Report Regarding Fire Service Charges

May 15, 2024

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Consulting Group LLC

1. Executive Summary

1.1 Background and Purpose

Since April 1, 2000, 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") based on Title 21 DCMR, Chapter 21, Section 4103 Fire Protection Service Fee. The fire protection fee is intended to recover certain costs incurred by the Authority including, but not limited to, the ability to deliver water for firefighting as well as upgrading and maintaining fire hydrants.

The fee was initially set at $217 per fire hydrant per year in 2000. A Memorandum of Understanding was executed on October 25, 2007 (the "2007 MOU") by DC Water and the District of Columbia Fire and EMS Department ("FEMS"). Among the purposes of the 2007 MOU is the definition of the parameters for a series of operating and capital improvements for fire protection service and the achievement of nozzle uniformity in the fire hydrants. Significant investments were made in the Water System by DC Water pursuant to the 2007 MOU.

In 2013, DC Water and FEMS executed the 2013 MOU, which superseded and supplemented the 2007 MOU. Among the purposes of the 2013 MOU is to memorialize the commitments of the parties with regard to the Fire Hydrant Risk Assessment, Repair, and Replacement Program. The most recent Memorandum of Understanding was executed on December 15, 2023 by DC Water and the FEMS (the "2023 MOU") which supplements the 2013 MOU. The purpose of the 2023 MOU is to add a third standard fire hydrant manufacturer to the current selections to increase competition.

Previous studies of the cost of fire protection services and the resulting fee to the District were prepared in calendar years 2006, 2009, 2011, 2015, 2018, and 2021. The current fire protection fee is $11,535,000 per year for fiscal years 2022 through 2024. The purpose of this cost of service study and resulting Fire Service Charges Report (the "Report") is to assess the appropriate level of cost recovery required from the District government for fire protection service and to recommend an appropriate fee for the 2025 through 2027 fiscal years.

1.2 Methodology

The approach that was taken in computing the cost of service involves a two-step process: 1) identifying and summarizing those costs that are directly assignable to the fire protection service provided to the District (e.g., the cost of replacing a hydrant), and 2) identifying those costs that should be allocated, in part, to fire protection service. The second step consists of allocating certain costs between general water service and fire protection service using 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 cost of service approach in the water industry. Fire protection is provided to: a) the general public through public fire hydrants and the infrastructure needed to supply water of sufficient quantity and pressure to the hydrants, and b) to individual customers that receive additional fire protection through privately-owned hydrants,

standpipes or sprinkler connections. Based on the estimated units of service in each category, the total fire protection costs of DC Water are assigned to the District and to private fire customers.

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 costs were provided by DC Water for this Report for 2019 through 2023. Since the 2023 fiscal year ended just prior to the publication of this Report, the figures presented for 2023 are considered preliminary projections. In a similar manner, there are certain allocated costs shown for the 2020 fiscal year in this Report which have changed somewhat from the prior Report; the figures presented at that time for 2020 were also preliminary projections. The differences in 2020 costs between the prior and current Reports are not material. Projections of direct costs for the current year (2024) and future years (2025 through 2027) were also provided by DC Water.

1.3 Findings

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

1. In 2006 and 2007, DC Water's total annual investments in fire protection assets and services (operating and capital spending, prior to the 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 annual total spending for fire protection service for the fourteen-year period of 2010 through 2023 ranged from $5.8 million to $12.2 million. Annual costs are increasing however; particularly in the post-pandemic period after 2022. Total annual costs in the period of 2022 through 2024 are estimated to be 18% higher than in the prior three year period of 2019 through 2021. The reasons for the higher costs include increasing complexity of testing, repair and replacement which require additional staff time and effort, hydrant replacements are more difficult (the more routine replacements were completed in prior years), DC Water is filling previously vacant positions, inflation, supply chain shortages, and better tracking of supporting costs.

2. The total spending represents both direct costs and allocated costs; the allocated public fire costs are relatively small - representing about 8.4% of the long-term total of direct and allocated public fire costs from 2019 through 2027. The illustration of historical (2019-23) and projected (2024-27) 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. The annual charge to the District, as computed herein, is based on the sum of:

   - ✓ Direct operation and maintenance ("O&M") expenses,
   - ✓ Allocated expenses,
   - ✓ A share of annual investments in fire protection assets as noted above, funded on a cash basis, and

- ✓ A share of principal and interest payments on DC Water bonds, the proceeds of which have been used to pay for the majority of the above-mentioned annual investments in fire protection assets.

Expenses are generally increasing with inflation in labor as well as supplies, parts and equipment. Debt service is increasing as the repayment of new investments is added to the existing fire-related principal and interest payments on DC Water bonds.

4. In 2020 and 2021, the District paid in full the fire protection service bill of DC Water of $12,527,000. In 2022 and 2023, the District paid in full the fire protection service bills of DC Water of $11,535,000. The payment of $11,535,000 is expected again in 2024.

5. At the time of the previous Report, it was expected that the level of annual investment and maintenance had reached a relatively stable pace and that inflation in upcoming costs would be modest. However, post-pandemic costs of fire protection were greater than anticipated. As a result, the District payments are less than the cost of service in 2022 through 2024. In aggregate, District payments for fire protection service during the period of 2006 through 2024 are less than DC Water's aggregate costs for fire protection services; the Authority's costs are reflected in both operating expenses as well as capital investments. For purposes of calculating an annual fire protection fee, we amortize certain capital costs. This approach enables the District to pay for certain capital costs over the long-term, as DC Water does. The estimated cumulative balance due from the District at the end of 2024 after reconciling all payments and calculated fees is $5,727,689.

6. The District has the option to pay the cumulative balance due in 2025, and then pay equal annual amounts to reflect the average cost of service in each year for 2025 through 2027. Alternatively, if DC Water elects to spread the recovery of prior balances consistent with past practice: assuming that the cumulative balance due is repaid in equal amounts over the next three years, the calculated annual fire protection fee is $17,575,000 each year for 2025 through 2027.

7. The projected costs of service and resulting calculated annual fire protection fee are based on the continuation of hydrant testing at the standard required in the 2013 MOU; i.e., testing each hydrant at least every six years. DC Water has indicated its intent to recommend to FEMS to move towards a five-year testing cycle for each hydrant in compliance with National Fire Protection Association ("NFPA") best practices recommendation beginning 2025. Such a shift will increase the cost of service each year, especially for Full-time Assigned Personnel. If FEMS concurs, this will results in an increase in costs that is not reflected in the projected costs of service and resulting calculated annual fire protection fee as presented herein, but will be captured in the reconciliation of fees and costs, or "true-up", to be performed as part of the next report on the cost of fire protection services in three years.

1.4 Summary of Costs/Cost Recovery Options

The figures presented in Table 1 on the following page show the historical cost of fire protection service, the payments made by the District and the reconciliation of costs and payments. Projected amounts are shown for the most recent year (2023), the current year (2024) and the upcoming three years (2025 through 2027). A uniform recovery of the projected 2024 end-of-year balance is used to compute the proposed annual fire protection charge of $17,575,000 for 2025 through 2027 in line 33.

Chapter 4 of the Report provides supporting data and further discussion of the cost recovery options.

