

PHILADELPHIA WATER DEPARTMENT
STATEMENT NO. 7A

BEFORE THE
PHILADELPHIA WATER, SEWER AND STORM WATER RATE BOARD

In the Matter of the Philadelphia Water Department's Proposed Change in Water, Wastewater and Stormwater Rates and Related Charges	Fiscal Years 2021 – 2022 Rates and Charges to Become Effective September 1, 2020 and September 1, 2021
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Direct Testimony

of

Black & Veatch Management Consulting, LLC

on behalf of

The Philadelphia Water Department

Dated: February 2020

TABLE OF CONTENTS

I.	INTRODUCTION AND QUALIFICATIONS.....	3
II.	PURPOSE OF TESTIMONY	4
III.	COST OF SERVICE STUDY OVERVIEW	6
IV.	MISCELLANEOUS CHARGES.....	40
V.	SENIOR DISCOUNT THRESHOLD.....	43
VI.	CONCLUSION	44

I. INTRODUCTION AND QUALIFICATIONS

Q1. PLEASE STATE YOUR NAME AND BUSINESS AFFILIATION.

A1. Our names are Ann Bui, Dave Jagt, and Brian Merritt. We are employed by the firm of Black & Veatch Management Consulting LLC (Black & Veatch), 11041 Lamar Avenue, Overland Park, Kansas. We will be presenting our collective testimony on behalf of the City of Philadelphia (the City) Water Department (“Water Department” or “PWD”) in this proceeding as a panel. Appended to this Direct Testimony are our respective resumes of experience.

Q2. PLEASE DESCRIBE THE FIRM OF BLACK & VEATCH MANAGEMENT CONSULTING, LLC (BLACK & VEATCH).

A2. A firm description of Black & Veatch is provided in Schedule BV-7.

Q3. PLEASE IDENTIFY THE MEMBERS OF THE BLACK & VEATCH TEAM PROVIDING TESTIMONY, PROVIDE THEIR RESPECTIVE PROJECT RESPONSIBILITIES AS WELL AS THEIR EDUCATIONAL AND PROFESSIONAL EXPERIENCE.

A3. The members of the Black & Veatch team providing testimony are Ms. Ann Bui, Mr. Dave Jagt, and Mr. Brian Merritt. A summary of the team’s educational background and professional experience are provided in Schedule BV-7. The respective project responsibilities for team members are described below.

Ms. Bui is a Managing Director with Black & Veatch and provided overall technical review of the Cost of Service Study, the design of rate schedules, and monthly bill impacts. Mr.

Jagt is a Manager with Black & Veatch and served as the senior technical lead for all the financial and cost of service analysis for this study. Mr. Merritt is a Manager with Black & Veatch and served as Project Manager for this water and wastewater Cost of Service Study.

II. PURPOSE OF TESTIMONY

Q4. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A4. The purpose of our testimony is to (1) provide a cost of service overview; (2) describe the analytical approach and results of the Cost of Service Study; (3) outline the miscellaneous fee updates; (4) discuss the proposed adjustment to the senior citizen income threshold; and (5) provide updates to the Tiered Assistance Program (TAP) Rate Rider formula prepared for the Water Department.

Q5. PLEASE DESCRIBE THE STUDY PERIOD USED IN THE COST OF SERVICE STUDY.

A5. The study period used in the Cost of Service Study is fiscal year (FY) 2020 to FY 2025 (Study Period). The revenue and revenue requirements projections and the associated revenue adjustment projections span this six-year period.

Q6. WHAT IS THE PERIOD FOR WHICH RATES ARE BEING PROPOSED?

A6. In this rate proceeding, the Water Department is proposing retail rate schedules for the following fully forecasted fiscal years (hereinafter called "Test Years"):

1. 'Test Year-1', which reflects FY 2021 (ending June 30, 2021); and
2. 'Test Year-2', which reflects FY 2022 (ending June 30, 2022).

1 The Cost of Service rates are proposed for two distinct test years to assure that the Water
2 Department can, in each year, meet all of the requirements prescribed by the General
3 Water and Wastewater Revenue Bond Ordinance of 1989 (General Bond Ordinance) and
4 the Philadelphia Code, Section 13-101 (Rate Ordinance).

5
6 *The Water Department is proposing rate increases that will go into effect on September 1st*
7 *of each respective fiscal year. Moreover, the Cost of Service Study and proposed rates*
8 *described herein apply only to PWD's "Base Rates," which exclude revenue loss*
9 *associated with providing TAP discounts and TAP Rate Rider Surcharge (TAP-R)*
10 *revenues.*

11
12 TAP discounts and TAP-R revenues are presented separately to show the derivation of the
13 overall Water Fund cashflow and to evaluate overall performance metrics as required by
14 the General Bond Ordinance and the Rate Ordinance.

15
16 **Q7. PLEASE IDENTIFY THE SUPPORTING SCHEDULES PROVIDED WITH YOUR**
17 **TESTIMONY.**

18 A7. **Schedule BV-1:** Summary tables relating to the comprehensive Cost of Service Study,
19 including the projection of revenue and revenue requirements, cost of service analysis, and
20 rate schedules for water, sanitary sewer, and stormwater service.

21 **Schedule BV-2:** Summary tables relating to the allocation of wastewater costs to the ten
22 (10) contract customers.

23 **Schedule BV-3:** Summary tables relating to the development of stormwater billable Gross
24 Area (GA) and Impervious Area (IA) units of service; development of GA and IA rates;
25 and the determination of the stormwater Billing & Collection charges.

Schedule BV-4: Summary tables relating to the miscellaneous fees analysis.

Schedule BV-5: Cost of Service Report.

Schedule BV-6: Assumptions and white papers.

Schedule BV-7: Resumes and Black & Veatch firm description.

III. COST OF SERVICE STUDY OVERVIEW

Q8. WAS THE COST OF SERVICE STUDY IN THIS PROCEEDING PERFORMED CONSISTENT WITH GENERALLY ACCEPTED INDUSTRY GUIDELINES?

A8. Yes. Black & Veatch utilized the principles and guidelines from the following industry manuals in performing its Cost of Service Study in this proceeding.:

1. AWWA's "Principles of Water Rates, Fees, and Charges" Manual of Water Supply Practices M1 (M1 Manual);
2. WEF's "Financing and Charges for Wastewater Systems" Manual of Practice M27, (MoP 27); and
3. WEF's "User Fee Funded Stormwater Programs."

These manuals serve as the generally accepted industry guidelines used by rate practitioners. Furthermore, the analysis and methodology used in this Cost of Service Study are consistent with that used in analogous studies performed by Black & Veatch in support of prior PWD rate proceedings.

Q9. PLEASE DESCRIBE THE VARIOUS COMPONENTS OF A COST OF SERVICE STUDY.

1 A9. Consistent with the principles and guidelines in the above-referenced manuals, the Cost of
2 Service Study, undertaken in this proceeding consist of three parts:

- 3 1. Revenue & Revenue Requirements;
- 4 2. Cost of Service Analysis; and
- 5 3. Rate Design.

6
7 As a general proposition, the cost of service analysis provides the basis for designing a rate
8 structure that allows the utility to recover costs from its customers equitably. As a part of
9 this analysis, the costs of providing service to various customer types are matched with
10 their associated service demands. As it is not practical to perform this matching of costs of
11 service at an individual customer level, the cost of service is determined by customer type.
12 The three components of the Cost of Service Study are discussed below.

13
14 Revenue & Revenue Requirements: The first step in the Cost of Service Study, the Revenue
15 & Revenue Requirements establishes how much money the utility needs to meet its fiscal
16 year operating and capital obligations; this step includes a review of operations and
17 maintenance (O&M) expenses, debt service payments, funding for specific deposits and
18 reserves, and the cost of capital improvement projects that the utility does not fund via debt
19 or contributions from third parties.

20
21 When the revenues generated from existing user rates and charges and other sources of
22 revenue are insufficient to cover operating and capital costs, the utility may require one or
23 more revenue adjustments as part of the revenue requirements analysis. As previously
24 noted, the Water Department has legal requirements and bond covenants that prescribe the
25

1 use of receipt-based¹ revenue projections (i.e., “cash-basis” or “legally enacted basis”) in
2 the revenue requirements analysis.

3
4 Black & Veatch reviewed the revenue requirements of the Water and Wastewater Systems
5 to determine whether system revenues are sufficient to cover all the cash expenditures for
6 the Study Period. Section 2 of this testimony provides additional details regarding the
7 development of the revenue and revenue requirement projections.

8
9 Cost of Service Analysis: The cost of service analysis begins after determining the revenue
10 requirements for the utility over the Study Period. In this rate proceeding, the cost of service
11 analysis is performed for specific prospective fiscal years (or “test years”). We use the test
12 years to illustrate the allocation of costs to customer types and the design of rate schedules
13 to recover those costs from the various customer types.

14
15 The term annual cost of service refers to the “net” revenue requirement (less any other
16 operating and or non-operating revenues) that need to be recovered from rates and charges.

17 The cost of service analysis involves multiple levels of cost allocation, namely:

- 18 (i) Allocation of identified costs (e.g., O&M, debt service, reserves, cash-funded
19 capital) to functional cost centers and then to cost components;
20 (ii) Calculation of unit cost for each cost component; and
21 (iii) Determination of the cost for each customer type by multiplying the unit cost of
22 each component by the number of units of service associated with each customer
23 type.

24
25 ¹ Under this basis, revenues are recorded on a receipts basis, except revenues from other governments and interest,
which are accrued as earned.

1 Schedule BV-5: *Cost of Service Report* provides additional details on the cost of service
2 allocations to customer types.

3
4 Rate Design: The final step in conducting a Cost of Service Study involves developing the
5 rate structure that allows the utility to recover its costs for a given test year. Because the
6 Water Department uses receipts as the basis for calculating revenues, its “collection lag
7 factor” must be evaluated. The lag factor reflects a final adjustment to the cost of service
8 rates to recognize the fact that there will be a proration of billings between the existing and
9 proposed rates during the first month following the effective date of the rate increase, as
10 well as the fact that not all of the fiscal year billings are fully collected within that fiscal
11 year.

12
13 Additional details on the final cost of service rate design are provided in the “*Cost of*
14 *Service Report*” (Schedule BV-5).

15
16 **Q10. PLEASE SUMMARIZE THE OVERALL REVENUE REQUIREMENTS AND**
17 **REVENUE INCREASES PROJECTED IN THE STUDY.**

18 A10. For the combined Water and Wastewater Systems, the revenue requirements are projected
19 for the two test years of FY 2021 and FY 2022, for which rates are proposed in this
20 proceeding. The revenue requirements analysis indicates the need for the following overall
21 annual increases in water and wastewater revenues:

- 22 • FY 2021: An increase of \$36,104,000; and
- 23 • FY 2022: An increase of \$38,079,000.

24 These levels of increase reflect an overall annual increase in revenues from the existing
25 levels (based on FY 2020 base rates) of approximately 6.20% in FY 2021; and 6.20% in

FY 2022. The annual revenue increase projections for FY 2020 through FY 2025 reflect only ten (10) months of additional base rate revenues in each of those fiscal years. Table C-1A (Schedule BV-1) presents a summary of the series of revenue adjustments projected for the combined Water and Wastewater Systems for the Study Period.

The requested relief, with respect to base rate revenues, can be broken down as follows:

	<u>FY 2021</u>		<u>FY 2022</u>	
	(%)	(\$)	(%)	(\$)
Water	5.50%	12,324,000	5.50%	12,884,000
Wastewater	6.64%	23,780,000	6.63%	25,195,000
Annual Increase	6.20%	36,104,000	6.20%	38,079,000

In the context of the overall estimated revenues, including both revenues derived from base rates and TAP-R, the adjustments for the combined (Water and Wastewater) system, as presented in Table C-1 (Schedule BV-1) are as follows:

	<u>FY 2021</u>		<u>FY 2022</u>	
	(%)	(\$)	(%)	(\$)
Annual Increase	6.11%	36,104,000	6.12%	38,079,000

The cumulative increases in base rate revenues will generate approximately \$118 Million from September 1, 2020 through June 30, 2022. The requested increases, as well as the accompanying TAP-R surcharge revenues, will allow the Water Department to meet financial metrics and maintain levels of service through FY 2021 and FY 2022.

Q11. PLEASE SUMMARIZE THE PROJECTION OF WATER AND WASTEWATER SYSTEM REVENUES UNDER EXISTING RATES, AND LIST THE KEY COMPONENTS OF THE REVENUES.

A11. The total revenue projections for the Study Period for the Water and Wastewater Systems include three categories of revenues, namely, “Water and Wastewater Operating Revenues;” “Other Operating Revenues;” and “Non-operating Income,” which primarily consists of interest earnings. Table C-3 (Schedule BV-1) presents the projection of these three categories of revenues for the Study Period.

Total Water Receipts:

FY 2021: \$273.9 Million

FY 2022: \$271.5 Million

Total Sanitary Sewer Receipts:

FY 2021: \$262.7 Million

FY 2022: \$261.1 Million

Total Stormwater Receipts:

FY 2021: \$175.2 Million

FY 2022: \$174.5 Million

Q12. PLEASE BRIEFLY DESCRIBE THE PROJECTIONS OF WATER AND WASTEWATER SYSTEM OPERATING REVENUES UNDER EXISTING RATES.

A12. The total **operating revenues** for the Water and Wastewater Systems include the following sources of revenues:

- a. Retail Water and Sanitary Sewer Service and Quantity charges, Stormwater Management Service Charges, and Extra-Strength surcharge.

- b. Wholesale contract customer water and sewer charges

a. Retail Operating Revenues

The operating revenue is calculated for each customer type as listed in the inset box, through a two-step process.

Customer Types

General Customers

- Residential
- Senior Citizens
- Commercial
- Industrial
- Public Utilities

Others

- Housing Authority
- Charities & Schools
- Hospital & Universities
- Hand Billed
- Scheduled (Flat Rate)

Fire Protection

- Public & Private

Groundwater

Step 1: Projection of Gross Billings

- First, to project water and sewer *gross billings*, for each fiscal year of the Study Period, we apply the FY 2019² and FY 2020 schedules of water and sewer quantity and service charges to the projections of annual water sales and number of customer accounts, respectively. To project the fiscal year water sales and number of customer accounts, we apply annual projection factors to the average of the FY 2018 and FY 2019 sales volume per account and the FY 2019 number of accounts. Determination of the annual projection factors is based on historical billed consumption data received from the Water Department.
- To project stormwater billings, for each fiscal year of the Study Period, we apply the FY 2020 GA and IA rates to the projected billable GA and IA respectively and apply the Billing & Collection charge to the projected number of billable accounts.
- Existing schedules of charges also include a charge for private fire protection connections to the Water System.
- The Water Department assesses an extra-strength surcharge to all retail customers that contribute high strength wastewater based upon their monitored strength.

Note - TAP discounts and TAP-R surcharge billings are excluded from the analysis.

Step 2: Application of Collection Factors

- Next, we apply receipt factors (“collection factors”) to the corresponding gross billings to determine the operating retail cash receipts. The historical collection

² To project the FY 2020 water gross billings, Black & Veatch applied the FY 2019 (effective September 1, 2018) and FY 2020 (effective September 1, 2019) schedules of water rates to proportionate shares of the projected FY 2020 annual water sales and number of customer accounts, to reflect the September 1, 2019 implementation of the FY 2020 rate schedule. To project FY 2021 to FY 2025 water gross billings, Black & Veatch applied the FY 2020 schedule of water rates to the projections of annual water sales and number of customer accounts.

factors are based on eight fiscal years (FY 2012 through FY 2019) of billing and associated collections. PWD Statement No. 6 – Direct Testimony of Raftelis provides additional details regarding the derivation of the collection factors.

b. Wholesale Operating Revenues

Water: Currently, Aqua Pennsylvania is the Water Department's only wholesale water customer.

Aqua Pennsylvania: The Water Department's service to Aqua Pennsylvania commenced in Fiscal Year 2002. Water charges for this service include a commodity charge designed to recover power and chemical costs and a fixed charge designed to recover allocated capital costs and all other allocated operation and maintenance expenses, excluding power and chemical costs.

Projected Aqua Receipts:

FY 2021: \$3.94 Million

FY 2022: \$3.94 Million

Wastewater: The Water Department provides wholesale wastewater service to ten (10) suburban customers on a contractual basis. Contractual rates for wastewater service generally consist of charges for operation and maintenance expenses and certain capital costs associated with the collection and treatment facilities used in providing the service.

Projected Wastewater

Contract Receipts:

FY 2021: \$39 Million

FY 2022: \$39 Million

Q13. ARE THERE ANY CHANGES TO OPERATING REVENUE PROJECTIONS UNDER EXISTING RATES DURING THE STUDY PERIOD?

1 A13. No. However, as previously noted, TAP-R surcharge revenues are presented separately
2 from Base Rate related revenues.

3
4 **Q14. PLEASE BRIEFLY DESCRIBE THE PROJECTIONS OF WATER AND**
5 **WASTEWATER SYSTEM “OTHER OPERATING” AND “NONOPERATING”**
6 **REVENUES.**

7 A14. The Projection of “Other Operating” and “Non-Operating” Revenues are discussed below.

8 a. Other Operating Revenue - Other Operating Revenue consists of penalties on
9 overdue bills for retail service customers and other income from miscellaneous
10 fees, fines, operating grants, permit fees, and transfers from the Debt Reserve Fund
11 to the Revenue Fund.

12
13 b. Non-operating Income - Non-operating Income of the Water Department consists
14 primarily of interest earnings on the amounts within certain funds and accounts. In
15 accordance with the General Bond Ordinance, the analysis credits interest earnings
16 in the Debt Reserve Fund, Revenue Fund, and the Rate Stabilization Fund as
17 revenue to the Revenue Fund. Interest Earnings in the Debt Reserve Fund are first
18 credited to the extent that they are needed to fulfill the Debt Service Reserve
19 Requirement and then amounts in excess of fulfilling the Debt Service Reserve
20 Requirement are permitted to be transferred to the City’s General Fund (up to
21 \$4,994,000 per annum).

