Report Regarding Fire Service Charges

Final Report
February 13, 2018

Amawalk
Consulting Group LLC

Except where noted, all references to years in the Report refer to the fiscal years of the Authority which begin on October 1st and end on September 30th. Actual direct costs were provided by DC Water for 2013 through 2017. Since the 2017 fiscal year ended just prior to the publication of this Report, the figures presented for 2017 are considered preliminary projections. Projections of direct costs for the current year (2018) and future years (2019 through 2021) were also provided by DC Water.

1.3 Findings

A summary of the key findings of the study is presented below.

1. In 2006 and 2007, DC Water's total annual investments in fire protection assets and services (operating and capital, prior to amortization of certain capital costs) were $1.5 million and $6.4 million, respectively. The annual investments were much greater after execution of the 2007 MOU, reaching a peak of $17.0 million in total annual costs in 2008, followed by $15.7 million in investments in 2009. Following those two years with the highest level of investment (2008 and 2009), the actual average annual total cost of fire protection service for the eight-year period of 2010 through 2017 was $7.2 million. The projected average fire protection cost for the four-year period of 2018 through 2021 is $10.1 million per year.

2. The total costs represent both direct costs and allocated costs; the allocated public fire costs are relatively small - representing about 7.5% of the long-term total costs from 2013 through 2021. The illustration of historical (2013-17) and projected (2018-21) fire protection costs, including both direct and allocated costs, is presented in Table 1. Additional information concerning these costs, including the methodology and the assumptions used, is presented in the Report.

3. In 2013, DC Water received District payments for fire protection of $6,317,670 which were less than the billed amount of $6,885,340 by $567,670. DC Water reduced its PILOT payment to the District by $567,670 so that the combination of payments and credits equaled the billed amount. In 2014, the District paid $6,885,340 to DC Water for fire protection service.

4. In 2015 through 2017, the District paid in full the fire protection service bill of DC Water of $10,796,000. The payment of $10,796,000 is expected again in 2018.

5. In aggregate, District payments for fire protection service during the period of 2006 through 2018 were less than DC Water's aggregate costs for fire protection services; the Authority's costs reflected both operating expenses as well as capital investments. The 2015 Report highlighted the shortfall in payments and alternative methods by which the District could become current in paying the cost of service. DC Water elected to utilize the amortization of certain capital costs in lieu of requesting cash reimbursement for all costs; this approach enables the District to pay for certain capital costs over the long-term, as DC water does. This Report calculates the total costs incurred by DC Water and compares it to the payments received to date from the District, both with and without the amortization of certain capital costs. For purposes of calculating an annual fire protection

Table 1 - Direct and Allocated Fire Costs
(All amounts in $)