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

	Cost Category	2019	2020	2021	2022	2023	2024	2025	2026	2027
				Historical				Projected		
	Direct Fire Costs									
1	Full time assigned personnel costs	1,289,095	1,206,274	1,411,581	1,592,518	1,773,469	1,826,673	1,881,473	1,937,917	1,996,055
2	Hydrant Parts	52,551	41,571	40,770	16,537	22,235	22,902	23,589	24,296	25,025
3	Material & Equipment (Fire Hydrant Program)	500,460	416,168	145,159	230,387	318,873	328,440	338,293	348,442	358,895
4	Hydrant Installation and Restoration	768,017	1,098,077	583,979	631,191	914,317	941,747	969,999	999,099	1,029,072
5	Personnel loaned from other departments (documented via WO)	1,847,942	2,042,592	2,687,650	2,670,335	2,887,748	2,974,380	3,063,612	3,155,520	3,250,186
6	DDOT Open Space Permits	371,249	329,148	14,597	23,634	26,113	26,897	27,704	28,535	29,391
7	Paid to Fire Department for Inspection Services (NTE)	0	0	0	0	0	0	0	0	0
8	Fire Protection Cost of Service Study			38,127	0	0	49,955			51,454
9	Burden applied to DC Water personnel costs	1,598,478	1,495,780	1,538,623	1,735,845	1,933,081	1,972,807	2,031,991	2,092,951	2,155,739
10	Burden applies to Personnel loaned (Hourly Rate, Salary Rate & OH)	2,291,448	2,532,815	2,929,539	2,910,665	3,147,645	3,212,331	3,308,701	3,407,962	3,510,200
11	Burden applied to Parts	32,581	25,774	19,570	7,938	10,673	10,535	10,851	11,176	11,512
12	Burden applied to Material & Equipment	310,285	258,024	69,676	110,586	153,059	151,082	155,615	160,283	165,092
13	Subtotal Direct Costs	9,062,108	9,446,224	9,479,269	9,929,635	11,187,213	11,517,747	11,811,826	12,166,181	12,582,620
	Allocated Fire Costs									
14	Fire Share of Water Base Costs @ 0.5%	574,719	496,117	522,971	536,510	631,445	682,839	703,324	724,424	746,156
15	Fire Share of Peak Costs; percentage varies: 1.83% from 2022-2027	272,756	516,827	568,088	631,828	736,218	788,708	812,369	836,740	861,842
16	Subtotal	847,475	1,012,944	1,091,058	1,168,338	1,367,663	1,471,547	1,515,693	1,561,164	1,607,999
17	Allocated Public Fire Costs	643,459	768,072	829,454	888,707	1,040,326	1,119,640	1,153,229	1,187,826	1,223,461
18	**Total Direct and Allocated Fire Costs**	9,705,567	10,214,297	10,308,723	10,818,342	12,227,539	12,637,387	12,965,055	13,354,007	13,806,081
23	**PAYGO %**	60.1%	29.1%	56.7%	27.0%	61.6%	59.2%	28.2%	23.7%	27.6%
24	Less: Construction Costs not Paid via PAYGO	306,167	778,273	252,813	460,573	351,017	383,763	696,905	762,075	745,329
25	**Expense- Related Fire Costs**	**9,399,401**	**9,436,024**	**10,055,910**	**10,357,769**	**11,876,522**	**12,253,625**	**12,268,150**	**12,591,932**	**13,060,752**
26	Capital Costs to be Amortized	306,167	778,273	252,813	460,573	351,017	383,763	696,905	762,075	745,329
27	Debt Service Allocation Ratio Based on Cumulative Costs	1.4%	1.4%	1.3%	1.3%	1.2%	1.2%	1.2%	1.1%	1.0%
28	Debt Service to be Allocated (Excludes Issuances Prior to 2007)	160,754,197	171,061,509	174,832,493	181,683,031	204,028,164	218,449,255	240,575,644	268,081,033	298,369,470
29	**Fire Share of Debt Service**	**2,275,688**	**2,438,891**	**2,308,909**	**2,413,176**	**2,444,494**	**2,637,838**	**2,929,777**	**3,049,111**	**3,097,741**
30	**Total Annual Costs**	**11,675,089**	**11,874,915**	**12,364,819**	**12,770,945**	**14,321,016**	**14,891,463**	**15,197,927**	**15,641,044**	**16,158,493**
19	**District Payment**	**12,527,000**	**12,527,000**	**12,527,000**	**11,535,000**	**11,535,000**	**11,535,000**			
31	**Annual Difference**	**851,911**	**652,085**	**162,181**	**-1,235,945**	**-2,786,016**	**-3,356,463**			
32	**2006-24 Cumulative Difference (Payments vs.Costs)**	**836,469**	**1,488,554**	**1,650,735**	**414,790**	**-2,371,226**	**-5,727,689**			
33	**Level charges (2025-27) including catch-up**							**17,575,000**	**17,575,000**	**17,575,000**

Notes

(A.) Direct fire protection costs are provided by DC Water for FY 2019 - FY 2027.
(B.) Allocated fire costs are anticipated to grow in proportion to the forecasted budgetwhich assumed 3.0% annual rate of increase in expenses for FY 2025 - FY 2027.
(C.) Public fire allocation percentages are provided in section 5.3 of the Appendix. It is assumed that the FY 2024 - FY 2027 public fire hydrant percentage stays the same as FY 2023.
(D.) Line 23 is the actual moneys from operations, including revenues from System Availability Fees and from Clean River Impervious Area Charges, as percentage of the total sources for capital construction.
(E.) Line 27 allocation ratio is based on cumulative fire construction costs divided by cumulative bond proceeds in each year starting with Series 2007 A&B and continuing through Series 2022 A&B&C&D&E.
(F.) Line 28 includes debt service payments on subordinate bonds and senior lien bonds starting with the Series 2007 A&B and continuing through anticipated future issuances, commercial paper, EMCP and capital equipment financing.
(G.) Debt service payments on bonds used to refund Series 2003 and 2004 bonds are excluded.
(H.) Positive annual difference indicates revenue received is more than the cost of service, negative annual difference indicates the revenue received is less than the cost of service.
(I.) Total annual cost for FY 2020 on Line 30 reflect actual FY 2020 operating expenses which are slightly higher than the preliminary figures used in the prior report.

1.5 A Note of Thanks

The Amawalk Consulting Group team wishes to express its appreciation to the representatives of DC Water who provided information to assist us in the preparation of this Report.

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 (2019 through 2023) to illustrate the historical cost of service versus the payments received from the District for such service. It is noted that the 2023 costs are preliminary and may be subject to change. As noted in the 2021 Report[1], the 2020 costs provided at the time were preliminary. The final 2020 costs used in this Report are slightly higher than what was used in the 2021 Report. The anticipated costs for the current year (2024) and three (3) upcoming years (2025 through 2027) 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 8.4% of the total long-term (2019 through 2027) 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.

Since the start of the years of peak investments in fire protection, cumulative annual charges to the District were typically less than the cumulative cost of service. The intent has been to recoup the accumulated differential over time so that all costs incurred are fully reimbursed by District payments. A reconciliation of DC Water costs of service and District payments has been prepared by Amawalk beginning with 2006. From 2008 through 2018, there was a cumulative balance due to DC Water at the end of each year. In 2019 through 2021, the District payments somewhat exceeded the cost of service generating a cumulative credit balance for the District. In 2022 and 2023, the annual charges to the District were less than the cost of service; the credit balance was more than used up in 2023; resulting in a balance due from the District at the end of 2023. The balance due is projected to increase further in 2024, with a projected end-of-year balance due from the District to DC Water of $5.73 million.

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: a) capital investments in facilities that are designed larger than would otherwise be required to be able to accommodate fire demand, and b) 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

[1] Report Regarding Fire Service Charges, DC Water, prepared by the Amawalk Consulting Group, dated March 10, 2021.

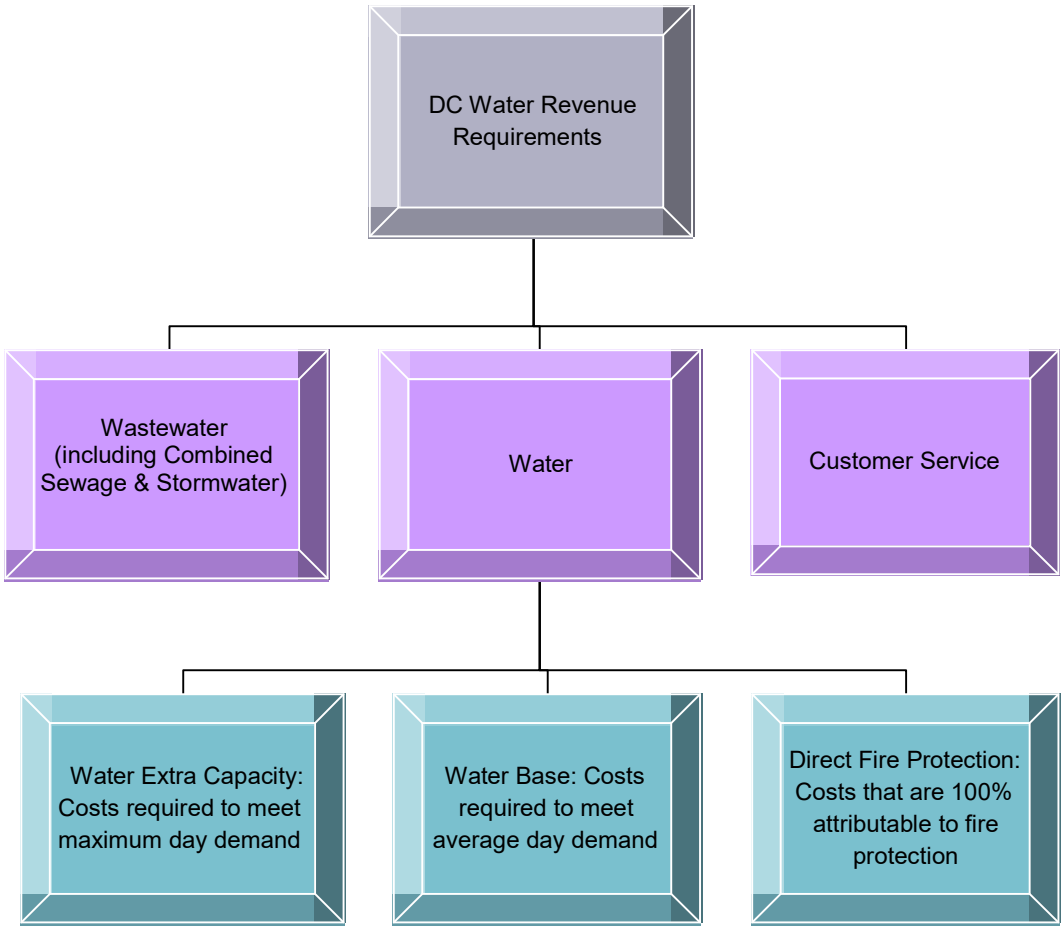
sufficient quantity and pressure to the hydrants) and to individual customers that receive additional fire protection through privately-owned hydrants, standpipes or sprinkler connections. The private fire connections provide a direct service and benefit to individual properties that is separate from 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 March 2021. Similar study reports were prepared in September 2006, January 2009, November 2011, February 2015, and February 2018. 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 water industry. The allocated fire protection costs are divided between public and private fire protection based on the number of equivalent connections in these two groups.