22
23 Actual annual fund valuations and interest earnings are based on a mark-to-market
24 valuation which the City performs at the end of the fiscal year. The differential
25 between mark-to-market and the Debt Reserve Fund requirement results in either a

1 transfer from the Water Department's Operating Fund to the Debt Reserve Fund, if
2 there is a deficiency in the Debt Reserve Fund, or a transfer from the Debt Reserve
3 Fund to the Operating Fund if there is an excess in the Debt Reserve Fund. As noted
4 above, projected transfers from the Debt Reserve Fund to the Operating Fund are
5 included as *Other Operating Revenue*.

6
7 **Q15. PLEASE BRIEFLY DESCRIBE HOW THE REVENUE LOSS ASSOCIATED**
8 **WITH THE TIERED ASSISTANCE PROGRAM (TAP) AND ASSOCIATED**
9 **REVENUE FROM THE TAP RATE RIDER ARE INCORPORATED INTO THE**
10 **COST OF SERVICE ANALYSIS.**

11 A15. For the purposes of evaluating Base Rates, revenue loss associated with the *Tiered*
12 *Assistance Program* ("TAP") is not included. Schedule BV-1: Table C-1A: Base Rates
13 excludes revenue loss associated with TAP discounts as well as revenues associated with
14 TAP-R surcharge rates. The exclusion of the TAP discounts from the analysis of Base
15 Rates is also illustrated on Line 13 of Schedule BV-1: Table C-3: Projected Revenue Under
16 Existing Rates.

17
18 The key financial and performance metrics apply to the overall Water Fund. As such, to
19 determine whether these metrics are met, Black & Veatch has included a separate Schedule
20 BV-1: Table C-1B: TAP-R Surcharge Rates Excluding Base Rates to show the derivation
21 of the overall combined cashflow in Schedule BV-1: Table C-1: Combined and to evaluate
22 the overall Rate Stabilization Fund and Covenant Metrics Performance for the overall
23 system as presented in Schedule BV-1: Table C-2.

1 The TAP revenue loss and the TAP-R surcharge rates are subject to annual reconciliation
2 in accordance with the adopted TAP Rate Rider as defined in Section 10.0 of the Water
3 Department's Rates and Charges. The TAP-R reconciliation will be handled via a
4 subsequent filing with the Philadelphia Water, Sewer and Storm Water Rate Board (Rate
5 Board). Consequently, no changes to the TAP-R surcharge rates are proposed as part of
6 this proceeding and thus, the TAP-R surcharge rates and revenue loss associated with
7 providing TAP discounts are held constant at current FY 2020 levels in Schedule BV-1:
8 Table C-1B: TAP-R Surcharge Rates and Schedule BV-1: Table C-1: Combined.

9
10 Proposed changes to the TAP-R Formula are discussed in Black & Veatch's supplemental
11 direct testimony (PWD Statement No. 7B). However, these changes would not take effect
12 until after the Rate Board's determination for this proceeding. Therefore, Black & Veatch
13 assumes that the current surcharge rates will be subject to reconciliation as defined in the
14 existing Section 10.0 of PWD's Rates and Charges. Any updates adopted by the Rate Board
15 as a result of this proceeding would be reflected in future TAP-R reconciliation filings after
16 September 1, 2020.

17
18 **Q16. PLEASE BRIEFLY DESCRIBE THE PROJECTIONS OF OPERATION AND**
19 **MAINTENANCE EXPENSE FOR THE STUDY PERIOD.**

20 A16. The Water Fund's FY 2020 budget (approved as of December 2019) is used as the
21 beginning base budget for the projections of Operation and Maintenance (O&M) expenses
22 for FY 2020 through FY 2025. PWD identified \$5.0 million of available appropriation in
23 the Power budget, which Black & Veatch shifted from Power to Other Services to provide
24 budget for ongoing major maintenance activities related to Water Department
25 infrastructure. The resulting FY 2020 O&M budget is then adjusted to reflect the actual to

1 budget spending factors. These adjusted FY 2020 O&M expenditures serve as the basis for
2 projecting O&M expenses for FY 2021 through FY 2025. Additional information
3 regarding O&M adjustments is provided in Schedule BV-6: WP-1 “*Philadelphia Water*
4 *Department Financial Plan: Revenue and Revenue Requirement Assumptions.*”

5
6 **Summary Discussion on the FY 2020 O&M Budget Adjustment**

7 Black & Veatch used the following steps in adjusting the FY 2020 O&M Budget, to reflect
8 the actual spend levels:

- 9 • First, we evaluated the historical actual expenditures versus budgeted expenses to
10 determine the expected spend factors for each of the object classes such as personal
11 services, pension obligations, pension, benefits, purchases of services, materials
12 and supplies, equipment, transfers, and contributions, indemnities, and taxes.
- 13 • From the analysis, we determined the average spend factors by cost classification
14 for each division within the Water Department and the City Department (for those
15 costs that are funded by the Water Department) based on the two-year average
16 actual spending levels of FY 2018 and FY 2019.
- 17 • The spend factors were then utilized to adjust the majority of the Fiscal Year 2020
18 approved O&M budget cost classes to a likely expenditure level for Fiscal Year
19 2020 for each, with the exception of the following:
 - 20 ▪ Rate Board Personnel and Services Costs, SMIP/GARP, Pension and
21 Pension Obligations for which a 100% spend factor is applied (as the budget
22 for these costs is expected to be fully expended);
 - 23 ▪ Other Benefits for which an 89.01% spend factor is applied to align
24 projected FY 2020 expenses with estimates as provided by the Department;
25 and

- Finance Department Transfers, for which an 85.4% spend factor, adjusted to reflect the \$2.0 million decrease in FY 2020 budget from FY 2019, is applied.

Summary Discussion on the O&M Cost Projections

The O&M expenses for each year of the Study Period are projected as follows:

Black & Veatch assumed escalation factors for the various cost categories identified in the FY 2020 budget based upon the Water Department's historical experience and/or recognized cost indices; the escalation factors are applied to the projected FY 2020 expenses (for each of the respective cost categories) beginning in FY 2021. The escalation factors used in the projection of the O&M expenses are discussed in detail in Schedule BV-6: WP-1, "*Philadelphia Water Department Financial Plan: Revenue and Revenue Requirement Assumptions.*"

Personal Services: The personal services costs are projected taking into consideration the following factors: (i) the actual to budget spend levels; (ii) the annual escalation factor for labor costs based on the City's Five Year Financial and Strategic Plan for FY 2021 through FY 2025 (Five-Year Plan), and (iii) the projection of Pensions, Pension Obligation, and Benefits based on the City's Five-Year Plan; and (iv) additional staffing during the Study Period as anticipated by the Water Department.

- Pension, pension obligation, and benefits, which are directly related to personal services expenses, were estimated based upon current levels of such expenses and the growth rates reflected in the City's 5-Year Plan; Pension and benefits expenses are estimated to increase from \$140.2 Million in FY 2020 to \$161.5 Million in

1 FY 2025. The Water Department participates in a City-wide pension program and
2 does not have direct control over this expense. Please see PWD Statement No. 2 –
3 Direct Testimony of Melissa La Buda for additional information.

- 4 • An annual escalation factor of 2.9% for FY 2021 through FY 2025 is used to project
5 labor (i.e., salary) expenses; and
- 6 • Additional staffing costs in the Operations division accounts for the:
 - 7 ▪ Added staff to support regulatory compliance efforts beginning in FY 2021
8 through FY 2025; and
 - 9 ▪ Additional functional fire hydrant testing to be provided by the Fire
10 Department throughout the Study Period.
- 11 • Per City policy, personnel salaries supporting the capital program can no longer be
12 funded via capital financing. Therefore, the Water Department has begun to
13 transition staff salaries from Capital funded positions to O&M funded positions.
14 This staff includes engineers, inspectors, planners and other positions supporting
15 the capital program but not involved in the actual construction of the assets. PWD
16 Statement No. 2 – Direct Testimony of Melissa La Buda provides additional
17 information regarding the City's policy.

18
19 The phased transition of salaries has already commenced and is expected to
20 continue over the next ten years until all positions are fully transitioned. This shift
21 in funding is reflected in the projected personal services costs as follows:

- 22 ▪ In FY 2021, \$1.8 million of salary costs are planned to be shifted from
23 Capital expenses to the projected O&M expenses; and
- 24 ▪ By FY 2025, the total salary costs associated with the shift in funding will
25 amount to nearly \$10 million.

1 *Power and Gas Costs:* Per the estimates provided by the City Energy Office, escalation
2 factors for Power and Gas costs are assumed as follows: 3.0% in FY 2021, 0.0% in
3 FY 2022, 0.5% in FY 2023 and 1% thereafter.

4
5 *Chemical Costs:* Based upon the Water Department's recent experience as well as the
6 Producer Price Index for Industrial Chemicals, an escalation factor of 5.0% is applied
7 annually to chemical expenses beginning in FY 2021 through FY 2025.

8
9 *SMIP/GARP Costs:* The Water Department expects to continue to provide a total annual
10 combined budget of \$25.0 Million for the Stormwater Management Incentive Program
11 (SMIP) and Greened Acres Retrofit Program (GARP) for FY 2021 through FY 2025.

12
13 *Indemnities:* Per discussions with the Water Department, no escalation in indemnities is
14 expected during FY 2021 and FY 2025.

15
16 **Q17. PLEASE DESCRIBE THE WATER DEPARTMENT'S PROJECTED CAPITAL**
17 **IMPROVEMENT PROGRAM (CIP) AND THE PROPOSED FINANCING OF THE**
18 **PROGRAM DURING THE STUDY PERIOD.**

19 A17. Schedule BV-1: Tables W-3 and WW-3 summarize the Water Department's Capital
20 Improvement Program (CIP) for FY 2020 through FY 2025 on an encumbrance basis.
21 Encumbrance reflects the total cost of each project in the year construction of the project
22 is scheduled to commence. Costs shown in Schedule BV-1: Tables W-3 and WW-3 reflect
23 the estimated total costs of the various projects, which will be financed with amounts
24 available in the Construction Fund, the annual Capital Account Deposit, amounts
25 transferred from the Residual Fund to the Construction Fund, and the proceeds of the

1 issuance and sale of revenue bonds. For further information regarding the Water
2 Department's required flow of funds, please see PWD Statement No. 2 – Direct Testimony
3 of Melissa La Buda.

4
5 **Projection of CIP Costs (Tables W-3 and WW-3)**

6 The FY 2020 CIP costs reflect the Water Department's expected FY 2020 expenditure
7 level. The Water Department provides the proposed FY 2021 through FY 2026 CIP budget
8 based on the FY 2021 budget level without any allowance for inflation. Therefore, an
9 annual inflation allowance of 3.0% has been applied to the CIP costs beginning with
10 FY 2022. The inflation allowance is based upon Black & Veatch's review of industry cost
11 indices, including the Engineering News Record (ENR) Construction Cost Index and the
12 Handy-Whitman Construction Cost Index. The cash flow adjustment indicated in Line 9
13 of Table W-3 and Line 10 of Table WW-3 (Schedule BV-1) represents the total impact of
14 adjustments made to capital budget appropriations to reflect project duration and
15 contingencies associated with anticipated annual expenditures. Line 10 on Table W-3 and
16 Line 11 on WW-3 (Schedule BV-1) show the net cash expenditures to be financed from
17 the sale of revenue bonds and other sources of capital. Schedule BV-1: Table C-7 presents
18 the combined Capital Improvement Program costs.

19
20 **Projected Capital Improvement Flow of Funds (Tables W-4 and WW-4)**

21 Tables W-4 and WW-4 (Schedule BV-1) present an estimate of the flow of funds in the
22 Construction Fund of the Water Department. Schedule BV-1: Table C-8 presents the
23 combined Capital Improvement Flow of Funds.

Bond Issuance Projection:

FY 2021: \$400 Million

FY 2022: \$445 Million

FY 2023: \$480 Million

FY 2024: \$525 Million

FY 2025: \$520 Million

- 1 • Bond Proceeds: Line 1 indicates the projected total
2 revenue bond principal amounts projected to be issued
3 2020 through 2025, to finance the proposed capital
4 improvements of the Water and Wastewater Systems.
5 Note – FY 2020 bonds reflect the actual issuance
6 amount.
- 7 • Debt Service Reserve: As shown in Lines 2 through 4, in addition to funding capital
8 construction costs, the bond issuance proceeds are also used to fund required
9 deposits into the Debt Reserve Fund and pay the costs of bond issuance. The annual
10 Debt Reserve Fund balance must equal the maximum future annual debt service
11 estimated for the outstanding and proposed bonds.
- 12 • Projected Debt Service: The debt service is estimated based on a 30-year
13 amortization schedule and an annual interest rate of 5.25% for FY 2021 through
14 FY 2025. The projected debt service for each proposed bond issue (FY 2021
15 through FY 2025), reflects interest-only payments for the first year of the bond
16 amortization.
- 17 • Capital Account Deposit: In addition to funds from bond proceeds, Line 8 shows
18 that during the Study Period, a total of approximately \$198.5 Million of Capital
19 Account Deposits will be available to finance water and wastewater capital
20 improvements. The capital account deposit amount for FY 2020 through FY 2025
21 is estimated based on 1.0% of the prior year depreciated value of plant investment
22 (original cost less depreciation). In addition, Line 10 indicates that \$215.3 Million
23 will be available from the Residual Fund as another source of funding for the
24 Capital Improvement Program.
25

- Interest Income: Interest income on annual average balances in the Construction Fund and the Debt Reserve Fund are shown in Lines 11 and 19. The interest earnings in the Construction Fund, which primarily consist of bond proceeds, are not available to the Revenue Fund as a part of the overall project revenues available for meeting the annual revenue requirements of the Water Department. An interest rate of 1.0% was assumed to determine the interest income for FY 2020 through FY 2025.

Q18. HAS THERE BEEN ANY CHANGE IN THE APPROACH IN PROJECTING ANNUAL CAPITAL CASHFLOW NEEDS?

A18. Yes. In prior rate proceedings, a simple spend factor of 90% was applied to the budget to represent the estimated annual cash expenditure. The 10% balance represented the unspent encumbrances, which would not become a cash expenditure until a subsequent year.

For this Cost of Service Study, Black & Veatch has utilized a more refined approach to develop projected spending for each fiscal year of the Study Period. The projected capital program is based on the Water Department's adopted FY 2020 capital budget and the submitted FY 2021 to FY 2026 capital program. Because the Water Department's CIP Budget is an appropriation-based budget, Black & Veatch adjusted the CIP Budget to account for:

- The aforementioned shift in funding source for positions from Capital to Operations;
- Application of a 3.0% inflation allowance (as noted above);
- Estimated cashflows for Water Master Plan improvements as provided by the Water Department;

- Expected project duration or anticipated cashflows as follows:
 - i. Estimated cashflows for Water Master Plan improvements as provided by the Water Department;
 - ii. Anticipated program level project durations, for improvements without detailed cashflow estimates, as follows: Water Conveyance – 2 years; Sewer Collection – 3 years; and Facilities Improvements – 5 years; and
- Removal of contingency, by applying an estimated 90% spend factor to the estimated annual cash need.

The cash flow adjustment Line 9 on Table W-3 and Line 10 on WW-3 (Schedule BV-1) summarizes the overall adjustments to the budget to reflect the anticipated expenses in comparison to the original CIP budget figures. The total net cash financing required on Line 10 on Table W-3 and Line 11 on WW-3 (Schedule BV-1) represents the projected capital spending for each respective fiscal year.

The above approach is intended to provide a refined projection of CIP cash needs and is used in the subsequent development of CIP financing.

Q19. WOULD YOU PLEASE SUMMARIZE THE ANNUAL DEBT SERVICE REQUIREMENTS OF THE WATER DEPARTMENT?

A19. Tables W-5 and WW-5 (Schedule BV-1) summarize the annual debt service payments for the Water and Wastewater Systems, respectively. Line 1 shows the annual debt service on existing revenue bonds, while Lines 2 through Line 7 show the projected debt service on the proposed revenue bond issues reflected in Tables W-4 and WW-4 (Schedule BV-1). The projected debt service on the proposed bonds issued in each of the years FY 2021

1 through FY 2025 reflects interest-only payments during the first year of the bond
2 amortization. Line 9 shows the applicable debt service on PennVest Loans allocable to the
3 Water and Wastewater Systems.

4
5 **Q20. CAN YOU PLEASE SUMMARIZE THE INTEREST EARNINGS PAYMENT AND**
6 **CAPITAL ACCOUNT DEPOSIT THAT MUST BE MET FROM WATER AND**
7 **WASTEWATER REVENUES?**

8 A20. Yes, in addition to the aforementioned revenue requirements, there are two transfers
9 required by the General Bond Ordinance that impact net revenue requirements.

10
11 Interest Earnings Payment: The first is interest earnings paid to the City. This payment
12 reflects application of the General Bond Ordinance, as amended and supplemented, that
13 in any fiscal year in which a balance exists in the Department's Operating Fund, a
14 payment may be made to the City's General Fund which does not exceed the lowest of (i)
15 the amount of interest earnings in the Debt Reserve Fund transferred to the Operating
16 Fund during the fiscal year or (ii) \$4,994,000. Projected interest earnings transferred to
17 the General Fund, to satisfy this ordinance requirement, over the Study Period are not
18 available to meet other system revenue requirements.

19
20 Tables W-6 and WW-6 present an estimate of the interest earnings payment for the Water
21 and Wastewater Systems.

22
23 Capital Account Deposit: The second transfer is the required Capital Account Deposit.
24 This amount is also a revenue requirement of the Water Fund. Under the General Bond
25 Ordinance, the City covenants to make a deposit to the Capital Account of the

1 Construction Fund in each fiscal year, in an amount not less than 1% of the total value of
2 the net assets of the Water Department (the “Capital Account Deposit”). The amounts
3 accumulated in the Capital Account are to be used by the Water Department to finance
4 capital improvements to the Water and Wastewater Systems. In accordance with the Rate
5 Board’s determination in the last proceeding for FY 2019 and FY 2020 (2018 Rate
6 Determination), the Capital Account Deposit is held at the 1% level.