	Cost Category	2013	2014	2015	2016	2017	2018	2019	2020	2021
				Historical				Projected		
	Direct Fire Costs									
1	Full time assigned personnel costs	1,369,145	903,814	852,481	928,964	1,006,617	1,036,815	1,067,920	1,099,957	1,132,956
2	Hydrant Parts	520,973	48,158	38,104	67,608	67,155	69,170	71,245	73,382	75,584
3	Material & Equipment (Fire Hydrant Program)	114,146	382,794	386,902	160,256	427,642	440,472	453,686	467,296	481,315
4	Hydrant Installation and Restoration	1,580,771	465,354	287,125	200,886	708,698	729,959	751,858	774,413	797,646
5	Personnel loaned from other departments (documented via WO)	546,562	1,328,698	1,228,069	1,054,792	2,053,752	2,115,365	2,178,826	2,244,191	2,311,516
6	DDOT Open Space Permits	23,203	32,986	284,548	435,591	358,096	368,839	379,904	391,301	403,040
7	Paid to Fire Department for Inspection Services (NTE)	134	0	0	0	0	0	0	0	0
8	Fire Protection Cost of Service Study		6,660	31,429			42,946			44,234
9	Burden applied to DC Water personnel costs	1,492,368	985,157	971,828	1,059,019	1,147,543	1,285,651	1,324,220	1,363,947	1,404,865
10	Burden applies to Personnel loaned (Hourly Rate, Salary Rate & OH)	595,753	1,448,280	1,399,998	1,202,463	2,341,278	2,623,052	2,701,744	2,782,796	2,866,280
11	Burden applied to Parts	260,486	24,079	18,290	32,452	32,234	42,885	44,172	45,497	46,862
12	Burden applied to Material & Equipment	57,073	191,397	185,713	76,923	205,268	273,092	281,285	289,724	298,415
13	Subtotal Direct Costs	6,560,615	5,817,376	5,684,487	5,218,955	8,348,283	9,028,246	9,254,859	9,532,504	9,862,714
	Allocated Fire Costs									
14	Fire Share of Water Base Costs @ 0.5%	489,717	546,010	513,771	530,766	532,574	559,197	575,973	593,253	611,050
15	Fire Share of Peak Costs @ 1.62% for 2013, increasing to 1.64% by 2016	196,315	302,288	235,984	282,220	270,663	288,624	297,282	306,201	315,387
16	Subtotal	686,033	848,298	749,754	812,986	803,236	847,821	873,256	899,453	926,437
17	Allocated Public Fire Costs	515,167	637,842	563,762	612,362	605,550	639,162	658,337	678,087	698,429
18	**Total Direct and Allocated Public Fire Costs**	**7,075,782**	**6,455,218**	**6,248,250**	**5,831,317**	**8,953,833**	**9,667,407**	**9,913,195**	**10,210,591**	**10,561,143**
19	**District Payment**	**6,885,340**	**6,885,340**	**10,796,000**	**10,796,000**	**10,796,000**	**10,796,000**			
20	**Annual Difference**	**-190,442**	**430,122**	**4,547,750**	**4,964,683**	**1,842,167**	**1,128,593**			
21	**2006-18 Cumulative Difference (Payments vs. Costs)**	**-37,329,443**	**-36,899,321**	**-32,351,570**	**-27,386,887**	**-25,544,720**	**-24,416,128**			
22	**Recovery of 2006-18 Difference + Current (2019-23)**							**19,101,000**	**19,101,000**	**19,101,000**

Notes

(A.) Direct fire protection costs are provided by DC Water for FY 2013 - FY2021.

(B.) Allocated fire costs are anticipated to grow in proportion to forecasted budget and assumed 3.0% rate of increase for FY 2019 - FY 2021.

(C.) Public fire allocation percentages are provided in section 5.3 of the Appendix. It is assumed that the FY 2018 - FY 2021 public fire hydrant percentage stays the same as FY 2017.

(D.) Projected 2018 - 2021 total direct and allocated public fire costs are shown as an annual expense without consideration of using bond proceeds for capital costs.

(E.) FY 2013 District payment includes an offset made by DC Water from amounts owed to the District of $0.568M

2. Background

2.1 Purpose

The District of Columbia Water and Sewer Authority ("DC Water" or the "Authority") has assessed a fire protection fee to the District of Columbia (the "District") since April 1, 2000. This fee is intended to recover costs incurred by DC Water for fire protection service provided by the Water System of DC Water. The purpose of this cost of service study is to assess the appropriate level of cost recovery required from the District government for this service.

This study Report presents actual operating and financial data for five (5) fiscal years (2013 through 2017) to illustrate the historical cost of service versus the payments received from the District for such service. It is noted that the 2017 costs are preliminary; final figures were not available as of the date of this Report. The anticipated costs for the current year (2018) and three (3) upcoming years (2019 through 2021) are presented herein. The presentation incorporates direct costs for fire protection services as well as the allocation of certain costs. The vast majority of costs are direct; allocated public fire costs represent about 7.5% of the total long-term (2013 through 2021) costs of fire protection service. The results of the cost of service calculations will be compared with the revenues produced under historical and current charges and will identify adjustments, where necessary, to provide sufficient revenues to recover the cost for this service.

Fire protection service differs from other services offered by water utilities because it is primarily a standby service that is required to be available when the need exists; i.e., as demanded. The development and maintenance of the supply, treatment, pumping, storage and distribution capacity for fire protection service requires capital investments in facilities that are designed larger than would otherwise be required to be able to accommodate fire demand and annual operation and maintenance ("O&M") expenses to ensure that the assets are appropriately maintained and provide service as needed. Fire protection is provided to both the general public (through public fire hydrants and the infrastructure needed to supply water of sufficient quantity and pressure to the hydrants) and to individual customers that receive additional fire protection through privately-owned hydrants, standpipes or sprinkler connections. The private fire connections provide a direct service and benefit to individual properties that is separate from the services provided to the general public.