DC Water provides not only water service, but also wastewater and stormwater services to its customers. The determination of the cost of fire protection service requires that costs unrelated to water be separated and not included in the computation of fire protection service costs. It also requires that costs attributable to multiple services be appropriately allocated among the services provided. Figure 1 provides a graphical overview of the cost of service methodology.

Figure 1



All of the annual costs of the Authority are categorized according to three functions: wastewater (including sanitary sewage, combined sewerage, 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 Water Base costs are those required to meet average day demand. The vast majority of water costs are expected to be assigned to Base Costs. The Water 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, or cash-financed) 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 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 2019 through 2023 reflect actual results[2].

- The costs shown for 2019 through 2027 have been provided by the Authority. The projected costs for 2024, the current year, and the estimates in each year for 2025 through 2027 are significant but less than the annual costs incurred in peak cost years of 2008 and 2009.

- Costs incurred by DC Water in 2023 were higher than the relatively stable level of costs in 2019 through 2022. DC Water has indicated that there is presently a high level of service required in hydrant replacements and repairs and the impacts of the service level and inflation on labor and parts and supplies are being reflected in an increased cost of service. Hydrant replacements are more difficult (the more routine replacements were completed in prior years), DC Water is filling previously vacant positions and implemented better tracking of supporting costs. The Authority anticipates continuing to perform most of the future hydrant-related projects with in-house personnel instead of outside contractors to optimize costs. More overtime work has been required. DC Water has further advised that the costs incurred in 2023 form a reasonable base from which projections of costs can be made for future years. All references in this Report to DC Water performing more fire protection-related work in-house in lieu of contracting-out are preliminary and subject to change. DC Water will periodically evaluate the cost-effectiveness of using in-house labor versus outsourced in order to select the most appropriate service delivery method.

[2] As noted previously, the 2023 results are preliminary

- Direct fire protection, other than hydrant installation and restoration (e.g., personnel, parts, permits), also reflect actual costs incurred in 2019 through 2023, subject to final figures for 2023. The projected costs in each year for 2024 through 2027 were also provided by DC Water.

- The cost of preparing the fire protection cost of service study is included starting with the 2021 Report which was initiated in 2020. Budgeted costs are included for this Report (2024) and projected costs are shown for the next report in 2027.

- We assume that the proceeds of debt are used to pay for most fire protection-related capital costs and that fire protection costs are capitalized at the same ratio as DC Water's overall capital spending, i.e., some percentage of fire costs were and will continue to be funded by PAYGO. As DC Water utilizes a higher percentage of PAYGO (compared to previous years) as part of its overall capital management, it is prudent to make similar assumptions in the capitalization of fire costs.

  The next step is to estimate the portion of the debt service that is attributable to fire protection capital spending. The allocation ratio in each year is calculated by comparing the cumulative fire protection capital costs up to that year (i.e., those fire protection capital costs not paid through PAYGO) and the cumulative proceeds of bonds issued for all DC Water assets up to that same year.

  In the third step, debt service payments for fire protection are calculated by multiplying the allocation ratio times actual and projected debt service payments for DC Water. Debt issued prior to 2007 and the resulting debt service on such debt is excluded because there were no fire protection costs tracked prior to 2006. Similarly, debt service payments for bonds that were used to refund debt that was issued prior to 2007 are excluded. When the refunding applies to both pre-2007 debt and post-2007 debt, the portions of refunding principal that are pre- and post-2007 to total borrowing for that bond issue are estimated. Debt that is issued to refund outstanding bonds is not treated as new principal. The calculation of the allocation ratios used in this study is provided in Section 5.5 of the Appendix.

Allocation of Certain Base and Extra Capacity Costs

In order to assign a portion of the total allocated costs to fire protection, a number of assumptions are utilized:

- The maximum day allocation for water used in fire protection is calculated as follows:
  - Design basis – 2 fires for 5 hours at 3,500 gallons per minute. This is the fire design basis as reported by DC Water in 2008 in its discussions with the Insurance Services Office (ISO). Additional information regarding the ISO can be found on its website at http://www.iso.com
  - Maximum day fire use – 2.1 million gallons per day (the calculated product of the above figures).
  - This Report presents the updated Design Fire Demand factors for 2013 to 2022 (maximum day fire use divided by peak Water System demand) which range from

1.42% to 1.83% for the allocation of fire costs – the percentage factor is increasing over time since the maximum day fire use remains constant but peak daily volumes are declining.

- This Report utilizes average day and peak day deliveries of water as reported by DC Water Department of Water Operations and the Washington Aqueduct through 2022. 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 assigned to 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 based on the large size of District. The fire protection share of peak costs is calculated based on the ratio of base and peak demand.
- O&M expense for DC Water as a whole is first assigned to wastewater and water expenditures, recognizing that wastewater includes sanitary sewage, and combined sewage and stormwater. The O&M expense for water, net of other water costs and non-water costs (wastewater), was assigned based on the weighted ratio of pumping facilities' staffing levels to water supply staffing levels, in the following manner:
  - 90.4% to base and 9.6% to peak in 2019;
  - 69.5% to base and 30.5% to peak in 2020;
  - 67.6% to base and 32.4% to peak in 2021;
  - 68.2% to base and 31.8% to peak in 2022; and
  - 68.4% to base and 31.6% to peak in 2023 and each year thereafter.
- Labor-related O&M expenses (i.e., salaries and wages, plus the total burden) are assumed by DC Water to increase in 2024 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; we add the two percentages to arrive at a total burden rate. The fringe benefit factors (actual and projected) are listed below and reflect figures used for 2019 through 2027:
  - 62% for 2019 – 2020;
  - 61% for 2021 – 2023; and
  - 62% for 2024 – 2027.

  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 2019 through 2027:
  - 62% for 2019 – 2020;
  - 48% for 2021 – 2023; and
  - 46% for 2024 – 2027.
- The burden rate for non-personnel expenses of DC Water is comprised of the overhead rate only.
- Debt service is first allocated to water and non-water based on actual capital drawdowns. Water debt service is then allocated between base and peak based on the ratio of base and peak demand for the past 10-years from 2013 to 2022: 61% to base and 39% to peak.

Customer Base for Fire Protection

- Units of service – This Report incorporates the most recent data (February 2024) provided by DC Water.

3. Calculation of the Cost of Service

3.1 Memorandum of Understanding ("MOU")

The 2007 MOU and the 2013 MOU, together with the 2023 MOU (described below), collectively, the "MOU", memorialized the commitments of both parties with regard to the Fire Hydrant Risk Assessment, Repair, and Replacement Program. Key elements of the MOU that currently affect this study are summarized below.

