DC Water

Stormwater Services – Cost of Service and Recovery Methodology Study

FINAL MEMO REPORT / February 2024

RAFTELIS

RAFTELIS

March 8, 2024

Syed Khalil, Vice President of Rates and Revenue
DC Water
1385 Canal St., SE
Washington DC, 20003

Subject: Stormwater Services – Cost of Service and Recovery Methodology Study

Dear Mr. Khalil:
Ownership of the Stormwater System in the District and compliance with Municipal Separate Storm Sewer System (MS4) permit requirements are shared between District departments and DC Water. Responsibility for operations of the system is defined in Memoranda of Understanding (MOUs) between the entities. The stormwater system discussed in this study captures and conveys only separated storm flows. Combined flows, a mixture of storm flows and sanitary sewer flows were not analyzed in this study. Combined system capital costs are recovered through the Clean Rivers Impervious Area Charge (CRIAC) and operating costs are recovered through the Sewer Volumetric Rate. This study's purpose is to identify the responsibilities of DC Water along with their costs and to recommend a methodology for cost recovery. The results of this study will inform the Cost of Service Study performed bi-annually to set DC Water retail rates and fees. DC Water should continue to track stormwater costs in order to estimate their financial impacts to retail customers. Further, during the cost of service study, DC Water should review stormwater costs in the combined sewer area and consider the possibility of allocating those costs to a stormwater O&M cost recovery method along with separate stormwater O&M costs.

The report is divided into the following sections:

1. Executive Summary
2. Background & Available Data
3. Operating Costs
4. Capital Costs
5. Conclusions & Recommendations

This report was developed from available data and discussion with DC Water staff. The goal of this report is to document the data upon which the study is based and support recommendations for the division of stormwater responsibilities and cost recovery. It has been a pleasure working with you, and we thank you and DC Water staff for the support you have provided during this study.

Sincerely,

Jon Davis
Executive Vice President

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1. Executive Summary

Stormwater runoff in the District is managed through a combination of combined and separated sewers. The combined sewers mix stormwater inflow with sanitary flows and transport them to Blue Plains for treatment. These costs are recovered by the DC Water CRIAC (Clean Rivers Impervious Area Charge) and the Sewer Volumetric Rate, but only for the capital costs associated with abating combined sewer overflows (a.k.a. Clean Rivers Project). Most stormwater is discharged to surface waters without treatment.

Costs for stormwater management are currently assessed by the District and recovered by the Stormwater Fee that is collected through the DC Water bill and passed to the District. Stormwater costs include compliance with portions of the MS4 NPDES permit (NPDES Permit No. DC0000221), flooding mitigation, and additional costs required by the MS4 NPDES Permit requirements that were outside statutory stormwater management responsibilities prior to April 20, 2000. Per the 2013 US Environmental Protection Agency Settlement Agreement and the District's Department of Energy and Environment (DOEE) Stormwater Management Plan (SWMP), DC Water is responsible for the meeting the other portions of the District's MS4 NPDES permit. A list of DC Water's, DOEE's and the District's Department of Transportation responsibilities can be found in Appendix A.

Currently, DC Water is utilizing revenue from volumetric sewer charges to offset its portion of expenses to remain compliant with the MS4 NPDES permit. In December 2022, DC Water and Raftelis executed a service agreement for Raftelis to identify the stormwater services DC Water is providing, estimate the associated costs, and research the potential for an impervious area-based charge to cover those costs similar to the CRIAC, the District of Columbia's and other communities' strategy to fund their stormwater programs.

The study analyzed an extensive amount of information provided by DC Water. The primary sources of data used for the study were: Sewer System Asset Management Plan, Maximo asset management data, and FY 2024 Adopted Operating and Capital Budgets and discussions with staff. DC Water staff were instrumental in assisting with the study.

Based on available data, Raftelis estimates the following range in costs reflect the need to properly operate the stormwater system consistent with applicable permits and agreements:

- Annual operating costs range from $5.8 to $9.7 million
- Annual capital improvement costs range from $12.2 to $20.3 million

To refine the estimates of operations and maintenance and capital costs, Raftelis recommends the following:

- Perform an engineering-based re-evaluation of the Sewer System Asset Management Plan.
- Perform a budget analysis to determine the true, fully loaded costs for labor, tools, etc.
- Create and follow standard operating procedures (SOP's) for the proper use of Maximo or other systems to accurately capture costs.
- Perform an assessment of the Maximo asset management system and modify processes or data to better support stormwater cost tracking.
- Analyze and develop a cost identification and allocation strategy for stormwater service in the combined sewer area for possible recovery through the alternative funding source described below.
- Create and annually update a financial model specific to stormwater services provided by DC Water.

It is not required that these recommendations be implemented before considering an alternative funding source like an impervious area-based fee. One approach is to switch from a volumetric rate to an impervious area-based fee using the low operation and maintenance estimates above and, over time, implement the above recommendations and consider altering the impervious area rates with updated information.

A similar approach can be deployed for capital expenses. DC Water can further explore recovering capital costs through an impervious area-based fee based on the current and future capital improvement plans.

DC Water may also consider the application of the stormwater rate to public property like roads, in addition to private property impervious area. Some utilities, including Mecklenburg County (NC), for example, apply the stormwater fee to public impervious area maintained by other jurisdictions within which they provide service.