2.2 Methodology

The results of the most recent study of fire protection costs and revenues for DC Water were presented in a Report dated February 2015. Similar study reports were prepared in September 2006, January 2009, and November 2011. Costs that are directly assignable to the fire protection service (e.g., the cost of replacing a hydrant) are shown as direct costs. In addition to direct costs, certain other costs should be allocated to fire protection. The approach that was taken in the previous studies for allocating costs between general water service and fire protection service used a methodology that is known as base-extra capacity; i.e., a division of costs between what is required for the provision of service on an average day and the extra capacity needed to meet maximum, or peak day demand. The base-extra capacity method is an accepted approach in the

All of the annual costs of the Authority are categorized according to three functions: wastewater (including combined sewer overflow ("CSO") abatement and stormwater), water and customer service. As illustrated in Figure 1, water-related costs are separated into three parts. The Base Costs of Water are those required to meet average day demand. The vast majority of water costs are expected to be assigned to Base Costs. The Extra Capacity Costs should reflect the cost associated with meeting the peak day demand. Direct fire protection costs are shown separately.

A portion of the annual cost of fire protection is expense-related, such as costs related to inspection and repair of hydrants and related appurtenances. Other costs are categorized as capital improvements; e.g., the replacement of hydrants and related sections of pipe and valves together with the technical analyses supporting such replacement. Accounting policy typically dictates which costs must be categorized as an expense versus which costs can be classified as capital. DC Water's Capitalization Policy is presented in Section 5.4 of the Appendix. Annual O&M expenses are typically paid from annual revenues. As noted previously, capital improvements can be funded either on a PAYGO (pay-as-you-go) basis (i.e., from annual revenues) or through the issuance of debt, the proceeds of which would pay for the capital improvements. The debt would then have to be repaid through annual principal and interest payments (collectively referred to as "debt service"). This Report illustrates the cost of service and calculated rate with certain assumptions regarding those costs that are classified as annual operating expenses and other costs that are capital-related. The assumptions that are used are identified herein.

DC Water also receives federal grants towards the cost certain capital projects; however, these grants do not apply to fire hydrants or related appurtenances or any other direct costs of fire protection services. Thus, such grants are not considered in this study as potential offsets to the direct cost of fire protection.

The total cost of fire protection service equals direct fire protection costs plus allocated costs.

2.3 Data and Assumptions Used in This Study

Highlights of the data and assumptions used to develop the cost of fire protection service are shown below.

Direct Fire Protection

- Hydrant installation and restoration costs that are directly attributable to fire protection are assigned by Authority representatives to operating expense and capital in accordance with DC Water's Capitalization Policy. The costs shown for 2013 through 2017 reflect actual results[1].

- The costs shown for 2013 through 2021 have been provided by the Authority. The projected costs for 2018 and the estimates in each year for 2019 through 2021 are less than the annual costs incurred in peak cost years of 2008 and 2009. DC Water has indicated that much progress has been made in hydrant replacement and repairs in recent

[1] As noted previously, the 2017 results are preliminary

- This Report utilizes average day and peak day deliveries of water as reported by DWS and the Washington Aqueduct through 2017. The average day usage and peak usage includes unbilled water.
- Water used in fire operations was assumed in the prior reports to be 0.5% of average day usage and, thus, 0.5% of base water costs. The range of values used for water used in fire operations for large systems is typically in the range of 0.5 - 1.0%. This Report continues to use the value of 0.5% of average day use. The fire protection share of peak costs is calculated based on the ratio of base and peak demand.
- O&M expense is first assigned to wastewater and water, recognizing that wastewater includes CSO (including Long-Term Control Plan and stormwater) expenditures. The O&M expense assigned to water, net of other water costs and non-water costs (wastewater, CSO and stormwater), was assigned in the following manner: 92.5% to base and 7.5% to peak in 2013, 85.0% to base and 15.0% to peak in 2014, 83.2% to base and 16.8% to peak in 2015, 83.9% to base and 16.1% to peak in 2016, and 84.1% to base and 15.9% to peak in 2017 and each year thereafter.
- Labor-related O&M expenses are assumed by DC Water to increase in 2018 and subsequent years at the average rate of 3.0% annually.
- The burden rate for DC Water direct labor is comprised of a fringe benefit factor plus an overhead factor. In computing the values for burden on labor, we add the two percentages to arrive at a total burden rate. The fringe benefit factors are listed below and reflect figures used for 2013 through 2021:
  - 59% for 2013 – 2014;
  - 66% for 2015 – 2017; and
  - 62% for 2018-2021.