- DC Water is required to inspect all public fire hydrants once per year and after each operation in accordance with National Fire Protection Association ("NFPA") guidelines
- FEMS may inspect any public fire hydrants with advanced coordination with DC Water and shall submit a schedule of inspection to DC Water by January 1st of each year. Inspections will be conducted between March 1st and December 15th of each calendar year. DC Water will conduct inspections prior to March 1st.
- DC Water shall be responsible for identifying and installing new hydrants as part of its ongoing capital program, developing manuals and protocols for hydrant inspection and inspection data management, and ensuring that the required preventative maintenance is performed on each hydrant as required by the manufacturer.
- DC Water has committed to providing water supply personnel on scene to FEMS when requested for 2 alarm fires or greater.
- DC Water shall be responsible for the repair or replacement of all public fire hydrants on a timely basis.
- In addition to the repairs and replacements, DC Water shall be responsible for upgrading all of the remaining public fire hydrants in the District, based on the funding available for the upgrades in 2013 and each year thereafter.
- DC Water shall conduct a flow test for every public hydrant in the public water distribution system at least once every 6 years as specified in the 2013 MOU, as funding allows. It is anticipated that DC Water may follow the more aggressive NFPA guidelines (which suggests testing every five years) starting in 2025 as explained below.
- In 2013 and each year thereafter, DC Water shall submit a report to FEMS on the number of repairs, upgrades, retrofits, or inspections during the prior quarter by the 45th day after the end of the second fiscal quarter. DC Water also shall submit a year-end report to FEMS containing the same information described above for the prior Fiscal Year, as well as all costs incurred by DC Water in carrying out its responsibilities under the MOU.
- Based on the submission of an annual budget and record of auditable expenditures by FEMS, DC Water agrees to pay one-half of the personnel operating costs of FEMS that are related to fire hydrant inspections.
- An independent cost of service study on fire hydrant inspection and repair services, including capital and operating expenses shall be performed every three years.

The 2023 MOU added a third standard fire hydrant manufacturer to the current selections of available hydrants to increase competition.

The projected costs of service and resulting calculated annual fire protection fee are based on the continuation of hydrant testing at the standard required in the MOU; i.e., testing each hydrant at least every six years. DC Water has indicated its intent to recommend to FEMS to move towards

a five-year testing cycle for each hydrant in compliance with NFPA best practices recommendation beginning 2025. Such a shift will increase the cost of service each year, especially for Full-time Assigned Personnel. If FEMS concurs, this will results in an increase in costs that is not reflected in the projected costs of service and resulting calculated annual fire protection fee as presented herein, but will be captured in the reconciliation of fees and costs, or "true-up", to be performed as part of the next report on the cost of fire protection services in three years.

The emphasis of the MOU is on a high quality of hydrants and related appurtenances and their availability to provide service, as needed. DC Water manages over 9,800 fire hydrants; at the time of this Report, it is reported that 45 hydrants, or 0.5%, are out of service according to the Authority's Water Hydrant Dashboard. This value is the sum of out of service hydrants due to defects and other operational activities that are temporary.

3.2 Fire Protection Cost Calculation - Methodology

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

The annual charge to the District, as computed herein, is based on the sum of:

- ✓ Identify and summarize costs that are directly assignable to the fire protection services,
- ✓ Identify and summarize those costs that should be allocated, in part, to fire protect services,
- ✓ A share of annual investments in fire protection assets as noted above, funded on a cash basis, and
- ✓ A share of principal and interest payments on DC Water bonds, the proceeds of which have been used to pay for the majority of the above-mentioned annual investments in fire protection assets.

Based on our discussions with DC Water representatives and the review of data provided, we have computed the fire protection costs for 2019 through 2023 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 2024 through 2027, shown in Table 7.

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

	Cost Category	2019	2020	2021	2022	2023
				Historical		
	Direct Fire Costs					
1	Full time assigned personnel costs	1,289,095	1,206,274	1,411,581	1,592,518	1,773,469
2	Hydrant Parts	52,551	41,571	40,770	16,537	22,235
3	Material & Equipment (Fire Hydrant Program)	500,460	416,168	145,159	230,387	318,873
4	Hydrant Installation and Restoration	768,017	1,098,077	583,979	631,191	914,317
5	Personnel loaned from other departments (documented via WO)	1,847,942	2,042,592	2,687,650	2,670,335	2,887,748
6	DDOT Open Space Permits	371,249	329,148	14,597	23,634	26,113
7	Paid to Fire Department for Inspection Services (NTE)	0	0	0	0	0
8	Fire Protection Cost of Service Study			38,127	0	0
9	Burden applied to DC Water personnel costs	1,598,478	1,495,780	1,538,623	1,735,845	1,933,081
10	Burden applies to Personnel loaned (Hourly Rate, Salary Rate & OH)	2,291,448	2,532,815	2,929,539	2,910,665	3,147,645
11	Burden applied to Parts	32,581	25,774	19,570	7,938	10,673
12	Burden applied to Material & Equipment	310,285	258,024	69,676	110,586	153,059
13	Subtotal Direct Costs	9,062,108	9,446,224	9,479,269	9,929,635	11,187,213
	Allocated Fire Costs					
14	Fire Share of Water Base Costs @ 0.5%	574,719	496,117	522,971	536,510	631,445
15	Fire Share of Peak Costs; percentage varies: 1.83% from 2022-2027	272,756	516,827	568,088	631,828	736,218
16	Subtotal	847,475	1,012,944	1,091,058	1,168,338	1,367,663
17	Allocated Public Fire Costs	643,459	768,072	829,454	888,707	1,040,326
18	**Total Direct and Allocated Public Fire Costs**	**9,705,567**	**10,214,297**	**10,308,723**	**10,818,342**	**12,227,539**

Following the execution of the 2007 MOU, direct fire costs increased significantly over the level of investments in the prior years. The peak level of total direct and allocated public fire costs was $17.0 million in 2008, followed by $15.7 million in investments in 2009. For 2010 through 2023, the pace of annual investments has ranged from $5.8 million to $12.2 million. The results shown in Table 2 reflect the trend towards no further reliance on contractors to support fire protection, instead using DC Water personnel exclusively to perform the work. All references in this Report to DC Water performing more fire protection-related work in-house in lieu of contracting-out are preliminary and subject to change. DC Water will periodically evaluate the cost-effectiveness of using in-house labor versus outsourced in order to select the most appropriate service delivery method. The reasons for the increase in costs post-pandemic include increasing complexity of testing, repair and replacement which require additional staff time and effort, filling previously unfilled positions, inflation, supply chain shortages, and better tracking of supporting costs.

Direct Costs –Direct costs are 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.
- Hydrant installation and restoration (line 4) – Costs incurred by DC Water for hydrant and hydrant-related work; these costs are assumed to be eligible to be capitalized.
- Personnel loaned from other departments (documented via Work Orders) (line 5) – DC Water personnel who are not typically assigned full-time to hydrant and hydrant-related work but provide assistance, as needed.

- Permits (line 6) – DC Water has to pay for permits issued by the District for construction-related activities associated with hydrants, valves and water mains.
- Amounts paid to FEMS for inspection services (line 7) – The MOU indicates that FEMS would provide inspection services and DC Water would reimburse a portion of its costs for such services.
- Consulting fees for the fire protection cost of service study (line 8) – costs incurred by DC Water for the report prepared every three years.
- Burden rate applied to personnel (lines 9 and 10) - for fringe benefits and overhead expenses for DC Water personnel costs. The burden rates applied to DC Water personnel on loan for fire protection service are the same as the factors used for full-time assigned personnel.
- Burden for overhead expenses that is applied to DC Water non-personnel costs (lines 11 and 12) – The same burden rates (overhead only) are applied to costs for parts and material and equipment.

Other Costs of Fire Protection Services – In addition to the direct costs of fire protection, it is appropriate to allocate a portion of the base cost of water service and a portion of the peak cost of water service to fire protection services. The assignment of a share of these costs to fire protection requires consideration of the following factors:

1. The range of base day costs attributable to fire for large water systems such as the DC Water system is considered to be between 0.5% and 1.0%, with the largest systems being at the low end of the range and other systems being towards the high end of the range. As a result, we propose to continue using the 0.5% factor that was used in the prior studies including the 2021 Report based on the large size of District. In calculating the share of base costs attributable to fire protection, direct fire costs will be excluded to prevent the double-counting of costs.

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2. In allocating peak day costs to fire protection, a "Design Fire Demand" of 2 simultaneous fires for 5 hours was used, each requiring 3,500 gallons per minute. The flow attributable to design fire flows – or 2.1 MGD – divided by the maximum, or peak, day flows represents the fire share of maximum day costs. This Report adjusts the calculated percentage in each year for 2019 through 2022 to reflect the average peak daily usage during those years. It is noted that while average daily demand fluctuated from year to year, average peak daily demand declined.

