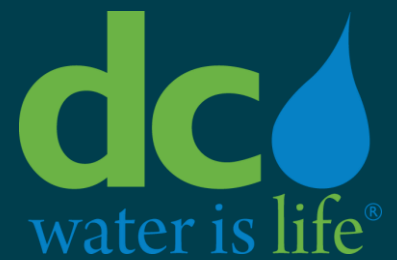




DC WATER

Cost of Service Study

Final Report / March 10, 2018



March 10th, 2018

Syed Khalil
Director of Rates and Revenue
DC Water
5000 Overlook Avenue, SW
Washington, DC 20032

Subject: 2018 Cost of Service Report

Dear Mr. Khalil,

Raftelis is pleased to provide this report describing the assumptions, process, and findings of our Water and Sewer Cost of Service Study (Study) performed for DC Water. Over the past several months, we have worked closely with DC Water completing this engagement. We would like to take this opportunity to thank you and your staff for the efforts and participation you put forth during the Study.

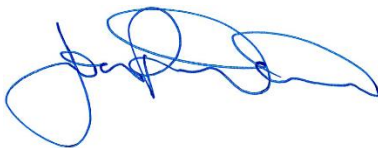
The major tasks of the Study included the following:

1. Revenue Sufficiency Model (Model) – Raftelis conducted a revenue sufficiency analysis to independently forecast operating and capital costs along with units of service for FY 2019; this served as the test year. We compared our forecasted revenue to the Financial Planning Model developed by DC Water Staff to identify any revenue shortfalls for the test year.
2. Cost of Service / Rate Equity Analysis – Raftelis reviewed and updated the cost of service allocation factors to ensure that proposed rates are equitable and that no cross subsidies exist between the various water and wastewater customer classes.

It has been a pleasure working with you, and we thank you and DC Water staff for the support provided during the course of this study.

Sincerely,

RAFTELIS FINANCIAL CONSULTANTS, INC.



Jon Davis
Vice President

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Section 1: EXECUTIVE SUMMARY

1.1. INTRODUCTION

Raftelis was engaged by DC Water to perform a Cost of Service (COS) Study (Study). In order to meet the needs of DC Water's Task Order objectives, the following deliverables were prepared:

3. Revenue Sufficiency Model (Model) – Raftelis conducted a revenue sufficiency analysis to independently forecast operating and capital costs along with units of service for FY 2019; this served as the test year. We compared our forecasted revenue to the Financial Planning Model developed by DC Water Staff to identify any revenue shortfalls for the test year.
4. Cost of Service / Rate Equity Analysis – Raftelis reviewed and updated the cost of service allocation factors to ensure that proposed rates are equitable and that no cross subsidies exist between the various water and wastewater customer classes.

A summary of the methodology and findings from the Revenue Sufficiency and COS Study is included in this Executive Summary.

1.2. REVENUE SUFFICIENCY MODEL

There are three important forecasting exercises involved in the revenue sufficiency analysis: operating expenditures, capital expenditures, and units of service, which determine revenue generation.

Units of service include number of customer accounts, billed water consumption, and equivalent residential units (ERUs). In order to forecast units of service, and thus revenue, in the most accurate manner, Raftelis reviewed billed water, customer account, and consumption data from FY 2011 through FY 2017.

Since FY 2011, billable water flows have decreased by an average annual rate of approximately 1.5%. This has occurred even though DC Water's customer base has increased slightly over the same period. The trend in declining consumption is likely related to a combination of the expanded use of low-flow fixtures, constrained economic conditions, and a broader awareness of resource conservation. This is consistent with per capita reduction in consumption Raftelis has seen in other utilities with similar demographics and service area characteristics. In terms of Equivalent Residential Units (ERUs), which are used to calculate revenue from the Clean River's Impervious Area Charge (CRIAC), we have assumed a revised count consistent with DC Water's most recent update to its impervious area database.

Based on projected consumption, accounts, and ERUs in FY 2019, Raftelis' calculated revenue from operations was consistent with DC Water's Financial Plan. In the aggregate, the variance in revenue when compared to the Financial Plan was negligible.

Our analysis found that DC Water has consistently been able to control operating expenditures at or below budgeted levels. Therefore, it was determined that budgeted operating expenditures provided a prudently conservative forecast for our sufficiency analysis. Capital expenditures consisted mainly of debt service and coverage requirements.

The revenue sufficiency forecast for the test year, FY 2019, showed revenue slightly lower than the Financial Plan by \$266,874. In total, our analysis projects minimal differences versus the Financial Plan. A comparison of total revenues and expenses is provided in Exhibit 1.1.

Exhibit 1.1: Comparison of Projected Revenues and Expenses

	Financial Plan ⁽¹⁾ (2019)	Raftelis Model (2019)	Delta
Revenue			
Operating	\$619,218,466	\$619,374,490	\$156,024
Non-Operating	<u>30,248,854</u>	<u>30,248,854</u>	=
Total: Revenue	\$649,467,320	\$649,623,344	\$156,024
Expenses			
Operating ⁽²⁾	\$338,498,706	\$338,497,996	\$(710)
Debt Service	<u>199,025,431</u>	<u>199,025,431</u>	=
Total: Expenses	\$537,524,137	\$537,523,427	\$(710)
Net Cash Available for PAYGO Capital & Other Cash Needs	\$111,943,183	\$112,099,917	\$156,734

(1) Financial Plan provided by DC Water Staff (dated 12.13.17)

(2) Includes PILOT and ROW fee.

This difference versus the Financial Plan is relatively small and is predicated on several assumptions that could materially change the outcome. A more thorough discussion of these assumptions can be found in Section 3.3 of this report. At this time, Raftelis does not see the need for altering the timing of rate increases proposed in the Financial Plan.

1.3. COST OF SERVICE / RATE EQUITY

Raftelis was asked if the proposed test year rates represented the true cost of service. In order to assure that there was no subsidization within the retail customer base, we developed test year revenue requirements and allocated them to existing rate structure components using reasonable allocation factors. Dividing the allocated revenue requirement by the units of service yields the COS-based rate. Exhibit 1.2 presents the allocation of test year revenue requirements to the water volume charge, metering fee, wastewater volume charge, and the CRIAC charge.

Exhibit 1.2: Net Revenue Requirement Allocation and Cost of Service Calculation

	2019	Water	Meter	Wastewater	CRIAC	WSRF
Retail Revenue Requirements	\$518,280,679	\$118,843,213	\$11,381,764	\$239,393,645	\$108,945,058	\$39,717,000
Percent of Retail Revenue Requirements		23%	2%	46%	21%	8%
Units of Service		32,080,694	2,949,021	30,897,804	410,000	6,304,286
Units		Ccf	equiv meters ⁽¹⁾	Ccf	ERUs ⁽¹⁾	equiv meters ⁽¹⁾
Calculated Unit Cost		\$3.70	\$3.86	\$7.75	\$23.00	\$6.30

(1) Represents annualized equivalent meters and ERUs

The results of the COS analysis support several recommendations for consideration by DC Water staff and the Board of Directors (Board) which are summarized below.

- We recommend deviating from the Financial Plan’s water and sewer volumetric rates based on the following:
 - The calculated Residential Tier 1 water volumetric rate of \$2.91 is \$0.93 lower than the Financial Plan rate of \$3.84, and the calculated Residential Tier 2 water volumetric rate of \$3.90 is \$0.93 lower than the Financial Plan rate of \$4.82.
 - The calculated Multi-Family and Non-Residential rates of \$3.37 and \$4.05 are also lower than the Financial Plan rates of \$4.30 and \$4.98, respectively.
 - The calculated sewer volumetric rate of \$7.75 per Ccf represents an increase of \$0.97 per Ccf when compared to the proposed sewer volumetric rate of \$6.78 in the Financial Plan.
 - These differences are related predominantly to a higher level of capital spending on the wastewater system compared to the water system since the last cost of service study, as well as utilizing the WSRF revenue as an offset to water revenue requirements, as it was intended to be used, rather than water and sewer. This, coupled with water and sewer rates increasing at equal rates annually over the same period, has created a need to shift revenue recovery to the sewer utility in FY 2019 to realign the rates with cost of service.
- Our COS analysis agrees with the Financial Plan with regard to the implementation of FY 2019’ metering fee, CRIAC, and WSRF. No modifications are recommended.

Section 2: INTRODUCTION

DC Water engaged Raftelis to provide financial consulting services in the fields of:

- Infrastructure financing;
- Rate revenue policy;
- Program management; and
- Financial planning related analysis and services.

Under the contract, work is assigned on a task order basis.

2.1. TASK ORDER

DC Water developed a specific task order for Raftelis under this engagement titled “Cost of Service Study 2018.” The task order included five specific objectives:

- Review of existing rates and charges for sufficient cost recovery;
- Review and recommend fees or charges not currently assessed but possibly applicable for recovery of DC Water’s ongoing activities;
- Ensure that rates and fees provide for recovery of the cost of providing services;
- Determine whether there are any cross-subsidies among the various water and wastewater retail customer classes; and

Raftelis proposed to meet these objectives through a three-step work approach.

1. Conduct a revenue sufficiency analysis to independently forecast operating and capital costs along with units of service for FY 2019; this will serve as the test year. We compared our forecasted revenue to the Financial Planning Model (Financial Plan) developed by DC Water Staff, to identify any revenue discrepancies for the test year.
2. Raftelis reviewed and updated the cost of service allocation to ensure that proposed rates are equitable and that no cross subsidies exist between the various water and wastewater customer classes.

2.2. DELIVERABLES

Raftelis proposed to prepare three deliverables for this task order:

1. A revenue sufficiency/cost of service model;
2. A report to document our study processes, results, and recommendations; and
3. A presentation to summarize the results of the study for the Retail Rates Committee of the DC Water Board.

Deliverables will be presented in draft form to Staff for review and comment. Comments will be incorporated into the finalization of the task order deliverables.

Section 3: REVENUE SUFFICIENCY ANALYSIS

The first step in the Raftelis work approach was performing a revenue sufficiency analysis. This analysis is intended to provide an independent forecast of revenues and expenditures for comparison with the Financial Plan developed by DC Water Staff. The analysis is discussed in this section.

3.1. REVENUE SUFFICIENCY MODEL

To review the revenue sufficiency in recovering DC Water's cost for providing water and sewer services; Raftelis has updated a Revenue Sufficiency Model (Model) which assesses the existing rates and charges against the revenue requirements of DC Water. This includes an independent forecast of operating and capital costs along with an analysis of the billable units of service. The resulting revenues and expenses for the test year are compared against the Financial Plan developed by Staff at the conclusion of this section. Our analysis assumes a test year of FY 2019. DC Water will be able to incorporate material differences identified in our analysis into the FY 2019 forecast.

3.1.1. Operating Expenses

DC Water's actual and projected operating expenses were incorporated into the Model based on information taken from DC Water's Revised FY 2019 and Approved FY 2018 Budgets. Raftelis conducted an independent review of forecasted escalation rates for future O&M costs and concluded that an across the board 3 percent increase was reasonable. However, it should be noted that although over the past several years inflation (as measured by the Consumer Price Index) has been lower than historical results, the potential for future inflation in excess of the 3 percent estimate is plausible. Due to the commodity intensive nature of the water and sewer industry, particularly the use of chemicals and electricity, which have increased more significantly than general inflation over the past decade, DC Water should re-visit these estimates for inflation annually as part of its financial planning process.