  The fringe benefit factors applied to DC Water personnel on loan for fire protection service are the same as the factors used for full-time assigned personnel.
- The overhead factors are listed below and reflect figures for 2013 through 2021:
  - 50% for 2013 – 2014;
  - 48% for 2015 – 2017; and
  - 62% for 2018-2021.
- The burden rate for non-personnel expenses of DC Water is comprised of the overhead rate only.
- Debt service is allocated to water and non-water. The water debt service was then assigned in the following manner: 73% to base and 27% to peak.

Customer Base for Fire Protection

- Units of service – This Report incorporates the most recent data (October 2017) provided by DC Water.

Report describes the components of cost and presents the resulting computations for fire protection service.

Based on our discussions with DC Water representatives and the review of data provided by DC Water, we have computed the fire protection costs for 2013 through 2017 as summarized in Table 2. Information regarding direct costs and allocated costs is presented following Table 2. The breakdown of DC Water full-time personnel costs is presented in Table 2A in the Appendix. This Report also presents the projected costs for 2018 through 2021, shown in Table 7.

Table 2 – Historical Direct and Allocated Fire Costs (All amounts in $)

	Cost Category	2013	2014	2015	2016	2017
				Historical		
	Direct Fire Costs					
1	Full time assigned personnel costs	1,369,145	903,814	852,481	928,964	1,006,617
2	Hydrant Parts	520,973	48,158	38,104	67,608	67,155
3	Material & Equipment (Fire Hydrant Program)	114,146	382,794	386,902	160,256	427,642
4	Hydrant Installation and Restoration	1,580,771	465,354	287,125	200,886	708,698
5	Personnel loaned from other departments (documented via WO)	546,562	1,328,698	1,228,069	1,054,792	2,053,752
6	DDOT Open Space Permits	23,203	32,986	284,548	435,591	358,096
7	Paid to Fire Department for Inspection Services (NTE)	134	0	0	0	0
8	Fire Protection Cost of Service Study		6,660	31,429		
9	Burden applied to DC Water personnel costs	1,492,368	985,157	971,828	1,059,019	1,147,543
10	Burden applies to Personnel loaned (Hourly Rate, Salary Rate & OH)	595,753	1,448,280	1,399,998	1,202,463	2,341,278
11	Burden applied to Parts	260,486	24,079	18,290	32,452	32,234
12	Burden applied to Material & Equipment	57,073	191,397	185,713	76,923	205,268
13	Subtotal Direct Costs	6,560,615	5,817,376	5,684,487	5,218,955	8,348,283
	Allocated Fire Costs					
14	Fire Share of Water Base Costs @ 0.5%	489,717	546,010	513,771	530,766	532,574
15	Fire Share of Peak Costs @ 1.62% for 2013, increasing to 1.64% by 2016	196,315	302,288	235,984	282,220	270,663
16	Subtotal	686,033	848,298	749,754	812,986	803,236
17	Allocated Public Fire Costs	515,167	637,842	563,762	612,362	605,550
18	**Total Direct and Allocated Public Fire Costs**	**7,075,782**	**6,455,218**	**6,248,250**	**5,831,317**	**8,953,833**

Following the execution of the 2007 MOU, direct fire costs increased significantly over the level of investments in prior years. The peak level of total direct and allocated public fire costs was $17.0 million in total annual costs in 2008, followed by $15.7 million in investments in 2009. For 2010 through 2017, the pace of annual investments has ranged from $5.8 million to $9.0 million, with an average annual cost of $7.2 million per year. The results shown in Table 2 reflect the trends towards fewer replacements, ending reliance on contractors and increased use of DC Water personnel.