3. Total DC Water O&M expenses are assigned to water service and wastewater service. Operations and maintenance expenses for water service will then be allocated to base usage and peak usage on the basis of staffing levels. We computed the maximum day or peak share of these costs using the ratio of pumping staffing divided by total water operations staffing; the base share of costs are computed using the ratio of non-pumping staffing divided by total staffing. For example, based on actual 2023 results, the following staffing levels are utilized to compute the applicable ratio:

- Pumping Services Staffing = 84 personnel, multiplied by allocation factors which is the percentage of work hours pumping staff spent on water services, to arrive at 59 full-time equivalent positions;
- Water Services Staffing = 187 personnel; and
- Ratio of Base to Peak = 68.4:31.6.

The ratio shown above is applied to operation and maintenance expenses beginning with 2024.

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 certain hydrant upgrade and replacement costs, is presented in Table 3. The allocations by line item for each year are illustrated in Tables 3A – 3F of the Appendix for 2019 through 2024.

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

Year	Total Costs	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO	Fire
2019	509,463,127	114,943,815	17,313,485	21,717,681	355,488,147	11,675,089
2020	506,617,004	99,223,474	30,369,724	21,081,382	355,942,425	11,874,915
2021	521,940,559	104,594,125	33,598,322	19,794,469	363,953,644	12,364,819
2022	549,122,566	107,301,943	34,600,132	19,463,432	387,757,059	12,770,945
2023	620,130,295	126,289,026	40,316,706	22,054,805	431,469,758	14,321,016
2024*	640,671,535	136,567,765	43,191,145	22,941,731	437,970,894	14,891,463

* 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 example, for 2022, the maximum day delivery was 115.0 MGD (exhibit 19 of the 2022 Annual Comprehensive Financial Report), resulting in a Design Fire Demand ratio of 1.83%. The following table shows these values for a ten year period. The 2022 percentage will be used for 2023 and subsequent years.

Table 4 – Ratio Computation for Design Fire Demand

Fiscal Year	Average Day (MGD)	Peak Day (MGD)	Design Fire Demand
2013	95.1	129.7	1.62%
2014	95.1	123.7	1.70%
2015	104.5	148.4	1.42%
2016	99.4	127.7	1.64%
2017	98.2	122.7	1.71%
2018	94.1	132.5	1.58%
2019	96.4	133.3	1.58%
2020	91.9	123.4	1.70%
2021	95.1	124.2	1.69%
2022	95.2	115.0	1.83%

Units of Service – Fire costs can be presented as a per hydrant charge (for public fire protection) and as a per hydrant or fire connection equivalent charge (for private fire hydrants and private fire lines). Table 5 illustrates the number of public fire hydrants in service by year as provided by DC Water. The number of equivalent private fire lines and private hydrants is also shown recognizing that these are estimated at the time of this Report. Table 5 below presents the estimated units of service. Breakdowns of the estimates for each year and calculations of equivalent fire connections are provided in Table 5A of the Appendix presented at end of this Report.

Table 5 – Units of Service

	2019	2020	2021	2022	2023
Average number of public hydrants	9,771	9,711	9,810	9,830	9,844
Estimated private hydrants	1,298	1,296	1,294	1,293	1,294
Estimated private fire lines	1,800	1,800	1,800	1,800	1,800

The allocation of the units of service between public and private fire service is shown in Table 6.

Table 6 – Public/Private Fire Protection Service & Cost Allocation %

Year	2019	2020	2021	2022	2023
Public %	75.93%	75.83%	76.02%	76.07%	76.09%
Private %	24.07%	24.17%	23.98%	23.93%	23.91%

3.3 Projected Cost of Service for Fire Protection

Table 2 illustrated the historical cost of service for 2019 through 2023. Tables 3 through 6 provided supporting information for the historical years. It is appropriate to consider both the current year and a reasonable period of future years to provide information for policy decisions concerning cost recovery. Table 7 provides the projected cost of service for 2024 through 2027. It is noted that Table 7 shows costs in each year; certain of those costs are amortized and

recovered through debt service payments. The figures provided in Table provide the expenses, cash-financed capital and debt service payments that comprise the annual cost of service.

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

	Cost Category	2024	2025	2026	2027
			Projected		
	Direct Fire Costs				
1	Full time assigned personnel costs	1,826,673	1,881,473	1,937,917	1,996,055
2	Hydrant Parts	22,902	23,589	24,296	25,025
3	Material & Equipment (Fire Hydrant Program)	328,440	338,293	348,442	358,895
4	Hydrant Installation and Restoration	941,747	969,999	999,099	1,029,072
5	Personnel loaned from other departments (documented via WO)	2,974,380	3,063,612	3,155,520	3,250,186
6	DDOT Open Space Permits	26,897	27,704	28,535	29,391
7	Paid to Fire Department for Inspection Services (NTE)	0	0	0	0
8	Fire Protection Cost of Service Study	49,955			51,454
9	Burden applied to DC Water personnel costs	1,972,807	2,031,991	2,092,951	2,155,739
10	Burden applies to Personnel loaned (Hourly Rate, Salary Rate & OH)	3,212,331	3,308,701	3,407,962	3,510,200
11	Burden applied to Parts	10,535	10,851	11,176	11,512
12	Burden applied to Material & Equipment	151,082	155,615	160,283	165,092
13	Subtotal Direct Costs	11,517,747	11,811,826	12,166,181	12,582,620
	Allocated Fire Costs				
14	Fire Share of Water Base Costs @ 0.5%	682,839	703,324	724,424	746,156
15	Fire Share of Peak Costs; percentage varies: 1.83% from 2022-2027	788,708	812,369	836,740	861,842
16	Subtotal	1,471,547	1,515,693	1,561,164	1,607,999
17	Allocated Public Fire Costs	1,119,640	1,153,229	1,187,826	1,223,461
18	**Total Direct and Allocated Public Fire Costs**	**12,637,387**	**12,965,055**	**13,354,007**	**13,806,081**

The projected personnel costs (salaries and wages) in 2024 through 2027 for lines 1 and 5 above are based on an annual increase of 3% from 2023 and were provided by DC Water. The burden applied to personnel costs in lines 9 and 10 is based on the projected personnel costs times the projected fringe benefit and overhead rates. The 2024 costs not related to personnel (lines 2, 3, 4 and 6) reflect increases of 3% over either the 2023 actual or estimated costs. The burden applied to non-personnel expenses is based on the projected non-personnel costs times the projected overhead rates.

3.4 Comparison of the Cost of Service With District Payments

In 2019 through 2021, the District paid $12,527,000 each year. In 2022 and 2023, the District paid $11,535,000 each year. It is anticipated that the District will pay $11,535,000 in 2024.

Preceding tables have presented both the historical cost of fire protection service (Table 2) and the projected cost (Table 7); these costs are prior to the amortization of certain capital costs. 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 (including the effects of amortized costs) with the payments made by the District for 2019 through 2023, together with a projected reconciliation for 2024. The cost of service shown in Table 8 reflects the figures shown in Table 1 earlier in this Report.

Table 8 – Reconciliation of Fire Costs vs. District Payments (All amounts in $)

	Cost Category	2019	2020	2021	2022	2023	2024
				Historical			Projected
30	Total Annual Costs	11,675,089	11,874,915	12,364,819	12,770,945	14,321,016	14,891,463
19	District Payment	12,527,000	12,527,000	12,527,000	11,535,000	11,535,000	11,535,000
31	Annual Difference	851,911	652,085	162,181	-1,235,945	-2,786,016	-3,356,463
32	2006-24 Cumulative Difference (Payments vs.Costs)	836,469	1,488,554	1,650,735	414,790	-2,371,226	-5,727,689

The calculation of the proposed annual payment assumes that most capital-related fire protection costs are paid for from the proceeds of bonds, with the remainder of such costs being paid for on an annual (cash) basis. The amount due in each year reflects the estimated debt service on those bonds plus the PAYGO amounts, plus operation and maintenance expenses.

3.5 Recommendation

The capacity made available to private fire connections provides both value and benefit to those customers. Presently the cost of fire protection service for private connections is being borne by all water customers. We respectfully suggest that DC Water consider the following steps so that it may consider whether or not to establish a separate charge for private fire protection service:

- Complete the inventory of private fire hydrants and private fire lines; and
- Include the development of private fire line charges in the scope of the next comprehensive rate study.

4. Cost Recovery Options

It is assumed that the accumulated balance of District payment obligations is to be recovered over the three-year period of 2025 through 2027. No interest factor is assumed for the outstanding balance of the accumulated costs and underpayments/overpayments.

The proposed annual fire protection fee 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 2019 through 2027, the PAYGO percentages range from a low of 23.7% in 2026 to a high of 61.6% in 2023; the percentages reflect the calculated actual or anticipated percentage of the CIP that DC Water has financed or expects to finance with PAYGO in each year.