It is recommended that consistency be maintained when considering other funding strategies. Currently, the District and DC Water (CRIAC) recover stormwater related costs from an impervious area-based fee. If a new impervious area-based fee is considered, the approaches and policies associated with charging those fees should be taken into account.

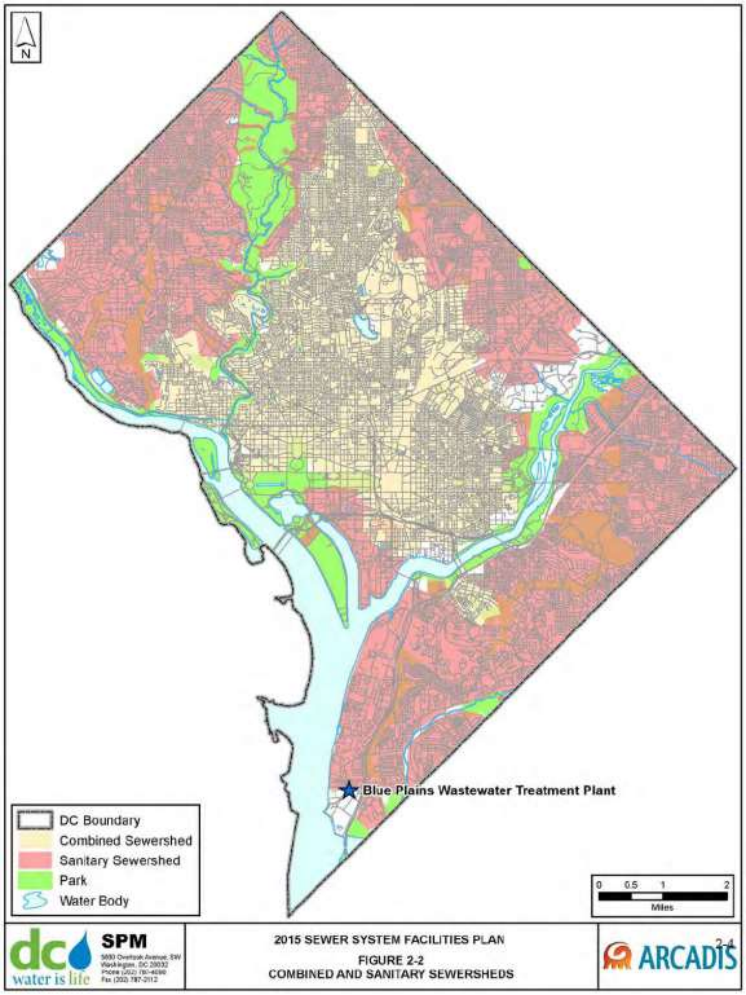
2. Background & Available Data

2.1. Background

The service area for DC Water includes both sanitary, storm, and combined sewer systems. The sanitary and storm sewer systems have a drainage area of 41 square miles and serve a population of approximately 250,000. The combined system has a drainage area of 20 square miles and serves a population of approximately 350,000. The storm sewer system is approximately 580 miles in length, average pipe size is 30 inches, average age is 75 years, and also has 587 outfalls. Whereas the combined system is approximately 593 miles in length, average pipe size is also 30 inches, but the average age is 75 years, and has 53 outfalls[1].

As seen in Figure 1, the combined sewersheds (yellow) are primarily in the center of the District of Columbia and the separate sewersheds (pink) are around the outside of the combined sewersheds. The storm sewersheds coincide with the separate sewersheds.