Direct Costs –Direct costs have been presented using the following categories:

- Full-time assigned personnel (line 1) – DC Water personnel who are assigned full-time to hydrant and hydrant-related work.
- Hydrant parts and paint (repairs and retrofit) (line 2) – Maintenance-related expenses for hydrants and related appurtenances.
- Material & Equipment (Fire Hydrant Program) (line 3) – Maintenance-related expenses for hydrants and related appurtenances.

using the ratio of non-pumping staffing divided by total staffing. Based on actual 2017 results, the following staffing levels are utilized:

- Pumping Services Staffing = 32;
- Water Services Staffing = 201; and
- Ratio of Base to Peak = 84.1:15.9.

The ratio shown above is applied to operation and maintenance expenses starting with 2018.

4. Administration expenses are allocated on the basis of the subtotal of expenses by category divided by total of all such expenses times the total administration costs.

A summary of the results of the proposed assignment of costs by year, assuming capitalization of hydrant installation and restoration costs, is presented in Table 3. The allocations by line item for each year are illustrated in Tables 3A – 3F of the Appendix for 2013 through 2018.

Table 3 – Annual Costs by Category (All amounts in $)

Year	Total Costs	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO	Fire
2013	368,834,848	97,943,420	12,124,817	11,652,156	247,114,455	7,495,229
2014	404,503,426	109,201,991	17,806,184	11,324,986	266,170,266	7,896,985
2015	423,586,079	102,754,136	16,676,169	12,400,902	291,754,872	8,054,201
2016	440,363,689	106,153,240	17,161,680	13,379,505	303,669,264	7,606,040
2017	472,074,191	106,514,727	16,458,879	13,717,495	335,383,090	10,540,096
2018*	492,761,142	111,839,489	17,551,072	14,525,007	348,845,575	11,347,372

* Projected costs.

Allocation Factors – The allocation of a portion of the cost of peak water service to fire protection is based Design Fire Demand as explained in the previous page. For 2016, the maximum day delivery was 127.7 MGD (exhibit 19 of the 2016 CAFR), resulting in a Design Fire Demand of 1.64%. The following table shows these values for a ten year period. The 2016 percentage will be used for 2017 and subsequent years.

The projected costs in 2018 through 2021 for personnel in lines 1 and 5 are based on an annual increase of 3% and were provided by DC Water.

Table 7 – Projected Direct and Allocated Fire Costs (All amounts in $)

	Cost Category	2018	2019	2020	2021
			Projected		
	Direct Fire Costs				
1	Full time assigned personnel costs	1,036,815	1,067,920	1,099,957	1,132,956
2	Hydrant Parts	69,170	71,245	73,382	75,584
3	Material & Equipment (Fire Hydrant Program)	440,472	453,686	467,296	481,315
4	Hydrant Installation and Restoration	729,959	751,858	774,413	797,646
5	Personnel loaned from other departments (documented via WO)	2,115,365	2,178,826	2,244,191	2,311,516
6	DDOT Open Space Permits	368,839	379,904	391,301	403,040
7	Paid to Fire Department for Inspection Services (NTE)	0	0	0	0
8	Fire Protection Cost of Service Study	42,946			44,234
9	Burden applied to DC Water personnel costs	1,285,651	1,324,220	1,363,947	1,404,865
10	Burden applies to Personnel loaned (Hourly Rate, Salary Rate & OH)	2,623,052	2,701,744	2,782,796	2,866,280
11	Burden applied to Parts	42,885	44,172	45,497	46,862
12	Burden applied to Material & Equipment	273,092	281,285	289,724	298,415
13	Subtotal Direct Costs	9,028,246	9,254,859	9,532,504	9,862,714
	Allocated Fire Costs				
14	Fire Share of Water Base Costs @ 0.5%	559,197	575,973	593,253	611,050
15	Fire Share of Peak Costs @ 1.62% for 2013, increasing to 1.64% by 2016	288,624	297,282	306,201	315,387
16	Subtotal	847,821	873,256	899,453	926,437
17	Allocated Public Fire Costs	639,162	658,337	678,087	698,429
18	**Total Direct and Allocated Public Fire Costs**	**9,667,407**	**9,913,195**	**10,210,591**	**10,561,143**

3.4 Comparison of the Cost of Service With District Payments

Prior to 2011, the District had paid a maximum of $1.9 million each year for fire protection service. In 2011, DC Water received District payments of $6,148,720. In addition, DC Water offset a portion of its payments to the District by $4,773,720, resulting in total credits of $10,922,440 for 2011 towards the cost of fire protection service. In 2012, the District paid in full the fire protection service bill of DC Water of approximately $6,173,720.