Utilizing these escalation criteria, Raftelis is projecting overall O&M costs of \$316,797,000 for the test year, FY 2019. It should be noted that this figure does not include expenses related to the payment in lieu of taxes (PILOT) or the right of way (ROW) fee. The forecast of O&M expenses for FY 2019 represents a 6.03% increase compared to the previous fiscal year. Exhibit 3.1 shows the increase in operating expenses from FY 2018 to FY 2019.

Exhibit 3.1: Projected O&M Expenses

Operating Expenses	FY 2018	FY 2019	Increase
Personnel Services	\$128,132,000	\$144,361,000	12.7%
Contractual Services	79,355,000	81,679,000	2.9%
Water Purchases	30,156,000	30,520,000	1.2%
Chemicals & Supplies	30,659,000	32,082,000	4.6%
Energy/Fuel/Comm./Rental	29,399,000	26,915,000	-8.4%
Equipment	1,071,000	1,240,000	15.8%
Total: Operating Expenses	\$298,772,000	\$316,797,000	6.0%

3.1.2. Units of Service

To determine DC Water’s projection of water revenues, historic billing system data was analyzed and included in the Model. Billing data from FY 2011 through FY 2017 was provided by DC Water Staff, which consisted of billed water usage by customer class and category, the number of water meters by meter size per customer class and category, and impervious area as measured by equivalent residential units (ERU).

Water consumption used in the Model is based on actual FY 2017 usage with adjustments in FY 2018 and FY 2019 to reflect a projected decline in consumption of 3.0% annually in residential and commercial consumption and 1.5% in multifamily, municipal, and federal consumption. These declines in consumption was based on a historical analysis of flow data from FY 2011 through FY 2017. Raftelis believes that these reductions are appropriate due to expanded use of low-flow plumbing fixtures and a growing culture of resource conservation. This is consistent with the per capita reduction seen in other utilities with similar demographics and service area characteristics.

Our test year assumes the residential water and wastewater classes also include a reduction of 345,600 hundred cubic feet (Ccf) based on a projection for eligible Customer Assistance Program (CAP) accounts. Raftelis’ estimation of CAP accounts is consistent with the Financial Plan, which incorporates 6,000 eligible CAP accounts and an approximate consumption of 48 Ccf per account, per year.

Projected wastewater flow is populated from actual water billings. However, the commercial wastewater category estimated consumption includes units of service for the water exempt category, which includes the Soldiers Home and Howard University. Based on input from DC Water Staff, it was determined that the water exempt category is still required to pay for sewer services. The exemption from water service billings is a result of an existing agreement where DC Water maintains water facilities at these locations free of charge. Historical and projected consumption is displayed in Exhibit 3.2. Additional detail providing DC Water’s historical and projected consumption per class and category can be found in Schedule B of the Appendices.

Exhibit 3.2: Historical and Projected Consumption per Class and Category

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Water Consumption	Historical	Historical	Historical	Historical	Historical	Historical	Historical	Projected	Projected
Residential Adjusted	6,419,929	7,725,096	7,518,576	7,439,934	7,085,413	6,916,584	6,698,718	6,544,989	6,311,199
Residential	6,736,729	8,041,896	7,864,176	7,785,534	7,431,013	7,262,184	7,044,318	6,832,989	6,627,999
Tier 1						3,848,958	3,733,489	3,621,484	3,711,680
Tier 2						3,413,226	3,310,830	3,211,505	2,916,320
CAP Accounts	-316,800	-316,800	-345,600	-345,600	-345,600	-345,600	-345,600	-288,000	-316,800
Commercial	10,584,115	13,165,672	13,429,574	13,295,278	13,428,787	12,359,896	12,019,443	11,658,860	11,309,094
Multi-family	6,416,308	7,533,047	7,466,384	7,391,720	7,437,925	8,889,754	9,013,474	8,878,272	8,745,098
Municipal	893,598	804,839	719,481	712,286	857,459	841,584	788,862	777,029	765,374
Federal	4,867,490	5,997,204	5,997,204	5,937,232	5,319,948	4,496,362	4,335,937	4,270,898	4,206,834
D.C. Housing Authority	676,223	749,065	749,065	741,574	795,696	761,401	765,900	754,412	743,095
Total: Water Consumption	29,857,663	35,974,923	35,880,284	35,518,025	34,925,228	34,265,581	33,622,334	32,884,459	32,080,694
Change		20.5%	-0.3%	-1.0%	-1.7%	-1.9%	-1.9%	-2.2%	-2.4%

Customer data from FY 2017 was provided by DC Water Staff and served as the basis for projecting customer growth or decline. Because of low historical growth in accounts, user accounts were conservatively projected through FY 2019 to remain constant. Further detail for individual escalation criteria per customer class, category and meter size may be found in Schedule C of the Appendices.

Historical actual and estimated, and future projected customers are presented in Exhibit 3.3.

Exhibit 3.3: Historical and Projected Customers per Class and Category

Customer Accounts	2016 (act)	2017 (est)	2018 (proj)	2019 (proj)
Commercial	10,798	10,798	10,798	10,798
Federal	488	488	488	488
DC Housing	1,128	1,128	1,128	1,128
Municipal	544	544	544	544
Multi-Family	7,500	7,500	7,500	7,500
Residential	104,435	104,435	104,435	104,435
Exempt	41	41	41	41
Wholesale	27	27	27	27
Total: Customer Accounts	124,961	124,961	124,961	124,961
	0.00%	0.00%	0.00%	0.00%

Raftelis also projected ERUs for use in the analysis of the Clean River’s Impervious Area Charge (CRIAC). Using a revised ERU count from DC Water’s most recent CRIAC Model, Raftelis assumed 410,000 CRIAC units which DC Water expects to capture annually at least through FY 2019.

3.1.3. Capital Plan Financing

Financing for the Capital Plan is consistent with data from the Financial Plan and is displayed in summary in Exhibit 3.4.

Exhibit 3.4: CIP Financing Summary

	FY 2018	FY 2019
Beginning Balance	\$ 172,705,647	\$ 249,878,053
Sources of Funds		
Proceeds from Rev. Bonds	\$ 300,000,000	\$ 110,000,000
System Availability Fee	1,925,000	3,850,000
Transfer from Operations - CRIAC	13,513,341	30,824,259
Transfer from Operations	87,803,245	69,948,351
EPA Grants /DC Reimbursement	23,620,069	44,338,617
CSO Grants	8,500,000	-
Wholesale Customer Capital Contributions	90,214,000	65,851,000
Interest Income	1,548,750	2,981,250
Subtotal: Sources	\$ 527,124,405	\$ 323,793,477
Uses of Funds		
Water Projects	\$ 58,044,000	\$ 45,747,000
Blue Plains Projects	95,485,000	74,617,000
Sanitary Sewer Projects	29,802,000	32,947,000
Combined Sewer Overflow / Long Term Control Plan	181,816,000	200,343,000
Stormwater Projects	945,000	4,909,000
Non Process Facilities	32,194,000	33,107,000
Washington Aqueduct Division Projects	11,768,000	12,930,000
Capital Equipment	27,135,000	27,400,000
Meter Replacement / AMR / CIS	12,763,000	7,118,000
Reimbursement for Prior Capital Expend.	-	-
Subtotal: Uses	\$ 449,952,000	\$ 439,118,000
Sources Minus Uses	\$ 77,172,405	\$ (115,324,523)
Capital Contingency Reserve for LTCP	-	30,000,000
Sources Minus Uses Net of Reserves	\$ 77,172,405	\$ (85,324,523)
Ending Balance	<u>\$ 249,878,053</u>	<u>\$ 164,553,530</u>

DC Water is faced with a significant capital program over the forecast period to address water and wastewater infrastructure needs and system improvements. Further detail of the CIP may be found in Schedule E of the Appendices. For the water utility, the primary drivers of the capital program include repair, replacement, and rehabilitation of water distribution system infrastructure; water pumping facility repairs and improvements; continued implementation of the water lead abatement program; water storage facilities repairs and improvements; and capital contributions to the Washington Aqueduct related to water source of supply. For the wastewater utility, the primary drivers of the capital program include improvements at the Blue Plains WWTP, including enhanced nitrogen removal facilities; repair, replacement, and rehabilitation of the

collection and conveyance systems; and Environmental Protection Agency (“EPA”) consent decree requirements associated with DC Water’s Long-term Combined Sewer Overflow Control Plan (“CSO LTCP”).

DC Water anticipates that the capital plan in FY 2019 and FY 2020 will be financed through a mix of proceeds from revenue bonds and commercial paper, federal grants, District of Columbia reimbursements, capital contributions from wholesale wastewater customers, revenues generated internally from rates, and cash reserves. Based on our evaluation, it appears that the Financial Plan provides for sufficient funding of the capital program. Raftelis also evaluated the proposed capital financing structure, with particular attention paid to assumptions related to the cost of financing for long-term revenue bonds. DC Water’s current underlying bond rating from Standard and Poor’s of AAA is an investment grade rating that indicates a strong capability to meet financial obligations. Moody’s carries a rating of Aa1 for DC Water. Based on current market conditions, and assuming DC Water would either insure or fund a debt service reserve for future revenue bonds, the current estimated range of interest rates assumed in the Financial Plan is reasonable and provides a level of conservatism in the forecast. Regardless, DC Water should revise these assumptions, as appropriate, during its annual financial planning process. It is possible that alternative long-term financing options could be utilized which would require an update to the projected debt service repayment assumptions.

3.1.4. Debt Service

Debt service within the Model is based, in part, on information taken from the Financial Plan. Raftelis calculated FY 2019 debt service based on projected funding needs in the CIP. Specifically, we assumed an additional \$300 million in debt would be issued in the middle of FY 2018 with a half-year debt service payment. Full debt service on this projected issuance was assumed to occur in FY 2019. It was assumed another \$110 million would be issued in the middle of FY 2019 with a half year debt service payment. Full debt service on this projected issuance was assumed to occur in FY 2020. These assumptions are consistent with the Financial Plan. A summary of the projected debt from FY 2018 to FY 209 is displayed below in Exhibit 3.5. Additional detail for the yearly debt service payments may be found in Schedule F of the Appendices.