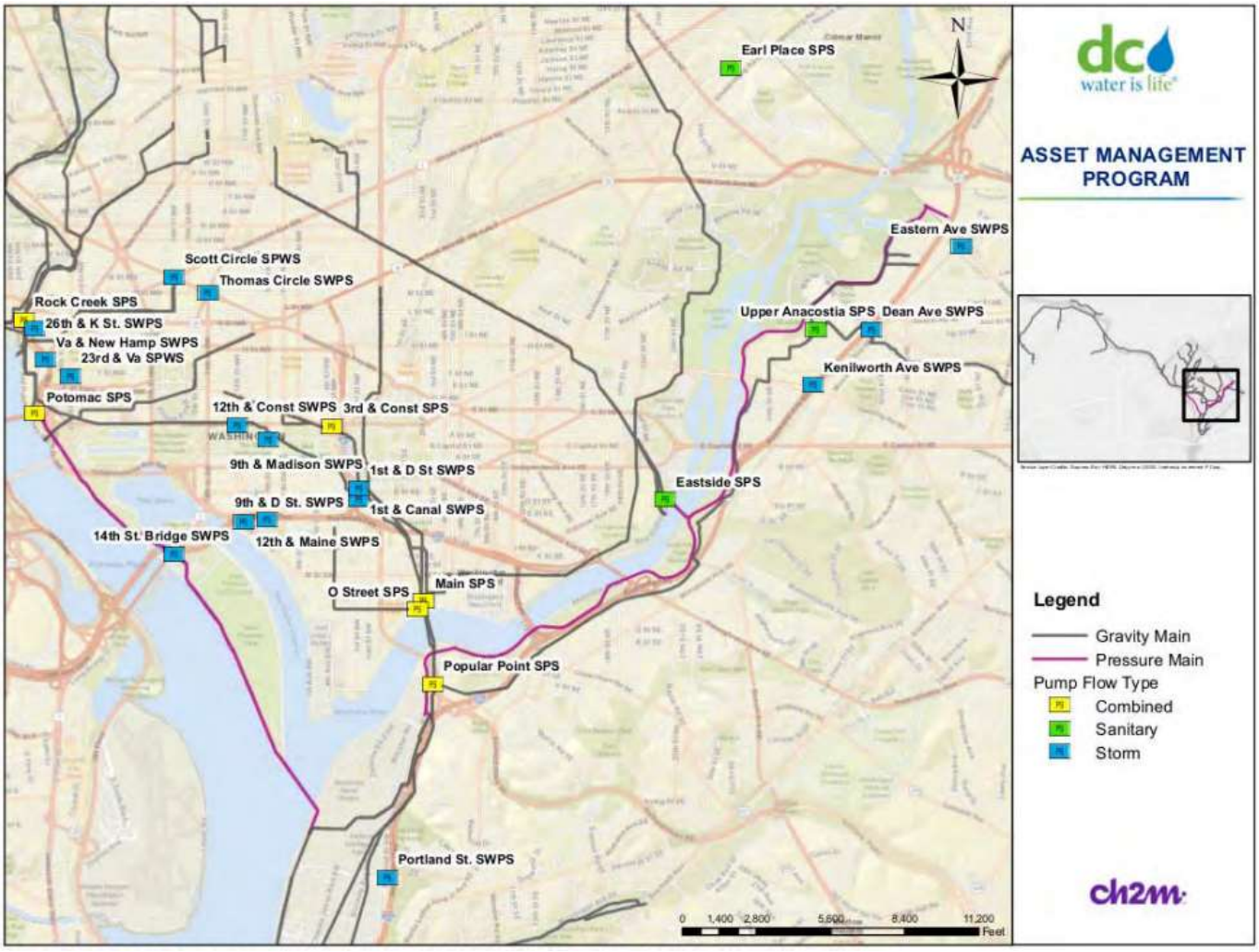
Figure 1: Map of Sewer Systems



[1] Sewer System Asset Management Plan (2017), CH2M

DC Water is also responsible for combined, sewer only, and stormwater only pump stations. For the last several years, the capital improvement program has focused on rehabilitating and making other capital investments to all three types of pump stations. Combined and sewer pump stations are activated routinely to facilitate flow getting to the treatment plants without incident. Stormwater pump stations are activated during heavy rainfall events.

Figure 2: Map of Pump Stations



2.2. Available Data

DC Water provided data to support the study, ranging from the 2017 Sewer System Asset Management Plan to DC Water operations costs to the 2013 US Environmental Protection Agency Settlement Agreement. A summary of the major data sources utilized in the study is summarized in the following sections.

2.2.1. Storm Sewer Asset Management Plan

DC Water's Sewer System Asset Management Plan (SSAMP) was finalized in January 2017. The SSAMP is a continuation of DC Water's multi-year effort to further improve how combined, sanitary sewer, and stormwater infrastructure is managed. Where possible, the SSAMP estimates current operations and maintenance costs, as well as future capital costs. The consultants retained for the SSAMP project, CH2M, utilized the KANEW model to project costs, such as renewal of large gravity sewer systems. The SSAMP

includes a combination of historical, present day (2016) and future estimates of costs. Where needed, estimated costs were escalated by 3% per year to account for inflation. Although a very comprehensive study, the results contained in the SSAMP should be taken with caution owing to the age of the study and owing to the inflationary impact COVID has had on construction and materials prices.

2.2.2. DC Water Data

DC Water provided labor, tool, and material costs associated with the operations and maintenance (O&M) of catch basins (October 2016 to April 2023) and pump stations (October 2018 to March 2023). It is our understanding that the source of this data is DC Water's Maximo asset management system. Although the data is helpful, it does not appear to capture the fully loaded costs to DC Water. "Fully loaded" costs not only include the cost for direct labor, but also includes benefits (insurance, retirement, etc.), and overhead or administrative costs such as legal, human resources, technology, etc. Equipment replacement costs may also need to be included in the labor costs, if not broken out into a separate cost category. The tool costs appear to be low, the total tool costs for catch basins over the 6 ½ years was only $6,401 (non-escalated). Due to the complex, multiple systems O&M crews have to maintain (sanitary sewer, stormwater and combined) and the conditions the crews work under (traffic safety, inclement weather, etc.) the recordation of time by crews may not have been to the detail needed to clearly differentiate nor specifically determine the costs of providing separate stormwater system service. The availability of data varies. Current, actual cost data associated with the O&M and capital investment into the stormwater pipe system is not available. However, DC Water did provide detailed information on the past (FY 2018 to present) and future (present to FY 2027) capital investments in stormwater pump stations.

2.2.3. FY 2024 Adopted Operating and Capital Budgets

The Raftelis team reviewed the FY 2024 Board Adopted Operating and Capital Budgets. According to DC Water staff, the budgeted expenses do not address either the operations and maintenance nor capital needs for all components of the stormwater system. However, the costs and narratives in the FY 2024 budget documents were helpful to get a general sense of the breath of stormwater services DC Water currently provides.

2.2.4. Additional information

The operation and maintenance and capital investments in the stormwater system, and compliance with the District's MS4 NPDES permit is allocated between DC Water and the District of Columbia. DC Water also provided the following documents as background information:

- DC Water Enabling Legislation
- Memorandum of Understanding between the District of Columbia and DC Water
- US EPA Settlement Agreement between the District of Columbia and DC Water

3. Operating Costs

The projected O&M costs needed to adequately maintain the stormwater system are broken into the categories below. It is important to note that this study did not review data related to or attempt to allocate the proportional cost to stormwater for the operation and maintenance of the combined sewer system.