7
8 Tables W-6 and WW-6 (Schedule BV-1) present an estimate of the Capital Account
9 Deposit, for the Water and Wastewater Systems. Further information is provided in
10 Schedule BV-5: “*Cost of Service Report*.”

11
12 **Q21. PLEASE DESCRIBE ANY FURTHER REQUIREMENTS THAT MUST BE**
13 **ADDRESSED IN DETERMINING THE OVERALL LEVELS OF WATER AND**
14 **WASTEWATER REVENUES NEEDED.**

15 A21. In addition to the foregoing cash revenue requirements, the Water Department’s annual
16 revenues must be sufficient to satisfy the requirements prescribed by the General Bond
17 Ordinance and Rate Ordinance. These two ordinances must be addressed in determining
18 the overall level water and wastewater revenues requirements.

- 19
20 i. General Bond Ordinance Requirement: In addition to meeting cash revenue
21 requirements (effectively the operation and maintenance expenses and annual capital
22 costs), the General Bond Ordinance requires that, during any given fiscal year, the
23 Water Department's revenues (for both water and wastewater service combined), must
24 be sufficient to satisfy (1) debt service coverage obligations as specified by the
25 ordinance and (2) yield Net Revenues at least equal to 90% of the Debt Service

Requirements (exclusive of debt service on subordinate bond and any transfers from the Rate Stabilization Fund) in such fiscal year; referred to as the “90% Test.”

In the first instance, the General Bond Ordinance requires that during any given fiscal year the Water Department must, at a minimum, impose, charge, and collect in each fiscal year such water and wastewater rents, rates, fees, and charges as shall yield net revenues which shall be

Bond Coverage Minimum:

Senior Debt Coverage: 1.2x

Total Coverage: 1.0x

Senior Coverage from
Current Revenues: 0.9x

equal to at least 1.20 times the debt service requirements for such fiscal year (excluding the principal and interest payments in respect of Subordinated Bonds).

Line 4 in Table C-2 (Schedule BV-1) presents the projected Senior Debt Coverage for the Study Period. A 1.30 senior debt service coverage ratio is projected since the 2018 Rate Determination indicated that a Senior Debt Service Coverage Ratio of 1.30x is a reasonable target.

In addition, in each fiscal year, water and wastewater rents, rates, fees, and charges shall yield net revenues which shall be at least equal to 1.00 times the sum of the following:

- the debt service requirements for such fiscal year (including debt service requirements in respect of Subordinated Bonds);
- amounts required to be deposited into the Debt Reserve Fund during such fiscal year;

- the principal or redemption price of and interest on General Obligation Bonds issued to fund capital expenditures of the Water and Wastewater Systems payable during such fiscal year;
- debt service requirements on any interim debt payable during such fiscal year; and
- the Capital Account Deposit for such fiscal year (less any amounts transferred from the Residual Fund to the Capital Account during such fiscal year).

Line 5 in Table C-2 (Schedule BV-1) presents the projected Total Coverage for the Study Period.

In the second instance, the General Bond Ordinance requires that the City establish rates and charges for use by the Water and Wastewater Systems sufficient to yield Net Revenues (excluding amounts transferred from the Rate Stabilization Fund into the Revenue Fund during, or as of the end of, such fiscal year) at least equal to 90% of the Debt Service Requirements (excluding debt service due on any Subordinated Bonds) in such fiscal year.

Line 6 in Table C-2 (Schedule BV-1) presents the projected Senior Debt Coverage from current revenues for the Study Period.

ii. Rate Ordinance Requirements: Section 13-101(4)(a) of the Philadelphia Code sets the floor for the amounts that rates and charges must generate to support the System. The rates and charges must yield to the City at least an amount equal to the sum of:

1. Operating expenses of the City in respect of the water, sewer, stormwater systems;

2. Debt service on all obligations of the City in respect of the water, sewer, stormwater systems;
3. In respect of water, sewer and stormwater revenue obligations of the City, such additional amounts as will be required to comply with any rate covenant and sinking fund reserve requirements approved by ordinance of City Council in connection with the authorization or issuance of water, sewer and stormwater revenue bonds; and
4. Proportionate charges for all services performed for the Water Department by all officers, departments, boards, or commissions of the City.

In addition, Section 13-101(4)(b) of the Philadelphia Code states that the rates and charges must not exceed (“ceiling”) the total appropriations from the Water Fund and provides considerations of the elements that are to be included in the calculation of the ceiling. The rates and charges projected for FY 2021 and FY 2022 do not exceed the Water Fund’s projected appropriations for the above years.

Line 11 in Table C-2 (Schedule BV-1) reflects the compliance with the Rate Ordinance requirement during the Study Period.

Q22. PLEASE DESCRIBE HOW THE GENERAL BOND ORDINANCE COVENANTS ARE RECOGNIZED IN THE REVENUE REQUIREMENT PROJECTIONS.

A22. Since the outstanding revenue bonds are combined water and wastewater bonds, compliance with the debt service coverage obligations is estimated using a combined projected cash flow schedule for the Water and Wastewater Systems.

Q23. WHAT WERE YOUR CONCLUSIONS REGARDING THE WATER FUND'S COMPLIANCE WITH THE STATED DEBT SERVICE COVERAGE OBLIGATIONS?

A23. With the inclusion of the overall additional service revenues proposed in this rate proceeding for the combined Water and Wastewater Systems, the Water Fund is able to satisfy the annual debt service coverage requirements for the Study Period.

Q24. ARE THERE ANY OTHER CONSIDERATIONS THAT WERE REFLECTED IN EXAMINING THE OVERALL NEED FOR AN INCREASE IN WATER AND WASTEWATER REVENUES?

A24. Yes. The Water Department must also establish rates and charges to meet the financial management requirements of the General Bond Ordinance with respect to, among other things, (1) maintaining the Rate Stabilization Fund; (2) financing a portion of major annual capital improvement requirements directly from annual system revenues; and (3) making required deposits into the Residual Fund of any monies remaining after payment of all current cash obligations.

For the Study Period, the proposed rates and charges reflect the targets identified during the 2018 Rate Determination, namely, a target Rate Stabilization Fund balance of approximately \$135 million, a 1.30 senior debt service coverage ratio, financing 20% of capital improvements via current system revenues and maintaining a target residual fund balance of \$15 million.

Q25. WOULD YOU PLEASE SUMMARIZE THE ALIGNMENT BETWEEN THE PROJECTION OF REVENUES UNDER EXISTING RATES AND REVENUE REQUIREMENTS FOR THE STUDY PERIOD?

A25. Table C-1 (Schedule BV-1) presents a cash flow statement of projected revenues and revenue and rate covenant requirements for Water and Wastewater System operations for the projected period of FY 2020 through FY 2025. The financial projections provide a clear indication of the inadequacy of the Department's current revenues to comply with the requirements of the General Bond Ordinance. As indicated on Lines 4 through 9 in Table C-1, annual increases in revenue are required beginning in FY 2021 in order to meet the revenue requirements

For the proposed two-year rate period, a 6.11% revenue adjustment is necessary for FY 2021, followed by a 6.12% increase in FY 2022. As stated previously, for this rate proceeding, the increase in each of these two fiscal years is assumed to be effective on September 1 of that fiscal year. As indicated in Lines 23 and 28 in Table C-1, the debt service coverage requirements discussed previously would be met with these overall levels of increase in revenues. Annual cash requirements for the combined Water and Wastewater Systems would also be met with these levels of increase as indicated by the positive balances shown in Line 29 of Table C-1A and Line 31 of Table C-1.

Note that the percentage revenue increases presented on Lines 4 to 9 of Table C-1A reflect the overall increase to the base rates. These percentage increases are slightly higher than the percentage increases presented on Lines 4 to 9 of Table C-1 since it reflects the level of increase relative to the total revenues, including TAP-R surcharge revenues.

1 Tables W-6 and WW-6 show the projected cash flow of base rates for the Water and
2 Wastewater Systems, broken down separately. The revenue requirements projected for
3 FY 2021 and FY 2022, respectively, for the Water and Wastewater Systems, are then used
4 in the development of the test year annual cost of service to be allocated for each system.

5
6 As indicated in Table W-6, an overall increase in revenue of 5.5% (or \$12.3 Million) in
7 FY 2021; and 5.5% (or \$12.8 Million) in FY 2022 are proposed for the Water System. For
8 the Wastewater System, an overall increase in revenue of 6.64% (or \$23.8 Million) in
9 FY 2021; and 6.63% (or \$25.2 Million) in FY 2022 are proposed as shown in Table WW-
10 6.

11
12 The above-referenced percentage increase in revenues is calculated in relation to the Water
13 and Wastewater System service revenues from the immediate prior year.

14
15 **Q26. PLEASE EXPLAIN THE EXPECTED IMPACT OF UPDATED STORMWATER**
16 **BILLING DATA ON THE SYSTEM-WIDE BILLABLE GROSS AREA (GA) AND**
17 **IMPERVIOUS AREA (IA).**

18 A26. The Water Department received updated Stormwater Billing Data based upon aerial and
19 infrared imagery, which provides new IA and GA information for properties city-wide
20 (prior to adjusting for credits). Based on the updated Stormwater Billing Data, the overall
21 impervious area has increased by 86 million square feet compared to the prior data set. The
22 majority of this increase in IA is attributable to residential parcels, which reflect a total
23 increase in IA of 72 million square feet. Overall non-residential impervious area increased
24 12 million square feet. Residential GA has increased 1.5 million square feet, while Non-
25 residential GA decreased 0.2 million square feet.

The methodology used in developing projections of billable GA and IA for the Cost of Service Study (collectively, the Stormwater Units of Service) is discussed in Schedule BV-6: WP-2 “*Stormwater Units of Service*.”

Q27. ARE THERE ANY IMPACTS TO THE MEAN RESIDENTIAL GA AND IA RESPECTIVELY?

A27. The updated data set does not have an impact on the mean residential GA square footage, which remains unchanged from the prior study at 2,110 square feet. The mean residential IA has increased to 1,200 square feet as compared to the mean residential IA of 1,050 square feet from the prior study.

Q28. HOW WILL THE UPDATED STORMWATER BILLING DATA INFLUENCE THE ALLOCATION OF COSTS BETWEEN RESIDENTIAL AND NON-RESIDENTIAL STORMWATER CUSTOMERS?

A28. The updated stormwater billing data indicate that while there is an increase in the overall annual cost of service allocated to stormwater from the Wastewater System, after accounting for credits and appeals, the system-wide IA unit rate used in establishing stormwater billing rates and charges for both residential and non-residential customers (including condominiums) will actually decrease because of an increase in City-wide IA.

The updated billing data also indicate the IA associated with the residential stormwater class now represents a greater portion of the overall city-wide impervious area. As a result, residential customers will also bear an increased portion of the revenue requirements allocated to IA. This is further influenced by the impact of stormwater credits, in which

1 only non-residential and condominiums customers are eligible. Credits reduce the overall
2 amount of billable IA and GA.

3
4 Prior to adjusting for discounts and lag factor, the residential stormwater management
5 service charge as presented in Schedule BV-3: Table SW-16, is determined by applying
6 the system-wide IA and GA unit rates (see Schedule BV-3: Table SW-14) to the residential
7 mean IA and GA square footage as discussed in the previous response. The resulting rate
8 is applied as a uniform flat fee per parcel for all residential properties.

9
10 If the stormwater revenue requirements from the prior proceeding were held constant (i.e.,
11 assuming no change in stormwater revenue needs), residential stormwater customers
12 would still see an increase in their monthly stormwater fees due to the increase in the
13 residential mean IA square footage.

14
15 **Q29. ARE ANY CHANGES PROPOSED TO THE EXISTING STORMWATER CREDIT**
16 **PROGRAM?**

17 A29. Yes. As discussed in PWD Statement No. 2 – Direct Testimony of Melissa La Buda, two
18 changes are proposed to the stormwater credit program:

- 19 (i) The Water Department is proposing to update the required depth of stormwater run-
20 off that customer must manage in order to be eligible for IA Managed Credit under
21 Section 4.5 (c)(1)(ii) of the Water Department's Rate and Charges from the first
22 inch of stormwater run-off to the first inch and a half of stormwater run-off. This
23 change will align the Water Department's current stormwater management
24 requirements as stated in Chapter 6 section 600.5(a)(1) of the Water Department's
25

1 Regulations. The Water Department is proposing to grandfather any credit
2 applications received before September 1, 2020.

- 3 (ii) The Water Department is proposing to align stormwater practices eligible for
4 Impervious Area Reduction (IAR) adjustments under Section 4.5(c)(1)(i) of Rates
5 and Charges with those noted in the Stormwater Management Service Charge
6 Credits and Appeals Manual, namely tree canopy cover, roof leader/downspout
7 disconnection and pavement disconnection.

8
9 **Q30. PLEASE EXPLAIN THE EXPECTED IMPACT OF THE STORMWATER**
10 **CREDIT PROGRAM ON THE SYSTEM-WIDE BILLABLE GA AND IA.**

11 A30. There is no impact anticipated from the change in the stormwater credit program on the
12 system-wide billable GA and IA.

13
14 **Q31. ARE ANY OTHER CHANGES PROPOSED TO THE WATER, SEWER, AND**
15 **STORMWATER RATE STRUCTURE?**

16 A31. No. There are no other changes proposed to the water, sewer, and stormwater rate structure.
17 As previously noted, the discussion of revenue and revenue requirements, cost of service
18 analysis, and resulting rates included in this testimony apply to the Water Department's
19 "Base Rates."

20
21 As with the prior proceeding, PWD is proposing rate increases that will go into effect on
22 September 1st of each respective fiscal year. However, rates are designed based upon a 12-
23 month period. Because the proposed revenue increase will not go into effect until
24 September 1st of each fiscal year, the proposed rates are designed based on annualizing the
25 10-month period for which rates are effective.

Q32. IN DESIGNING THE RETAIL WATER, SEWER, AND STORMWATER COST OF SERVICE RATE SCHEDULES ARE THERE ANY ADDITIONAL FACTORS THAT HAVE BEEN TAKEN INTO ACCOUNT?

A32. Yes. The proposed charges for water and wastewater service applicable to general service retail customers, as shown in Schedule BV-1: Table W-18 and Table WW-18, respectively, recognize that certain retail customer types, including senior citizens, charities and schools, and the Philadelphia Housing Authority, receive services at a discounted rate. The Water Department anticipates that the existing discounts (25% for senior citizens, charities, and schools and 5% for the Philadelphia Housing Authority) will continue to be applicable for the entire rate period.

In designing proposed rates, the retail water, sanitary sewer, and stormwater annual costs of service determined for each customer type are adjusted to reflect the fact that these customer types will not pay the full cost of service. Accordingly, we increase the proposed retail water, sewer, and stormwater rates to recover this cost of service revenue reduction due to discounts.

In addition, in the case of the non-residential stormwater class, we adjust their stormwater rates to address the discounts as well as to recover the reduction in revenue due to the existing stormwater customer assistance program (CAP). Anticipated revenue reductions due to stormwater CAP are shown in Schedule BV-6: WP-1 "*Philadelphia Water Department Financial Plan: Revenue and Revenue Requirement Assumptions*" as well as Schedule BV-5: "*Cost of Service Report*."

1 As previously noted, revenue loss due to providing TAP discounts and TAP-R surcharge
2 revenues were excluded from the analysis of Base Rates.

3
4 The cost recovery approach used for billing discounts, stormwater credits, incentives, and
5 grant programs are outlined in Schedule BV-6: WP-3 *“Cost Recovery of Discounts,*
6 *Credits, Grants and TAP”* and also further discussed in Schedule BV-6: WP-1
7 *“Philadelphia Water Department Financial Plan: Revenue and Revenue Requirement*
8 *Assumptions.”*

9
10 **Q33. PLEASE EXPLAIN WHY THE COST OF SERVICE BASED PROPOSED FY 2021**
11 **WATER SERVICE CHARGES REFLECT A DECREASE FROM EXISTING**
12 **WATER SERVICE CHARGES.**

13 A33. The primary factor impacting the distribution of cost of service associated with water
14 service charges is the revised distribution of plant investment. The distribution of the FY
15 2019 plant investment reflects a lower allocation of plant investment in meters due to
16 retirements.

17
18 **Q34. PLEASE EXPLAIN WHY THE COST OF SERVICE BASED PROPOSED PUBLIC**
19 **FIRE PROTECTION CHARGES REFLECT A DECREASE FROM THE**
20 **EXISTING WATER PUBLIC FIRE PROTECTION CHARGE.**

21 A34. The FY 2021 and FY 2022 costs of service and resulting water public fire protection
22 charges reflect the results of the current Cost of Service Study. The allocation of water
23 distribution-related operating and maintenance expenses to water distribution-related
24 functional components (treated water storage, transmission and distribution mains, meters,
25 and fire hydrants) was revised to be solely based on the distribution of plant investment for

1 these components. Prior cost of service studies included a direct allocation of a portion of
2 distribution-related operating and maintenance expenses to hydrants, to mitigate the impact
3 of the changes in the cost allocation distribution as a result of a reorganization of water
4 distribution related cost centers within the operations division. The current Cost of Service
5 Study eliminates this adjustment, as it no longer applies to the organization of Operations
6 and is no longer appropriate to continue to adjust the resulting cost distribution based on
7 the prior organization of the water distribution-related cost centers.

8
9 **Q35. BASED UPON THE PROPOSED SCHEDULES OF RETAIL RATES, WHAT IS**
10 **THE INCREASE TO THE TYPICAL RESIDENTIAL CUSTOMER'S BILL?**

11 A35. Table C-4, in Schedule BV-1, presents a series of typical or representative combined
12 monthly residential water, sanitary sewer, and stormwater bills under existing and proposed
13 rates for Test Year-1 (FY 2021) and Test Year-2 (FY 2022) for the 5/8-inch meter size.
14 The typical PWD residential customer has a 5/8-inch meter and uses about 0.5 Mcf
15 (thousand cubic feet), approximately 500 cubic feet, monthly. Under the proposed
16 schedules of water and wastewater rates for Test Year-1 (FY 2021), this customer's
17 monthly bill would increase from \$66.99 to \$72.65, an increase of \$5.66 or about 8.4%. In
18 FY 2022, the bill increases to \$77.19, an increase of \$4.54 over FY 2021 rates, or about
19 6.2%.

