30.90)	-51.73%
5/8"	3	59.73	46.45	(13.28)	-22.24%
5/8"	6	65.88	64.07	(1.81)	-2.75%
5/8"	9	84.33	81.69	(2.64)	-3.13%
5/8"	12	102.77	99.31	(3.47)	-3.37%
5/8"	18	139.67	134.54	(5.12)	-3.67%
5/8"	20	151.97	146.29	(5.67)	-3.73%
5/8"	25	182.71	175.66	(7.05)	-3.86%
3/4"	30	225.36	217.83	(7.53)	-3.34%
3/4"	50	348.34	335.29	(13.05)	-3.74%
1"	75	491.82	485.03	(6.79)	-1.38%
1"	100	614.75	613.60	(1.14)	-0.19%
1 1/2"	150	910.55	925.45	14.91	1.64%
2"	200	1,210.15	1,237.97	27.82	2.30%
2"	300	1,701.85	1,752.27	50.43	2.96%
3"	500	2,969.46	3,075.83	106.38	3.58%
3"	1,000	5,427.96	5,647.33	219.37	4.04%
4"	5,000	25,410.83	26,536.41	1,125.59	4.43%
6"	10,000	50,756.22	53,011.99	2,255.77	4.44%
8"	20,000	100,682.79	105,240.56	4,557.77	4.53%
10"	20,000	101,477.71	106,033.99	4,556.28	4.49%
12"	20,000	101,988.45	106,521.40	4,532.95	4.44%

7 Conclusion

The results of this analysis indicate that a series of revenue increases are expected to be required from 2017-2021 to help provide proper funding of all District programs and maintain strong key financial indicators. It is important to note that the projected adjustments reflect capital expenditures projected to provide for on-going renewals and replacements and completion of Phase 1 and preliminary estimated Phase 2 costs beginning in 2019 of the Long Term Control Plan. Once Phase 2 costs and schedule are finalized and agreed upon by all parties to the consent decree, required increases for 2018 and beyond could vary from those projected within this report, depending on the size and timing of Phase 2 related projects. As discussed in this report, the alternative rate schedules summarized in Section 6 are designed to recover the total system-wide revenue needs of the District as presently projected. The four alternative rate designs presented herein are designed to recover the anticipated revenue needs of the District in 2017 and 2018 while addressing certain policy considerations, as previously discussed.

Because of the magnitude of the capital program moving forward, and the potential impact in individual years that could occur due to changes in the timing of projects, it is recommended that the revenue requirement analysis be conducted annually to ensure that revenues remain sufficient to provide adequate funding for the capital improvement program without unanticipated, large increases in rates in a single year. It is further recommended that a detailed cost allocation and rate design study be completed at a minimum of every two years, as it is expected that due to the nature of the WWIP, shifts in allocated costs by customer class could result in rate increases for each class that are different from the average revenue increase, and the shift could be significant over time.

Table 7-1 compares the two (2) 2017 alternative rate structures with existing rates, including a summary of the resulting mix of revenue generated from the minimum/service charges and commodity charges and two (2) 2018 alternative rate structures with Option 2 rates, including a summary of the resulting mix of revenue generated from the minimum/service charges and commodity charges. Table 7-2 compares the typical bills shown on Tables 6-4, 6-8, 6-12, and 6-16. For comparison purposes, the Option 2 minimum charge rate for quarterly shown monthly is calculated by taking Option 2 quarterly rate divided by three in order to provide an easy, and comparable, comparison with 2018 proposed monthly bills. 2017 rate structures reflect quarterly billing, while 2018 rate structures reflect monthly billing. Option 1 (Cost of Service) and Option 2 ("Across the Board") both reflect the current billing structure. Option 3 reflects monthly billing and 3 Ccf minimum allowance while Option 4 reflects monthly billing with the elimination of the 3 Ccf minimum allowance.

Option 1-3 all result in about the same amount of fixed charge revenue from the minimum/service charge as the current structure. However, Option 4, which eliminates the minimum allowance, results in substantial reduction in fixed revenue generated from the minimum/service charge (40 percent revenue from fixed charges compared to 55 percent for Option 3. Decisions regarding a final rate structure should take into consideration both customer impact and impact on fixed charge revenues, as revenue stability is a key consideration in determining the financial strength of a utility.