To compute debt service attributable to fire protection, fire protection investments to date at a given point in time are added and that result is divided by the sum of the proceeds of all bond issues (excluding refunding bonds) for that same time period. The resulting percentage is debt service attributable to fire protection which can be multiplied by total DC Water debt service in a given year to arrive at the debt service attributable to fire protection. Debt issued prior to 2007 and the resulting debt service on such debt is excluded because there were no fire protection costs tracked prior to 2006. Table 9A in the Appendix provides the results of the percentage calculations.

The annual District payments have reduced and then eliminated the amounts owed to DC Water through 2021; the trend was reversed starting in 2022. The net obligation due to the District of is expected to increase to $5,727,689 at the end of 2024.

If DC Water desired to request that the District pay in 2025 the approximately $5.73 million in accumulated, unreimbursed costs incurred by DC Water as projected, there would be a substantial one-time increase in receipts in that year followed by equal annual amounts in subsequent years to reflect the average cost of service as well as the absence of the repayment of the cumulative obligation to DC Water. Under such a scenario, the District would make one payment of $5.73 million and three annual payments of $15,665,000 in 2025 through 2027.

If no one-time catch-up payment is requested, adding the projected accumulated obligation evenly over the next three years to the projected cost of service results in an annual charge to the District of $17,575,000 for 2025 through 2027. This technique of applying the accumulated obligation evenly over the subsequent three years has been used by DC Water in its billings to the District in prior years.

Table 9 – Amortized and Expensed Direct & Allocated Fire Costs (All amounts in $)

	Cost Category	2019	2020	2021	2022	2023	2024	2025	2026	2027
				Historical			Projected			
18	**Total Direct and Allocated Fire Costs**	9,705,567	10,214,297	10,308,723	10,818,342	12,227,539	12,637,387	12,965,055	13,354,007	13,806,081
23	**PAYGO %**	60.1%	29.1%	56.7%	27.0%	61.6%	59.2%	28.2%	23.7%	27.6%
24	Less: Construction Costs not Paid via PAYGO	306,167	778,273	252,813	460,573	351,017	383,763	696,905	762,075	745,329
25	**Expense- Related Fire Costs**	**9,399,401**	**9,436,024**	**10,055,910**	**10,357,769**	**11,876,522**	**12,253,625**	**12,268,150**	**12,591,932**	**13,060,752**
26	Capital Costs to be Amortized	306,167	778,273	252,813	460,573	351,017	383,763	696,905	762,075	745,329
27	Debt Service Allocation Ratio Based on Cumulative Costs	1.4%	1.4%	1.3%	1.3%	1.2%	1.2%	1.2%	1.1%	1.0%
28	Debt Service to be Allocated (Excludes Issuances Prior to 2007)	160,754,197	171,061,509	174,832,493	181,683,031	204,028,164	218,449,255	240,575,644	268,081,033	298,369,470
29	**Fire Share of Debt Service**	**2,275,688**	**2,438,891**	**2,308,909**	**2,413,176**	**2,444,494**	**2,637,838**	**2,929,777**	**3,049,111**	**3,097,741**
30	**Total Annual Costs**	**11,675,089**	**11,874,915**	**12,364,819**	**12,770,945**	**14,321,016**	**14,891,463**	**15,197,927**	**15,641,044**	**16,158,493**
19	**District Payment**	**12,527,000**	**12,527,000**	**12,527,000**	**11,535,000**	**11,535,000**	**11,535,000**			
31	**Annual Difference**	**851,911**	**652,085**	**162,181**	**-1,235,945**	**-2,786,016**	**-3,356,463**			
32	**2006-24 Cumulative Difference (Payments vs.Costs)**	**836,469**	**1,488,554**	**1,650,735**	**414,790**	**-2,371,226**	**-5,727,689**			
33	**Level charges (2025-27) including catch-up**							**17,575,000**	**17,575,000**	**17,575,000**

Notes

(A.) Line 23 is the actual moneys from operations, including revenues from System Availability Fees and from Clean River Impervious Area Charges, as percentage of the total sources for capital construction.
(B.) Line 27 allocation ratio is based on cumulative fire construction costs divided by cumulative bond proceeds in each year starting with Series 2007 A&B and continuing through Series 2022 A&B&C&D&E.
(C.) Line 28 includes debt service payments on subordinate bonds and senior lien bonds starting with the Series 2007 A&B and continuing through anticipated future issuances, commercial paper, EMCP and capital equipment financing.
(D.) Debt service payments on bonds used to refund Series 2003 and 2004 bonds are excluded.
(E.) Positive annual difference indicates revenue received is more than the cost of service, negative annual difference indicates the revenue received is less than the cost of service.
(F.) Total public fire cost for FY 2020 reflect actual FY 2020 operating expenses which are slightly higher than the preliminary figures used in the prior report.

5. Appendix

5.1 Supporting Information 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 2023	FY 2024 (Projected)
Water Services Worker 06	74,572	76,809
Water Services Worker 08	315,431	324,894
Water Services Worker 09	382,926	394,414
Water Services Worker 10	765,122	788,076
Foreman, Water Services	235,417	242,480
Grand Total Manpower Cost	1,773,469	1,826,673

5.2 Supporting Information for Table 3

The tables presented below present the allocation of costs by year for Water Base, Water Peak, Water Other, Wastewater and Fire Direct for 2019 through 2024. Please note that the figures are presented in thousands of dollars. A significant portion of the increase in costs between 2021 and 2022 is attributable to debt service on DC Water obligations.

Table 3A – 2019 Cost Allocation

Category	2019 Actual ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Treatment - Operations	77,024				77,024
Wastewater Treatment - Process Engineer	6,892				6,892
Wastewater Engineering	1,740				1,740
Water Operations	23,863	21,563	2,300		
Water Quality and Technology	3,436	3,105	331		
Sewer Operations	15,916				15,916
Maintenance	18,867	1,193	127		17,546
Pumping Operations/DDCS					
Water Purchase	32,430	32,430			
Net Distribution & Conveyance	20,071	14,139	1,508		4,424
Engineering and Technical Services	21,564	6,810	726	1,020	13,007
Customer Experience	32,311			16,156	16,156
Permits	3,192	2,249	240		704
Clean Rivers	2,175				2,175
Administration	68,622	21,550	1,384	4,542	41,145
Less: Fire O&M	-9,399	-8,493	-906		
Debt Service					
Jennings Randolph Bonds	805	518	287		
1998 Revenue Bonds	23,281	4,495	2,489		16,297
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	0	0	0		0
Series 2008A Subordinate Bond	0	0	0		0
Series 2009A Revenue Bond	0	0	0		0
Series 2010A Revenue Bond	10,864	1,544	855		8,466
Series 2012A,B-1,B-2,C Subordinate Bond	20,923	1,505	834		18,584
Series 2013A Subordinate Bond	14,905	991	549		13,365
Series 2014A Revenue Bond	16,749				16,749
Series 2014B, C Subordinate Bond	19,466	1,294	717		17,455
Series 2015A,B Subordinate Bond	19,412	2,313	1,281		15,818
Series 2016 Subordinate Bond	28,843	3,437	1,903		23,503
Series 2016B Subordinate Bond	853	87	48		719
Series 2017 A&B Revenue Bond Bond	16,973	1,723	954		14,296
Series 2018 A&B Revenue Bond	18,279	3,894	2,157		12,228
Commercial Paper	827	127	70		629
EMCP	856	132	73		651
Less Debt Service Attributable to Fire	-2,276	-1,661	-614		
Total Allocated	509,463	114,944	17,313	21,718	355,488

2018 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	575
Fire Share of Peak Costs@1.58%	273