3.1. Catch Basins and Inlets

According to DC Water, there are just under 26,000 catch basins and inlets that are in the road right of way. Of those, this report focuses on approximately 15,000 in the MS4 area which capture and convey stormwater runoff to segregated stormwater pipe systems. Proper maintenance of catch basins and inlets reduces the chances of flooding vehicles and adjacent properties and facilitates the safe passage of vehicles, especially emergency response agencies, during heavy rainfall events. The study analyzed DC Water's Maximo and SSAMP data. For reasons discussed in Section 2.2.2 the costs escalated to 2023 were increased 150% to take into account costs not captured in the unit rates contained in Maximo and the probable under-recording of work being performed by crews. The results are contained in Table 1.

Table 1: Catch Basins and Inlets – Maximo Data

	Preventative Maintenance, Inspection, and Inventory		Emergency and Construction Management	
Year	Actual Costs Annualized	Escalated Costs	Actual Costs Annualized	Escalated Costs
2016	$ 181,292	$ 222,966	$ 86,013	$ 105,785
2017	$ 312,830	$ 373,535	$ 158,972	$ 189,821
2018	$ 247,808	$ 287,278	$ 213,259	$ 247,226
2019	$ 168,605	$ 189,767	$ 219,070	$ 246,566
2020	$ 66,862	$ 73,062	$ 128,699	$ 128,699
2021	$ 137,848	$ 146,243	$ 174,412	$ 185,033
2022	$ 147,740	$ 152,172	$ 230,697	$ 237,618
2023	$ 165,452	$ 165,452	$ 161,820	$ 161,820
Average		$ 201,309		$ 187,821
Total Escalated Costs				$ 389,130
Total increased 150%				$ 972,825

Sections 9.2.1.4 and 9.3.1.4 of the SSAMP estimate the 2016 costs of inspecting and maintaining (cleaning) catch basins, respectively. However, this study assumes the additional inspection and cleaning of catch basins as required by the Long Term Control Plan Consent Decree and included in the SSAMP are not stormwater costs. The additional inspections in the Anacostia Combined Sewer Overflow area, as required by the consent decree, are specifically related to preventing sanitary sewer overflows. The costs were also escalated to 2023 values as can be seen in Table 2.

Table 2: Catch Basins and Inlets – SSAMP

Activity	Number of Catch Basins/Inlets	Costs per Catch Basin/Inlet	Total Costs	Total Escalated Cost
Inspection	17,733	$ 100	$ 1,773,300	$ 2,180,935
Maintenance	17,733	$ 100	$ 1,773,300	$ 2,180,935
Total Escalated Costs				$ 4,361,870

For the purposes of this report, the total estimated cost for maintaining catch basins and inlets is $4,361,870.

3.2. Stormwater Pipes

Based on data provided by DC Water, there are approximately 580 miles of stormwater pipes that DC Water is responsible for maintaining. The stormwater pipe costs in this report and the SSAMP include the costs to repair and maintain manholes. The stormwater pipes are also placed in three categories: small (6" to 24"), large (> 24" to < 60") and very large systems (> 60" in diameter). DC Water is not currently funding the O&M of stormwater pipe systems and thus no direct cost data are available. The SSAMP (specifically Section 8.1) does not allocate the historical costs of the combined, sanitary sewer, or stormwater systems.

On a provisional basis, Raftelis has used a method of approximating the annual operating costs associated with operations and maintenance of the stormwater pipe system. This method assumes that the ratio of sewer to separate storm overall capital expenditures to mirrors that of operating costs and applies that ratio to the applicable, total sewer system operating costs contained in the FY 2024 Approved Operating Budget. The Pumping and Sewer Operations Department's FY 2024 approved operating budget is $42,700,000. However, chemicals and utilities/rent represent $8,123,000 of the total. Removing those costs from the total budget results in a revised total of $34,580,000 for all three components of the sewer system. Based on the 10-year Capital Improvement Program (CIP) referenced in Section 8.2.2 of the SSAMP, only 3.3% of the CIP is attributed to stormwater. Applying that percentage to the revised total of $34,580,000 results in an approximate O&M cost for the stormwater system of $1,141,140 per year. Owing to the data gap in O&M activities for the separate stormwater system, estimation is required. Since funding specifically for stormwater pipe maintenance is also lacking, it is reasonable to expect that the investment currently is very low. In the future, O&M investment should be increased to better manage the lifecycle costs of the system. Estimated renewal (capital) costs required for proper management of the stormwater system is contained in Capital Costs, Section 4.2 of this report.

Table 3: FY 2024 Operating Budget

Pumping and Sewer Operations Department FY 2024 Approved Budget	
Approved Budget	$ 42,700,000
Expenses (Chemicals and utilities/rent)	$ 8,123,000
Revised Total	$ 34,580,000
Stormwater Percentage of Total CIP	3.3%
Estimated, Annual O&M Costs	$ 1,141,140

3.3. Pump Stations

DC Water is responsible for maintaining 16 stormwater only pump stations. DC Water provided actual labor and material costs incurred from October 2018 to March 2023 for the operation and maintenance of the pump stations. These costs were escalated to 2023 values and, similar to the catch basins and inlets adjustments, the escalated costs were increased by 150% to account for unit rates not being fully loaded and probable under-recording of maintenance activities. Section 9.3.2.1 of the SSAMP estimates the annual inspection and maintenance costs for each pump station, to which an inflation rate of 3% is applied over the 7-year period. That data was analyzed and escalated to 2023 values. The comparison of data from DC Water and the SSAMP can be found in Table 4.