Table 7-1 Comparison of Existing Rates with 2 Alternative 2017 & 2 Alternative 2018 Rate Structures

Minimum Charge						
Meter Size	Existing Quarterly Rate	Test Year - 2017		Test Year - 2018		
		Option 1 Quarterly Rate	Option 2 Quarterly Rate	Option 2 Quarterly Shown Monthly	Option 3 Monthly Rate	Option 4 Monthly Rate
Inches						
5/8"	\$ 117.35	\$ 120.51	\$ 122.74			
3/4"	\$ 151.32	\$ 159.50	\$ 158.27			
1"	\$ 207.44	\$ 214.08	\$ 216.96			
1 1/2"	\$ 352.51	\$ 370.02	\$ 368.69			
2"	\$ 499.33	\$ 525.96	\$ 522.25			
3"	\$ 1,281.49	\$ 1,212.12	\$ 1,340.31			
4"	\$ 2,122.30	\$ 1,991.84	\$ 2,219.71			
6"	\$ 4,139.17	\$ 3,941.13	\$ 4,329.16			
8"	\$ 6,256.78	\$ 5,890.43	\$ 6,543.97			
10"	\$ 8,360.75	\$ 7,839.73	\$ 8,744.51			
12"	\$ 9,653.24	\$ 9,009.31	\$ 10,096.32			
Meter Size	Existing Monthly Rate	Option 1 Monthly Rate	Option 2 Monthly Rate	Option 2 Quarterly Shown Monthly	Option 3 Monthly Rate	Option 4 Monthly Rate
Inches						
5/8"	\$ 57.11	\$ 52.35	\$ 59.73	\$ 40.91	\$ 44.26	\$ 28.83
3/4"	\$ 68.49	\$ 65.34	\$ 71.63	\$ 52.76	\$ 57.07	\$ 41.64
1"	\$ 88.14	\$ 83.54	\$ 92.19	\$ 72.32	\$ 78.23	\$ 62.80
1 1/2"	\$ 135.90	\$ 135.52	\$ 142.14	\$ 122.90	\$ 132.93	\$ 117.50
2"	\$ 187.29	\$ 187.50	\$ 195.89	\$ 174.08	\$ 188.30	\$ 172.87
3"	\$ 459.03	\$ 416.22	\$ 480.10	\$ 446.77	\$ 483.26	\$ 467.83
4"	\$ 760.08	\$ 676.12	\$ 794.97	\$ 739.90	\$ 800.34	\$ 784.91
6"	\$ 1,487.10	\$ 1,325.89	\$ 1,555.36	\$ 1,443.05	\$ 1,560.92	\$ 1,545.49
8"	\$ 2,210.47	\$ 1,975.66	\$ 2,311.93	\$ 2,181.32	\$ 2,359.49	\$ 2,344.06
10"	\$ 2,970.50	\$ 2,625.42	\$ 3,106.85	\$ 2,914.84	\$ 3,152.92	\$ 3,137.49
12"	\$ 3,458.83	\$ 3,015.28	\$ 3,617.59	\$ 3,365.44	\$ 3,640.33	\$ 3,624.90
Commodity Charge						
	2017	2018				
First (cf)	500-M / 900-Q	300	\$ 0	\$ 0	\$ 0	\$ 5.873
To (cf)	4,500-M / 14,100-Q	4,700	\$ 5.879	\$ 7.771	\$ 6.149	\$ 5.873
Over (cf)	5,000-M / 15,000-Q	5,000	\$ 4.701	\$ 4.045	\$ 4.917	\$ 5.143
Revenue Under Proposed Rates (\$1,000s)						
Minimum Charge	\$ 136,660	\$ 140,453	\$ 142,935	\$ 142,935	\$ 148,983	\$ 107,978
Commodity Charge	\$ 114,527	\$ 124,574	\$ 118,897	\$ 118,897	\$ 124,142	\$ 165,220
Total	\$ 251,187	\$ 265,027	\$ 261,833	\$ 261,833	\$ 273,126	\$ 273,197
Minimum Charge	54.4%	53.0%	54.6%	54.6%	54.5%	39.5%
Commodity Charge	45.6%	47.0%	45.4%	45.4%	45.5%	60.5%
Typical Bill						
Quarterly - Residential - 5/8" 18 Ccf	\$ 170.26	\$ 190.45	\$ 178.08			
Monthly - Residential - 5/8" 6 Ccf	\$ 62.99	\$ 60.12	\$ 65.88	\$ 59.36	\$ 63.55	\$ 64.07

Table 7-2 Comparison of Existing Typical Bills with 2 Alternative 2017 & 2 Alternative 2018 Rate Structures