Exhibit 3.5: Projected Debt Service

		2018	2019
Existing Debt			
Senior Debt			
	1998 Revenue Bonds	\$23,367,025	\$23,365,950
	Series 2009A	4,436,250	-
	Series 2014A	16,849,000	16,849,000
	Series 2017A&B Revenue Bond	17,071,500	17,069,250
<i>Subtotal: Senior Debt</i>		61,723,775	57,284,200
Subordinated Debt			
	District G.O. Bonds:	\$-	\$-
	Jennings Randolph:	805,192	805,191
	Little Seneca Reservoir:	-	-
	Commercial Paper	500,000	500,000
	Series 2003 Subordinate Bond	-	-
	Series 2007A Subordinate Bond	-	-
	Series 2008A Subordinate Bond	7,208,250	-
	Series 2010A Subordinate Bond	11,094,004	11,094,004
	Series 2012 Subordinate Bond	21,057,900	21,060,650
	Series 2013A Subordinate Bond	14,994,250	14,994,250
	Series 2014B Subordinate Bond	3,250,000	3,250,000
	Series 2014C Subordinate Bond	17,468,100	17,998,100
	Series 2015A,B Subordinate Bond	18,100,663	19,503,263
	Series 2016A Subordinate Bond	17,419,713	28,954,713
	Series 2016B Subordinate Bond	857,500	857,500
<i>Subtotal: Subordinated Debt</i>		\$112,755,572	\$119,017,671
Total: Existing Debt		\$176,479,347	\$176,301,871
Planned Debt			
	WASA Bonds - Planned	\$61,913,207	\$80,817,765
	Capital Equipment Financing	-	-
Total: Planned Debt		\$61,913,207	\$80,817,765
Total: Debt		\$236,392,553	\$257,119,635
<i>% Change</i>		<i>14.2%</i>	<i>8.8%</i>

3.2. COMPARISON TO FORECAST

DC Water's Financial Plan projects a surplus of \$111,519,575 in FY 2019. The small variance of (\$156,024) when compared to Raftelis' forecast of a surplus of \$111,676,309 is a result of a several factors which are discussed below. While individual variances are highlighted in the following sections, a complete comparison schedule vs. the Financial Plan is also found in Schedule G of the Appendices.

3.2.1. Operating Revenue

As discussed previously in Section 3.1.2, Raftelis has estimated billable water and sewer flows based on FY 2017 data with adjustments made in FY 2018 and FY 2019 to reflect an anticipated decline in consumption. As a result, Raftelis is projecting operating revenues of \$619,374,490, which is an insignificant \$156,024 less than operating revenues in DC Water’s Financial Plan. A summary of the operating revenue comparison of the Model and the Financial Plan is provided in Exhibit 3.6.

Exhibit 3.6: Operating Revenue Comparison

Operating Revenue	Financial Plan 2019	Raftelis Model 2019	Delta
Volumetric Charges	\$358,842,575	\$358,998,599	\$156,024
Metering Fee	10,776,046	10,776,046	-
WSRF	39,717,000	39,717,000	
Right of Way Fee/PILOT	21,700,996	21,700,996	-
CRIAC CSO Revenue	108,945,058	108,945,058	-
Wholesale Revenue	79,236,790	79,236,790	-
Total: Operating Revenue	<u>\$619,218,466</u>	<u>\$619,374,490</u>	<u>\$156,024</u>

Additional detail associated with the difference in specific operating revenue categories is provided below. It should be noted that operating revenue is based on projected receipts.

3.2.1.1 Volumetric Charges

Revenues from the volumetric charges are calculated primarily based on the projected rates from Raftelis’ COS results multiplied by projected consumption. Projected revenue from the Federal Government is based on information available in the Financial Plan, as the Federal Government pays for service in advance, with a reconciliation performed annually based on actual consumption. This results in volumetric charge revenue which is \$156,024 less than DC Water’s Financial Plan. The slightly higher level of revenue is still consistent with the Financial Plan, which supports the reasonableness of DC Water’s existing forecast.

3.2.1.2 Metering Fee

Revenues from the metering fee are calculated based on the projected rates in the Financial Plan multiplied by the projected customers per meter size. Raftelis’ projection of revenue from the metering fee are consistent with the revenue in DC Water’s Financial Plan. DC Water is projected to recover \$10,776,046 in FY 2019.

3.2.1.3 Water System Replacement Fee (WSRF)

Revenues from the WSRF are calculated based on the projected rates in the Financial Plan multiplied by the projected customers per meter size. Raftelis’ projection of revenue from the WSRF are consistent with the revenue in DC Water’s Financial Plan. DC Water is projected to recover \$39,717,000 in FY 2019.

3.2.1.4 Impervious Area Charge

Raftelis is projecting DC Water to recover \$108,945,058 in FY 2019 which is consistent with the revenue projected from the CRIAC in the Financial Planning Model.

3.2.2. Non-Operating Revenue

Raftelis' projection of non-operating revenues reflects the same amount as DC Water's Financial Plan.

A comparison of total revenues is presented in Exhibit 3.7.

Exhibit 3.7: Total Revenue Comparison

	Financial Plan 2019	Raftelis Model 2019	Delta
Operating Revenue			
Volumetric Charges	\$358,842,575	\$358,998,599	\$156,024
Metering Fee	10,776,046	10,776,046	-
Infrastructure Surcharge	39,717,000	39,717,000	
Right of Way Fee/PILOT	21,700,996	21,700,996	-
CRIAC CSO Revenue	108,945,058	108,945,058	-
Wholesale Revenue	79,236,790	79,236,790	-
<i>Subtotal: Operating Revenue</i>			
Non-Operating Revenue			
Interest Earnings	\$2,547,000	\$2,547,000	-
Other Revenue	27,085,000	27,085,000	-
Transfer from Rate Stabilization Fund	-	-	-
Northern Virginia Debt Service	193,246	193,246	-
<i>Subtotal: Non-Operating Revenue</i>	\$2,547,000	\$2,547,000	-
Total: Revenue	<u>\$649,043,712</u>	<u>\$649,199,736</u>	<u>\$156,024</u>

The Model forecasts total revenues in the test year (FY 2019) that are approximately \$156,024 less than total revenue projected in the Financial Plan. In the aggregate, this revenue discrepancy is of little to no significance.

3.2.3. Operating Expenses

Operating expenses in the Model are inputted from the Revised FY 2017 and Approved FY 2018 Budgets and forecasted for FY 2019. When compared to the Financial Plan, FY 2019 operating expenses are nearly identical. A comparison of the Model and Financial Plan operating expenses can be viewed in Exhibit 3.8.

Exhibit 3.8: Operating Expense Comparison

Operating Expenses	Financial Plan 2019	Raftelis Model 2019	Delta
Personnel Services	\$ 144,361,000	\$144,361,000	\$-
Contractual Services	81,679,000	81,679,000	-
Water Purchases	30,520,000	30,520,000	-
Chemicals & Supplies	32,082,000	32,082,000	-
Utilities & Rent	26,915,000	26,915,000	-
Small Equipment	1,240,000	1,240,000	-
PILOT/ROW Fee	21,701,706	21,700,996	(710)
Total: Operating Expenses	\$338,498,706	\$338,497,996	\$(710)

3.2.4. Debt Service

Because Raftelis updated the Model’s existing debt service based on actual principal and interest schedules provided in the official statement to investors, and since the same assumptions were used to forecast planned debt issuance, there is not a difference between the Model and the Financial Plan’s debt service for FY 2019. A summary of the debt service comparison is displayed in Exhibit 3.9.

Exhibit 3.9: Debt Service Comparison

Debt Service	Financial Plan 2019	Raftelis Model 2019	Delta
1998 Revenue Bonds	\$23,365,950	\$23,365,950	\$ -
Series 2014A	16,849,000	16,849,000	-
Series 2017A&B Revenue Bond	17,069,250	17,069,250	
Jennings Randolph	805,191	805,191	-
Commercial Paper	500,000	500,000	-
Series 2010A Subordinate Bond	11,094,004	11,094,004	-
Series 2012 Subordinate Bond	21,060,650	21,060,650	-
Series 2013A Subordinate Bond	14,994,250	14,994,250	-
Series 2014B Subordinate Bond	3,250,000	3,250,000	-
Series 2014C Subordinate Bond	17,998,100	17,998,100	-
Series 2015A,B Subordinate Bond	19,503,263	19,503,263	-
Series 2016A Subordinate Bond	28,954,713	28,954,713	
Series 2016B Subordinate Bond	857,500	857,500	
EMCP	500,000	500,000	
DC Water Bonds Planned	22,223,560	22,223,560	-
Total: Debt Service	\$199,025,431	\$199,025,431	\$ -

To summarize, a comparison of total revenues and expenses is provided in Exhibit 3.10.

Exhibit 3.10: Comparison of Revenues and Expenses

	Financial Plan ⁽¹⁾ (2019)	Raftelis Model (2019)	Delta
Revenue			
Operating	\$619,218,466	\$619,374,490	\$156,024
Non-Operating	<u>30,248,854</u>	<u>30,248,854</u>	=
Total: Revenue	\$649,467,320	\$649,623,344	\$156,024
Expenses			
Operating ⁽²⁾	\$338,498,706	\$338,497,996	\$(710)
Debt Service	<u>199,025,431</u>	<u>199,025,431</u>	=
Total: Expenses	\$537,524,137	\$537,523,427	\$(710)
Net Cash Available for PAYGO Capital & Other Cash Needs	\$111,943,183	\$112,099,917	\$156,734

(1) Financial Plan provided by DC Water Staff (dated 12.17.17)

(2) Includes PILOT and ROW fee.

Section 4: COST OF SERVICE ANALYSIS

Raftelis evaluated the level of rate equity under the current rate structure. Specifically, Raftelis was tasked with determining if existing water and sewer customer classes were subsidizing each other by developing cost of service-based rates and comparing them to proposed DC Water rates for the test year, FY 2019. Raftelis used the Model, described in the previous section, to allocate costs and calculate cost of service-based rates.

4.1. REVENUE REQUIREMENTS

To forecast the level of revenue necessary to ensure financial sufficiency for the utility, revenue requirements must be identified and projected for the test year. Revenue requirements include all costs incurred to operate the water and wastewater systems. These costs represent the annual cash needs of the utility for operation, but also examine existing and proposed debt, debt service coverage requirements, and the funding of target reserve fund balances. Development of revenue requirements includes capital costs and funding sources identified in DC Water’s capital improvement plan such as revenue bonds, capital reserves, and current year rate revenues. The revenue requirements identified in this process represent the costs that are currently being recovered from the retail rates.

Operations and Maintenance Expenses. First and foremost, the utility must recover costs associated with the routine operation, maintenance, and repair of the system. This component includes items in the DC Water budget such as labor, power, materials, PILOT, ROW fees, and most other costs associated with the day-to-day functioning of the system.

Capital Improvement Plan. Capital needs are typically the single largest component of a water and wastewater utility's cost structure. These expenditures pay for necessary infrastructure rehabilitation, replacements, expansions, and upgrades. Often, a portion of these costs are recovered through fund balance contributions or rate revenue with the balance funded through debt. Since DC Water has designed its metering fee to also recover ongoing AMR costs, this item in the Model has been added as an adjustment and included in the net revenue requirements.

Capital Financing Plan. Capital needs can be funded in a variety of ways, including, for example, revenue bonds, revolving fund loans, and rate revenues. By using the optimal blend of funding sources, it is possible to manage rate impacts, financial stability, and equitably allocate costs to customers over the useful life of the assets.

Debt Service Coverage Requirements. In addition to meeting cash flow needs, revenues must be adequate to satisfy debt service coverage requirements set forth in DC Water's bond covenants. These requirements stipulate minimum debt coverage ratios as well as what revenues and expenses must be included in calculating coverage ratios.

The test year revenue requirements are presented in Exhibit 4.1.