Table 3B – 2020 Cost Allocation

Category	2020 Actual ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Operations					
Wastewater Treatment Operations	69,432				69,432
Process Engineering	6,557				6,557
Maintenance Services	18,690				18,690
Engineering					
Engineering and Technical Services	21,328	5,182	2,272	1,009	12,865
CIP Infrastructure Management	1,453	353	155	69	876
Wastewater Engineering	2,617				2,617
Permits	3,385	911	400		2,074
Water Operations					
Water Purchase	31,696	31,696			
Other Water Operations	28,134	19,558	8,576		
Pumping and Sewer Operations	34,328	9,241	4,052		21,035
Customer Experience	30,902			15,451	15,451
Clean Rivers	1,927				1,927
Administration	68,987	18,439	4,257	4,553	41,738
Less: Fire O&M	-9,436	-6,560	-2,876		
Debt Service					
Jennings Randolph Bonds	805	491	314		
1998 Revenue Bonds	19,360	3,542	2,266		13,552
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	0	0	0		0
Series 2008A Subordinate Bond	0	0	0		0
Series 2009A Revenue Bond	0	0	0		0
Series 2010A Revenue Bond	15,836	2,132	1,364		12,340
Series 2012A,B-1,B-2,C Subordinate Bond	19,991	1,363	872		17,756
Series 2013A Subordinate Bond	1,244	78	50		1,115
Series 2014A Revenue Bond	16,788				16,788
Series 2014B, C Subordinate Bond	31,129	1,961	1,255		27,914
Series 2015A,B Subordinate Bond	19,366	2,186	1,399		15,781
Series 2016 Subordinate Bond	16,909	1,909	1,221		13,779
Series 2016B Subordinate Bond	855	82	53		720
Series 2017 A&B Revenue Bond Bond	17,777	1,710	1,094		14,973
Series 2018 A&B Revenue Bond	18,277	3,690	2,361		12,226
Series 2019A,B Subordinate Bond	6,879	1,003	642		5,233
Series 2019C Subordinate Bond	1,572	229	147		1,196
Series 2019D Subordinate Bond	11,319	1,651	1,057		8,611
Series 2022A Subordinate Bond	286	47	30		209
Commercial Paper	297	49	31		217
EMCP	365	60	38		267
Less Debt Service Attributable to Fire	-2,439	-1,780	-659		
Total Allocated	506,617	99,223	30,370	21,081	355,942

2020 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	496
Fire Share of Peak Costs@1.70%	517

Table 3C – 2021 Cost Allocation

Category	2021 Actual ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Operations					
Wastewater Treatment Operations	70,050				70,050
Process Engineering	5,870				5,870
Maintenance Services	19,047				19,047
Engineering					
Engineering and Technical Services	21,451	5,068	2,429	1,015	12,939
CIP Infrastructure Management	3,675	868	416	174	2,217
Wastewater Engineering	2,384				2,384
Permits	3,949	1,064	510		2,375
Water Operations					
Water Purchase	33,135	33,135			
Other Water Operations	29,803	20,146	9,657		
Pumping and Sewer Operations	35,654	9,606	4,605		21,443
Customer Experience	28,389			14,195	14,195
Clean Rivers	2,602				2,602
Administration	73,418	20,042	5,052	4,412	43,912
Less: Fire O&M	-10,056	-6,798	-3,258		
Debt Service					
Jennings Randolph Bonds	805	491	314		
1998 Revenue Bonds	21,390	3,913	2,504		14,973
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	0	0	0		0
Series 2008A Subordinate Bond	0	0	0		0
Series 2009A Revenue Bond	0	0	0		0
Series 2010A Revenue Bond	14,608	1,967	1,258		11,383
Series 2012A,B-1,B-2,C Subordinate Bond	20,046	1,367	874		17,805
Series 2013A Subordinate Bond	0	0	0		0
Series 2014A Revenue Bond	16,829				16,829
Series 2014B, C Subordinate Bond	30,400	1,915	1,225		27,260
Series 2015A,B Subordinate Bond	24,714	2,790	1,785		20,139
Series 2016 Subordinate Bond	16,979	1,917	1,227		13,836
Series 2016B Subordinate Bond	428	41	26		360
Series 2017 A&B Revenue Bond Bond	17,819	1,714	1,097		15,009
Series 2018 A&B Revenue Bond	18,312	3,697	2,365		12,250
Series 2019A,B Subordinate Bond	7,620	1,112	711		5,797
Series 2019C Subordinate Bond	1,741	254	163		1,325
Series 2019D Subordinate Bond	12,302	1,795	1,148		9,359
Series 2022A Subordinate Bond	0				
WIFIA Loan	736	146	94		496
Commercial Paper	62	12	8		42
EMCP	87	17	11		58
Less Debt Service Attributable to Fire	-2,309	-1,686	-623		
Total Allocated	521,941	104,594	33,598	19,794	363,954

2021 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	523
Fire Share of Peak Costs@1.69%	568

Table 3D – 2022 Cost Allocation

Category	2022 Actual ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Operations					
Wastewater Treatment Operations	83,179				83,179
Process Engineering	6,453				6,453
Maintenance Services	20,363				20,363
Engineering					
Engineering and Technical Services	19,801	4,717	2,204	937	11,944
CIP Infrastructure Management	4,289	1,022	477	203	2,587
Wastewater Engineering	2,531				2,531
Permits	3,877	968	452		2,457
Water Operations					
Water Purchase	33,345	33,345			
Other Water Operations	30,231	20,604	9,627		
Pumping and Sewer Operations	37,049	9,249	4,321		23,479
Customer Experience	27,824			13,912	13,912
Clean Rivers	3,364				3,364
Administration	79,820	20,491	5,007	4,412	49,910
Less: Fire O&M	-10,358	-7,059	-3,298		
Debt Service					
Jennings Randolph Bonds	805	491	314		
1998 Revenue Bonds	20,360	3,725	2,383		14,252
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	0	0	0		0
Series 2008A Subordinate Bond	0	0	0		0
Series 2009A Revenue Bond	0	0	0		0
Series 2010A Revenue Bond	15,291	2,059	1,317		11,915
Series 2012A,B-1,B-2,C Subordinate Bond	17,667	1,204	771		15,692
Series 2013A Subordinate Bond	0	0	0		0
Series 2014A Revenue Bond	16,849				16,849
Series 2014B, C Subordinate Bond	28,646	1,804	1,155		25,687
Series 2015A,B Subordinate Bond	22,638	2,556	1,635		18,447
Series 2016 Subordinate Bond	17,039	1,924	1,231		13,884
Series 2016B Subordinate Bond	0	0	0		0
Series 2017 A&B Revenue Bond Bond	17,846	1,717	1,098		15,031
Series 2018 A&B Revenue Bond	18,326	3,699	2,367		12,259
Series 2019A,B Subordinate Bond	7,625	1,112	712		5,801
Series 2019C Subordinate Bond	1,741	254	163		1,325
Series 2019D Subordinate Bond	12,303	1,795	1,148		9,360
Series 2022A Subordinate Bond	1,445	388	248		810
Series 2022B Subordinate Bond	2,078	557	357		1,164
Series 2022C1 Subordinate Bond	4,659	1,249	799		2,610
Series 2022C2 Subordinate Bond	92	25	16		52
Series 2022D Subordinate Bond	2,215	594	380		1,241
Series 2022E Subordinate Bond	1,509	405	259		846
WIFIA Loan	94	25	16		53
Commercial Paper	287	77	49		161
EMCP	252	68	43		141
Less Debt Service Attributable to Fire	-2,413	-1,762	-652		
Total Allocated	549,123	107,302	34,600	19,463	387,757

2022 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	537
Fire Share of Peak Costs@1.83%	632

Table 3E – 2023 Cost Allocation

Category	2023 Revised Budget ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Operations					
Wastewater Treatment Operations	97,013				97,013
Process Engineering	6,979				6,979
Maintenance Services	20,498				20,498
Clean Water and Technology	3,728				3,728
Resource Recovery	5,645				5,645
Engineering					
Engineering and Technical Services	23,337	5,583	2,573	1,104	14,077
CIP Infrastructure Management	5,034	1,204	555	238	3,037
Wastewater Engineering	3,432				3,432
Permits	4,428	1,062	489		2,877
Water Operations					
Water Purchase	40,334	40,334			
Other Water Operations	31,861	21,809	10,052		
Pumping and Sewer Operations	37,350	8,957	4,129		24,264
Customer Experience	31,331			15,666	15,666
Clean Rivers	4,119				4,119
Administration	93,510	23,430	5,282	5,047	59,750
Less: Fire O&M	-11,877	-8,129	-3,747		
Debt Service					
Jennings Randolph Bonds	805	491	314		
1998 Revenue Bonds	21,019	3,845	2,460		14,713
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	0	0	0		0
Series 2008A Subordinate Bond	0	0	0		0
Series 2009A Revenue Bond	0	0	0		0
Series 2010A Revenue Bond	17,774	2,393	1,531		13,850
Series 2012A,B-1,B-2,C Subordinate Bond	0	0	0		0
Series 2013A Subordinate Bond	0	0	0		0
Series 2014A Revenue Bond	16,742				16,742
Series 2014B, C Subordinate Bond	28,577	1,800	1,152		25,626
Series 2015A,B Subordinate Bond	20,350	2,297	1,470		16,583
Series 2016 Subordinate Bond	16,940	1,912	1,224		13,804
Series 2016B Subordinate Bond	0	0	0		0
Series 2017 A&B Revenue Bond Bond	17,733	1,706	1,091		14,936
Series 2018 A&B Revenue Bond	18,229	3,680	2,355		12,195
Series 2019A,B Subordinate Bond	7,583	1,106	708		5,769
Series 2019C Subordinate Bond	1,732	253	162		1,317
Series 2019D Subordinate Bond	12,241	1,786	1,143		9,313
Series 2022A Subordinate Bond	16,204	4,346	2,781		9,078
Series 2022B Subordinate Bond	3,893	1,044	668		2,181
Series 2022C1 Subordinate Bond	8,921	2,393	1,531		4,998
Series 2022C2 Subordinate Bond	177	47	30		99
Series 2022D Subordinate Bond	10,599	2,843	1,819		5,938
Series 2022E Subordinate Bond	2,892	776	496		1,620
WIFIA Loan	391	126	80		185
Commercial Paper	1,414	455	291		668
EMCP	1,637	526	337		774
Less Debt Service Attributable to Fire	-2,444	-1,784	-660		
Total Allocated	620,130	126,289	40,317	22,055	431,470