Table 4: Operations and Maintenance of Pump Stations

	Costs Provided (Oct 2018-Mar 2023)	Annual Estimated Inspection and Maintenance Costs from SSAMP
Pump Name	**Total Cost**	**Estimated Costs (Annual)**
1st & D Street	$ 150,415	$ 420,000
9th & D Street	$ 105,563	$ 410,000
23rd & Virginia Ave	$ 99,465	$ 150,000
1st & Canal	$ 82,835	$ 360,000
Deane Avenue	$ 92,240	$ 440,000
26th & K Street	$ 73,232	$ 860,000
Thomas Circle	$ 68,834	$ 120,000
14th Street Bridge	$ 50,441	$ 380,000
Portland Street	$ 54,178	$ 290,000
New Hampshire & Virginia Ave	$ 53,946	$ 200,000
Eastern Ave	$ 49,449	$ 300,000
12th & Maine Street	$ 31,016	$ 290,000
Scott Circle	$ 29,058	$ 310,000
9th & Madison	$ 29,057	$ 250,000
12th & Constitution	$ 25,774	$ 290,000
Kenilworth Ave	$ 16,170	$ 370,000
Main, Sewer Collection	$ 1,438	$ -
Total	$ 1,013,111	$ 5,440,000
Escalated Costs	$ 1,082,709	
Annualized Costs	$ 237,709	$ 6,690,514
Estimated Costs (increased by 150%)	$ 612,854	

DC Water also provided the historical, as well as projected, capital costs for the pump stations from FY 2018 to FY 2027. Raftelis also used an additional alternative method to estimate annual O&M costs: we multiplied the capital costs by 3% (pre-FY 2023, costs incurred) or 5% (costs yet to be incurred) to account for newer

pump stations (pre-FY 2023) should have lower maintenance costs than older ones (post-FY 2023). That estimate can be found in Table 5.

Table 5: Stormwater Pump Stations CIP

Year	CIP Disbursement /Forecast Spending	Escalated for Inflation	Maintenance Costs as a % of CIP	Estimated Annual Maintenance
FY 2018	$ 775,000	$ 898,000	3%	$ 26,953
FY 2019	$ 1,280,000	$ 1,441,000	3%	$ 43,220
FY 2020	$ 1,770,000	$ 1,934,000	3%	$ 58,024
FY 2021	$ 1,170,000	$ 1,241,000	3%	$ 37,238
FY 2022	$ 959,000		3%	$ 28,770
FY 2023	$ 3,825,000		3%	$ 114,750
FY 2024	$ 8,870,000		5%	$ 443,500
FY 2025	$ 7,450,000		5%	$ 372,500
FY 2026	$ 2,980,000		5%	$ 149,000
FY 2027	$ 2,950,000		5%	$ 147,500
Total Estimated Annual Maintenance				$ 1,421,454

For the purposes of this report, the total estimated annual maintenance cost for stormwater pump stations is $1,421,454.

3.4. Stormwater Outfalls

According to DC Water, there are 587 stormwater outfalls DC Water is responsible for maintaining. Proper maintenance of outfalls is critical to the operation of the stormwater system and the integrity of the creek and riverbanks where the outfalls are located. Sometimes the discharge of stormwater from the outfalls is into sensitive waters . Moreover, a failing outfall can exacerbate the erosion of the creek or riverbank leading to higher sediment loading.

Although there is minimal detailed data from DC Water on the current spend on the O&M costs for maintaining outfalls and the SSAMP does not address outfalls specifically, we still learned that future renewal costs should be approximately $48,400 per year (after escalation to 2023 values). The FY 2024 Approved Capital Improvement Program includes the MS4 Outfall Sewer Rehab I project at a 10-year cost of $266,000 and a Lifetime Budget of $3.2M. Based on the nature and location of the work, costs may be extensive and include environmental permitting (wetland delineations, tree survey, stream restoration, turbidity testing, etc.). For the purposes of this study, it is assumed that annual operations and maintenance costs are relatively negligible and captured within the estimation of O&M for the stormwater system as discussed in Section 3.2 of this report.

3.5. Stormwater Programs

Consistent with the Settlement Agreement and other documents, DC Water is not only responsible for stormwater infrastructure, it is also a key partner in satisfying requirements in the District's MS4 NPDES

permit and the Settlement Agreement through managing several different programs. The specific programs are the Floatables Reduction, Illicit Discharge Detection, and Pollution Prevention programs.

3.5.1. Floatables Reduction Program

The Floatables Reduction Program focuses on preventing and removing trash and debris from the District of Columbia's waterways. The Floatables Reduction Program includes deploying booms and operating skimmer boats in waterways for the removal of debris and trash. The Program also includes creating and implementing education and outreach initiatives. The MS4 NPDES permit contains a specific, single-year measure of removing 108,347 pounds of trash and debris from the Anacostia River. Current annual operating costs include: 4 FTEs and an $80,000 maintenance, and repair contract. A new skimmer boat (under fabrication) with a cost of $718,000 is expected in FY24.