Exhibit 4.1: Test Year Revenue Requirements (FY 2019)

Revenue Requirements	2019
----------------------	------

Operating Expenses	\$316,797,000
Debt Service	199,025,431
Unadjusted Revenue Requirements	\$515,822,431
Adjustments:	
Adjustments for Coverage	111,520,285
Adjusted Revenue Requirements	\$627,342,716

The revenue requirements are offset by other operating and non-operating income from sources in addition to user charges. The net revenue requirements represent the level of revenues that must be generated from user charges to meet the utility's operating and capital needs. Revenue offsets itemized within the Model include wholesale revenues, miscellaneous fees, and interest income. Exhibit 4.2 summarizes the revenue offsets in the test year.

Exhibit 4.2: Test Year Revenue Offsets (FY 2019)

Revenue Offsets	FY 2019
<i>Wholesale Revenue</i>	
LCSA + PI	\$(8,865,806)
WSSC	(57,627,788)
Fairfax County	(12,743,197)
<i>Other Revenue</i>	
IMA Indirect Cost Reimb. For Capital Projects	(3,215,000)
Dev. Contr/Water Services Fees, Taps	(4,000,000)
Dev. Contr/Liability Deposits/Sewer Service Fees	(2,000,000)
Commercial Water Maintenance	(32,000)
DC Fire Protection Fee	(10,796,000)
Transfer from DC PILOT/ROW Fund	-
DC Contribution of 50% PILOT Escrow to DCW	-
Sales to DC Agencies-Steam/Meter	(170,000)
Misc. Rev: Bid Deposits, Fleet Auction, Compost Sales	(2,000,000)
Pipe Repair Sales/Replacement	(22,000)
Stormwater	(1,000,000)
Northern Virginia Debt Service	(193,246)
Interest Income	(2,547,000)
Total: Revenue Offsets	\$(105,212,036)

4.2. ALLOCATION OF COSTS

Once the revenue requirements were projected through the test year, Raftelis then evaluated the appropriateness of the allocation factors used in the most recent cost of service analysis. Specifically, Raftelis reviewed each major category of operating costs and identified a reasonable basis of allocation amongst the water volumetric charge, wastewater volumetric charge, and metering fee. Costs allocated to the wastewater volumetric charge were then allocated between the wastewater volumetric charge and the impervious area fee based on information available in DC Water’s most recent CRIAC model.

Revenue requirements and revenue offsets related directly to providing water service or sewer service were allocated 100% to water and sewer, respectively. Revenue requirements related entirely to the CSO LTCP were allocated 100% to the CRIAC. A portion of customer service costs associated with meter maintenance were allocated to the metering fee while the remaining costs were divided equally between water and sewer since almost all customers receive a bill for both services. Permits were also allocated equally between water and wastewater. For other direct operating costs, such as Maintenance Services, the same allocation factors were used as in the prior COS Study. Engineering and Technical Services were allocated based on project expenditures in the CIP. Raftelis also used similar percentages to the last COS study to allocate indirect costs, which were based on reasonable allocation factors, such as revenues, employees, vehicles, etc., that were related to individual budget centers. These assumptions are consistent with factors identified in DC Water’s existing inter-municipal agreements (“IMA”). It should be noted that a small portion (1.1%) of several direct operating cost budget centers and indirect costs were allocated to the CRIAC.

Responsibility for debt service coverage is distributed proportionately amongst the water volumetric charge, wastewater volumetric charge, and CRIAC. Raftelis reviewed and updated allocations of existing debt service based on actual CIP expenditures. Future debt service associated with planned revenue bonds were allocated proportionately based on the projects identified in the CIP. Further detail of the allocation costs may be found in Schedule H of the Appendices.

Exhibit 4.3 presents the allocation of test year revenue requirements to the water volumetric charge, metering fee, wastewater volumetric charge, and the CRIAC charge.

Exhibit 4.3: Net Revenue Requirement Allocation and Cost of Service Calculation

	2019	Water	Meter	Wastewater	CRIAC	WSRF
Retail Revenue Requirements	\$518,280,679	\$118,843,213	\$11,381,764	\$239,393,645	\$108,945,058	\$39,717,000
Percent of Retail Revenue Requirements		23%	2%	46%	21%	8%
Units of Service		32,080,694	2,949,021	30,897,804	410,000	6,304,286
Units		Ccf	equiv meters ⁽¹⁾	Ccf	ERUs ⁽¹⁾	equiv meters ⁽¹⁾
Calculated Unit Cost		\$3.70	\$3.86	\$7.75	\$23.00	\$6.30

(1) Represents annualized equivalent meters and ERUs.

4.3. METERING FEE

The cost pool for the metering fee includes total revenue requirements of \$11,381,764. This total includes a pro forma adjustment for historical cost of the AMR program, ongoing AMR costs, and approximately 35 percent of the customer service budget center, which represents a portion of the costs associated with meter maintenance. Based on these allocations, the COS rate of \$3.86 is comparable to the meter fee identified in the Financial Plan.

4.4. WATER VOLUMETRIC RATE

Raftelis previously recommended a class-based water volumetric rate to DC Water, which implemented one starting in 2016. This type of rate structure is properly done when the customer classes that exhibit more peaking in their water usage when compared to other customer classes are required to pay for the related costs. This involves allocating water system volumetric costs between base, or average, demand and peak-demand, which is a two-step allocation process.

The first step involves the allocation of all water system cost into functional components consistent with the operating characteristics of the utility. For DC Water these functional components included:

- Source of Supply and Treatment;
- Distribution;
- Storage;
- Pumping;
- Customer Service/Meter; and
- Administration/General.

Raftelis worked closely with DC Water Staff to review and evaluate water system operating costs and developed allocation factors to assign these costs into the categories identified above. Raftelis also reviewed historical capital expenditures identified in the Financial Plan over the past decade, which were used a basis of allocating debt service and coverage between water source of supply and treatment and the distribution system. Other water revenues exclusive of user charges (revenue offsets) were also allocated to the various system functions based on the revenue source. The most significant revenue offsets of note were the DC Fire Protection Fee, which was allocated evenly between water source of supply and treatment and water distribution, and water service fees/taps, which was assigned to water distribution. Exhibit 4.4 summarizes the allocation of water system costs to functional components. Supporting detail for the cost allocations is provided in Schedule J of the Appendices.

Exhibit 4.4: Allocation of Water Costs into Functional Components

Net Water System Costs	FY 2019	Base	Extra Capacity	Customer Service/Meter (1)	Admin/General
Source of Supply	\$45,086,880	\$28,855,603	\$16,231,277	\$-	\$-
Distribution	66,290,744	59,661,670	6,629,074	-	-
Storage	3,469,348	2,775,478	693,870	-	-
Pumping	4,389,532	2,194,766	2,194,766	-	-
Customer Service/Meter	5,690,882	-	-	5,690,882	-
Admin/General	(393,291)	-	-	-	(393,291)
	\$124,534,095	\$93,487,517	\$25,748,987	\$5,690,882	\$(393,291)

(1) Includes portion of metering charge allocated to water.

Once costs were allocated into functional components, the next step in the process was to allocate these functional costs into categories, particularly volumetric costs into base and peaking components. Raftelis, through discussion with DC Water staff and industry experience, developed reasonable percentages for distributing costs between serving base and peak demand.

Water Supply & Treatment

DC Water, the City of Arlington (Arlington), and the City of Falls Church (Falls Church) purchase potable water from the Washington Aqueduct. The total annual cost of the Aqueduct, which is operating by the Army Corps of Engineers, is allocated amongst these three utilities based on both average and peak usage. Specifically, the cost allocation methodology assigns costs into fixed and variable components. Fixed costs, which represent the majority of operating costs and include costs related to providing system capacity, are allocated based on peak-daily demand. Variable costs, which are a function of the amount of water produced and include chemicals and electricity primarily, are allocated based on average usage.

It is important to note the wholesale water purchase methodology does not include a specific allocation of system capacity that DC Water has “purchased” in the Washington Aqueduct. However, DC Water pays for extra water capacity to meet peak demand, so it is reasonable to allocate some portion of source of supply and treatment costs to an extra capacity component. For the purpose of this analysis, and based on a review of historical billing data, Raftelis assigned 2/3 of water source of supply and treatment to the component and 1/3 of water source of supply and treatment to the extra capacity component. Since DC Water does not own water production facilities, and although it would be preferable to review more detailed water production statistics to enhance the precision of this estimate, allocating 1/3 source of supply and treatment costs to extra capacity is reasonable and consistent with industry standards and practices.

Water Distribution

Based on the results of the Customer Class Segmentation Study, it does not appear that DC Water’s system peaks significantly in aggregate. This is consistent with a predominantly urban customer base with more limited elective consumption, particularly irrigation from residential customers. As a result, a significant portion of water transmission and distribution costs are associated with serving a base level of demand. However, it is not unreasonable to allocate a small percentage of distribution system costs to a peaking component, as DC Water has sized its system to serve peak demand. For this COS analysis, Raftelis assigned 10% of the distribution system costs to system peaking. This is consistent to percentages used in other studies for utilities with similar operating characteristics.

Water Storage

Like water distribution, it is reasonable to allocate a portion of water storage costs to a peaking component. DC Water utilizes storage facilities to provide adequate supply and pressure to serve both average and peak demand. Again, due to its limited amount of system peaking, this should represent a relatively small portion of total storage costs. For this COS analysis, Raftelis assigned 20% of the storage costs to system peaking. This is consistent to percentages used in other studies for utilities with similar operating characteristics.

Water Pumping

A significant portion of the costs allocated to water pumping are associated with the electricity required to operate the pumping facilities. During peak flows, DC Water is subject to additional demand charges for power, and it is appropriate to allocate these costs to a peaking component. Additionally, like both water distribution and storage, DC Water has sized its pumping equipment to serve both average and peak demand. As a result, Raftelis has assigned 50% of the pumping costs to system peaking. This is consistent to percentages used in other studies for utilities with similar operating characteristics.

Exhibit 4.5 summarizes the allocation of water system costs to functional categories. Supporting detail for the cost allocations is provided in Schedule K of the Appendices.

Exhibit 4.5: Allocation of Water Costs into Functional Categories

	\$ Allocated to Water	Source of Supply & Treatment	Distribution	Storage	Pumping	Customer Service/ Meter (1)	Admin/ General
<i>Water System Costs</i>							
Operations	\$77,338,792	\$31,769,809	\$27,485,517	\$3,469,348	\$4,389,532	\$2,574,546	\$7,650,040
Administration	34,041,900	-	-	-	-	-	34,041,900
Debt Service & Coverage	70,878,428	19,093,301	48,668,791	-	-	3,116,336	-
Revenue Offsets	(57,725,025)	(5,776,230)	(9,863,565)	-	-	-	(42,085,231)
Net Water System Revenue Requirements	\$124,534,095	\$45,086,880	\$66,290,744	\$3,469,348	\$4,389,532	\$5,690,882	\$(393,291)
% Allocation	100.0%	36.2%	53.2%	2.8%	3.5%	4.6%	-0.3%

Raftelis reviewed and evaluated peak monthly usage compared to average monthly usage for a five-year period from 2012-2017 for its established customer classes. The peak monthly capacity factors from this analysis were applied to projected annual usage in FY 2019. The results are presented in Exhibit 4.6.