20
21 **Q36. BASED UPON THE PROPOSED SCHEDULES OF RETAIL RATES, WHAT IS**
22 **THE INCREASE TO THE TYPICAL SENIOR RESIDENTIAL CUSTOMER'S**
23 **BILL?**

24 A36. Table C-4, in Schedule BV-1, presents a series of typical or representative combined
25 monthly residential water, sanitary sewer, and stormwater bills under existing and proposed

1 rates for Test Year-1 (FY 2021) and Test Year-2 (FY 2022) for the 5/8-inch meter size. A
2 typical PWD senior residential customer has a 5/8-inch meter and uses about 0.3 Mcf
3 (thousand cubic feet), approximately 300 cubic feet, monthly. Under the proposed
4 schedules of water and wastewater rates for Test Year-1 (FY 2021), this customer's
5 monthly bill would increase from \$51.39 to \$55.78, an increase of \$4.39 or about 8.5%. In
6 FY 2022, the bill increases to \$59.31, an increase of \$3.53 over FY 2021 rates, or about
7 6.3%.

8
9 Eligible senior citizens may receive a 25% discount on their entire bill. The total monthly
10 bills presented above do not reflect this discount. Accounting for the discount for
11 qualifying senior citizens, the typical senior residential customer's monthly bill (based
12 upon the previously stated billing parameters) would increase from \$38.54 to \$41.83, an
13 increase of \$3.29 or about 8.5 percent. In FY 2022, the bill increases to \$44.48, an increase
14 of \$2.65 over FY 2021 rates, or about 6.3 percent.

15
16 **Q37. BASED UPON THE PROPOSED SCHEDULES OF RETAIL RATES, WHAT IS**
17 **THE INCREASE TO THE TYPICAL SMALL BUSINESS CUSTOMER'S BILL?**

18 A37. Table C-5, in Schedule BV-1, presents a series of typical or representative combined
19 monthly non-residential water, sanitary sewer, and stormwater bills under existing and
20 proposed rates for Test Year-1 (FY 2021) and Test Year-2 (FY 2022) for multiple meter
21 sizes and various parcel characteristics (i.e., GA and IA). A typical PWD small commercial
22 business customer has a 5/8-inch meter and uses about 0.6 Mcf (thousand cubic feet),
23 approximately 600 cubic feet, monthly. A parcel with a gross area of 5,5000 square feet
24 and an impervious area of 4,000 square feet was assumed for the development of the typical
25 bill comparison.

Under the proposed schedules of water and wastewater rates for Test Year-1 (FY 2021), this customer's monthly bill would increase from \$112.45 to \$117.34, an increase of \$4.89 or about 4.4%. In FY 2022, the bill increases to \$125.14, an increase of \$7.80 over FY 2021 rates, or about 6.6%.

Q38. PLEASE EXPLAIN WHY, UNDER THE PROPOSED RATES AND CHARGES, THE TYPICAL RESIDENTIAL AND SENIOR CITIZEN CUSTOMERS WOULD SEE BILL INCREASES THAT ARE HIGHER THAN THE OVERALL ADJUSTMENTS TO SERVICE REVENUES SOUGHT AS A PART OF THIS PROCEEDING.

A38. Typical residential and senior citizen customers will see bill impacts higher than the proposed service revenue increases due to:

- (i) cost of service allocations;
- (ii) projected declines in billed water and sewer volumes; and
- (iii) increase in portion of overall billable stormwater units of service associated with residential customers compared to prior studies.

IV. MISCELLANEOUS CHARGES

Q39. ARE ANY CHANGES BEING PROPOSED TO THE DEPARTMENT'S MISCELLANEOUS WATER, SEWER, AND STORMWATER CHARGES?

A39. Yes. The Water Department is proposing to update the following miscellaneous charges:

<u>Rates & Charges</u>	
<u>Section Reference</u> ³	<u>Miscellaneous Charge Description</u>
	<u>Restoration of Water Service</u>
6.4 (c)(1)(i)	Operating Service Valve 2-inch and Smaller Device Line
6.4 (c)(1)(ii)	Operating Service Valve larger than 2-inch Service Line
<i>Proposed 6.4 (e)</i>	<u><i>Customer enrolled in IWRAP / required visit to property</i></u>
6.4 (e) (1)	<i>Shut off service for non-payment; and, payment is tendered at the time of the shut-off</i>
6.4 (e) (1)	<i>Restore water service after termination for non-payment or violation of service requirements</i>
	<u>Hydrant Permits</u>
6.9 (b)(1)	One Week
	<u>Flow Tests</u>
6.10	Flow Tests
	<u>Miscellaneous Sewer Charges</u>
7.5	Manhole Pump-out Permit
7.6	Trucked or Hauled Wastewater Permit
	<u>Miscellaneous Stormwater Charges</u>
8.2 (c)(1)	Fee In Lieu - Exemption to Water Quality Requirement
	<u>Other Charges</u>
3.5 (c)	Sewer Credit Application Fee
4.5 (f)(4)	Stormwater Credit Application Fee Renewal

³ Miscellaneous Charges in Sections 7.1 and 7.2 are based upon and included in the Cost of Service Study.

1 The proposed miscellaneous charges are detailed in Table M-1, in Schedule BV-4. Please
2 refer to Section 6 of PWD Exhibit No. 3 for additional information regarding the
3 Miscellaneous Charges.

4
5 **Q40. PLEASE BRIEFLY DESCRIBE THE APPROACH FOR DEVELOPING THE**
6 **PROPOSED MISCELLANEOUS CHARGES.**

7 A40. The miscellaneous fees listed in the previous response had not transitioned to their full cost
8 of service rates with the implementation of the 2018 Rate Determination.

9
10 Black & Veatch performed a review of the above miscellaneous charges in order to
11 determine the updated cost of service rates. As with the prior study,

12 (i) All proposed miscellaneous charges are rounded to the nearest five or ten
13 dollars;

14 (ii) The proposed fees are phased-in by increasing the rate by 40% each fiscal
15 year or until the cost of service rate is achieved, except the miscellaneous
16 charge for the Restoration of Water Service for Operating Service Valve 2-
17 inch and Smaller Service Lines as stated under Section 6.4(c)(1)(i) of the
18 Water Department's Rates and Charges.

19
20 With respect to the Restoration of Water Service for Operating Service Valve 2-inch and
21 Smaller Service Lines [Section 6.4(c)(1)(i)], as a result of the 2018 Rate Determination,
22 this fee was set to \$60 (see Page 92 to 93 of the 2018 Rate Determination). The Water
23 Department is proposing to increase this fee to align with the calculated cost of service. In
24 addition, the Water Department is proposing to implement a special restoration of service
25

1 fee and visitation and shut-off specifically for TAP customers⁴. These fees are proposed to
2 be set at \$12.00, based upon the minimum allowable bill for customers enrolled in TAP.
3 These fees, included under proposed Section 6.4(e) in the proposed Rates and Charges (see
4 PWD Exhibit 3), are listed below:

- 5 (i) Shut-off of service / payment tendered at the time of shut-off;
- 6 (ii) Restoration of service after termination for non-payment or violation of service
7 requirements.

8
9 **V. SENIOR DISCOUNT THRESHOLD**

10
11 **Q41. PLEASE DESCRIBE THE PROPOSED ADJUSTMENT TO THE SENIOR**
12 **CITIZEN INCOME ELIGIBILITY THRESHOLD.**

13 A41. Per Section 19-1901 of the Philadelphia Code, the senior citizen income eligibility
14 threshold was established at \$14,000 in fiscal year (FY) 1987 and adjusted to reflect the
15 net change in the Consumer Price Index (All Urban Consumers (CPI-U) for Philadelphia
16 (All Items)). Based upon the 2018 Rate Determination, the current senior citizen income
17 threshold, as stated in Section 5.2(b)(1)(iii) of the Water Department's Rates and Charges
18 (Effective September 1, 2019), is \$32,300.

19
20 Black & Veatch developed a projection of the senior citizen income threshold, per the
21 Philadelphia Code requirements, for the proposed rate period of FY 2021 and FY 2022.
22 The approach used to determine the income eligibility threshold for the senior citizens
23 discount is the same as used in prior rate proceedings, and further detailed in Schedule BV-
24 6: WP-4 "*Senior Citizen Discount Threshold Adjustment.*" Based on this analysis, the

25

⁴ Also referred to in PWD's Rates and Charges as Income-Based Water Revenue Assistance Program (IWRAP).

1 senior income threshold is proposed to be adjusted from \$32,300 to \$33,200 for the period
2 of FY 2021 to FY 2022.

3
4 **VI. CONCLUSION**

5
6 **Q42. DOES THIS COMPLETE YOUR DIRECT TESTIMONY IN THIS MATTER?**

7 A42. Yes, it does.
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**In the Matter of the Philadelphia Water
Department's Proposed Change in Water,
Wastewater and Stormwater Rates and Related
Charges**

Fiscal Years 2021-2022

Philadelphia Water Department

Black & Veatch Management Consulting, LLC

Schedule BV-1

Dated: February 11, 2020

Schedule REF #		Schedule Name
BV-1	Black & Veatch Schedule	
1	TABLE C-1A	PROJECTED REVENUE AND REVENUE REQUIREMENTS - BASE RATES EXCLUDING TAP-R SURCHARGE RATES
2	TABLE C-1B	PROJECTED REVENUE AND REVENUE REQUIREMENTS - TAP-R SURCHARGE RATES EXCLUDING BASE RATES
3	TABLE C-1	COMBINED UTILITY: PROJECTED REVENUE AND REVENUE REQUIREMENTS - BASE AND TAP-R SURCHARGE RATES
5	TABLE C-2	COMBINED UTILITY: PROJECTED RATE STABILIZATION FUND AND COVENANTS METRICS PERFORMANCE
6	TABLE C-3	COMBINED UTILITY: PROJECTED RECEIPTS UNDER EXISTING RATES
7	TABLE C-4	COMBINED UTILITY: COMPARISON OF TYPICAL BILL FOR RESIDENTIAL CUSTOMERS UNDER EXISTING AND PROPOSED RATES
8	TABLE C-5	COMBINED UTILITY: COMPARISON OF EXAMPLE BILLS FOR NON-RESIDENTIAL CUSTOMERS UNDER EXISTING AND PROPOSED RATES
9	TABLE C-6	COMBINED UTILITY: PROJECTED OPERATION AND MAINTENANCE EXPENSE
10	TABLE C-7	COMBINED UTILITY: PROJECTED CAPITAL IMPROVEMENT PROGRAM
11	TABLE C-8	COMBINED UTILITY: PROJECTED FLOW OF FUNDS - CONSTRUCTION FUND & DEBT RESERVE ACCOUNT
12	TABLE C-9	COMBINED UTILITY: SUMMARY OF EXISTING AND PROPOSED DEBT SERVICE
13	TABLE W-1	WATER: PROJECTED RECEIPTS UNDER EXISTING RATES
14	TABLE W-1A	WATER: OTHER REVENUE PROJECTED RECEIPTS
15	TABLE W-2	WATER: PROJECTED OPERATION AND MAINTENANCE EXPENSE
16	TABLE W-3	WATER: PROJECTED CAPITAL IMPROVEMENT PROGRAM
17	TABLE W-4	WATER: PROJECTED FLOW OF FUNDS - CONSTRUCTION FUND & DEBT RESERVE ACCOUNT
18	TABLE W-5	WATER: SUMMARY OF EXISTING AND PROPOSED DEBT SERVICE
19	TABLE W-6	WATER: PROJECTED REVENUE AND REVENUE REQUIREMENTS

Schedule REF #		Schedule Name
BV-1	Black & Veatch Schedule	
20	TABLE W-7	WATER: ESTIMATED TEST YEAR COST OF SERVICE
21	TABLE W-8	WATER: ALLOCATION OF TEST YEAR PLANT INVESTMENT TO FUNCTIONAL COST COMPONENTS
22	TABLE W-9	WATER: ALLOCATION OF TEST YEAR PLANT DEPRECIATION EXPENSE
23	TABLE W-10	WATER: ALLOCATION OF TEST YEAR OPERATION AND MAINTENANCE EXPENSE
24	TABLE W-11	WATER: ESTIMATED RETAIL UNITS OF SERVICE
25	TABLE W-12	WATER: EQUIVALENT METER AND BILL RATIOS
26	TABLE W-13A	WATER: SUMMARY OF COST OF SERVICE ALLOCATED TO AQUA PA AND PROPOSED RATES TEST YEAR 2021
27	TABLE W-13B	WATER: SUMMARY OF COST OF SERVICE ALLOCATED TO AQUA PA AND PROPOSED RATES TEST YEAR 2022
28	TABLE W-14	WATER: TEST YEAR RETAIL UNIT COSTS OF SERVICE
29	TABLE W-15	WATER: TEST YEAR COST OF SERVICE BY FUNCTIONAL COST COMPONENTS
30	TABLE W-16	WATER: TEST YEAR ADJUSTED COST OF SERVICE
31	TABLE W-17	WATER: COMPARISON OF TEST YEAR COSTS OF SERVICE AND ADJUSTED COST OF SERVICE WITH REVENUES UNDER EXISTING RATES
32	TABLE W-18	WATER: PROPOSED RATES FOR GENERAL SERVICE
33	TABLE W-19	WATER: PROPOSED RATES FOR FIRE PROTECTION
34	TABLE W-19A	WATER: PROPOSED RATES FOR FIRE PROTECTION RESIDENTIAL PRIVATE FIRE PROTECTION
35	TABLE WW-1	WASTEWATER: PROJECTED RECEIPTS UNDER EXISTING RATES
36	TABLE WW-1A	WASTEWATER: PROJECTED RECEIPTS UNDER EXISTING SANITARY SEWER RATES

Schedule REF #		Schedule Name
BV-1	Black & Veatch Schedule	
37	TABLE WW-1B	WASTEWATER: PROJECTED RECEIPTS UNDER EXISTING STORMWATER RATES
38	TABLE WW-1C	WASTEWATER: OTHER REVENUE PROJECTED RECEIPTS
39	TABLE WW-2	WASTEWATER: PROJECTED OPERATION AND MAINTENANCE EXPENSE
40	TABLE WW-3	WASTEWATER: PROJECTED CAPITAL IMPROVEMENT PROGRAM
41	TABLE WW-4	WASTEWATER: PROJECTED FLOW OF FUNDS - CONSTRUCTION FUND & DEBT RESERVE ACCOUNT
42	TABLE WW-5	WASTEWATER: SUMMARY OF EXISTING AND PROPOSED DEBT SERVICE
43	TABLE WW-6	WASTEWATER: PROJECTED REVENUE AND REVENUE REQUIREMENTS
44	TABLE WW-7	WASTEWATER: ESTIMATED TEST YEAR COST OF SERVICE
45	TABLE WW-8	WASTEWATER: TEST YEAR UNITS OF SERVICE BY CUSTOMER TYPE
46	TABLE WW-9	WASTEWATER: TEST YEAR PLANT INVESTMENT SUMMARY OF ALLOCATIONS TO FUNCTIONAL COST COMPONENTS
47	TABLE WW-9A	WASTEWATER: ALLOCATION OF TEST YEAR PLANT INVESTMENT FOR THE NORTHEAST WATER POLLUTION CONTROL PLANT
48	TABLE WW-9B	WASTEWATER: ALLOCATION OF TEST YEAR PLANT INVESTMENT FOR THE SOUTHWEST WATER POLLUTION CONTROL PLANT
49	TABLE WW-9C	WASTEWATER: ALLOCATION OF TEST YEAR PLANT INVESTMENT FOR THE SOUTHEAST WATER POLLUTION CONTROL PLANT
50	TABLE WW-10	WASTEWATER: OPERATION AND MAINTENANCE EXPENSE SUMMARY OF ALLOCATIONS TO FUNCTIONAL COST COMPONENTS
51	TABLE WW-10A	WASTEWATER: ALLOCATION OF TEST YEAR OPERATION AND MAINTENANCE EXPENSE FOR THE COLLECTION SYSTEM
52	TABLE WW-10B	WASTEWATER: ALLOCATION OF OPERATION AND MAINTENANCE EXPENSE FOR THE NORTHEAST WPC PLANT

Schedule REF #		Schedule Name
BV-1	Black & Veatch Schedule	
53	TABLE WW-10C	WASTEWATER: ALLOCATION OF OPERATION AND MAINTENANCE EXPENSE FOR THE SOUTHWEST WPC PLANT
54	TABLE WW-10D	WASTEWATER: ALLOCATION OF OPERATION AND MAINTENANCE EXPENSE FOR THE SOUTHEAST WPC PLANT
55	TABLE WW-10E	WASTEWATER: TEST YEAR OPERATION AND MAINTENANCE EXPENSE SUMMARY NET OPERATION & MAINTENANCE EXPENSE
56	TABLE WW-11	WASTEWATER: RETAIL UNIT COSTS OF SERVICE - (Part I)
57	TABLE WW-12	WASTEWATER: RETAIL UNIT COSTS OF SERVICE - (Part 2)
58	TABLE WW-13	WASTEWATER: RETAIL COST OF SERVICE
59	TABLE WW-14	WASTEWATER: ADJUSTED COST OF SERVICE (AFTER ALLOCATION OF I/I AND DISCOUNTS)
60	TABLE WW-15	WASTEWATER: INSIDE CITY RETAIL SERVICE UNIT COSTS OF SERVICE FOR RATE DESIGN
61	TABLE WW-16	WASTEWATER: DEVELOPMENT OF COST OF SERVICE MONTHLY SERVICE CHARGE FOR CUSTOMERS WITH 5/8-INCH METERS
62	TABLE WW-17	WASTEWATER: DEVELOPMENT OF COST OF SERVICE VOLUME CHARGE PER MCF OF NORMAL STRENGTH SANITARY WASTEWATER
63	TABLE WW-18	WASTEWATER: PROPOSED RATES FOR GENERAL SERVICE SANITARY SEWER