3.5.2. Illicit Discharge Detection Program

The Illicit Discharge Detection Program includes the identification and mapping of all the outfalls in the MS4 permit area. Dry weather sampling of discharge from the outfalls is important to identify direct connections that can carry pollutants to the stormwater system. The sampling program is intended to also identify indirect connection or transient discharges to the stormwater system, such as spills from vehicle accidents, power washing contaminated surfaces, and improper construction techniques at sites under development. DC Water also enforces regulations to control illicit discharges and dumping into the stormwater system (catch basins) and supports DC Homeland Security and Emergency Management Agency in responding to spills. In addition, the new MS4 permit has a specific requirement to perform illicit discharge investigations in Fort Dupont and Fort Chaplin sewershed in Anacostia and Broad Branch sewershed in Rock Creek. Annual operating costs are not available for the Illicit Discharge Detection Program, but assuming a fully loaded cost of $400,000 to $600,000 per year may be a reasonable estimate.

3.5.3. Pollution Prevention Program

The Pollution Prevention Program is intended to prevent negative water quality impacts from DC Water-owned or leased properties and job sites. A key element to satisfying the requirements of the Pollution Prevention Program is for DC Water to create, update, and comply with Stormwater Pollution Prevention Plans (SWPPP) per property. If DC Water holds third-party leases to DC Water-owned properties, the lessee must comply with the conditions contained in the SWPPP. Unlike the Floatables Reduction and Illicit Discharge Detection program, the Pollution Prevention Program is more associated with the cost to operate the facility on the property and less about the tangible benefits from a service DC Water is delivering to the community. Although compliance with the Pollution Prevention Program is very important for the protection of the District's surface water bodies, the recommendation is to not include a cost estimate as a direct stormwater expense.

Table 6: Stormwater Programs

Program	Potential Range of Costs	
	Low	High
Floatable Reduction	$ 400,000	$ 600,000
Illicit Discharge Detection	$ 400,000	$ 600,000
Pollution Prevention	$ 0	$ 0
Estimated, Annual O&M Costs	$ 800,000	$1,200,000

A summary of the above, estimated operating costs can be found in Section 5 of this report.

4. Capital Costs

The projected capital costs needed to adequately manage the stormwater system, carry out MS4 NPDES permit compliance, and other obligations are broken into the categories below. The categories and the order in which they are presented are consistent with Section 3 of this report. This study did not analyze capital cost data extensively nor try to allocate the proportional capital or O&M cost to stormwater for the combined sewer system. In addition, this study did not project how capital costs may be financed.

4.1. Catch Basins and Inlets

The SSAMP includes estimates for cost to renew, or in this case replace, catch basins and inlets. The renewal costs are considered a capital expense and can be found in Section 9.1.1.1 of the SSAMP. The estimated annual renewal costs were based on the quantity of assets at the time (25,199) and are $1,550,000 (2016) for catch basins and inlets. Currently, the inventory includes 25,864 assets under the responsibility of DC Water. Escalating the estimate contained in the SSAMP to 2023 values results in an annual renewal cost estimate of $2,180,935.

4.2. Stormwater Pipes

DC Water reviewed their asset management system data for small and large stormwater pipes and estimates the projections of renewal costs for stormwater pipes as discussed in the SSAMP are 33% too low. Similar to catch basins and inlets, renewal costs should be considered a capital expense. The SSAMP estimates 4 miles of stormwater pipes will need to be renewed, but data from DC Water indicates it is closer to 6 miles of pipe that need renewal in 2023. Utilizing the cost data in the SSAMP for Year 2023 (no need to escalate values to account for inflation) and applying the findings from DC Water is reflected in Table 7.

Table 7: Stormwater Pipes (including manholes)

Pipe System	Number of Miles to be Renewed (SSAMP)	Annual Costs (2023)	Number of Miles to be Renewed (DC Water)	Adjusted Annual Costs Based on DC Water Data
Small and Large	4	$ 8,700,000	6	$ 13,050,000
Very Large	0.1	$ 800,000	0.15	$ 1,200,000
Total Escalated Costs		$ 9,500,000		$ 14,250,000

Although it is best practice to use most recent information such as DC Water's asset management system data, it is our understanding that the data only represents 6% of the entire stormwater system. Therefore, adjusting the capital costs data in the SSAMP based on DC Water's inventory data may be overstating the true need. The FY 2024 Approved CIP Budget includes a total of $26,158,000 in capital investments (minus Pumping Station Rehabilitation) from FY 2023 to FY 2032, or $2,615,800 per year. However, it is not clear to Raftelis if the 10-year budgeted CIP is sufficient. Without a detailed update to the SSAMP for stormwater systems, it is very tough to estimate the need for capital investments. For the purpose of this study, taking the midpoint ($8,432,900) between the adjusted annual costs based on DC Water data ($14,250,000) and the annual budget contained in the FY 2024 Approved Capital Improvement Program Budget ($2,615,800) may be the best estimate of the annual renewal (capital) investment until an engineering-level assessment of the SSAMP can be performed.

4.3. Pump Stations

It is mentioned in the SSAMP and has been discussed with DC Water staff that DC Water is committed to upgrading the 16 stormwater pump stations through the capital improvement program (see Table 7).