Preceding tables have presented both the historical cost of fire protection service (Table 2) and the projected cost of service (Table 7). This part of the Report compares the cost of service to DC Water with the payments from the District for fire protection service. Table 8 illustrates a reconciliation of the cost of service with the payments made by the District for 2013 through 2017, together with a projected reconciliation for 2018. This reconciliation again assumes that all costs incurred by DC Water in each year are due in full as payments from the District; i.e., capital costs are not amortized.

4. Cost Recovery Options

In the prior report there was a larger accumulated deficit of District payment obligations; the current deficit is smaller. Thus, no alternatives are presented for recovering the unpaid amounts; such amounts are assumed to be recovered over the three-year period of 2019 through 2021. A 4.5% interest factor is used for the outstanding balance of the accumulated costs and underpayments/overpayments.

The Base Case assumes that DC Water's construction-related costs for fire protection are capitalized to a large extent; i.e., most of the costs are paid for through the proceeds of bonds and the debt service on those bonds must be paid each year through the maturity of the bonds. The remaining portions of such costs are treated as PAYGO. For the period of 2013 through 2021, the PAYGO percentages range from a low of 4% in 2014 to a high of 34% in 2021; the percentages reflect the actual or anticipated percentage of the CIP that DC Water financed or expects to finance with PAYGO in each year.

The refunding of prior bonds with the proceeds of new bonds which results in changes in debt service leads us to a more practical approach to computing debt service attributable to fire protection; i.e., adding all fire protection investments to date at a given point in time and dividing that result by the sum of all bond issues (excluding refunding bonds) for that same time period. The resulting percentage is a debt service attributable to fire protection which can be multiplied by debt service in a given year to arrive at the debt service attributable to fire protection. Table 9A in the Appendix provides the results of the percentage calculations.

The Base Case, using a mix of PAYGO and debt for fire protection investments results in an annual charge to the District of $12,527,000 for 2019 through 2021, including the effects of the reconciliation of historical costs and District payments using this methodology.

If DC Water desired instead to request that the District pay in 2019 the approximately $24.4 million in accumulated, unreimbursed costs incurred by DC Water to date, there would be a substantial one-time increase in receipts in that year followed by significant reductions in subsequent years due to the absence of an obligation to include debt service in the fire protection cost of service. .

5. Appendix

5.1 Supporting Table for Table 2

Tables 2A below presents the breakdown for DC Water full-time personnel costs.

Table 2A – Components of Full-time Personnel Costs

	FY 2017	FY 2018 (Projected)
Water Services Worker 06	53,482	55,086
Water Services Worker 08	318,371	327,922
Water Services Worker 10	549,286	565,765
Foreman, Water Services	85,478	88,043
Grand Total Manpower Cost	1,006,617	1,036,815

Table 3B – 2014 Cost Allocation

Category	2014 Actual ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Treatment - Operations	77,867				77,867
Wastewater Treatment - Process Engineer	5,328				5,328
Water Services					
Water Purchase	28,807	28,807			
Net water services	32,763	27,833	4,930		
Sewer Services	19,736				19,736
Maintenance	17,243	1,025	182		16,036
Distribution & Conveyance System	7,772	5,000	886		1,887
Engineering and Technical Services	22,040	6,544	1,159	1,042	13,295
Customer Service	15,862			7,931	7,931
Permits	1,877	1,207	214		456
Clean Rivers	2,261				2,261
Administration	60,679	18,452	1,931	2,351	37,944
Less: Fire O&M	-6,006	-5,102	-904		
Debt Service					
Jennings Randolph Bonds	805	588	217		
1998 Revenue Bonds	23,370	5,118	1,893		16,359
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	11,351	4,754	1,758		4,839
Series 2008A Subordinate Bond	19,750	7,148	2,644		9,958
Series 2009A Revenue Bond	18,671	4,794	1,773		12,104
Series 2010A Revenue Bond	9,284	1,496	553		7,234
Series 2012A,B-1,B-2,C Subordinate Bond	21,360	1,743	645		18,972
Series 2013A Subordinate Bond	14,994	1,131	418		13,445
Series 2014B, C Subordinate Bond	10	1	0		9
DC Water Future Bonds	0	0	0		0
Commercial Paper	569	43	16		511
Less Debt Service Attributable to Fire	-1,891	-1,380	-510		
Total Allocated	404,503	109,202	17,806	11,325	266,170