TABLE C-1A: PROJECTED REVENUE AND REVENUE REQUIREMENTS
Base Rates Excluding TAP-R Surcharge
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
OPERATING REVENUE							
1	Water Service - Existing Rates	276,970	273,936	271,454	269,033	266,630	264,236
2	Wastewater Service - Existing Rates	438,395	437,910	435,507	432,522	429,503	426,500
3	Total Service Revenue - Existing Rates	715,366	711,846	706,961	701,554	696,133	690,736
	Additional Service Revenue Required						
	Percent Increase						
	Months Effective						
4	FY 2021 6.20% 10		36,104	43,832	43,496	43,160	42,826
5	FY 2022 6.20% 10			38,079	46,193	45,836	45,481
6	FY 2023 6.75% 10				43,691	52,996	52,585
7	FY 2024 6.75% 10					46,280	56,135
8	FY 2025 6.75% 10						49,021
9	Total Additional Service Revenue Required	-	36,104	81,911	133,381	188,272	246,047
10	Total Water & Wastewater Service Revenue	715,366	747,951	788,872	834,935	884,406	936,783
	Other Income (a)						
11	Other Operating Revenue	47,656	29,445	29,365	29,280	29,196	29,112
	Build America Bond Reimbursement	-	-	-	-	-	-
	Construction Fund Interest Income	-	-	-	-	-	-
12	Debt Reserve Fund Interest Income	-	-	-	-	-	-
13	Operating Fund Interest Income	985	1,035	1,089	1,089	1,177	1,169
14	Rate Stabilization Interest Income	1,681	1,532	1,486	1,436	1,412	1,396
15	Total Revenues	765,687	779,962	820,813	866,740	916,191	968,461
OPERATING EXPENSES							
16	Total Operating Expenses	(518,271)	(534,165)	(552,364)	(571,485)	(590,284)	(608,717)
NET REVENUES							
17	Transfer From/(To) Rate Stabilization Fund	21,600	8,200	900	9,200	(4,500)	7,700
18	NET REVENUES AFTER OPERATIONS	269,017	253,997	269,349	304,455	321,406	367,443
DEBT SERVICE							
	Senior Debt Service						
	Revenue Bonds						
19	Outstanding Bonds	(196,266)	(177,586)	(167,288)	(161,204)	(140,923)	(140,987)
20	Pennvest Parity Bonds	(10,631)	(10,765)	(11,080)	(13,611)	(13,611)	(13,611)
21	Projected Future Bonds	-	(7,000)	(28,788)	(59,345)	(92,657)	(128,031)
22	Total Senior Debt Service	(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
23	TOTAL SENIOR DEBT SERVICE COVERAGE (L18/L22)	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x
	Subordinate Debt Service						
	Outstanding General Obligation Bonds	-	-	-	-	-	-
	Pennvest Subordinate Bonds	-	-	-	-	-	-
24	Subordinate Debt Service	-	-	-	-	-	-
25	Transfer to Escrow	-	-	-	-	-	-
26	Total Debt Service on Bonds	(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
27	CAPITAL ACCOUNT DEPOSIT	(27,065)	(29,230)	(31,569)	(34,094)	(36,822)	(39,767)
28	TOTAL COVERAGE (L18/(L22+L24+L27))	1.14 x	1.13 x	1.12 x	1.13 x	1.13 x	1.13 x
29	End of Year Revenue Fund Balance	35,055	29,416	30,625	36,200	37,394	45,047

(a) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund. Includes Debt Service Reserve Fund Release in FY 2020.

TABLE C-1B: PROJECTED REVENUE AND REVENUE REQUIREMENTS
TAP-R Surcharge Rates Excluding Base Rates
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
OPERATING REVENUE							
1	Water Service - Existing Rates	3,777	3,925	3,909	3,870	3,831	3,791
2	Wastewater Service - Existing Rates	5,870	6,299	6,298	6,238	6,174	6,109
3	Total Service Revenue - Existing Rates	9,646	10,224	10,206	10,108	10,004	9,901
	Additional Service Revenue Required						
	Percent Increase						
	Months Effective						
4	FY 2021	0.00%	10				
5	FY 2022	0.00%	10				
6	FY 2023	0.00%	10				
7	FY 2024	0.00%	10				
8	FY 2025	0.00%	10				
9	Total Additional Service Revenue Required	-	-	-	-	-	-
10	Total Water & Wastewater Service Revenue	9,646	10,224	10,206	10,108	10,004	9,901
	Other Income						
11	Other Operating Revenue (a)	(9,929)	(9,929)	(9,929)	(9,929)	(9,929)	(9,929)
	Build America Bond Reimbursement	-	-	-	-	-	-
	Construction Fund Interest Income	-	-	-	-	-	-
12	Debt Reserve Fund Interest Income	-	-	-	-	-	-
13	Operating Fund Interest Income	-	-	-	-	-	-
14	Rate Stabilization Interest Income	-	-	-	-	-	-
15	Total Revenues	(283)	295	278	179	75	(28)
OPERATING EXPENSES							
16	Total Operating Expenses	-	-	-	-	-	-
NET REVENUES							
17	Transfer From/(To) Rate Stabilization Fund (b)	283	(295)	(278)	(179)	(75)	28
18	NET REVENUES AFTER OPERATIONS	-	-	-	-	-	-
DEBT SERVICE							
	Senior Debt Service						
	Revenue Bonds						
19	Outstanding Bonds	-	-	-	-	-	-
20	Pennvest Parity Bonds	-	-	-	-	-	-
21	Projected Future Bonds	-	-	-	-	-	-
22	Total Senior Debt Service	-	-	-	-	-	-
23	TOTAL SENIOR DEBT SERVICE COVERAGE (L18/L22)	NA	NA	NA	NA	NA	NA
	Subordinate Debt Service						
	Outstanding General Obligation Bonds	-	-	-	-	-	-
	Pennvest Subordinate Bonds	-	-	-	-	-	-
24	Subordinate Debt Service	-	-	-	-	-	-
25	Transfer to Escrow	-	-	-	-	-	-
26	Total Debt Service on Bonds	-	-	-	-	-	-
27	CAPITAL ACCOUNT DEPOSIT	-	-	-	-	-	-
28	TOTAL COVERAGE (L18/(L22+L24+L27))	NA	NA	NA	NA	NA	NA
29	End of Year Revenue Fund Balance	-	-	-	-	-	-

(a) Reflects projected contra revenue credits for Affordability Program Discounts (TAP Costs).

(b) Rate Stabilization Fund transfers necessary to meet over or under recovery of TAP costs until recovery is reconciled via TAP-R reconciliation.

TABLE C-1: PROJECTED REVENUE AND REVENUE REQUIREMENTS
Base and TAP-R Surcharge Rates
(in thousands of dollars)

Line No.	Description	2020 (c)	2021	2022	2023	2024	2025
OPERATING REVENUE							
1	Water Service - Existing Rates	280,747	277,861	275,363	272,903	270,460	268,028
2	Wastewater Service - Existing Rates	444,265	444,209	441,805	438,760	435,677	432,609
3	Total Service Revenue - Existing Rates	725,012	722,070	717,168	711,663	706,137	700,637
	Additional Service Revenue Required						
	Percent Increase						
	Months Effective						
4	FY 2021 6.11% 10		36,104	43,832	43,496	43,160	42,826
5	FY 2022 6.12% 10			38,079	46,193	45,836	45,481
6	FY 2023 6.71% 10				43,691	52,996	52,585
7	FY 2024 6.72% 10					46,280	56,135
8	FY 2025 6.73% 10						49,021
9	Total Additional Service Revenue Required	-	36,104	81,911	133,381	188,272	246,047
10	Total Water & Wastewater Service Revenue	725,012	758,174	799,079	845,043	894,410	946,684
	Other Income (a)						
11	Other Operating Revenue	37,728	19,516	19,437	19,352	19,267	19,184
	Build America Bond Reimbursement	-	-	-	-	-	-
	Construction Fund Interest Income	-	-	-	-	-	-
12	Debt Reserve Fund Interest Income	-	-	-	-	-	-
13	Operating Fund Interest Income	985	1,035	1,089	1,089	1,177	1,169
14	Rate Stabilization Interest Income	1,681	1,532	1,486	1,436	1,412	1,396
15	Total Revenues	765,405	780,257	821,091	866,919	916,266	968,433
OPERATING EXPENSES							
16	Total Operating Expenses	(518,271)	(534,165)	(552,364)	(571,485)	(590,284)	(608,717)
NET REVENUES							
17	Transfer From/(To) Rate Stabilization Fund	21,883	7,905	622	9,021	(4,575)	7,728
18	NET REVENUES AFTER OPERATIONS	269,017	253,997	269,349	304,455	321,406	367,443
DEBT SERVICE							
	Senior Debt Service						
	Revenue Bonds						
19	Outstanding Bonds	(196,266)	(177,586)	(167,288)	(161,204)	(140,923)	(140,987)
20	Pennvest Parity Bonds	(10,631)	(10,765)	(11,080)	(13,611)	(13,611)	(13,611)
21	Projected Future Bonds	-	(7,000)	(28,788)	(59,345)	(92,657)	(128,031)
22	Total Senior Debt Service	(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
23	TOTAL SENIOR DEBT SERVICE COVERAGE (L18/L22)	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x
	Subordinate Debt Service						
	Outstanding General Obligation Bonds	-	-	-	-	-	-
	Pennvest Subordinate Bonds	-	-	-	-	-	-
24	Subordinate Debt Service	-	-	-	-	-	-
25	Transfer to Escrow	-	-	-	-	-	-
26	Total Debt Service on Bonds	(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
27	CAPITAL ACCOUNT DEPOSIT	(27,065)	(29,230)	(31,569)	(34,094)	(36,822)	(39,767)
28	TOTAL COVERAGE (L18/(L22+L24+L27))	1.14 x	1.13 x	1.12 x	1.13 x	1.13 x	1.13 x

TABLE C-1: PROJECTED REVENUE AND REVENUE REQUIREMENTS
Base and TAP-R Surcharge Rates
(in thousands of dollars)

Line No.	Description	2020 (c)	2021	2022	2023	2024	2025
RESIDUAL FUND							
29	Beginning of Year Balance	15,666	15,073	15,039	15,014	15,063	15,007
30	Interest Income	153	150	150	150	150	149
	Plus:						
31	End of Year Revenue Fund Balance	35,055	29,416	30,625	36,200	37,394	45,047
32	Deposit for Transfer to City General Fund (b)	1,922	1,920	2,107	2,330	2,616	2,977
	Less:						
33	Transfer to Construction Fund	(35,800)	(29,600)	(30,800)	(36,300)	(37,600)	(45,200)
34	Transfer to City General Fund	(1,922)	(1,920)	(2,107)	(2,330)	(2,616)	(2,977)
35	Transfer to Debt Service Reserve Fund	-	-	-	-	-	-
36	End of Year Balance	15,073	15,039	15,014	15,063	15,007	15,003
RATE STABILIZATION FUND							
37	Beginning of Year Balance (c)	177,971	156,089	148,184	147,561	138,541	143,116
38	Deposit From/(To) Revenue Fund	(21,883)	(7,905)	(622)	(9,021)	4,575	(7,728)
39	End of Year Balance	156,089	148,184	147,561	138,541	143,116	135,388

(a) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund and reflects projected contra revenue credits for Affordability Program Discounts (TAP Costs). Includes Debt Service Reserve Fund Release in FY 2020.

(b) Transfer of interest earnings from the Bond Reserve Account to the Residual Fund as shown in Line 32 to satisfy the requirements for the transfer to the City General Fund shown on Line 34.

(c) FY 2020 beginning balance is estimated based on preliminary FY 2019 results.

TABLE C-2
Base and TAP-R Surcharge Rates
COMBINED SYSTEM: PROJECTED RATE STABILIZATION FUND
AND COVENANTS METRICS PERFORMANCE

Line #	Description	2020	2021	2022	2023	2024	2025
RATE STABILIZATION FUND							
1	Beginning Balance: Rate Stabilization Fund (a)	177,971	156,089	148,184	147,561	138,541	143,116
2	Transfers From (To) Revenue Fund (b)	(21,883)	(7,905)	(622)	(9,021)	4,575	(7,728)
3	Year-End Rate Stabilization Fund Balance (Line 1 + Line 2)	156,089	148,184	147,561	138,541	143,116	135,388
General Bond Ordinance Covenants							
4	Senior Debt Coverage (c)	1.30	1.30	1.30	1.30	1.30	1.30
5	Total Debt Coverage (d)	1.14	1.13	1.12	1.13	1.13	1.13
6	90% Test - Senior Debt Coverage from Current Revenues (e)	1.19	1.25	1.29	1.26	1.30	1.27
O&M Actual to Budget Ratio							
7	Projected O&M Budget (f)	590,441	612,192	632,887	654,632	676,189	697,481
8	O&M Actual to Budget Ratio	87.8%	87.3%	87.3%	87.3%	87.3%	87.3%
Rate Ordinance Requirements							
9	Projected Total Revenues	765,405	780,257	821,091	866,919	916,266	968,433
10	Projected Total Appropriations (g)	859,458	866,189	902,236	959,087	1,002,095	1,064,924
11	Rate Ordinance Requirement Compliance (h)	Yes	Yes	Yes	Yes	Yes	Yes
Cash Funding							
12	Cash Funded Capital (i)	62,865	58,830	62,369	70,394	74,422	84,967
13	Capital Improvement Program annual expenses	355,787	435,911	508,928	513,328	568,514	555,538
14	Cash Funded Capital Ratio (j)	17.7%	13.5%	12.3%	13.7%	13.1%	15.3%

(a) FY 2020 beginning balance is estimated based on FY 2019 preliminary financial results.

(b) See Line 17 in Table C-1.

(c) Senior Debt Coverage = (Total Revenues - Operating Expenses + Transfer From (to) Rate Stabilization) divided by Senior Debt. The General Bond Ordinance requires the minimum Senior Debt Service Coverage of 1.20.

(d) Total Debt Coverage = (Total Revenues - Operating Expenses + Rate Stabilization Transfer) divided by (Senior Debt + Subordinate Debt + Capital Account Deposit). The General Bond Ordinance requires the minimum Total Debt Service Coverage of 1.00.

(e) Senior Debt Coverage from Current Revenues = (Total Revenues - Operating Expenses - Transfer to Rate Stabilization Fund) divided by Senior Debt. Transfers from Rate Stabilization are excluded from the Total Revenues. The General Bond Ordinance requires a minimum Senior Debt Service Coverage of 0.90 from current revenues.

(f) FY 2020 budget reflects the PWD adopted budget; FY 2021 through FY 2025 budget reflects annual cost escalation factors.

(g) Total Appropriation = Total O&M Budget + Senior Debt + Subordinate Debt + Transfer to Escrow + Capital Account Deposit + Transfer to Rate Stabilization Fund + Transfer to Residual Fund. Costs to service the City included as required by the General Bond Ordinance rate covenants.

(h) Rate Ordinance requires that Total Revenues not exceed Total Appropriations.

(i) Cash Funded Capital = Capital Account Deposit + Residual Transfer to Construction Fund

(j) Cash Funded Capital Ratio = Cash Funded Capital divided by Capital Improvement Program annual expenses.

TABLE C-3: PROJECTED RECEIPTS UNDER EXISTING RATES
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Water Sales Receipts	276,970	273,936	271,454	269,033	266,630	264,236
	Wastewater Sales Receipts						
2	Sanitary Sewer	264,188	262,733	261,052	259,320	257,582	255,852
3	Stormwater	174,207	175,178	174,455	173,202	171,922	170,648
4	Subtotal Wastewater Service Receipts	438,395	437,910	435,507	432,522	429,503	426,500
5	Total Water & Wastewater Receipts	715,366	711,846	706,961	701,554	696,133	690,736
Other Income							
6	Penalties	10,130	10,065	9,985	9,900	9,816	9,732
7	Miscellaneous City Revenue	1,720	1,720	1,720	1,720	1,720	1,720
8	Other	10,900	11,300	11,300	11,300	11,300	11,300
9	State & Federal Grants	1,000	1,000	1,000	1,000	1,000	1,000
10	Permits Issued by L&I	4,640	4,640	4,640	4,640	4,640	4,640
11	Miscellaneous (Procurement)	420	420	420	420	420	420
12	City & UESF Grants	300	300	300	300	300	300
13	Affordability Program Discount Cost (a)	-	-	-	-	-	-
14	Release from Debt Service Reserve (b)	18,546	-	-	-	-	-
15	Other Operating Revenues	47,656	29,445	29,365	29,280	29,196	29,112
Interest Income							
16	Interest Income on Debt Service Reserve Fund (c)	-	-	-	-	-	-
17	Operating Fund	985	1,035	1,089	1,089	1,177	1,169
18	Rate Stabilization Fund	1,681	1,532	1,486	1,436	1,412	1,396
19	Total Nonoperating Income	2,665	2,567	2,576	2,524	2,589	2,565
20	Total Receipts	765,687	743,858	738,902	733,359	727,918	722,413

(a) Affordability Program Discounts represent anticipated lost revenue due to the Tiered Assistance Program (TAP).

Beginning in FY 2019, TAP Revenue Loss is recovered via the TAP Rate Rider Surcharge.

(b) Projected Release from Debt Reserve Fund based on outstanding and proposed debt service payments.

(c) Excludes deposit into Residual Fund for Transfer to City General Fund.