2023 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	631
Fire Share of Peak Costs@1.83%	736

Table 3F – 2024 Cost Allocation

Category	2024 Approved ($000)	Water Base	Water Peak	Water Other	Wastewater & Storm/CSO
Operating Expense					
Wastewater Operations					
Wastewater Treatment Operations	96,277				96,277
Process Engineering	8,065				8,065
Maintenance Services	23,147				23,147
Clean Water and Technology	5,090				5,090
Resource Recovery	6,538				6,538
Engineering					
Engineering and Technical Services	23,349	5,586	2,575	1,104	14,084
CIP Infrastructure Management	5,549	1,327	612	262	3,347
Wastewater Engineering	3,746				3,746
Permits	5,475	1,328	612		3,535
Water Operations					
Water Purchase	44,039	44,039			
Other Water Operations	32,278	22,094	10,184		
Pumping and Sewer Operations	42,703	10,355	4,773		27,576
Customer Experience	32,472			16,236	16,236
Clean Rivers	4,219				4,219
Administration	100,981	25,698	5,688	5,339	64,256
Less: Fire O&M	-12,254	-8,388	-3,866		
Debt Service					
Jennings Randolph Bonds	805	491	314		
1998 Revenue Bonds	2,381	436	279		1,666
Capital Equipment Financing	0	0	0		0
Series 2007A Subordinate Bond	0	0	0		0
Series 2008A Subordinate Bond	0	0	0		0
Series 2009A Revenue Bond	0	0	0		0
Series 2010A Revenue Bond	15,276	2,057	1,316		11,904
Series 2012A,B-1,B-2,C Subordinate Bond	0	0	0		0
Series 2013A Subordinate Bond	0	0	0		0
Series 2014A Revenue Bond	16,849				16,849
Series 2014B, C Subordinate Bond	20,049	1,263	808		17,978
Series 2015A,B Subordinate Bond	20,548	2,320	1,484		16,744
Series 2016 Subordinate Bond	17,039	1,924	1,231		13,885
Series 2016B Subordinate Bond	0	0	0		0
Series 2017 A&B Revenue Bond Bond	17,849	1,717	1,099		15,034
Series 2018 A&B Revenue Bond	18,326	3,700	2,367		12,260
Series 2019A,B Subordinate Bond	7,625	1,112	712		5,801
Series 2019C Subordinate Bond	1,741	254	163		1,325
Series 2019D Subordinate Bond	12,305	1,795	1,149		9,361
Series 2022A Subordinate Bond	36,943	9,907	6,339		20,696
Series 2022B Subordinate Bond	3,979	1,067	683		2,229
Series 2022C1 Subordinate Bond	8,921	2,393	1,531		4,998
Series 2022C2 Subordinate Bond	177	47	30		99
Series 2022D Subordinate Bond	10,649	2,856	1,827		5,966
Series 2022E Subordinate Bond	2,891	775	496		1,619
WIFIA Loan	2,244	722	462		1,061
Commercial Paper	2,148	691	442		1,015
EMCP	2,890	929	595		1,366
Less Debt Service Attributable to Fire	-2,638	-1,926	-712		
Total Allocated	640,672	136,568	43,191	22,942	437,971

2024 Fire Protection Costs ($000)	Before Capitalization
Fire Share of Water Base Costs@.005	683
Fire Share of Peak Costs@1.83%	789

5.3 Supporting Information for Table 5

The tables presented below convert public and private customer values into equivalent connections based on the diameter of the fire connections for 2019 to 2023 (it is assumed that all hydrants have a six inch connection). The values presented for 2023 are again used for 2024 and each year thereafter.

Table 5A – 2019 through 2023 Equivalent Fire Connections

Fire Hydrants	Number in Service	Demand Factor	Equivalent Connections	% of Total
2019				
Public Fire Hydrants	9,771	111.31	1,087,610	75.93%
Private Fire Hydrants	1,298	111.31	144,480	10.09%
Private Fire Lines (Estimated)	1,800	111.31	200,358	13.99%
Total Public and Private	12,869		1,432,448	100.00%
2020				
Public Fire Hydrants	9,711	111.31	1,080,931	75.83%
Private Fire Hydrants	1,296	111.31	144,258	10.12%
Private Fire Lines (Estimated)	1,800	111.31	200,358	14.05%
Total Public and Private	12,807		1,425,547	100.00%
2021				
Public Fire Hydrants	9,810	111.31	1,091,951	76.02%
Private Fire Hydrants	1,294	111.31	144,035	10.03%
Private Fire Lines (Estimated)	1,800	111.31	200,358	13.95%
Total Public and Private	12,904		1,436,344	100.00%
2022				
Public Fire Hydrants	9,830	111.31	1,094,177	76.07%
Private Fire Hydrants	1,293	111.31	143,924	10.01%
Private Fire Lines (Estimated)	1,800	111.31	200,358	13.93%
Total Public and Private	12,923		1,438,459	100.00%
2023				
Public Fire Hydrants	9,844	111.31	1,095,736	76.09%
Private Fire Hydrants	1,294	111.31	144,035	10.00%
Private Fire Lines (Estimated)	1,800	111.31	200,358	13.91%
Total Public and Private	12,938		1,440,129	100.00%

5.4 Fire-Related Capitalization Policy

The fire hydrant is an asset tracked by DC Water Department of Water Operations. The asset includes both the visible and below ground mechanical parts. The below ground 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.

Water Operations 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, Water Operations 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.
- Painting and other aesthetic maintenance.

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

Valves are assets that are also tracked by Water Operations. Control valves are used to isolate flow to fire hydrants without impacting customers. The Department of Water Operations performs tasks that help preserve the useful life of the asset. This task is exercising the valve during the annual unidirectional flow program. This is an operational task. Furthermore, daily tasks associated with designing valve shuts and providing oversight to those who operate the valves in support of the fire hydrant program are considered to be operating expenses.

5.5 Allocation Ratios for Capitalization

The following table illustrates the allocation ratios that were used in computing debt service attributable to hydrant installation and restoration costs that are assumed to be financed through DC Water debt obligations and not funded through PAYGO.

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%	773,291	
2018 Total	2,682,525,682		42,140,238	1.57%
2018 AB	346,672,033	19%	742,055	
2019 Total	3,029,197,715		42,882,294	1.42%
	No Bond Issued	60%	306,167	
2020 Total	3,029,197,715		43,188,460	1.43%
2019A	125,000,000			
2019B	75,000,000			
2019C	100,000,000			
2019D	Refunding	29%	778,273	
2021 Total	3,329,197,715		43,966,733	1.32%
2021 Bonds	No Bond Issued	57%	252,813	
2022 Total	3,329,197,715		44,219,546	1.33%
2022A	Refunding			
2022B	100,000,000			
2022C	125,000,000			
2022D	75,000,000			
2022E	100,000,000	27%	460,573	
2023 Total	3,729,197,715		44,680,120	1.20%
2023 Bonds	No Bond Issued	62%	351,017	
2024 Total	3,729,197,715		45,031,137	1.21%
2024 Bonds	No Bond Issued	59%	383,763	
2025 Total	3,729,197,715		45,414,899	1.22%
2025 Bonds	325,000,000	28%	696,905	
2026 Total	4,054,197,715		46,111,804	1.14%
2026 Bonds	460,620,000	24%	762,075	
2027 Total	4,514,817,715		46,873,879	1.04%
2027 Bonds	404,627,000	28%	745,329	
2028 Total	4,919,444,715		47,619,208	0.97%

Notes:
1. Source: Sources and Uses tables from the Official Statements.
2. 2024-2027 Bond proceeds and fire costs are projected.