2014 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	546
Fire Share of Peak Costs@1.70%	302

Table 3D – 2016 Cost Allocation

Category	2016 Actual ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Treatment - Operations	64,983				64,983
Wastewater Treatment - Process Engineer	6,921				6,921
Water services	23,407	19,643	3,764		
Sewer Services	14,846				14,846
Maintenance	18,564	1,091	209		17,265
Distribution & Conveyance System					
Water Purchase	26,345	26,345			
Net Distribution & Conveyance	18,957	12,252	2,348		4,357
Engineering and Technical Services	24,319	7,133	1,367	1,150	14,669
Customer Service	17,677			8,839	8,839
Permits	2,049	1,324	254		471
Clean Rivers	2,835				2,835
Administration	74,986	23,011	2,696	3,391	45,889
Less Fire O&M	-5,655	-4,745	-909		
Debt Service					
Jennings Randolph Bonds	805	588	217		
1998 Revenue Bonds	23,368	5,118	1,893		16,358
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	1,893	793	293		807
Series 2008A Subordinate Bond	9,969	3,608	1,334		5,026
Series 2009A Revenue Bond	6,611	1,698	628		4,286
Series 2010A Revenue Bond	11,230	1,810	669		8,751
Series 2012A,B-1,B-2,C Subordinate Bond	21,107	1,723	637		18,747
Series 2013A Subordinate Bond	14,994	1,131	418		13,445
Series 2014A Revenue Bond	16,849				16,849
Series 2014B, C Subordinate Bond	17,720	1,336	494		15,890
Series 2015A,B Subordinate Bond	16,793	2,269	839		13,684
Series 2016 Subordinate Bond	10,500	1,419	525		8,556
Series 2016B Subordinate Bond	0				
DC Water Future Bonds	0	0	0		0
Commercial Paper	149	20	7		121
EMCP	93	13	5		76
Less Debt Service Attributable to Fire	-1,951	-1,424	-527		
Total Allocated	440,364	106,153	17,162	13,380	303,669

2016 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	531
Fire Share of Peak Costs@1.64%	282

Table 3F – 2018 Cost Allocation

Category	2018 Approved ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Treatment - Operations	74,686				74,686
Wastewater Treatment - Process Engineer	7,673				7,673
Water services	24,094	20,258	3,836		
Sewer Services	14,315				14,315
Maintenance	19,558	1,151	218		18,189
Distribution & Conveyance System					
Water Purchase	30,156	30,156			
Net Distribution & Conveyance	18,334	12,197	2,309		3,828
Engineering and Technical Services	26,728	7,854	1,487	1,264	16,122
Customer Service	19,281			9,641	9,641
Permits	2,295	1,527	289		479
Clean Rivers	2,995				2,995
Administration	79,716	24,283	2,702	3,620	49,111
Less: Fire O&M	-9,080	-7,635	-1,446		
Debt Service					
Jennings Randolph Bonds	805	588	217		
1998 Revenue Bonds	23,367	5,117	1,893		16,357
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	0	0	0		0
Series 2008A Subordinate Bond	7,208	2,609	965		3,634
Series 2009A Revenue Bond	4,436	1,139	421		2,876
Series 2010A Revenue Bond	11,094	1,788	661		8,645
Series 2012A,B-1,B-2,C Subordinate Bond	21,058	1,719	636		18,704
Series 2013A Subordinate Bond	14,994	1,131	418		13,445
Series 2014A Revenue Bond	16,849				16,849
Series 2014B, C Subordinate Bond	20,718	1,562	578		18,578
Series 2015A,B Subordinate Bond	18,101	2,446	905		14,750
Series 2016 Subordinate Bond	17,420	2,354	871		14,195
Series 2016B Subordinate Bond	858	99	37		722
Series 2017 A&B Revenue Bond Bond	17,072	1,966	727		14,379
DC Water Future Bonds	9,298	1,071	396		7,832
Commercial Paper	500	58	21		421
EMCP	500	58	21		421
Less Debt Service Attributable to Fire	-2,267	-1,655	-612		
Total Allocated	492,761	111,839	17,551	14,525	348,846