Exhibit 4.6: Peak Monthly Flow by Customer Class

	Base		Max-Month		
	Annual Usage (Ccf)	Average Monthly Usage (Ccf)	Peaking Factor	Total Monthly Capacity (Ccf)	Extra Capacity (Ccf)
Single-Family Residential	6,311,199	525,933	1.16	610,083	84,149
Multi-Family Residential (1)	9,488,193	790,683	1.16	917,192	126,509
Non-Residential (1)	16,281,302	1,356,775	1.39	1,885,917	529,142
	32,080,694				739,801

(1) Includes Public and Private DCHA.

As seen above, the max month total capacity is determined by multiplying the average monthly usage by the peaking factor for each customer class. The total monthly capacity is subtracted from the average monthly usage to determine the extra capacity. The distribution of flows per customer class based on both an average day and peak-month was then determined (see Exhibit 4.7).

Exhibit 4.7: Allocation of Flows by Customer Class

	Base Flows		Peak Flows	
	Average Monthly Usage (Ccf)	% Total	Extra Capacity (Ccf)	% Total
Residential	525,933	19.7%	84,149	11.4%
Multi-Family Residential	790,683	29.6%	126,509	17.1%
Non-Residential	1,356,775	50.8%	529,142	71.5%
	2,673,391	100%	739,801	100%

The percentages identified above for each customer class were multiplied by the costs allocated to base and peak flows (see Exhibit 5.10), respectively. The result was a distribution of water volumetric revenue requirements by customer class and base and peaking components (see Exhibit 4.8).

Exhibit 4.8: Allocation of Base and Peak Volumetric Costs by Customer Class

Customer Class	Base	Max-Month	Base	Peaking	Allocation for Volumetric Revenue Requirements
Residential	19.7%	11.4%	\$18,314,323	\$2,928,842	\$21,243,165
Multi-Family/DC Housing	29.6%	17.1%	27,533,569	4,403,191	31,936,760
Non-Residential	50.8%	71.5%	47,246,334	18,416,954	65,663,288
	100.0%	100.0%	\$93,094,226	\$25,748,987	\$118,843,213

The volumetric revenue requirements identified above were then divided by annual consumption for each customer class, to develop separate, class-based volumetric rates (see Exhibit 4.9).

Exhibit 4.9: Class-Based Volumetric Rates

Customer Class	Volumetric Revenue Requirements	Annual Usage (Ccf)	Class Based Volumetric Rate (per Ccf)
Residential Tier 1	\$ 9,851,523	3,394,880	\$2.91
Residential Tier 2	\$ 11,344,651	2,916,320	\$3.90
Multi-Family	\$ 31,936,760	9,488,193	\$3.37
Non-Residential	\$ 65,663,288	16,281,302	\$4.05
	\$ 118,843,213	32,080,694	

Allocations to the water volumetric cost pool result in revenue requirements of \$118,843,213, which is then divided by projected units of service for the test year of 32,080,694 Ccf. The calculated Tier 1 water volumetric rate of \$2.91 represents a decrease of \$0.93 over the proposed FY 2019 rate of \$3.84 identified in the Financial Plan. Raftelis' calculated Tier 2 water volumetric rate of \$3.90 is \$0.92 less than the \$4.82 stated in the Financial Plan.

Non-Residential customers had the highest peaking factors and, therefore, were allocated a higher proportion of peaking costs. This results in a volumetric rate for Non-Residential customers of \$4.05 per Ccf, which is \$0.93 per Ccf lower than the average volumetric rate of \$4.98 per Ccf. Conversely, Multi-Family customers had lower peaking factors and, therefore, were allocated a lower proportion of peaking costs. This results in a volumetric rate for Multi-Family customers of \$3.37 per Ccf, which is \$0.93 per Ccf lower than the average volumetric rate of \$4.30 per Ccf.

The primary difference in the calculated water volumetric rate and the proposed FY 2019 rate in the Financial Plan relates to a higher level of capital spending on the wastewater system compared to the water system since the last cost of service study, as well as the reallocation of WSRF revenue to solely the water volumetric rate. DC Water has historically increased water and wastewater rates at the same rate, yet costs have increased over that time differently, with wastewater costs rising faster than water. The combination of these historical occurrences suggests a need to rebalance water and wastewater volumetric rates.

4.5. WASTEWATER VOLUMETRIC RATE

Wastewater volume revenue requirements total \$239,393,645. The revenue requirements were then divided by the projected test year consumption of 30,897,804 Ccf which result in a unit cost of \$7.75. This represents an increase of \$0.97 versus the proposed FY 2019 rate of \$6.78. Similar to the water volume charge, the calculated wastewater volume charge differs from the Financial Plan because of the aforementioned historical across-the-board rate increases and disproportionate cost increases.

4.6. METERING FEE

Total revenue requirements allocated to the metering fee for the test year, FY 2019, totaled \$11,381,764. Raftelis divided the metering fee revenue requirements by our units of service, as measured by equivalent meters, and the calculated charge results in a rate of \$3.86 per equivalent meter.

4.7. IMPERVIOUS AREA CHARGE

Total revenue requirements allocated to the CRIAC for the test year, FY 2019, totaled \$108,945,058. Raftelis divided the CRIAC revenue requirements by our units of service, as measured by ERUs, and the calculated charge results in a rate of \$23.00 per ERU.

4.8. WATER SYSTEM REPLACEMENT FEE (WSRF)

Total revenue requirements allocated to the WSRF for the test year, FY 2019, totaled \$39,717,000. Raftelis divided the metering fee revenue requirements by our units of service, as measured by equivalent meters, and the calculated charge results in a rate of \$6.30 per equivalent meter.

4.9. COS / RATE EQUITY CONCLUSIONS

The results of the COS analysis support several conclusions and/or recommendations for consideration by DC Water staff and the Board, which are summarized below.

- In general, the existing rate structure provides for a reasonable allocation of costs to utility customers. However, there are several opportunities for consideration to provide further rate equity when considering proposed rate recommendations in FY 2019.
- The cost of service suggests that DC Water should consider reducing its water rates as compared to the Financial Plan's proposed FY 2019 across-the-board increases. The primary difference in the calculated water volumetric rate and the proposed FY 2019 rate in the Financial Plan relates to a historical shift in the allocation of costs between the water and wastewater systems, as well as a reallocation of the WSRF revenue as an offset to solely the water volumetric rates. DC Water has historically increased water and wastewater rates at the same rate, yet costs have increased over that time differently, with wastewater costs rising faster than water. The combination of these historical occurrences suggests a need to rebalance water and wastewater volumetric rates. As a result, it is reasonable for DC Water to decrease the water volumetric rates as presented in previous sections
- The cost of service suggest that DC Water should consider increasing its sewer rates as compared to the Financial Plan's proposed FY 2019 across-the-board increases. Like the water volume charge, the calculated wastewater volume charge differs from the Financial Plan because of the aforementioned historical across-the-board rate increases and disproportionate cost increases, and reallocation of the WSRF revenues as an offset to solely the water volumetric rate. As a result, it is reasonable for DC Water to expand the increase in the sewer volumetric rate.
- The calculated rates water and sewer rates are designed to generate revenues consistent with projected revenues in the Financial Plan in FY 2019. The shift in emphasis to the sewer volumetric rate in terms of revenue generation is designed to reflect more appropriately the cost of provide services.

Section 5: PROPOSED RATES AND IMPACTS

Through our COS analysis, Raftelis has calculated modified proposed rates for FY 2019 and FY 2020, along with corresponding customer impacts. Exhibit 5.1 presents the existing and proposed rates, along with the increases presented with both percentages and dollars.

Exhibits 5.2 and 5.3, present the customer impacts for a typical Residential customer and a typical Residential CAP customer, respectively, associated with the proposed FY 2019 and FY 2020 rates.

Exhibit 5.1: Existing and Proposed Rates

Rate Component	FY 2018 (Existing)	FY 2019 (Proposed)	FY 2020 (Proposed)	FY 2019		FY 2020	
				% Difference	\$ Difference	% Difference	\$ Difference
Water Volumetric – Residential – Tier 1	\$ 3.39	\$ 2.91	\$ 3.06	(14.2%)	(\$ 0.48)	5.2%	\$ 0.15
Water Volumetric – Residential – Tier 2	\$ 4.26	\$ 3.90	\$ 4.10	(8.5%)	(\$ 0.36)	5.1%	\$ 0.20
Water Volumetric – Multi-Family	\$ 3.80	\$ 3.37	\$3.54	(11.3%)	(\$ 0.43)	5.0%	\$ 0.17
Water Volumetric – Non-Residential	\$ 4.40	\$ 4.05	\$ 4.25	(8.0%)	(\$ 0.35)	4.9%	\$ 0.20
Sewer Volumetric	\$ 6.00	\$ 7.75	\$ 8.14	29.2%	\$ 1.75	5.0%	\$ 0.39
Metering Fee	\$ 3.86	\$ 3.86	\$ 3.86	0.0%	\$ 0.00	0.0%	\$ 0.00
Clean Rivers IAC	\$ 25.18	\$ 23.00	\$ 25.58	(8.7%)	(\$ 2.18)	11.2%	\$ 2.58
WSRF	\$ 6.30	\$ 6.30	\$ 6.30	0.0%	\$ 0.00	0.0%	\$ 0.00