TABLE C-4

**COMBINED SYSTEM: COMPARISON OF TYPICAL
BILL FOR RESIDENTIAL CUSTOMERS
UNDER EXISTING AND PROPOSED RATES**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
		FY 2020	FY 2021		FY 2022	
Meter Size	Monthly Use	Existing Rates	Proposed Rates	% Proposed of Existing	Proposed Rates	% Proposed of FY 2021
Inches	Mcf	\$	\$	%	\$	%
5/8	0.0	28.02	30.49	8.8	32.49	6.6
5/8	0.2	43.60	47.36	8.6	50.37	6.4
5/8	0.3	51.39	55.78	8.5	59.31	6.3
5/8	0.4	59.18	64.22	8.5	68.24	6.3
5/8	0.5	66.99	72.65	8.4	77.19	6.2
5/8	0.6	74.78	81.08	8.4	86.13	6.2
5/8	0.7	82.57	89.52	8.4	95.06	6.2
5/8	0.8	90.36	97.94	8.4	104.00	6.2
5/8	1.7	160.49	173.84	8.3	184.45	6.1
5/8	2.7	234.04	254.03	8.5	270.36	6.4
5/8	3.3	277.04	301.07	8.7	321.02	6.6

Notes:

FY 2021 and FY 2022 figures reflect the current TAP-R rates, of \$0.71 MCF for water and \$1.16/MCF for sewer. The TAP-R rates are subject to annual reconciliation.

Mcf - Thousand cubic feet

TABLE C-5
COMBINED SYSTEM: COMPARISON OF EXAMPLE BILLS
FOR NON-RESIDENTIAL CUSTOMERS
UNDER EXISTING AND PROPOSED RATES

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				FY 2020	FY 2021		FY 2022	
Meter Size	Monthly Use	Impervious Area	Gross Area	Existing Rates	Proposed Rates	% Proposed of Existing	Proposed Rates	% Proposed of FY 2021
Inches	Mcf	sf	sf	\$	\$	%	\$	%
5/8	0.0	1,794	2,110	39.75	40.63	2.2	43.39	6.8
5/8	0.2	1,794	2,110	55.33	57.50	3.9	61.27	6.6
5/8	0.3	1,794	2,110	63.12	65.92	4.4	70.21	6.5
5/8	0.4	1,794	2,110	70.91	74.36	4.9	79.14	6.4
5/8	0.5	1,794	2,110	78.72	82.79	5.2	88.09	6.4
5/8	0.6	4,000	5,500	112.45	117.34	4.4	125.14	6.6
5/8	0.7	4,000	5,500	120.24	125.78	4.6	134.07	6.6
5/8	0.8	26,000	38,000	412.67	420.78	2.0	451.39	7.3
5/8	1.7	26,000	38,000	482.80	496.68	2.9	531.84	7.1
5/8	2.7	4,000	5,500	271.71	290.29	6.8	309.37	6.6
5/8	3.3	4,000	5,500	314.71	337.33	7.2	360.03	6.7
5/8	11.0	7,000	11,000	906.99	981.88	8.3	1,053.87	7.3
1	1.7	7,700	7,900	252.57	265.13	5.0	282.58	6.6
1	5.0	22,500	24,000	670.82	706.27	5.3	756.97	7.2
1	8.0	7,700	7,900	706.02	760.94	7.8	815.92	7.2
1	17.0	22,500	24,000	1,530.98	1,647.31	7.6	1,770.01	7.4
2	7.6	1,063	1,250	625.67	679.77	8.6	728.29	7.1
2	16.0	22,500	24,000	1,487.27	1,599.02	7.5	1,717.71	7.4
2	33.0	66,500	80,000	3,262.21	3,491.54	7.0	3,754.77	7.5
2	100.0	7,700	7,900	7,328.55	8,005.71	9.2	8,614.68	7.6
4	30.0	7,700	7,900	2,407.09	2,619.26	8.8	2,814.78	7.5
4	170.0	10,500	12,000	11,867.48	12,959.09	9.2	13,928.53	7.5
4	330.0	26,000	38,000	22,152.47	24,176.95	9.1	25,965.32	7.4
4	500.0	140,000	160,000	34,270.90	37,290.33	8.8	40,039.54	7.4
6	150.0	10,500	12,000	10,743.70	11,728.81	9.2	12,607.31	7.5
6	500.0	41,750	45,500	33,182.57	36,206.20	9.1	38,871.36	7.4
6	1,000.0	26,000	38,000	64,498.69	70,432.47	9.2	75,593.70	7.3
6	1,500.0	140,000	160,000	97,407.12	106,256.45	9.1	114,035.12	7.3
8	750.0	10,500	12,000	48,702.53	53,191.47	9.2	57,093.15	7.3
8	1,500.0	66,500	80,000	96,655.96	105,513.41	9.2	113,233.83	7.3
8	2,000.0	26,000	38,000	127,657.52	139,423.13	9.2	149,615.54	7.3
8	3,000.0	140,000	160,000	191,245.95	208,757.11	9.2	223,996.96	7.3
10	600.0	22,500	24,000	39,596.40	43,226.82	9.2	46,400.17	7.3
10	1,700.0	41,750	45,500	109,138.22	119,171.65	9.2	127,885.46	7.3
10	3,300.0	26,000	38,000	208,688.34	227,929.92	9.2	244,557.80	7.3
10	6,000.0	140,000	160,000	377,982.77	412,727.90	9.2	442,801.22	7.3

(a) Examples with gross area less than 5,000 square feet reflect an impervious area of 85% of the gross area consistent with PWD Regulations section 304.3.

(b) FY 2021 and FY 2022 figures reflect the current TAP-R rates, of \$0.71 MCF for water and \$1.16/MCF for sewer. The TAP-R rates are subject to annual reconciliation.

Mcf - Thousand cubic feet
 sf - square feet

TABLE C-6: PROJECTED OPERATION AND MAINTENANCE EXPENSE
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Water and Wastewater Operations							
1	Personal Services	147,363	153,861	160,524	167,042	173,804	180,818
2	Pension and Benefits	140,205	145,346	149,587	154,522	158,506	161,548
3	Subtotal	287,568	299,207	310,111	321,563	332,310	342,366
Purchase of Services							
4	Power	13,914	14,332	14,332	14,403	14,547	14,693
5	Gas	3,987	4,107	4,107	4,128	4,169	4,211
6	SMIP/GARP	25,000	25,000	25,000	25,000	25,000	25,000
7	Other	153,457	156,401	162,798	169,459	176,394	183,615
8	Subtotal	196,359	199,840	206,237	212,990	220,110	227,518
Materials and Supplies							
9	Chemicals	22,266	23,379	24,548	25,776	27,064	28,418
10	Other	25,960	26,713	27,487	28,284	29,105	29,949
11	Subtotal	48,226	50,092	52,036	54,060	56,169	58,366
12	Equipment	5,393	5,501	5,611	5,723	5,837	5,954
13	Indemnities and Transfers	12,395	12,464	12,534	12,605	12,676	12,747
14	Subtotal Expenses	549,941	567,104	586,528	606,941	627,102	646,952
15	Liquidated Encumbrances	(31,671)	(32,939)	(34,164)	(35,456)	(36,818)	(38,235)
16	Total Expenses	518,271	534,165	552,364	571,485	590,284	608,717

TABLE C-7: PROJECTED CAPITAL IMPROVEMENT PROGRAM
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Engineering and Administration (a)	16,047	13,865	12,141	10,381	8,621	6,861
2	Plant Improvements	120,000	328,000	259,200	356,500	190,200	301,200
3	Distribution System Rehabilitation	78,060	93,060	101,060	172,160	117,460	108,060
4	Large Meter Replacement	35,000	5,000	5,000	5,000	5,000	5,000
5	Storm Flood Relief	10,000	15,000	15,000	15,000	15,000	15,000
6	Reconstruction of Sewers	67,800	72,460	67,860	67,860	67,860	67,860
7	Green Infrastructure	62,000	72,000	72,000	72,000	72,000	72,000
8	Vehicles	12,000	12,000	12,000	12,000	12,000	12,000
9	Total Improvements	400,907	611,385	544,261	710,901	488,141	587,981
10	Inflation Adjustment (b)	-	-	16,328	43,294	45,264	73,797
11	Inflated Total	400,907	611,385	560,589	754,195	533,405	661,778
12	Cash Flow Adjustment (c)	(45,120)	(175,475)	(51,660)	(240,867)	35,109	(106,239)
13	Net Cash Financing Required	355,787	435,911	508,928	513,328	568,514	555,538

(a) Beginning in FY 2017, Engineering and Administration Costs no longer include pension and benefits costs per City policy.

(b) Allowance for inflation of 3.0 percent per year after fiscal year 2021.

(c) Reflects adjustment to annual capital budget appropriations for project duration and contingency to reflect anticipated annual expenditures.

TABLE C-8: PROJECTED FLOW OF FUNDS - CONSTRUCTION FUND & DEBT RESERVE ACCOUNT
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Disposition of Bond Proceeds							
1	Proceeds From Sale of Bonds	305,834	400,000	445,000	480,000	525,000	520,000
	Transfers:						
2	Debt Reserve Fund (a)	4,078	14,048	23,363	21,136	36,203	35,822
3	Cost of Bond Issuance (b)	1,752	2,360	2,626	2,832	3,098	3,068
4	Construction Fund (c)	300,004	383,592	419,012	456,032	485,700	481,110
5	Total Issue	305,834	400,000	445,000	480,000	525,000	520,000
Construction Fund							
6	Beginning Balance	270,235	280,055	309,374	311,415	334,350	329,259
7	Transfer From Bond Proceeds	300,004	383,592	419,012	456,032	485,700	481,110
8	Capital Account Deposit	27,065	29,230	31,569	34,094	36,822	39,767
9	Penn Vest Loan	-	19,875	26,500	6,625	-	-
10	Transfer from Residual Fund	35,800	29,600	30,800	36,300	37,600	45,200
11	Interest Income on Construction Fund	2,738	2,932	3,089	3,213	3,302	3,345
12	Total Available	635,842	745,285	820,344	847,679	897,774	898,682
13	Net Cash Financing Required	355,787	435,911	508,928	513,328	568,514	555,538
14	Ending Balance	280,055	309,374	311,415	334,350	329,259	343,144
Debt Reserve Fund							
15	Beginning Balance	199,460	184,992	199,040	222,402	243,539	279,741
16	Transfer From Bond Proceeds	4,078	14,048	23,363	21,136	36,203	35,822
17	Debt Service Reserve Release	(18,546)	-	-	-	-	-
18	Ending Balance	184,992	199,040	222,402	243,539	279,741	315,563
19	Interest Income on Debt Reserve Fund	1,922	1,920	2,107	2,330	2,616	2,977

(a) Amount of Debt Reserve Fund estimated based on outstanding and proposed debt service payments.

(b) Cost of bonds issuance assumed at 0.59 percent of issue amount.

(c) Deposits equal proceeds from sale of bonds less transfers to Debt Reserve Fund and Costs of Issuance.

TABLE C-9: SUMMARY OF EXISTING AND PROPOSED DEBT SERVICE
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Revenue Bonds							
1	Existing (a)	196,266	177,586	167,288	161,204	140,923	140,987
	Proposed						
2	Fiscal Year 2021 (b)		7,000	21,000	27,583	27,583	27,583
3	Fiscal Year 2022 (b)			7,788	23,363	30,686	30,686
4	Fiscal Year 2023 (b)				8,400	25,200	33,100
5	Fiscal Year 2024 (b)					9,188	27,563
6	Fiscal Year 2025 (b)						9,100
7	Total Proposed	-	7,000	28,788	59,345	92,657	128,031
8	Total Revenue Bonds	196,266	184,586	196,076	220,550	233,580	269,018
Pennvest Loans							
9	Pennvest Loans - Parity Pennvest (c)	10,631	10,765	11,080	13,611	13,611	13,611
10	Total Senior Debt Service	206,897	195,351	207,155	234,161	247,191	282,629

(a) Projected debt service amounts for the Variable Rate Series 1997B and 2005B Bonds are based upon assumed interest rates of 3.0% and 4.53%, respectively. Projected amounts also include (i) debt service for the Series 2019B Bonds which issued in FY 2020; and (ii) savings from the Series 2019A Refunding Bonds and the Forward Refunding for the Series 2011A Bonds.

(b) Projected debt service amounts assume interest only payment for the first year of the bond authorization based on 5.25% interest rate; and assume issuance during the first quarter of the fiscal year.

(c) Includes projected Pennvest Loan for the Torresdale Pump Station Rehabilitation.

TABLE W-1: PROJECTED RECEIPTS UNDER EXISTING RATES
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Residential	155,079	152,513	150,367	148,242	146,128	144,014
2	Senior Citizens	5,155	5,058	4,979	4,902	4,827	4,751
3	Commercial	62,082	61,729	61,500	61,287	61,078	60,879
4	Industrial	4,331	4,260	4,234	4,230	4,226	4,222
5	Public Utilities	380	379	378	378	377	377
6	Subtotal General Customers	227,027	223,938	221,458	219,039	216,636	214,243
7	Housing Authority	6,041	6,021	6,018	6,017	6,017	6,017
8	Charities and Schools	4,759	4,736	4,734	4,733	4,733	4,733
9	Hospitals and Universities	7,350	7,346	7,343	7,343	7,343	7,343
10	Hand Billed	14,348	14,326	14,332	14,330	14,330	14,330
11	Scheduled (Flat Rate)	1	1	1	1	1	1
	Fire Protection						
12	Private	4,388	4,394	4,394	4,394	4,394	4,394
13	Public	9,235	9,235	9,235	9,235	9,235	9,235
14	Subtotal Retail Customers	273,150	269,996	267,514	265,092	262,689	260,296
15	Aqua Pennsylvania	3,821	3,940	3,940	3,940	3,940	3,940
16	Total Water Sales	276,970	273,936	271,454	269,033	266,630	264,236
17	Other Operating Revenues (a)	20,935	14,977	14,940	14,903	14,866	14,829
	Interest Income						
18	Interest Income on Debt Service Reserve Fund (b)	-	-	-	-	-	-
19	Operating Fund	413	415	398	413	466	504
20	Rate Stabilization Fund	810	814	797	741	709	718
21	Total Interest Income	1,223	1,229	1,195	1,154	1,176	1,222
22	Total Receipts	299,129	290,143	287,590	285,090	282,672	280,287

(a) Includes Debt Service Reserve Fund Release in FY 2020.

(b) Excludes deposit into Residual Fund for Transfer to City General Fund.

TABLE W-1A: OTHER REVENUE PROJECTED RECEIPTS
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Other Income							
1	Penalties	3,996	3,945	3,908	3,871	3,834	3,797
2	Miscellaneous City Revenue	1,720	1,720	1,720	1,720	1,720	1,720
3	Other	5,450	5,650	5,650	5,650	5,650	5,650
4	State & Federal Grants	1,000	1,000	1,000	1,000	1,000	1,000
5	Permits Issued by Licenses & Inspections	2,320	2,320	2,320	2,320	2,320	2,320
6	Miscellaneous (Procurement)	210	210	210	210	210	210
7	City & UESF Grants	132	132	132	132	132	132
8	Affordability Program Discount Cost (a)	-	-	-	-	-	-
9	Release from Debt Service Reserve (b)	6,107	-	-	-	-	-
10	Total Water Other Income	20,935	14,977	14,940	14,903	14,866	14,829
Interest Income							
11	Debt Reserve Fund (c)	-	-	-	-	-	-
12	Operating Fund	413	415	398	413	466	504
13	Rate Stabilization Fund	810	814	797	741	709	718
14	Total Water Operations	22,158	16,206	16,135	16,057	16,042	16,051

(a) Beginning in FY 2019, TAP Revenue Loss is recovered via the TAP Rate Rider Surcharge.

(b) Projected Release from Debt Reserve Fund based on outstanding and proposed debt service payments.

(c) Excludes deposit into Residual Fund for Transfer to City General Fund.

TABLE W-2: PROJECTED OPERATION AND MAINTENANCE EXPENSE
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Water Operations							
1	Personal Services	60,302	62,659	65,186	67,762	70,433	73,203
2	Pension and Benefits	57,373	59,191	60,744	62,683	64,234	65,401
3	Subtotal	117,675	121,850	125,930	130,445	134,667	138,604
Purchase of Services							
4	Power	7,305	7,524	7,524	7,562	7,637	7,714
5	Gas	612	630	630	634	640	646
6	Other	46,125	46,306	48,194	50,160	52,206	54,337
7	Subtotal	54,042	54,461	56,349	58,355	60,483	62,697
Materials and Supplies							
8	Chemicals	18,996	19,946	20,943	21,990	23,090	24,244
9	Other	10,432	10,735	11,046	11,367	11,696	12,035
10	Subtotal	29,428	30,681	31,989	33,357	34,786	36,280
11	Equipment	2,456	2,505	2,556	2,607	2,659	2,712
12	Indemnities and Transfers	4,571	4,596	4,621	4,647	4,672	4,698
13	Subtotal Expenses	208,174	214,093	221,445	229,410	237,268	244,991
14	Liquidated Encumbrances	(10,673)	(11,100)	(11,513)	(11,949)	(12,408)	(12,885)
15	Total Expenses	197,501	202,992	209,932	217,462	224,860	232,106

TABLE W-3: PROJECTED CAPITAL IMPROVEMENT PROGRAM
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Engineering and Administration (a)	7,382	6,378	5,585	4,775	3,966	3,156
2	Water Treatment Plant Improvements	50,000	128,000	149,200	196,500	80,200	241,200
3	Distribution System Rehabilitation	78,060	93,060	101,060	172,160	117,460	108,060
4	Large Meter Replacement	35,000	5,000	5,000	5,000	5,000	5,000
5	Vehicles	6,000	6,000	6,000	6,000	6,000	6,000
6	Total Improvements	176,442	238,438	266,845	384,435	212,626	363,416
7	Inflation Adjustment (b)	-	-	8,005	23,412	19,716	45,612
8	Inflated Total	176,442	238,438	274,850	407,847	232,342	409,028
9	Cash Flow Adjustment (c)	(19,858)	(68,434)	(25,328)	(130,254)	15,293	(65,664)
10	Net Cash Financing Required	156,584	170,003	249,522	277,593	247,635	343,364

(a) Beginning in FY 2017, Engineering and Administration Costs no longer include pension and benefits costs per City policy.