Table 8: Stormwater Pump Stations CIP

Year	CIP Disbursement /Forecast Spending	Escalated for Inflation	CIP Investment (FY 2023)
FY 2018	$ 775,000	$ 898,000	3%
FY 2019	$ 1,280,000	$ 1,441,000	3%
FY 2020	$ 1,770,000	$ 1,934,000	3%
FY 2021	$ 1,170,000	$ 1,241,000	3%
FY 2022	$ 959,000		3%
FY 2023	$ 3,825,000		3%
FY 2024	$ 8,870,000		5%
FY 2025	$ 7,450,000		5%
FY 2026	$ 2,980,000		5%
FY 2027	$ 2,950,000		5%
Average Annual Capital Investment		$ 3,255,000	

The upgraded pump stations may have a life span of up to 30 years after the capital investment is complete. Several gaps in the data make an exact estimate difficult to develop. First, it is not clear if all 16 pump stations were to be updated during the 10-year CIP (FY 2018 – FY 2027). Second, we lacked detailed information on which of the pump stations have been updated and whether those investments resulted in extending the life span of the stormwater pump stations by another 50 years or extending the life span by a smaller increment. An engineering-based re-evaluation of the SSAMP may be the best option to address this gap. For the purpose of this study, it is assumed 50% of the average annual capital investment from FY 2018 – FY 2027 ($1,627,000) will be needed post-FY 2027 because.

4.4. Stormwater Outfalls

As stated earlier, DC Water is responsible for maintaining 587 stormwater outfalls. Capital funding for repairs and rehabilitation to further the life span of outfalls are important for the health and integrity of the creek and river banks where the outfalls are located. High velocity discharges from a stable outfall can have the potential for eroding creek and river banks, but even more damaging is an compromised outfall. Compromised outfalls can cause both negative environmental impacts and also increase the potential for flooding.

As discussed in Section 3.4 of this report, the SSAMP does not address outfalls specifically, except that it mentions that future renewal costs should be approximately $48,400 per year (after escalation to 2023 values). DC Water's FY 2024 Approved Capital Improvement Program includes the MS4 Outfall Sewer Rehab I project at a 10-year cost of $266,000 and a Lifetime Budget of $3.2M. Recognizing that the current capital investments may not be sufficient to address the true need for improving stormwater outfalls, a provisional, simplified method of approximating the desired level of capital funding for outfalls is shown in Table 9. The main assumptions inherent in this estimate, which can be fine-tuned over time, are the percent of outfalls

inspected per year, the percent requiring capital renewal or repairs, and the cost per repair. The current assumption is that 10% of the outfalls will be inspected per year . Note that 51 outfalls were inspected in FY 2023. An update to DC Water's SSAMP, and developing refined tracking mechanisms (Maximo, asset management system, etc.) will result in a much better estimate of future capital funding needs to ensure outfalls are structurally sound and are not contributing to negative environmental impacts. Not only updating the SSAMP is important but ensuring resources are available to perform inspections, manage asset data, track costs, etc. as needed to fulfill the actions contained in the newly revised SSAMP is very important.

Table 9: Stormwater Outfalls

Number of Outfalls	% of Outfalls Inspected per Year	Outfalls Inspected per Year	% of Outfalls Requiring Renewal/Capital Investment	Outfalls Requiring Renewal/Capital Investment	Cost for Renewal/Capital Repairs	Average Annual Capital Program Cost
746	10%	75	10%	7	$ 1,000,000	$ 7,000,000

4.5. Stormwater Programs

As discussed in Section 3.5 of this report, DC Water is a key partner in managing certain programs to satisfy requirements in the District's MS4 NPDES permit and to meet the conditions set by the Settlement Agreement. The programs are the Pollution Prevention, Illicit Discharge Detection, and Floatables Reduction programs.

4.5.1. Pollution Prevention Program

The Pollution Prevention program is associated with the cost to operate the facility on the property and compliance with MS4 requirements. It includes training and other operations expenses, and capital investments in facilities as needed.

4.5.2. Illicit Discharge Detection Program

The Illicit Discharge Detection program largely does not have large, costly assets to be renewed or replaced through a capital funding program, except vehicles or a share of laboratory assets. For the purposes of this study, it is assumed vehicles will be replaced by the DC Water - Fleet Management Department on a routine basis like all other vehicles DC Water owns.

4.5.3. Floatables Reduction Program

The boat dock and field office building design-build CIP is expected to begin in the near future. Following the completion of the construction, periodic capital investment in the dock, building, and boats may be needed. In comparison with the more asset-heavy portions of the program such as the stormwater pipe system, the Floatables Reduction Program has modest capital costs. A replacement schedule for boats could be considered and the replacement or repairs of dock(s) could be programmed into a capital improvement funding strategy even if the total is negligible compared to other components of the stormwater system. They can be taken into consideration when the SSAMP is updated.

A summary of the above, estimated capital costs can be found in Section 5 of this report.

5. Conclusions and Recommendations

DC Water has the daunting task of collecting and treating 320,000,000 gallons of wastewater every day. In addition to wastewater treatment, DC Water provides potable water to over 700,000 residents and 21.3 million annual visitors to the District of Columbia. DC Water, as required by the EPA Settlement Agreement, also assists the District in complying with MS4 NPDES permit requirements through operation and maintenance and making capital investments in the stormwater system.

Operating and maintaining the various types of infrastructure to provide the services mentioned above is complex. Further, managing data to support the allocation of resources to support operation, maintenance, and replacement or renewal of the of the infrastructure is an operation in itself. At the moment, some data gaps hamper DC Water's ability to fully quantify and separate out the separate stormwater system-specific costs.