Meter Size Inches	Usage Ccf	Existing			2017 - Option 1			2017 - Option 2			Option 2			2018 - Option 3			2018 - Option 4		
		Bill \$	Increase \$	Increase %	Bill \$	Increase \$	Increase %	Bill \$	Increase \$	Increase %	Usage Ccf	Bill \$	Increase \$	Increase %	Bill \$	Increase \$	Increase %	Bill \$	Increase \$
Current Quarterly																			
5/8"	0	117.35	120.51	3.16	2.69%	122.74	5.39	4.59%	0	40.91	44.26	3.35	8.18%	28.83	(12.08)	-29.53%			
5/8"	3	117.35	120.51	3.16	2.69%	122.74	5.39	4.59%	1	40.91	44.26	3.35	8.18%	34.70	(6.21)	-15.18%			
5/8"	6	117.35	120.51	3.16	2.69%	122.74	5.39	4.59%	2	40.91	44.26	3.35	8.18%	40.58	(0.34)	-0.82%			
5/8"	9	117.35	120.51	3.16	2.69%	122.74	5.39	4.59%	3	40.91	44.26	3.35	8.18%	46.45	5.54	13.53%			
5/8"	12	134.99	143.82	8.84	6.55%	141.19	6.20	4.59%	4	47.06	50.69	3.63	7.71%	52.32	5.26	11.18%			
5/8"	18	170.26	190.45	20.19	11.86%	178.08	7.82	4.59%	6	59.36	63.55	4.19	7.06%	64.07	4.71	7.93%			
5/8"	20	182.02	205.99	23.97	13.17%	190.38	8.36	4.59%	7	65.51	69.98	4.47	6.83%	69.94	4.43	6.76%			
5/8"	25	211.41	244.85	33.44	15.81%	221.12	9.71	4.59%	8	71.66	76.42	4.76	6.64%	75.81	4.16	5.80%			
3/4"	30	274.78	322.69	47.91	17.44%	287.40	12.62	4.59%	10	95.80	102.09	6.29	6.56%	100.37	4.57	4.77%			
3/4"	50	392.36	478.11	85.75	21.86%	410.38	18.02	4.59%	15	126.54	134.24	7.70	6.08%	129.74	3.19	2.52%			
1"	75	595.45	726.96	131.51	22.09%	622.79	27.34	4.59%	25	207.60	219.71	12.11	5.84%	209.63	2.03	0.98%			
1"	100	742.43	921.24	178.81	24.08%	776.52	34.09	4.59%	30	238.34	251.87	13.52	5.67%	238.99	0.65	0.27%			
1 1/2"	150	1,181.45	1,465.73	284.28	24.06%	1,235.70	54.25	4.59%	50	411.90	435.19	23.29	5.65%	411.15	(0.75)	-0.18%			
2"	200	1,563.32	1,823.91	260.59	16.67%	1,635.11	71.79	4.59%	60	512.26	541.99	29.73	5.80%	517.95	5.69	1.11%			
2"	300	2,033.42	2,228.40	194.98	9.59%	2,126.81	93.39	4.59%	100	708.94	747.71	38.77	5.47%	723.67	14.73	2.08%			
3"	500	3,755.78	3,723.54	(32.24)	-0.86%	3,928.27	172.49	4.59%	150	1,227.47	1,299.82	72.34	5.89%	1,275.78	48.31	3.94%			
3"	1,000	6,106.28	5,745.99	(360.29)	-5.90%	6,386.77	280.49	4.59%	300	1,965.02	2,071.27	106.24	5.41%	2,047.23	82.21	4.18%			
4"	5,000	25,751.09	22,705.31	(3,045.78)	-11.83%	26,934.17	1,183.08	4.59%	1,600	8,650.26	9,074.25	423.99	4.90%	9,050.21	399.95	4.62%			
6"	10,000	51,272.96	44,879.10	(6,393.86)	-12.47%	53,628.62	2,355.66	4.59%	3,300	17,712.31	18,577.93	865.62	4.89%	18,553.89	841.58	4.75%			
8"	20,000	100,400.57	87,277.40	(13,123.17)	-13.07%	105,013.43	4,612.86	4.59%	6,600	34,676.68	36,348.40	1,671.72	4.82%	36,324.36	1,647.68	4.75%			
10"	20,000	102,504.54	89,226.70	(13,277.84)	-12.95%	107,213.97	4,709.43	4.59%	6,600	35,410.19	37,141.83	1,731.64	4.89%	37,117.79	1,707.60	4.82%			
12"	20,000	103,797.03	90,396.28	(13,400.75)	-12.91%	108,565.78	4,768.75	4.59%	6,600	35,860.79	37,629.24	1,768.44	4.93%	37,605.20	1,744.41	4.86%			
Former Monthly for Comparison Only																			
5/8"	0	57.11	52.35	(4.76)	-8.33%	59.73	2.62	4.59%	0	59.73	44.26	(15.47)	-25.90%	28.83	(30.90)	-51.73%			