2018 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	559
Fire Share of Peak Costs@1.64%	289

Table 5B – 2016 and 2017 Equivalent Fire Connections

Fire Hydrants	Number in Service	Demand Factor	Equivalent Connections	% of Total
2016				
Public Fire Hydrants	9,517	111.31	1,059,337	75.32%
Private Fire Hydrants	1,318	111.31	146,707	10.43%
Private Fire Lines (Estimated)	1,800	111.31	200,358	14.25%
Total Public and Private	12,635		1,406,402	100.00%
2017				
Public Fire Hydrants	9,551	111.31	1,063,122	75.39%
Private Fire Hydrants	1,318	111.31	146,707	10.40%
Private Fire Lines (Estimated)	1,800	111.31	200,358	14.21%
Total Public and Private	12,669		1,410,186	100.00%

5.4 Fire-Related Capitalization Policy

The fire hydrant is an asset tracked by DWS. The asset includes both the visible and invisible mechanical parts. The non-visible parts are connected to the fire hydrant lead pipe (pipe that connects the fire hydrant to the main) and terminate at the safety flange. All but two to six inches of this portion of the fire hydrant is below ground. The visible parts are connected at the safety flange and are referred to as the top section.

DWS performs tasks that increase the life of the asset to 30 years (meeting capitalization requirements) by meeting the criteria agreed upon by FEMS and DC Water in the MOU signed in 2013. These tasks include the following:

- Upgrading the 4 inch nozzle to 4.5 inches.
- Replacing the top section of the hydrant (does not involve construction).
- Replacing the entire fire hydrant assembly (involves construction).

Additionally, DWS provides maintenance of all hydrants in the public space. This is accomplished by providing preventative maintenance and upgrades to existing fire hydrants. Preventative maintenance consists of but is not limited to the following:

- Replacing key nuts, bolts, caps, nozzles, gaskets, chains.
- Repairing operating assembly, damaged threads.

These tasks are operational and do not increase the life of the asset but do help it achieve its intended useful life.

Table 9A – Allocation Ratio

Bond	Bond Proceeds	Paygo %	Cumulative Fire Costs Not Funded via PAYGO	Allocation
2006		22%	144,445	
2007A	231,550,000			
2007B	58,450,000	6%	4,554,391	
2008 Total	290,000,000		4,698,836	1.62%
2008A	Refunding	0%	13,545,049	
2009 Total	290,000,000		18,243,885	6.29%
2009A	299,033,760	4%	11,029,212	
2010 Total	589,033,760		29,273,097	4.97%
2010A	287,219,747	11%	4,595,778	
2011 Total	876,253,507		33,868,875	3.87%
	No Bond Issued	1%	2,699,084	
2012 Total	876,253,507		36,567,959	4.17%
2012A	202,951,631			
2012B1, B2	97,050,144			
2012C	Refunding	7%	2,513,958	
2013 Total	1,176,255,282		39,081,917	3.32%
2013A	298,920,565	9%	1,441,563	
2014 Total	1,475,175,847		40,523,480	2.75%
2014A	346,002,729			
2014B	99,521,298			
2014C	Refunding	4%	448,933	
2015 Total	1,920,699,874		40,972,414	2.13%
2015A/B	404,453,241	24%	217,891	
2016 Total	2,325,153,115		41,190,305	1.77%
2016A	Refunding			
2016B	25,000,000	12%	176,643	
2017 Total	2,350,153,115		41,366,948	1.76%
2017AB	332,372,567	19%	572,889	
2018 Total	2,682,525,682		41,939,836	1.56%
2018 Bonds	300,000,000	20%	586,990	
2019 Total	2,982,525,682		42,526,827	1.43%
2019 Bonds	110,000,000	31%	518,209	
2020 Total	3,092,525,682		43,045,036	1.39%
2020 Bonds	195,183,000	29%	551,583	
2021 Total	3,287,708,682		43,596,619	1.33%

Notes:

1. Source: Sources and Uses tables from the Official Statement for each bond issue.
2. 2018-2020 Bond proceeds and fire costs are projected.