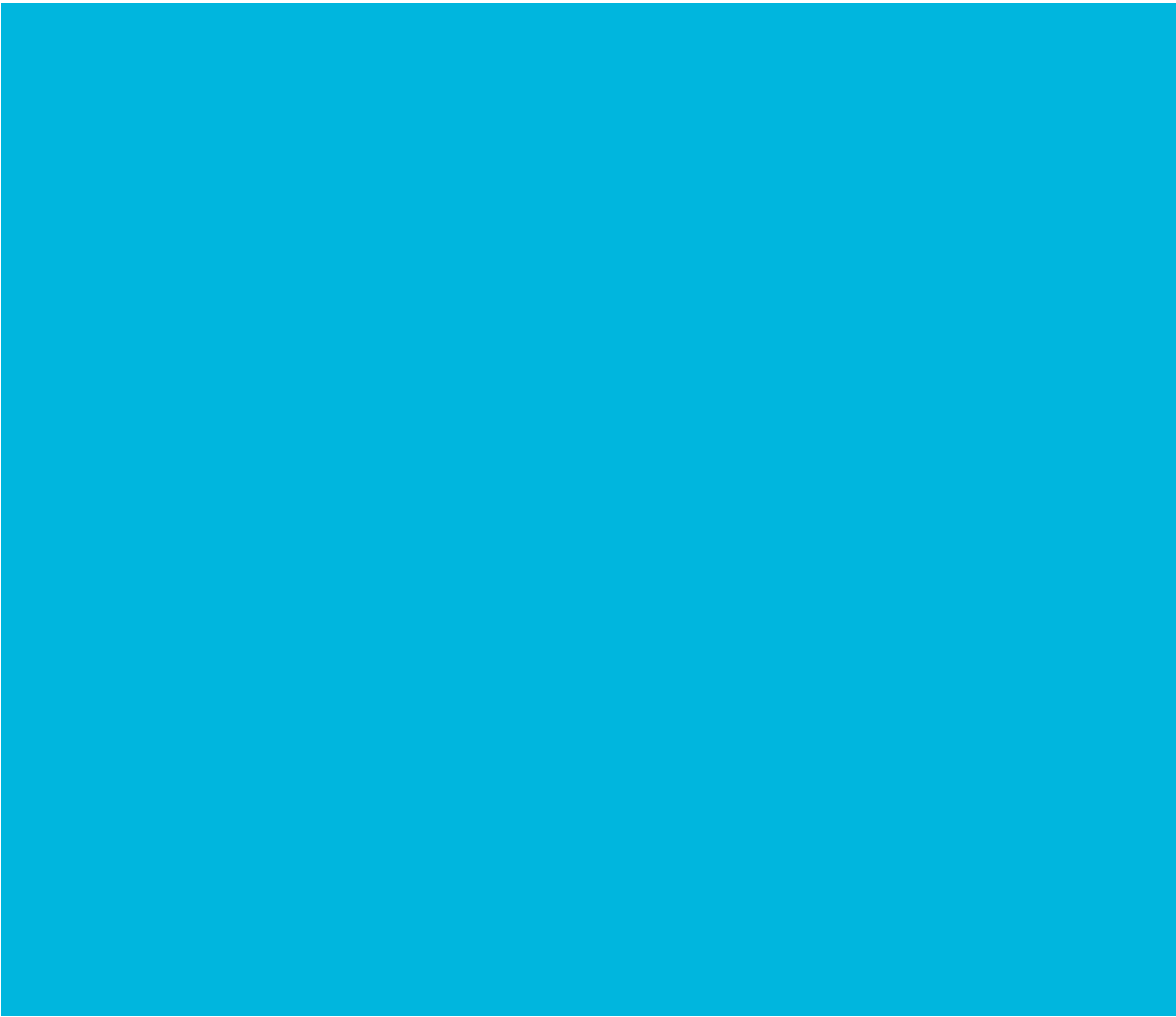
Exhibit 5.2: Residential Customer Monthly Bill Impacts (5/8", 6.2 Ccf)

	Current	Cost of Service	Cost of Service	FY 2019		FY 2020	
	(FY 2018)	(FY 2019)	(FY 2020)	\$ Change	% Change	\$ Change	% Change
DC Water and Sewer Retail Rates	\$ 60.13	\$ 68.27	\$ 71.73	\$ 8.14	13.5%	\$ 3.46	5.1%
DC Water Clean Rivers IAC	25.18	23.00	25.58	(2.18)	-8.7%	2.58	11.2%
DC Water Customer Metering Fee	3.86	3.86	3.86	-	0.0%	-	0.0%
DC Water Water System Replacement Fee	6.30	6.30	6.30	-	0.0%	-	0.0%
Subtotal: DC Water Rates & Charges	\$ 95.47	\$ 101.43	\$ 107.47	\$ 5.96	6.2%	\$ 6.04	6.0%
District of Columbia PILOT	\$ 3.04	\$ 3.10	\$ 3.16	\$ 0.06	2.0%	\$ 0.06	2.0%
District of Columbia Right of Way Fee	1.12	1.12	1.18	-	0.0%	0.06	5.4%
District of Columbia Stormwater Fee	2.67	2.67	2.67	-	0.0%	-	0.0%
Subtotal District of Columbia Charges	\$ 6.83	\$ 6.89	\$ 7.01	\$ 0.06	0.9%	\$ 0.12	1.7%
Total Amount Appearing on DC Water Bill	\$ 102.30	\$ 108.32	\$ 114.48	\$ 6.02	5.9%	\$ 6.16	5.7%

Exhibit 5.3: Residential CAP Customer Monthly Bill Impacts

	Current	Cost of Service	Cost of Service	FY 2019		FY 2020	
	(FY 2018)	(FY 2019)	(FY 2020)	\$ Change	% Change	\$ Change	% Change
DC Water and Sewer Retail Rates	\$ 60.13	\$ 68.27	\$ 71.73	\$ 8.14	13.5%	\$ 3.46	5.1%
DC Water Clean Rivers IAC	25.18	23.00	25.58	(2.18)	-8.7%	2.58	11.2%
DC Water Customer Metering Fee	3.86	3.86	3.86	-	0.0%	-	0.0%
DC Water Water System Replacement Fee	6.30	6.30	6.30	-	0.0%	-	0.0%
Subtotal: DC Water Rates & Charges	\$ 95.47	\$ 101.43	\$ 107.47	\$ 5.96	6.2%	\$ 6.04	6.0%
District of Columbia PILOT	\$ 3.04	\$ 3.10	\$ 3.16	\$ 0.06	2.0%	\$ 0.06	2.0%
District of Columbia Right of Way Fee	1.12	1.12	1.18	-	0.0%	0.06	5.4%
District of Columbia Stormwater Fee	2.67	2.67	2.67	-	0.0%	-	0.0%
Subtotal District of Columbia Charges	\$ 6.83	\$ 6.89	\$ 7.01	\$ 0.06	0.9%	\$ 0.12	1.7%
Less: CAP Discount - 4 Ccf per Month	\$ (40.24)	\$ (45.36)	\$ (47.60)	\$ (5.12)	12.7%	\$ (2.24)	4.9%
Less: CAP Discount - 50% of CRIAC	(12.59)	(11.50)	(12.79)	1.09	-8.7%	(1.29)	11.2%
Less: CAP Discount - WSRF	(6.30)	(6.30)	(6.30)	-	-	-	0.0%
Subtotal: CAP Discount	\$ (59.13)	\$ (63.16)	\$ (66.69)	\$ (4.03)	6.8%	\$ (3.53)	5.6%
Total Amount Appearing on DC Water Bill with CAP Discount	\$ 43.17	\$ 45.16	\$ 47.79	\$ 1.99	4.6%	\$ 2.63	5.8%

APPENDICES: SUPPORTING SCHEDULES



DC Water
2018 Cost of Service Study
Appendix A
Comparison vs. Financial Plan

	Financial Plan	RFC Model	Delta
	2019	2019	2019
OPERATING REVENUE:			
Residential & Commercial	\$ 299,927,386	\$ 299,813,759	\$ (113,627)
D. C. Government	9,082,750	8,993,534	(89,216)
Federal Government	41,524,939	41,524,939	-
D. C. Housing Authority	8,302,500	8,661,367	358,867
Groundwater	5,000	5,000	-
Metering Fee	10,776,046	10,776,046	-
Water System Replacement Fee (WSRF)	39,717,000	39,717,000	-
Right-of-Way Fee / PILOT	21,700,996	21,700,996	-
IAB CSO Revenue	108,945,058	108,945,058	-
Total Retail Revenue	<u>\$ 539,981,675</u>	<u>\$ 540,137,699</u>	<u>\$ 156,024</u>
			<i>0.03%</i>
WHOLESALE REVENUE:			
LCSA + PI	\$ 8,865,806	\$ 8,865,806	-
WSSC	57,627,788	57,627,788	-
Fairfax County	12,743,197	12,743,197	-
Total Wholesale Revenue	<u>\$ 79,236,790</u>	<u>\$ 79,236,790</u>	<u>\$ -</u>
TOTAL OPERATING REVENUE	<u>\$ 619,218,466</u>	<u>\$ 619,374,490</u>	<u>\$ 156,024</u>
			<i>0.03%</i>
NON-OPERATING REVENUE:			
Interest Earnings	\$ 2,547,000	\$ 2,547,000	\$ -
Other Revenue	27,085,000	27,085,000	-
Transfer from Rate Stabilization Fund	-	-	-
Northern Virginia Debt Service	193,246	193,246	-
Total Non-Operating Revenue	<u>\$ 29,825,246</u>	<u>\$ 29,825,246</u>	<u>\$ -</u>
TOTAL REVENUE	<u>\$ 649,043,712</u>	<u>\$ 649,199,736</u>	<u>\$ 156,024</u>
			<i>0.02%</i>
OPERATING EXPENSE:			
Personnel Services	\$ 144,361,000	\$ 144,361,000	\$ -
Contractual Services	81,679,000	81,679,000	-
Water Purchases	30,520,000	30,520,000	-
Chemicals & Supplies	32,082,000	32,082,000	-
Utilities & Rent	26,915,000	26,915,000	-
Small Equipment	1,240,000	1,240,000	-
Payment in Lieu of Taxes / Right of Way Fee	21,701,706	21,700,996	(710)
Total Operating Expenditures	<u>\$ 338,498,706</u>	<u>\$ 338,497,996</u>	<u>\$ (710)</u>
			<i>0.00%</i>
NET REVENUES	<u>\$ 310,545,006</u>	<u>\$ 310,701,740</u>	<u>\$ 156,734</u>
DEBT SERVICE:			
1998 Revenue Bonds	\$ 23,365,950	\$ 23,365,950	\$ -
Series 2009A	-	-	-
Series 2014A	16,849,000	16,849,000	-
Series 2017A&B Revenue Bond	17,069,250	17,069,250	-
District G.O. Bonds:	-	-	-
Jennings Randolph:	805,191	805,191	-
Little Seneca Reservoir:	-	-	-
Commercial Paper	500,000	500,000	-
Series 2003 Subordinate Bond	-	-	-
Series 2007A Subordinate Bond	-	-	-
Series 2008A Subordinate Bond	-	-	-
Series 2010A Subordinate Bond	11,094,004	11,094,004	-
Series 2012 Subordinate Bond	21,060,650	21,060,650	-
Series 2013A Subordinate Bond	14,994,250	14,994,250	-
Series 2014B Subordinate Bond	3,250,000	3,250,000	-
Series 2014C Subordinate Bond	17,998,100	17,998,100	-
Series 2015A,B Subordinate Bond	19,503,263	19,503,263	-
Series 2016A Subordinate Bond	28,954,713	28,954,713	-
Series 2016B Subordinate Bond	857,500	857,500	-
EMCP	500,000	500,000	-
Capital Equipment Financing	-	-	-
DC Water Bonds Planned	22,223,560	22,223,560	-
Total Debt	<u>\$ 199,025,431</u>	<u>\$ 199,025,431</u>	<u>\$ -</u>
			<i>0.00%</i>
TOTAL DISBURSEMENTS	<u>\$ 537,524,137</u>	<u>\$ 537,523,427</u>	<u>\$ (710)</u>
			<i>0.00%</i>
Total Surplus (Deficit)	<u>\$ 111,519,575</u>	<u>\$ 111,676,309</u>	<u>\$ 156,734</u>