The report describes some factors that limit the specificity with which we can the stormwater costs DC Water is incurring. However, based on the information, written and verbal, that DC Water staff have provided, a summary of the operations and maintenance and capital costs are shown in Tables 10 and 11 below. As an illustration of the assumptions and estimation methods made in the study, owing to data gaps, the estimated costs are shown below as a range – plus and minus 25% of the estimated costs (except for stormwater programs that are already expressed as a range).

Table 10: Estimated Operations and Maintenance Program Annual Costs for Stormwater Systems

System/ Activity	Estimated Operations and Maintenance Costs	Estimated Range of Annual Costs	
		Low (-25%)	High (+25%)
Catch Bains/Inlets	$ 4,361,870	$ 3,271,400	$ 5,452,340
Stormwater Pipes	$ 1,141,140	$ 855,860	$ 1,426,430
Pump Stations	$ 1,421,454	$ 1,066,090	$ 1,776,820
Outfalls	-	-	-
Programs	-	$ 600,000	$ 1,000,000
Total Estimated Annual Costs		$ 5,793,350	$ 9,655,590

Table 11: Estimated Capital Improvement Program Annual Costs for Stormwater Systems

System/ Activity	Estimated Annual Capital Improvement Program Costs	Estimated Range of Annual Costs	
		Low (-25%)	High (+25%)
Catch Bains/Inlets	$ 2,180,935	$ 1,635,700	$ 2,726,170
Stormwater Pipes	$ 8,432,900	$ 6,324, 680	$10,541,130
Pump Stations (after FY 2027)	$ 1,627,000	$ 1,220,250	$ 2,033,750
Outfalls	$ 4,000,000	$ 3,000,000	$ 5,000,000
Programs	-	-	-
Total Estimated Annual Costs		$ 12,180,630	$ 20,301,050

As mentioned above, the range of costs is based on a number of assumptions that can be further refined over time. To better estimate annual operations and maintenance and capital costs, we recommend the following:

- Perform an engineering-based re-evaluation of the SSAMP to account for the actual increase in construction and materials costs, investments DC Water has made in the stormwater system, and lessons learned since the SSAMP was completed over the last 6+ years.
- Perform a budget analysis to better determine the true, fully loaded costs for labor, tools, etc. for all positions, crews, equipment, etc. in DC Water.
- Create and follow standard operating procedures (SOP's) for the proper use of Maximo or other systems to accurately capture costs. After the fully loaded rates are determined and included in Maximo (or some other system), all staff (not just field crews) should follow the SOPs to properly capture time and expenses per infrastructure type (sewer, combined, and stormwater).
- Perform an assessment of the Maximo asset management system to determine how it can support more accurately capturing costs beyond updating the labor and other rates contained in Maximo.

It is not required that the above recommendations be implemented before considering an alternative funding source like an impervious area-based fee. One approach is to switch from a volumetric charge to an impervious area-based fee using the low operation and maintenance estimates above and, over time, implement the above recommendations and consider altering the impervious area rates using the updated information.

A similar approach can be deployed for capital expenses. DC Water can further explore recovering capital costs through an impervious area-based fee based on the current capital program as shown in the FY 2024 Approved Capital Improvement Program Budget. As that budget is modified a recovery of the capital costs can possibly occur if altering the impervious area rates is desired.

An additional recommendation is to create a financial model containing details like stormwater cash needs (operating and capital), units of service, bill classes (residential vs. commercial), collection rates, bad debt, etc. and update it annually. Financial analysis previously performed to establish and track the CRIAC will be helpful with this endeavor.

APPENDIX: A

Additional Documentation

The following table is a summary of stormwater assets and the responsible party per the MS4 NPDES Permit, Settlement Agreement, and other legal instruments.

Stormwater Facility	Responsible Party*
Topography, gutters, and surface configuration for drainage	
In right of way	DDOT
In public space not in right of way	District or Federal agency with jurisdiction
Private space	Landowner
Catch Basins and Inlets	
In right of way	Site specific depending on location. Majority are DC Water
In public space not in right of way	District or Federal agency with jurisdiction
Private space	Landowner
Stormwater pipes, manholes, junction structures outfall structures, inlet structures, outlet structures and appurtenances, exclusive of culverts	
In right of way	Site specific depending on location, but the majority is the responsibility of DC Water
In public space not in right of way	District or Federal agency with jurisdiction
Private space	Landowner
Culverts, where primary function is to convey stream (intermittent or continuous), with incidental stormwater	
In right of way	DDOT
In public space not in right of way	District or Federal agency with jurisdiction
Private space	Landowner
Open channel/ditches that are primarily stormwater conveyances	
In right of way	DC Water
In public space not in right of way	District or Federal agency with jurisdiction
Private space	Landowner
Open channel/ditches/pipes that are primarily streams or springs, with incidental stormwater	
In right of way	DDOT

Stormwater Facility	Responsible Party*
In public space not in right of way	District or Federal agency with jurisdiction
Private space	Landowner
Laterals from properties to stormwater conveyance or open channels	
In public ROW	DC Water
Private space	Landowner
Underdrains	
To drain invert of storm sewer that DC Water is responsible for	DC Water
In right of way	DDOT
In public space not in right of way	District or Federal agency with jurisdiction
Private space	Landowner
Stormwater controls	
Trash traps or other controls on outlets to address water quality impairments	DOEE

*DDOT – District's Department of Transportation
DOEE - District Office of Energy and Environment