5/8"	3	57.11	52.35	(4.76)	-8.33%	59.73	2.62	4.59%	3	59.73	44.26	(15.47)	-25.90%	46.45	(13.28)	-22.24%			
5/8"	6	62.99	60.12	(2.87)	-4.55%	65.88	2.89	4.59%	6	65.88	63.55	(2.33)	-3.53%	64.07	(1.81)	-2.75%			
5/8"	9	80.63	83.43	2.81	3.48%	84.33	3.70	4.59%	9	84.33	82.85	(1.48)	-1.76%	81.69	(2.64)	-3.13%			
5/8"	12	98.26	106.75	8.48	8.63%	102.77	4.51	4.59%	12	102.77	102.14	(0.63)	-0.62%	99.31	(3.47)	-3.37%			
5/8"	18	133.54	153.37	19.84	14.85%	139.67	6.13	4.59%	18	139.67	140.73	1.06	0.76%	134.54	(5.12)	-3.67%			
5/8"	20	145.30	168.91	23.62	16.26%	151.97	6.67	4.59%	20	151.97	153.59	1.62	1.07%	146.29	(5.67)	-3.73%			
3/4"	25	174.69	207.77	33.08	18.94%	182.71	8.02	4.59%	25	182.71	185.74	3.03	1.66%	175.66	(7.05)	-3.86%			
3/4"	30	215.47	259.61	44.15	20.49%	225.36	9.89	4.59%	30	225.36	230.71	5.35	2.37%	217.83	(7.53)	-3.44%			
3/4"	50	333.05	415.03	81.99	24.62%	348.34	15.29	4.59%	50	348.34	359.33	10.99	3.16%	335.29	(13.05)	-3.74%			
1"	75	470.22	534.36	64.14	13.64%	491.82	21.60	4.59%	75	491.82	509.06	17.24	3.51%	485.03	(6.79)	-1.38%			
1"	100	587.75	635.48	47.73	8.12%	614.75	27.00	4.59%	100	614.75	637.64	22.89	3.72%	613.60	(1.14)	-0.19%			
1 1/2"	150	870.56	899.70	19.15	2.20%	910.55	39.99	4.59%	150	910.55	949.49	38.94	4.28%	925.45	14.91	1.64%			
2"	200	1,157.00	1,143.93	(13.07)	-1.13%	1,210.15	53.15	4.59%	200	1,210.15	1,262.01	51.86	4.29%	1,237.97	27.82	2.30%			
2"	300	1,627.10	1,548.42	(78.68)	-4.84%	1,701.85	74.75	4.59%	300	1,701.85	1,776.31	74.46	4.38%	1,752.27	50.43	2.96%			
3"	500	2,839.04	2,586.12	(252.92)	-8.91%	2,969.46	130.42	4.59%	500	2,969.46	3,099.87	130.41	4.39%	3,075.83	106.38	3.58%			
3"	1,000	5,189.54	4,608.57	(580.97)	-11.19%	5,427.96	238.42	4.59%	1,000	5,427.96	5,671.37	243.41	4.48%	5,647.33	219.37	4.04%			
4"	5,000	24,294.59	21,048.07	(3,246.52)	-13.35%	25,410.83	1,116.24	4.59%	5,000	25,410.83	26,560.45	1,149.62	4.52%	26,536.41	1,125.59	4.43%			
6"	10,000	48,526.61	41,922.34	(6,604.27)	-13.61%	50,756.22	2,229.61	4.59%	10,000	50,756.22	53,036.03	2,279.81	4.49%	53,011.99	2,255.77	4.44%			
8"	20,000	96,259.98	83,021.11	(13,238.87)	-13.75%	100,682.79	4,422.81	4.59%	20,000	100,682.79	105,264.60	4,581.81	4.55%	105,240.56	4,557.77	4.43%			
10"	20,000	97,020.01	83,670.87	(13,349.14)	-13.75%	101,477.71	4,457.70	4.59%	20,000	101,477.71	106,058.03	4,580.32	4.51%	106,033.99	4,556.28	4.49%			
12"	20,000	97,508.34	84,060.73	(13,447.61)	-13.79%	101,988.45	4,480.11	4.59%	20,000	101,988.45	106,545.44	4,556.99	4.47%	106,521.40	4,532.95	4.44%			

In addition, it is recommended that the District consider the implementation of hauled waste rates based on type of waste delivered, as discussed within this report. While it is anticipated that a phase-in to cost of service based rates would be required to mitigate impact on some customers, this change would improve equity and reflect the differences in cost to provide hauled waste disposal services to customers.