(b) Allowance for inflation of 3.0 percent per year after fiscal year 2021.

(c) Reflects adjustment to annual capital budget appropriations for project duration and contingency to reflect anticipated annual expenditures.

TABLE W-4: PROJECTED FLOW OF FUNDS - CONSTRUCTION FUND & DEBT RESERVE ACCOUNT
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Disposition of Bond Proceeds							
1	Proceeds From Sale of Bonds	126,000	180,000	229,000	232,000	295,000	324,000
	Transfers:						
2	Debt Reserve Fund (a)	1,680	6,322	12,023	10,216	20,342	22,320
3	Cost of Bond Issuance (b)	722	1,062	1,351	1,369	1,741	1,912
4	Construction Fund (c)	123,598	172,616	215,626	220,415	272,917	299,768
5	Total Issue	126,000	180,000	229,000	232,000	295,000	324,000
Construction Fund							
6	Beginning Balance	119,286	108,145	151,326	167,378	144,978	202,608
7	Transfer From Bond Proceeds	123,598	172,616	215,626	220,415	272,917	299,768
8	Capital Account Deposit	11,113	12,002	12,962	13,999	15,119	16,329
9	Penn Vest Loan	-	19,875	26,500	6,625	-	-
10	Transfer from Residual Fund	9,600	7,400	8,900	12,600	15,500	20,300
11	Interest Income on Construction Fund	1,131	1,291	1,586	1,554	1,729	1,991
12	Total Available	264,729	321,329	416,900	422,571	450,243	540,997
13	Net Cash Financing Required	156,584	170,003	249,522	277,593	247,635	343,364
14	Ending Balance	108,145	151,326	167,378	144,978	202,608	197,632
Debt Reserve Fund							
15	Beginning Balance	65,709	61,282	67,603	79,626	89,842	110,184
16	Transfer From Bond Proceeds	1,680	6,322	12,023	10,216	20,342	22,320
17	Debt Service Reserve Release	(6,107)	-	-	-	-	-
18	Ending Balance	61,282	67,603	79,626	89,842	110,184	132,504
19	Interest Income on Debt Reserve Fund	635	644	736	847	1,000	1,213

(a) Amount of Debt Reserve Fund estimated based on outstanding and proposed debt service payments.

(b) Cost of bonds issuance assumed at 0.59 percent of issue amount.

(c) Deposits equal proceeds from sale of bonds less transfers to Debt Reserve Fund and Costs of Issuance.

TABLE W-5: SUMMARY OF EXISTING AND PROPOSED DEBT SERVICE
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Revenue Bonds							
1	Existing (a)	63,775	56,792	54,430	52,627	49,006	49,087
	Proposed						
2	Fiscal Year 2021 (b)		3,150	9,450	12,412	12,412	12,412
3	Fiscal Year 2022 (b)			4,008	12,023	15,791	15,791
4	Fiscal Year 2023 (b)				4,060	12,180	15,998
5	Fiscal Year 2024 (b)					5,163	15,488
6	Fiscal Year 2025 (b)						5,670
7	Total Proposed	-	3,150	13,458	28,495	45,546	65,359
8	Total Revenue Bonds	63,775	59,942	67,888	81,122	94,552	114,446
Pennvest Loans							
9	Pennvest Loans - Parity Pennvest (c)	4,353	4,487	4,802	7,333	7,333	7,333
10	Total Senior Debt Service	68,129	64,429	72,690	88,455	101,885	121,779

(a) Projected debt service amounts for the Variable Rate Series 1997B and 2005B Bonds are based upon assumed interest rates of 3.0% and 4.53%, respectively. Projected amounts also include (i) debt service for the Series 2019B Bonds which issued in FY 2020; and (ii) savings from the Series 2019A Refunding Bonds and the Forward Refunding for the Series 2011A Bonds.

(b) Projected debt service amounts assume interest only payment for the first year of the bond authorization based on 5.25% interest rate; and assume issuance during the first quarter of the fiscal year.

(c) Includes projected Pennvest Loan for the Torresdale Pump Station Rehabilitation.

TABLE W-6: PROJECTED REVENUE AND REVENUE REQUIREMENTS
Base Rates
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
OPERATING REVENUE							
1	Water Service - Existing Rates (a)	276,970	273,936	271,454	269,033	266,630	264,236
2	Additional Service Revenue Required						
	Percent Increase						
	Months Effective						
3	FY 2021		12,324	14,930	14,797	14,665	14,533
4	FY 2022			12,884	15,611	15,471	15,332
5	FY 2023				26,698	32,347	32,057
6	FY 2024					29,343	35,551
7	FY 2025						32,250
8	Total Additional Service Revenue Required	-	12,324	27,814	57,105	91,827	129,723
9	Total Water Service Revenue	276,970	286,260	299,268	326,138	358,456	393,960
	Other Income (b)						
10	Other Operating Revenue	20,935	14,977	14,940	14,903	14,866	14,829
11	Debt Reserve Fund Interest Income	-	-	-	-	-	-
12	Operating Fund Interest Income	413	415	398	413	466	504
13	Rate Stabilization Interest Income	810	814	797	741	709	718
14	Total Revenues	299,129	302,467	315,404	342,195	374,498	410,011
OPERATING EXPENSES							
15	Water Operations	(197,501)	(202,992)	(209,932)	(217,462)	(224,860)	(232,106)
16	Water Treatment Plant Sludge (c)	(13,232)	(14,561)	(15,573)	(16,266)	(16,997)	(17,919)
17	Total Operating Expenses	(210,733)	(217,554)	(225,505)	(233,728)	(241,857)	(250,024)
18	Transfer From/(To) Rate Stabilization Fund	200	(1,150)	4,600	6,550	(150)	(1,650)
19	NET REVENUES AFTER OPERATIONS	88,596	83,763	94,499	115,017	132,491	158,337
DEBT SERVICE							
	Senior Debt Service						
	Revenue Bonds						
20	Outstanding Bonds	(63,775)	(56,792)	(54,430)	(52,627)	(49,006)	(49,087)
21	Pennvest Parity Bonds	(4,353)	(4,487)	(4,802)	(7,333)	(7,333)	(7,333)
22	Projected Future Bonds	-	(3,150)	(13,458)	(28,495)	(45,546)	(65,359)
23	Total Senior Debt Service	(68,129)	(64,429)	(72,690)	(88,455)	(101,885)	(121,779)
24	TOTAL SENIOR DEBT SERVICE COVERAGE (L19/L23)	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x
	Subordinate Debt Service						
25	Subordinate Debt Service	-	-	-	-	-	-
26	Transfer to Escrow	-	-	-	-	-	-
27	Total Debt Service on Bonds	(68,129)	(64,429)	(72,690)	(88,455)	(101,885)	(121,779)
28	CAPITAL ACCOUNT DEPOSIT	(11,113)	(12,002)	(12,962)	(13,999)	(15,119)	(16,329)
29	TOTAL COVERAGE (L19/(L23+L25+L28))	1.11 x	1.09 x	1.10 x	1.12 x	1.13 x	1.14 x
30	End of Year Revenue Fund Balance	9,355	7,332	8,847	12,562	15,487	20,229

(a) Revenue from rates effective September 1, 2019.

(b) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund. Includes Debt Service Reserve Fund Release in FY 2020.

(c) Cost to process the Water Treatment Sludge at the wastewater treatment plants based on wastewater cost of service analysis.

TABLE W-7: ESTIMATED TEST YEAR COST OF SERVICE
(in thousands of dollars)
Test Year 2021

Line No.		(1)	(2)	(3)
		Operating Expense	Capital Cost	Total
		\$	\$	\$
REVENUE REQUIREMENTS				
1	Operations & Maintenance Expense	117,843		117,843
2	Direct Interdepartmental Charges	85,149		85,149
3	Water Treatment Plant Sludge	14,732		14,732
	Existing Bond Debt Service			
4	Revenue Bonds		61,279	61,279
	Subordinate Bonds		-	-
5	Proposed Bond Debt Service		3,150	3,150
6	Capital Account Deposit		12,002	12,002
7	Residual Fund Deposit	5,461	1,917	7,378
8	Deposit (From)/To Rate Stabilization Fund	2,739	961	3,700
9	Total	225,924	79,309	305,233
DEDUCTIONS OF FUNDS FROM OTHER SOURCES				
10	Other Operating Revenue	(14,977)	-	(14,977)
11	Interest Income	(929)	(326)	(1,255)
12	COST OF SERVICE TO BE DERIVED FROM RATES	210,018	78,983	289,001

TABLE W-8
WATER: ALLOCATION OF TEST YEAR PLANT INVESTMENT TO FUNCTIONAL COST COMPONENTS
TEST YEAR 2021

Line No.	Description	(1) Estimated Test Year Plant Investment	(2) Base	(3) Extra Capacity		(5) Customer Meters	(6) Public Fire Protection - Direct Standard Pressure	(7) Wholesale Direct
				Maximum Day In Excess of Base	Maximum Hour In Excess of Maximum Day			
		\$	\$	\$	\$	\$	\$	\$
Raw Water Supply and Pumping								
	Source of Supply							
1	Land	200,000	200,000					
2	Buildings and Equipment	5,291,000	5,291,000					
	Power and Pumping							
3	Land	31,000	22,000	9,000				-
4	Buildings and Equipment	21,339,000	14,977,000	6,117,000				245,000
5	Total Raw Water Supply and Pumping	26,861,000	20,490,000	6,126,000	-	-	-	245,000
Purification and Treatment								
	Power and Pumping (a)							
6	Land	71,000	36,000	11,000	23,000			1,000
7	Buildings and Equipment	77,766,000	39,757,000	12,233,000	24,466,000			1,310,000
	Treatment							
8	Land	1,325,000	924,000	378,000				23,000
9	Buildings and Equipment	350,000,000	244,176,000	99,734,000				6,090,000
10	Total Purification and Treatment	429,162,000	284,893,000	112,356,000	24,489,000	-	-	7,424,000
Transmission and Distribution								
11	Mains	875,954,000	453,372,000	139,499,000	278,998,000			4,085,000
12	Meters	25,888,000				25,888,000		-
13	Hydrants	9,200,000					9,200,000	-
	Filtered Water Storage							
14	Land	182,000	93,000	29,000	57,000			3,000
15	Buildings and Equipment	17,168,000	8,772,000	2,699,000	5,398,000			299,000
16	Total Transmission and Distribution	928,392,000	462,237,000	142,227,000	284,453,000	25,888,000	9,200,000	4,387,000
17	Subtotal	1,384,415,000	767,620,000	260,709,000	308,942,000	25,888,000	9,200,000	12,056,000
Administrative and General (b)								
18	Land	205,000	113,000	39,000	46,000	4,000	1,000	2,000
19	Buildings and Equipment	68,390,000	37,919,000	12,879,000	15,261,000	1,279,000	454,000	598,000
20	Total Administrative and General	68,595,000	38,032,000	12,918,000	15,307,000	1,283,000	455,000	600,000
21	Total Water Plant Investment	1,453,010,000	805,652,000	273,627,000	324,249,000	27,171,000	9,655,000	12,656,000

(a) Includes booster pumping

(b) Administrative and General allocated based on allocation of system investment.

TABLE W-9
WATER: ALLOCATION OF TEST YEAR PLANT DEPRECIATION EXPENSE
TEST YEAR 2021

Line No.	Description	(1)	(2)	(3)		(4)	(5)	(6)	(7)
		Total		Extra Capacity				Public Fire	
		Test Year		Maximum Day	Maximum Hour			Protection - Direct	
		Depreciation Expense	Base	In Excess of Base	In Excess of Maximum Day	Customer Meters	Standard Pressure	Wholesale Direct	
		\$	\$	\$	\$	\$	\$	\$	
Raw Water Supply and Pumping									
1	Source of Supply	132,000	132,000	-					
2	Power and Pumping	438,000	307,000	126,000				5,000	
3	Total Supply and Pumping	570,000	439,000	126,000	-	-	-	5,000	
Purification and Treatment									
4	Power and Pumping (a)	1,539,000	787,000	242,000	484,000			26,000	
5	Treatment	8,076,000	5,634,000	2,301,000				141,000	
6	Total Purification and Treatment	9,615,000	6,421,000	2,543,000	484,000	-	-	167,000	
Transmission and Distribution									
7	Mains	16,390,000	8,483,000	2,610,000	5,221,000			76,000	
8	Meters	1,812,000				1,812,000		-	
9	Hydrants	230,000					230,000	-	
10	Filtered Water Storage	597,000	305,000	94,000	188,000			10,000	
11	Total Transmission and Distribution	19,029,000	8,788,000	2,704,000	5,409,000	1,812,000	230,000	86,000	
12	Subtotal	29,214,000	15,648,000	5,373,000	5,893,000	1,812,000	230,000	258,000	
13	Administrative and General	2,116,000	1,174,000	398,000	472,000	40,000	14,000	18,000	
14	Total Water Plant Depreciation Expense	31,330,000	16,822,000	5,771,000	6,365,000	1,852,000	244,000	276,000	

(a) Includes booster pumping

TABLE W-10
WATER: ALLOCATION OF TEST YEAR OPERATION AND MAINTENANCE EXPENSE
TEST YEAR 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Test Year Operation & Maintenance Expense	Base	Extra Capacity		Customer Costs	Public Fire Protection	Direct Standard Pressure	Wholesale Direct
				Maximum Day In Excess of Base	Maximum Hour In Excess of Maximum Day				
		\$	\$	\$	\$	\$	\$	\$	
Raw Water Pumping									
1	Purchased Power	2,364,000	2,227,000	117,000					20,000
2	Purchased Gas	-	-	-					-
3	Other	3,230,000	2,263,000	925,000					42,000
4	Total Raw Water Pumping	5,594,000	4,490,000	1,042,000	-	-	-	-	62,000
Purification and Treatment									
	Power and Pumping (a)								
5	Purchased Power	3,917,000	3,495,000	194,000	194,000				34,000
6	Purchased Gas	425,000	219,000	67,000	135,000				4,000
7	Other	11,760,000	6,035,000	1,857,000	3,713,000				155,000
	Treatment								
8	Purchased Power	-	-	-	-				-
9	Purchased Gas	26,000	18,000	8,000	-				-
10	Chemicals	16,752,000	16,607,000						145,000
	Other								
11	Other	44,914,000	31,469,000	12,854,000					591,000
12	Water Treatment Plant Sludge	14,732,000	14,573,000						159,000
13	Subtotal Other (b)	59,646,000	46,042,000	12,854,000	-	-	-	-	750,000
14	Total Purification and Treatment	92,526,000	72,416,000	14,980,000	4,042,000	-	-	-	1,088,000
Transmission and Distribution									
15	Mains	65,062,000	33,632,000	10,348,000	20,696,000				386,000
16	Meters	1,794,000				1,794,000			-
17	Hydrants	683,000						683,000	-
18	Filtered Water Storage	1,289,000	655,000	202,000	403,000				29,000
19	Total Transmission and Distribution	68,828,000	34,287,000	10,550,000	21,099,000	1,794,000	-	683,000	415,000
20	Customer Accounting and Collection	23,990,000					23,990,000		-
21	Subtotal	190,938,000	111,193,000	26,572,000	25,141,000	1,794,000	23,990,000	683,000	1,565,000
22	Administrative and General	26,786,000	12,987,000	4,593,000	4,352,000	315,000	4,208,000	120,000	211,000
23	Subtotal Water Operating Expense	217,724,000	124,180,000	31,165,000	29,493,000	2,109,000	28,198,000	803,000	1,776,000
24	Residual Fund Deposit	5,461,000	3,114,000	782,000	740,000	53,000	707,000	20,000	45,000
25	Deposit (from) to RSF	2,739,000	1,562,000	392,000	371,000	27,000	355,000	10,000	22,000
26	Total Water Operating Expense	225,924,000	128,856,000	32,339,000	30,604,000	2,189,000	29,260,000	833,000	1,843,000
27	Other Operating Revenue	14,977,000	8,601,000	2,158,000	2,042,000	146,000	1,952,000	55,000	23,000
28	Non-Operating Income	929,000	530,000	133,000	126,000	9,000	120,000	3,000	8,000
29	Total Operating Expense Less Other	210,018,000	119,725,000	30,048,000	28,436,000	2,034,000	27,188,000	775,000	1,812,000

(a) Includes booster pumping.

(b) Includes Wastewater System cost of treating water treatment plant sludge of \$14,732,000.

TABLE W-11
WATER: ESTIMATED RETAIL UNITS OF SERVICE
TEST YEAR 2021

Line No.	Customer Class	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Total	Average	Maximum Day Extra Capacity		Maximum Hour Extra Capacity		Customer Costs		Equiv. Meters
		Test Year Water Use	Daily Water Use (Base)	Capacity Factor	Total Capacity	Extra Capacity (a)	Capacity Factor	Total Capacity	Extra Capacity (b)	
		Mcf	Mcf/day (1) / 365	%	Mcf/day (2) x (3) / 100	Mcf/day (4) - (2)	%	Mcf/day (2) x (6) / 100	Mcf/day (7) - (4)	
1	Residential	2,958,300	8,100	200	16,200	8,100	360	29,160	12,960	457,953
2	Senior Citizens	123,000	340	200	680	340	360	1,220	540	23,496
3	Commercial	1,574,500	4,310	180	7,760	3,450	265	11,420	3,660	125,374
4	Industrial	125,500	340	160	540	200	200	680	140	5,942
5	Public Utilities	9,300	30	160	50	20	200	60	10	1,335
6	Total General Service	4,790,600	13,120		25,230	12,110		42,540	17,310	614,100
7	Housing Authority	157,300	430	190	820	390	313	1,340	520	10,199
8	Charities & Schools	157,200	430	180	770	340	270	1,160	390	19,084
9	Hospital/University	289,800	790	180	1,420	630	233	1,840	420	9,970
10	Hand Billed	449,400	1,230	180	2,210	980	270	3,320	1,110	6,071
11	Scheduled (Flat Rate)	0	0	200	0	0	360	0	0	3
	Fire Protection (c)									
12	Public		0		980	980		2,550	1,570	
13	Private	13,900	40		170	130		380	210	3,817
14	Total Retail Customers	5,858,200	16,040		31,600	15,560		53,130	21,530	663,244

(a) Capacity in excess of average daily use.