DC Water
2018 Cost of Service Study
Appendix B
Revenue Requirements

Allocation Costs

	FY 2019	Water	Meter Charge	Wastewater	CSO
Operations					
Wastewater Treatment	\$ 84,427,575	\$ -	\$ -	\$ 84,427,575	\$ -
Water Services	25,387,721	25,387,721	-	-	-
Sewer Services	15,777,539	-	-	15,777,539	-
Distribution and Conveyance Systems	49,884,046	36,329,214	-	13,554,832	-
Maintenance Services	21,340,556	1,493,839	-	19,846,717	-
Engineering & Technical Services	9,828,236	2,653,624	-	7,066,502	108,111
Customer Service	20,951,215	6,527,089	7,394,993	6,798,669	230,463
Permits	2,499,618	1,249,809	-	1,222,313	27,496
Long Term Control Plan	1,140,425	-	-	-	1,140,425
Subtotal Operations	\$ 231,236,930	\$ 73,641,295	\$ 7,394,993	\$ 148,694,147	\$ 1,506,495
Administration					
Office of the Secretary	\$ 644,876	\$ 290,194	\$ -	\$ 347,588	\$ 7,094
General Manager	4,569,864	2,056,439	-	2,463,157	50,269
General Counsel	7,745,662	3,485,548	-	4,174,912	85,202
Public Affairs	2,790,719	1,255,824	-	1,504,198	30,698
Internal Audit	933,909	420,259	-	503,377	10,273
Finance and Budget	16,413,068	7,385,881	-	8,846,644	180,544
Information Technology	12,044,750	3,252,082	-	8,660,175	132,492
Security	7,837,039	3,526,667	-	4,224,164	86,207
Assistant General Manager	575,298	258,884	-	310,086	6,328
Facilities Management	9,490,341	3,891,040	-	5,494,907	104,394
Procurement & Materiel Management	6,283,782	2,576,350	-	3,638,310	69,122
Fleet Management	5,486,796	1,152,227	-	4,274,214	60,355
Human Resources	8,607,006	3,528,872	-	4,983,456	94,677
Occupational Safety and Health	2,136,960	961,632	-	1,151,821	23,507
Subtotal Administration	\$ 85,560,070	\$ 34,041,900	\$ -	\$ 50,577,009	\$ 941,161
Total O&M	\$ 316,797,000	\$ 107,683,196	\$ 7,394,993	\$ 199,271,156	\$ 2,447,656
Debt Service					
1998 Revenue Bonds	\$ 23,365,950	\$ 3,791,369	\$ 1,913,669	\$ 17,030,031	\$ 630,881
Series 2009A	-	-	-	-	-
Series 2014A	16,849,000	-	-	-	16,849,000
Series 2017A&B Revenue Bond	17,069,250	3,773,712	484,174	6,390,404	6,420,961
DC Water Bonds Planned	22,223,560	5,201,349	255,391	9,229,631	7,537,190
District G.O. Bonds:	-	-	-	-	-
Jennings Randolph:	805,191	805,191	-	-	-
Little Seneca Reservoir:	-	-	-	-	-
Commercial Paper	500,000	101,099	10,648	28,753	359,500
Series 2003 Subordinate Bond	-	-	-	-	-
Series 2007A Subordinate Bond	-	-	-	-	-
Series 2008A Subordinate Bond	-	-	-	-	-
Series 2010A Subordinate Bond	11,094,004	1,783,916	93,190	2,347,491	6,869,407
Series 2012 Subordinate Bond	21,060,650	2,348,262	109,515	3,074,855	15,528,017
Series 2013A Subordinate Bond	14,994,250	2,642,643	358,179	6,940,366	5,053,062
Series 2014B Subordinate Bond	3,250,000	484,800	12,456	1,394,244	1,358,500
Series 2014C Subordinate Bond	17,998,100	5,355,575	96,941	8,714,545	3,831,039
Series 2015A,B Subordinate Bond	19,503,263	6,065,558	392,016	7,202,834	5,842,855
Series 2016A Subordinate Bond	28,954,713	11,313,814	260,592	13,905,740	3,474,566
Series 2016B Subordinate Bond	857,500	-	-	-	857,500
EMCP	500,000	158,691	-	188,445	152,864
Capital Equipment Financing	-	-	-	-	-
15 Year AMR meter pro forma adjustment	-	-	-	-	-
Total Debt	\$ 199,025,431	\$ 43,825,981	\$ 3,986,771	\$ 76,447,338	\$ 74,765,341

Allocation Percentages

	FY 2019	Volume	Meter Charge	Wastewater	CSO
Operations					
Wastewater Treatment	100%			100.00%	
Water Services	100%	100.00%		0.00%	
Sewer Services	100%			100.00%	
Distribution and Conveyance Systems	100%	72.83%		27.17%	
Maintenance Services	100%			93.00%	
Engineering & Technical Services	100%	27.00%		71.90%	1.10%
Customer Service	100%	31.15%	35.30%	32.45%	1.10%
Permits	100%	50.00%		48.90%	1.10%
Long Term Control Plan	100%	0.00%		0.00%	100.00%
Administration					
Office of the Secretary	100%	45.00%		53.90%	1.10%
General Manager	100%	45.00%		53.90%	1.10%
General Counsel	100%	45.00%		53.90%	1.10%
Public Affairs	100%	45.00%		53.90%	1.10%
Internal Audit	100%	45.00%		53.90%	1.10%
Finance and Budget	100%	45.00%		53.90%	1.10%
Information Technology	100%	27.00%		71.90%	1.10%
Risk Management	100%	45.00%		53.90%	1.10%
Assistant General Manager	100%	45.00%		53.90%	1.10%
Facilities Management	100%	41.00%		57.90%	1.10%
Procurement & Materiel Management	100%	41.00%		57.90%	1.10%
Fleet Management	100%	21.00%		77.90%	1.10%
Human Resources	100%	41.00%		57.90%	1.10%
	100%	45.00%		53.90%	1.10%
		Volume	Meter	Wastewater	CSO
1998 Revenue Bonds	100%	16.23%	8.19%	72.88%	2.70%
Series 2009A	100%	20.75%	0.64%	62.11%	16.50%
Series 2014A	100%	0.00%	0.00%	0.00%	100.00%
Series 2017A&B Revenue Bond	100%	22.11%	2.84%	37.44%	37.62%
DC Water Bonds Planned	100%	23.40%	1.15%	41.53%	33.92%
District G.O. Bonds:	100%	24.00%	0.00%	76.00%	0.00%
Jennings Randolph:	100%	100.00%	0.00%	0.00%	0.00%
Little Seneca Reservoir:	100%	100.00%	0.00%	0.00%	0.00%
Commercial Paper	100%	20.22%	2.13%	5.75%	71.90%
Series 2003 Subordinate Bond	100%	27.92%	2.63%	65.96%	3.50%
Series 2007A Subordinate Bond	100%	47.84%	0.49%	40.87%	10.80%
Series 2008A Subordinate Bond	100%	32.70%	0.47%	56.94%	9.90%
Series 2010A Subordinate Bond	100%	16.08%	0.84%	21.16%	61.92%
Series 2012 Subordinate Bond	100%	11.15%	0.52%	14.60%	73.73%
Series 2013A Subordinate Bond	100%	17.62%	2.39%	46.29%	33.70%
Series 2014B Subordinate Bond	100%	14.92%	0.38%	42.90%	41.80%
Series 2014C Subordinate Bond	100%	29.76%	0.54%	48.42%	21.29%
Series 2015A,B Subordinate Bond	100%	31.10%	2.01%	36.93%	29.96%
Series 2016A Subordinate Bond	100%	39.07%	0.90%	48.03%	12.00%
Series 2016B Subordinate Bond	100%	0.00%	0.00%	0.00%	100.00%
EMCP	100%	31.74%	0.00%	37.69%	30.57%
Capital Equipment Financing	100%	17.44%	2.82%	28.94%	50.80%
15 Year AMR meter pro forma adjustment	100%	0.00%	100.00%	0.00%	0.00%

DC Water
2018 Cost of Service Study
Appendix B
Revenue Requirements

Allocation Costs

	FY 2019	Water	Meter Charge	Wastewater	CSO
		22.0%	2.0%	38.4%	37.6%
Wholesale Revenue					
LCSA + PI	\$ 8,865,806	\$ -	\$ -	\$ 8,865,806	\$ -
WSSC	57,627,788	-	-	57,627,788	-
Fairfax County	12,743,197	-	-	12,743,197	-
Other Revenue					
IMA Indirect Cost Reimb. For Capital Projects	3,215,000	-	-	3,215,000	-
Dev. Contr/Water Services Fees, Taps	4,000,000	4,000,000	-	-	-
Dev. Contr/Liability Deposits/Sewer Service Fees	2,000,000	-	-	2,000,000	-
Commercial Water Maintenance	32,000	32,000	-	-	-
DC Fire Protection Fee	10,796,000	10,796,000	-	-	-
System Availability Fee	3,850,000	1,925,000	-	1,925,000	-
Transfer from DC PILOT/ROW Fund	-	-	-	-	-
DC Contribution of 50% PILOT Escrow to DCW	-	-	-	-	-
Sales to DC Agencies-Steam/Meter	170,000	55,335	-	114,665	-
Misc. Rev: Bid Deposits, Fleet Auction, Compost Sal	2,000,000	-	-	2,000,000	-
Pipe Repair Sales/Replacement	22,000	7,161	-	14,839	-
Stormwater	1,000,000	-	-	1,000,000	-
Northern Virginia Debt Service	193,246	46,379	-	146,867	-
WSRF	39,717,000	39,717,000	-	-	-
Interest Income	2,547,000	1,146,150	-	1,400,850	-
	-	-	-	-	-
Total Revenue Offsets	\$ (148,779,036)	\$ (57,725,025)	\$ -	\$ (91,054,011)	\$ -
Unadjusted Revenue Requirement	\$ 367,043,394	\$ 93,784,151	\$ 11,381,764	\$ 184,664,483	\$ 77,212,997
Adjustment for Coverage	111,520,285	25,059,062	-	43,711,482	42,749,741
Adjustment for IAC	-	-	-	11,017,680	(11,017,680)
Adjustment for 15-Year AMR	-	-	-	-	-
Total Revenue Requirement	\$ 478,563,679	\$ 118,843,213	\$ 11,381,764	\$ 239,393,645	\$ 108,945,058
					\$ -

Allocation Percentages

	FY 2019	Volume	Meter Charge	Wastewater	CSO
LCSA + PI	100%			100.00%	
WSSC	100%			100.00%	
Fairfax County	100%			100.00%	
IMA Indirect Cost Reimb. For Capital Projects	100%			100.00%	
Dev. Contr/Water Services Fees, Taps	100%	100.00%			
Dev. Contr/Liability Deposits/Sewer Service Fees	100%			100.00%	
Commercial Water Maintenance	100%	100.00%			
DC Fire Protection Fee	100%	100.00%		0.00%	
System Availability Fee	100%	50.00%		50.00%	
Transfer from DC PILOT/ROW Fund	100%	32.55%		67.45%	
DC Contribution of 50% PILOT Escrow to DCW	100%	32.55%		67.45%	
Sales to DC Agencies-Steam/Meter	100%	32.55%		67.45%	
Misc. Rev: Bid Deposits, Fleet Auction, Compost Sales	100%			100.00%	
Pipe Repair Sales/Replacement	100%	32.55%		67.45%	
Stormwater	100%			100.00%	
Northern Virginia Debt Service	100%	24.00%		76.00%	
WSRF	100%	100.00%	0.00%	0.00%	0.00%
Interest Income	100%	45.00%		55.00%	0.00%

DC Water
2018 Cost of Service Study
Appendix C
Allocation of Water Costs to Functional Components

	\$ Allocated to Water	Source of Supply & Treatment	Distribution	Storage	Pumping	Customer Service/Meter	Admin/General
Operations							
Water Services	\$ 25,387,721	\$ -	\$ 19,742,723	\$ 2,492,017	\$ 3,152,981	\$ -	\$ -
Distribution and Conveyance Systems	36,329,214	30,520,000	4,517,526	570,223	721,465	-	-
Maintenance Services	1,493,839	-	1,161,682	146,633	185,525	-	-
Engineering & Technical Services	2,653,624	-	2,063,587	260,475	329,562	-	-
Customer Service	10,224,586	-	-	-	-	2,574,546	7,650,040
Permits	1,249,809	1,249,809	-	-	-	-	-
Administration							
Office of the Secretary	\$ 290,194	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 290,194
General Manager	2,056,439	-	-	-	-	-	2,056,439
General Counsel	3,485,548	-	-	-	-	-	3,485,548
Public Affairs	1,255,824	-	-	-	-	-	1,255,824
Internal Audit	420,259	-	-	-	-	-	420,259
Finance and Budget	7,385,881	-	-	-	-	-	7,385,881
Information Technology	3,252,082	-	-	-	-	-	3,252,082
Security	3,526,667	-	-	-	-	-	3,526,667
Assistant General Manager	258,884	-	-	-	-	-	258,884
Facilities Management	3,891,040	-	-	-	-	-	3,891,040
Procurement & Materiel Management	2,576,350	-	-	-	-	-	2,576,350
Fleet Management	1,152,227	-	-	-	-	-	1,152,227
Human Resources	3,528,872	-	-	-	-	-	3,528,872
Occupational Safety and Health	961,632	-	-	-	-	-	961,632
Total Water O&M	\$ 111,380,692	\$ 31,769,809	\$ 27,485,517	\$ 3,469,348	\$ 4,389,532	\$ 2,574,546	\$ 41,691,940
		28.5%	24.7%	3.1%	3.9%	2.3%	37.4%
Debt Service (1)							
1998 Revenue Bonds	\$ 4,748,204	\$ 1,023,670	\$ 2,767,700	\$ -	\$ -	\$ 956,834	\$ -
Series 2009A	-	-	-	-	-	-	-
Series 2014A	-	-	-	-	-	-	-
Series 2017A&B	4,015,799	1,264,053	2,429,507	-	-	322,239	-
DC Water Bonds Planned	5,329,044	1,406,764	3,803,472	-	-	118,809	-
District G.O. Bonds:							
Jennings Randolph:	805,191	805,191	-	-	-	-	-
Little Seneca Reservoir:	-	-	-	-	-	-	-
Commercial Paper	106,423	28,362	76,683	-	-	1,378	-
Series 2003 Subordinate Bond	-	-	-	-	-	-	-
Series 2007A Subordinate Bond	-	-	-	-	-	-	-
Series 2008A Subordinate Bond	-	-	-	-	-	-	-
Series 2010A Subordinate Bond	1,830,511	486,723	1,315,953	-	-	27,835	-
Series 2012 Subordinate Bond	2,403,020	473,395	1,874,356	-	-	55,269	-
Series 2013A Subordinate Bond	2,821,732	555,881	2,200,951	-	-	64,900	-
Series 2014B Subordinate Bond	491,028	96,733	383,002	-	-	11,294	-
Series 2014C Subordinate Bond	5,404,046	1,064,597	4,215,156	-	-	124,293	-
Series 2015A,B Subordinate Bond	6,261,566	1,970,953	3,788,168	-	-	502,445	-
Series 2016A Subordinate Bond	11,444,111	3,602,263	6,923,541	-	-	918,307	-
Series 2016B Subordinate Bond	-	-	-	-	-	-	-
EMCP	158,691	49,951	96,006	-	-	12,734	-
Capital Equipment Financing	-	-	-	-	-	-	-
15 Year AMR meter pro forma adjustment	-	-	-	-	-	-	-
Total Water Debt	\$ 45,819,366	\$ 12,828,535	\$ 29,874,495	\$ -	\$ -	\$ 3,116,336	\$ -
		28.0%	65.2%	0.0%	0.0%	6.8%	0.0%
Revenue Offsets							
Wholesale Revenue							
LCSA + PI	\$ -	-	-	-	-	-	-
WSSC	-	-	-	-	-	-	-
Fairfax County	-	-	-	-	-	-	-
Other Revenue							
IMA Indirect Cost Reimb. For Capital Projects	-	-	-	-	-	-	-
Dev. Contr/Water Services Fees, Taps	(4,000,000)	-	(4,000,000)	-	-	-	-
Dev. Contr/Liability Deposits/Sewer Service Fees	-	-	-	-	-	-	-
Commercial Water Maintenance	(32,000)	-	(32,000)	-	-	-	-
DC Fire Protection Fee	(10,796,000)	(5,398,000)	(5,398,000)	-	-	-	-
System Availability Fee	(1,925,000)	-	-	-	-	-	(1,925,000)
Transfer from DC PILOT/ROW Fund	-	-	-	-	-	-	-
DC Contribution of 50% PILOT Escrow to DCW	-	-	-	-	-	-	-
Sales to DC Agencies-Steam/Meter	(55,335)	-	(55,335)	-	-	-	-
Misc. Rev: Bid Deposits, Fleet Auction, Compost	-	-	-	-	-	-	-
Pipe Repair Sales/Replacement	(7,161)	-	-	-	-	-	(7,161)
Stormwater	-	-	-	-	-	-	-
Northern Virginia Debt Service	(46,379)	-	-	-	-	-	(46,379)
WSRF	(39,717,000)	-	-	-	-	-	(39,717,000)
Interest Income	(1,146,150)	(378,230)	(378,230)	-	-	-	(389,691)
Total Water Revenue Offsets	\$ (57,725,025)	\$ (5,776,230)	\$ (9,863,565)	\$ -	\$ -	\$ -	\$ (42,085,231)
Unadjusted Net Water Revenue Requirements	\$ 99,475,033	\$ 38,822,115	\$ 47,496,448	\$ 3,469,348	\$ 4,389,532	\$ 5,690,882	\$ (393,291)
		39.0%	47.7%	3.5%	4.4%	5.7%	-0.4%
Adjustment for DS Coverage	25,059,062	6,264,765	18,794,296	-	-	-	-
Adjusted Net Water Revenue Requirements	\$ 124,534,095	\$ 45,086,880	\$ 66,290,744	\$ 3,469,348	\$ 4,389,532	\$ 5,690,882	\$ (393,291)
		36.2%	53.2%	2.8%	3.5%	4.6%	-0.3%

DC Water
 2018 Cost of Service Study
 Appendix D
 Allocation to Functional Water Categories

Functional Categories	Test Year	Allocation Percentages			
	FY 2016 Adjusted Revenue Requirements	Base	Extra Capacity Max-Month	Customer Service/Meter	Admin/General
Source of Supply & Treatment	\$ 45,086,880	64.0%	36.0%	0.0%	0.0%
Distribution	66,290,744	90.0%	10.0%	0.0%	0.0%
Storage	3,469,348	80.0%	20.0%	0.0%	0.0%
Pumping	4,389,532	50.0%	50.0%	0.0%	0.0%
Customer Service/Meter	5,690,882	0.0%	0.0%	100.0%	0.0%
Admin/General	(393,291)	0.0%	0.0%	0.0%	100.0%

Total \$ **124,534,095**

Allocation of Adjusted Test Year Revenue Requirements			
Base	Extra Capacity Max-Month	Customer Service/Meter	Admin/General
\$ 28,855,603	\$ 16,231,277	\$ -	\$ -
59,661,670	6,629,074	-	-
2,775,478	693,870	-	-
2,194,766	2,194,766	-	-
-	-	5,690,882	-
-	-	-	(393,291)
\$ 93,487,517	\$ 25,748,987	\$ 5,690,882	\$ (393,291)

	Base		Max-Month		
	Annual Usage (ccf)	Average Monthly Rate (ccf)	Capacity Factor (1)	Total Capacity (ccf)	Extra Capacity
Residential	6,311,199	525,933	1.16	610,083	84,149
Multi-Family/DC Housing	9,488,193	790,683	1.16	917,192	126,509
Non-Residential (Commercial)	11,309,094	942,424	1.39	1,309,970	367,546
Non-Residential (Federal)	4,206,834	350,570	1.39	487,292	136,722
Non-Residential (Municipal)	765,374	63,781	1.39	88,656	24,875
Total	32,080,694				739,801

	Base	Max-Month	Base	Max-Month	Allocation for Volumetric Revenue Req.
	Residential Customers	19.7%	11.4%	\$ 18,314,323	\$ 2,928,842
Multi-Family/DC Housing	29.6%	17.1%	27,533,569	4,403,191	31,936,760
Non-Residential (Commercial)	35.3%	49.7%	32,817,598	12,792,531	45,610,129
Non-Residential (Federal)	13.1%	18.5%	12,207,716	4,758,654	16,966,369
Non-Residential (Municipal)	2.4%	3.4%	2,221,020	865,769	3,086,789
Total	100.0%	100.0%	\$ 93,094,226	\$ 25,748,987	\$ 118,843,213

	Unit Cost (per ccf)
Residential Customers	\$ 3.37
Multi-Family/DC Housing	\$ 3.37
Non-Residential (Commercial)	\$ 4.04
Non-Residential (Federal)	\$ 4.04
Non-Residential (Municipal)	\$ 4.04

	Base	Max-Month	Base	Max-Month	Allocation for Volumetric Revenue Req.
	Residential Customers				
0-4 ccf	3,394,880	282,907	1.00	282,907	-
>4 ccf	2,916,320	243,027	1.34	325,656	82,629
Multi-Family/DC Housing	9,488,193	790,683	1.16	917,192	126,509
Non-Residential (Commercial)	11,309,094	942,424	1.39	1,309,970	367,546
Non-Residential (Federal)	4,206,834	350,570	1.39	487,292	136,722
Non-Residential (Municipal)	765,374	63,781	1.39	88,656	24,875
Total	32,080,694				738,281

	Base	Max-Month	Base	Max-Month	Allocation for Volumetric Revenue Req.
	Residential Customers				
0-4 ccf	10.6%	0.0%	9,851,523	-	9,851,523
>4 ccf	9.1%	11.2%	8,462,801	2,881,851	11,344,651
Multi-Family/DC Housing	29.6%	17.1%	27,533,569	4,412,258	31,945,827
Non-Residential (Commercial)	35.3%	49.8%	32,817,598	12,818,873	45,636,472
Non-Residential (Federal)	13.1%	18.5%	12,207,716	4,768,453	16,976,168
Non-Residential (Municipal)	2.4%	3.4%	2,221,020	867,552	3,088,572
Total	100.0%	100.0%	\$ 93,094,226	\$ 25,748,987	\$ 118,843,213

Residential Customers		
0-4 ccf	\$	2.91
>4 ccf	\$	3.90
Multi-Family/DC Housing	\$	3.37
Non-Residential (Commercial)	\$	4.05
Non-Residential (Federal)	\$	4.05
Non-Residential (Municipal)	\$	4.05