(b) Capacity in excess of maximum day.

(c) System wide fire protection demands reflect two simultaneous fires, one requiring 10,000 gallons per minute (gpm) fire flow demand for 10 hours and the second requiring 5,000 gpm for 8 hours. These demands are allocated between standard pressure public fire service and private fire service based upon equivalent 6-inch connections for each of the two fire service classes.

Mcf - thousand cubic feet

TABLE W-12
WATER: EQUIVALENT METER
AND BILL RATIOS

Line No.	Meter Size (Inches)	(1) Equivalent Factors	
		Meters	
		Capacity Basis	Bills
1	5/8	1.0	1.0
2	3/4	1.5	1.0
3	1	2.5	1.1
4	1-1/4	3.8	1.2
5	1-1/2	5.0	1.2
6	2	8.0	1.5
7	3	15.0	2.0
8	4	25.0	4.0
9	6	50.0	7.0
10	8	80.0	10.0
11	10	115.0	15.0
12	12	215.0	20.0

TABLE W-13A
WATER: SUMMARY OF COST OF SERVICE
ALLOCATED TO AQUA PA
AND PROPOSED RATES
Test Year 2021

Line No.	Description	(1)	(2)
		Allocated Investment	Cost of Service
1	Operating Expense (Table W-10, Line 29, Column 8)		\$ 1,808,000
2	Depreciation Expense (Table W-9, Line 14, Column 7)		276,000
3	Return on Investment		
4	Allocated Investment (Table W-8, Line 21, Column 7)	\$ 12,656,000	
5	Return @ 7.50%		949,000
6	Total Allocated Cost of Service		3,033,000

CONTRACTUAL RATES

7	Commodity Charge (\$/Mg)		0.266
8	Lump Sum Payment (\$/year)		2,835,000

Mg - Thousand gallons

TABLE W-13B
WATER: SUMMARY OF COST OF SERVICE
ALLOCATED TO AQUA PA
AND PROPOSED RATES
Test Year 2022

Line No.	Description	(1)	(2)
		Allocated Investment	Cost of Service
1	Operating Expense		\$ 1,858,000
2	Depreciation Expense		276,000
3	Return on Investment		
4	Allocated Investment	\$ 12,656,000	
5	Return @ 7.50%		949,000
6	Total Allocated Cost of Service		3,083,000

FY 2022 CONTRACTUAL RATES

7	Commodity Charge (\$/Mg)		0.278
8	Lump Sum Payment (\$/year)		2,876,000

Mg - Thousand gallons

TABLE W-14
WATER: TEST YEAR RETAIL UNIT COSTS OF SERVICE
TEST YEAR 2021

Line No.	Description	(1)		(2)	(3)		(4)	(5)	(6)	(7)
		Total Test Year Retail Costs		Base	Extra Capacity		Maximum Hour In Excess of Maximum Day	Customer Costs		Direct Public Fire Protection
					Maximum Day In Excess of Base	Maximum Day				
\$										
Total Retail Customer Units of Service										
1	Number			5,858,200	15,560	21,530	663,244	6,434,676		
2	Units			Mcf	Mcf/day	Mcf/day	Equiv. Meters	Equiv. Bills	Total	
Operating Expense										
3	Total Expense - \$		208,206,000	119,725,000	30,048,000	28,436,000	2,034,000	27,188,000	775,000	
4	Unit Expense - \$/Unit			20.4372	1,931.1054	1,320.7617	3.0667	4.2252		
Depreciation Expense										
5	Total Expense - \$		31,054,000	16,822,000	5,771,000	6,365,000	1,852,000		244,000	
6	Unit Expense - \$/Unit			2.8715	370.8869	295.6340	2.7923			
Plant Investment										
7	Total Investment - \$		1,440,354,000	805,652,000	273,627,000	324,249,000	27,171,000		9,655,000	
8	Unit Investment - \$/Unit			137.5255	17,585.2828	15,060.3344	40.9668			
Unit Return on Investment										
9	Total Return - \$		46,401,000	25,954,000	8,815,000	10,446,000	875,000		311,000	
10	Inside City - \$/Unit (a)			4.4304	566.5099	485.1687	1.3197			
Total Unit Costs of Service										
11	Inside City - \$/Unit			27.7391	2,868.5022	2,101.5644	7.1787	4.2252		

(a) Retail rate of return = Retail allocation of Return on Investment / Retail Allocation of System Plant Investment = \$46,401,000 / \$1,440,354,000 = 3.2215%

Mcf - thousand cubic feet

TABLE W-15
WATER: TEST YEAR COST OF SERVICE BY FUNCTIONAL COST COMPONENTS
TEST YEAR 2021

Line No.	Customer Class	(1)	(2)	(3) (4)		(5)	(6)	(7)
		Total Allocated Cost Of Service	Base	Extra Capacity		Customer Costs		Direct Public Fire Protection
				Maximum Day	Maximum Hour In Excess of Maximum Day			
						Meters	Billing	
Retail								
	General Service							
1	Senior Citizens	\$ 6,881,000	\$ 3,412,000	\$ 975,000	\$ 1,135,000	\$ 169,000	\$ 1,190,000	\$ -
2	Residential	157,382,000	82,060,000	23,235,000	27,236,000	3,288,000	21,563,000	-
3	Commercial	64,472,000	43,675,000	9,896,000	7,692,000	900,000	2,309,000	-
4	Industrial	4,470,000	3,481,000	574,000	294,000	43,000	78,000	-
5	Public Utilities	361,000	258,000	57,000	21,000	10,000	15,000	-
6	Subtotal General Service	233,566,000	132,886,000	34,737,000	36,378,000	4,410,000	25,155,000	-
7	Housing Authority	6,967,000	4,363,000	1,119,000	1,093,000	73,000	319,000	-
8	Charities & Schools	6,493,000	4,361,000	975,000	820,000	137,000	200,000	-
9	Hospitals & University	10,876,000	8,039,000	1,807,000	883,000	72,000	75,000	-
10	Hand Billed	17,654,000	12,466,000	2,811,000	2,333,000	44,000	-	-
11	Scheduled (Flat Rate)	-	-	-	-	-	-	-
Fire Protection								
12	Private	2,665,000	386,000	373,000	441,000	27,000	1,438,000	-
	Public							
13	Standard Pressure	7,440,000	-	2,811,000	3,299,000	-	-	1,330,000
14	Subtotal Public Fire Protection	7,440,000	-	2,811,000	3,299,000	-	-	1,330,000
15	Total Retail Service	\$ 285,661,000	\$ 162,501,000	\$ 44,633,000	\$ 45,247,000	\$ 4,763,000	\$ 27,187,000	\$ 1,330,000

TABLE W-16
WATER: TEST YEAR ADJUSTED COST OF SERVICE
TEST YEAR 2021

Line No.	Customer Class	(1) Allocated Cost of Service	(2) Discount	(3) Cost of Service w Discount	(4) Recovery of Discount	(5) Adjusted Cost of Service	(6) Percent Change
		\$	\$	\$	\$	\$	%
1	Residential	157,382,000	-	157,382,000	3,613,000	160,995,000	2.30%
2	Senior Citizens	6,881,000	1,720,000	5,161,000	118,000	5,279,000	-23.28%
3	Commercial	64,472,000	-	64,472,000	1,480,000	65,952,000	2.30%
4	Industrial	4,470,000	-	4,470,000	103,000	4,573,000	2.30%
5	Public Utilities	361,000	-	361,000	8,000	369,000	2.22%
6	Housing Authority	6,967,000	348,000	6,619,000	152,000	6,771,000	-2.81%
Charities and Schools							
7	Charities & Schools	6,493,000	1,623,000	4,870,000	112,000	4,982,000	-23.27%
8	Hospital/University	10,876,000	2,719,000	8,157,000	187,000	8,344,000	-23.28%
9	Subtotal Charities and Schools	17,369,000	4,342,000	13,027,000	299,000	13,326,000	-23.28%
10	Hand Billed	17,654,000	-	17,654,000	405,000	18,059,000	2.29%
11	Scheduled (Flat Rate)	-	-	-	-	-	0.00%
Fire Protection							
12	Private	2,665,000	-	2,665,000	61,000	2,726,000	2.29%
	Public						
13	Standard Pressure	7,440,000	-	7,440,000	171,000	7,611,000	2.30%
14	Subtotal Public Fire Protection	7,440,000	-	7,440,000	171,000	7,611,000	2.30%
15	Subtotal Retail Service	285,661,000	6,410,000	279,251,000	6,410,000	285,661,000	0.00%
16	Wholesale	3,336,000	-	3,336,000	-	3,336,000	0.00%
17	Total System	288,997,000	6,410,000	282,587,000	6,410,000	288,997,000	0.00%

TABLE W-17
WATER: COMPARISON OF TEST YEAR COSTS OF SERVICE
AND ADJUSTED COST OF SERVICE
WITH REVENUES UNDER EXISTING RATES
TEST YEAR 2021

Line No.	Customer Class	(1) Revenue Under Existing Rates	(2) Adjusted Cost of Service	(3) Indicated Increase (Decrease) Required
		\$	\$	%
Retail				
	General Service			
1	Senior Citizens	5,058,165	5,279,000	4.40%
2	Residential	152,512,645	160,995,000	5.60%
3	Commercial	61,728,805	65,952,000	6.80%
4	Industrial	4,259,578	4,573,000	7.40%
5	Public Utilities	378,582	369,000	-2.50%
6	Subtotal General Service	223,937,776	237,168,000	5.90%
7	Housing Authority	6,020,520	6,771,000	12.50%
8	Charities & Schools	4,736,465	4,982,000	5.20%
9	Hospitals & University	7,345,739	8,344,000	13.60%
10	Hand Billed	14,326,243	18,059,000	26.10%
11	Scheduled (Flat Rate)	672	-	-100.00%
Fire Protection				
12	Private	4,279,533	2,726,000	-36.30%
	Public			
13	Standard Pressure	9,235,000	7,611,000	-17.60%
	High Pressure (a)	-	-	0.00%
14	Subtotal Public Fire Protection	9,235,000	7,611,000	
15	Total Retail Service	269,881,948	285,661,000	5.80%
Wholesale				
16	Total Wholesale (Aqua Pennsylvania)	3,819,124	3,033,000	-20.60%
17	Total System	273,701,072	288,694,000	5.50%

**TABLE W-18
WATER: PROPOSED RATES FOR
GENERAL SERVICE**

		(1)	(2)
		SERVICE CHARGE	
Line No.	Meter Size	FY 2021 Monthly	FY 2022 Monthly
	Inches	\$	\$
1	5/8	5.08	5.19
2	3/4	5.40	5.52
3	1	6.47	6.63
4	1-1/2	8.51	8.73
5	2	11.73	12.06
6	3	18.37	18.94
7	4	33.60	34.58
8	6	62.74	64.64
9	8	95.03	98.00
10	10	139.39	143.70
11	12	224.76	232.22

QUANTITY CHARGE			
Line No.	Monthly Water Usage	FY 2021 Charge per Mcf	FY 2022 Charge per Mcf
		\$	\$
12	First 2 Mcf	48.57	51.02
13	Next 98 Mcf	42.67	46.05
14	Next 1,900 Mcf	33.07	35.47
15	Over 2,000 Mcf	32.17	34.49

Mcf - Thousand cubic feet

**TABLE W-19
WATER: PROPOSED RATES FOR
PRIVATE FIRE PROTECTION**

Line No.	Size of Meter or Connection	(1)	(2)
		FY 2021 Monthly Charge	FY 2022 Monthly Charge
	Inches	\$	\$
1	4" or less	27.52	28.43
2	6	50.57	52.33
3	8	75.56	78.29
4	10	111.41	115.38
5	12	172.45	179.27

PUBLIC FIRE PROTECTION

Line No.	Description	(1)	(2)
		FY 2021 Annual Charge	FY 2022 Annual Charge
		\$	\$
6	Standard Pressure	7,611,000	8,088,000

**TABLE W-19A
PROPOSED RATES FOR
FIRE PROTECTION
RESIDENTIAL PRIVATE FIRE PROTECTION**

Line No.	Size of Meter or Connection	(1)	(2)
		FY 2021 Monthly Charge	FY 2022 Monthly Charge
	Inches	\$	\$
Water Service Charge Including Fire Protection			
1	3/4	8.40	8.71
2	1	9.47	9.82
3	1-1/2	11.51	11.92
4	2	14.73	15.25
Sewer Service Charge			
5	3/4	7.61	8.15
6	1	7.61	8.15
7	1-1/2	7.61	8.15
8	2	7.61	8.15

TABLE WW-1: PROJECTED RECEIPTS UNDER EXISTING RATES
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Sanitary Sewer Receipts	264,188	262,733	261,052	259,320	257,582	255,852
2	Stormwater Receipts	174,207	175,178	174,455	173,202	171,922	170,648
3	Total Wastewater Service Receipts	438,395	437,910	435,507	432,522	429,503	426,500
4	Other Operating Revenues (a)	26,721	14,468	14,425	14,377	14,330	14,283
	Interest Income						
5	Interest Income on Debt Service Reserve Fund (b)	-	-	-	-	-	-
6	Operating Fund	571	620	691	676	711	665
7	Rate Stabilization Fund	871	717	689	694	703	678
8	Total Interest Income	1,442	1,338	1,380	1,370	1,413	1,343
9	Total Receipts	466,558	453,715	451,312	448,270	445,247	442,126

(a) Includes Debt Service Reserve Fund Release in FY 2020.

(b) Excludes deposit into Residual Fund for Transfer to City General Fund.

TABLE WW-1A: PROJECTED RECEIPTS UNDER EXISTING SANITARY SEWER RATES
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Residential	126,592	125,152	123,673	122,166	120,657	119,148
2	Senior Citizens	4,308	4,251	4,196	4,143	4,089	4,036
3	Commercial	51,739	51,703	51,552	51,383	51,211	51,048
4	Industrial	2,371	2,303	2,282	2,279	2,275	2,271
5	Public Utilities	345	346	346	346	345	345
6	Sewer Only	2,170	2,181	2,184	2,184	2,184	2,184
7	Groundwater	2,957	2,968	2,967	2,967	2,967	2,967
8	Subtotal General Customers	190,482	188,904	187,202	185,468	183,731	182,000
9	Housing Authority	5,104	5,111	5,112	5,112	5,112	5,112
10	Charities and Schools	4,148	4,152	4,153	4,153	4,153	4,153
11	Hospitals and University	6,843	6,879	6,883	6,883	6,883	6,883
12	Hand Bill	13,495	13,591	13,607	13,608	13,608	13,608
13	Scheduled	1	1	1	1	1	1
14	Fire Service	249	250	250	250	250	250
15	Contract Service	39,006	38,982	38,982	38,982	38,982	38,982
16	Surcharge	4,859	4,862	4,862	4,862	4,862	4,862
17	Total Sanitary Sewer Service Receipts	264,188	262,733	261,052	259,320	257,582	255,852

TABLE WW-1B: PROJECTED RECEIPTS UNDER EXISTING STORMWATER RATES
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Residential						
2	Non Discount	79,406	79,913	79,980	79,986	79,986	79,986
3	Discount: Senior, Education & Charities	3,240	3,261	3,263	3,263	3,263	3,263
4	Discount PHA	728	732	733	733	733	733
5	Non Residential						
6	Non Discount	77,582	77,844	77,106	75,958	74,796	73,640
7	Discount: Senior, Education & Charities	8,931	9,036	9,002	8,936	8,866	8,796
8	Discount PHA	1,253	1,309	1,315	1,317	1,316	1,316
9	Condominium						
10	Non Discount	2,991	3,007	2,981	2,937	2,891	2,846
11	Discount: Senior, Education & Charities	76	75	73	71	69	67
12	Discount PHA	1	1	1	1	1	1
13	Total Receipts	174,207	175,178	174,455	173,202	171,922	170,648

TABLE WW-1C: OTHER REVENUE PROJECTED RECEIPTS
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Other Income							
1	Penalties	6,134	6,120	6,077	6,029	5,982	5,935
2	Miscellaneous City Revenues	-	-	-	-	-	-
3	Other	5,450	5,650	5,650	5,650	5,650	5,650
4	State & Federal Grants	-	-	-	-	-	-
5	Permits Issued by Licenses & Inspections	2,320	2,320	2,320	2,320	2,320	2,320
6	Miscellaneous (Procurement)	210	210	210	210	210	210
7	City & UESF Grants	168	168	168	168	168	168
8	Affordability Program Discount Cost (a)	-	-	-	-	-	-
9	Release from Debt Service Reserve (b)	12,439	-	-	-	-	-
10	Total Wastewater Other Income	26,721	14,468	14,425	14,377	14,330	14,283
Interest Income							
11	Debt Reserve Fund (c)	-	-	-	-	-	-
12	Operating Fund	571	620	691	676	711	665
13	Rate Stabilization Fund	871	717	689	694	703	678
14	Total Wastewater Operations	28,163	15,805	15,806	15,748	15,743	15,626

(a) Beginning in FY 2019, TAP Revenue Loss is recovered via the TAP Rate Rider Surcharge.

(b) Projected Release from Debt Reserve Fund based on outstanding and proposed debt service payments.

(c) Excludes deposit into Residual Fund for Transfer to City General Fund.

TABLE WW-2: PROJECTED OPERATION AND MAINTENANCE EXPENSE

(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Wastewater Operations							
1	Personal Services	87,061	91,202	95,338	99,280	103,371	107,615
2	Pension and Benefits	82,832	86,155	88,842	91,839	94,272	96,147
3	Subtotal	169,893	177,357	184,180	191,118	197,642	203,762
Purchase of Services							
4	Power	6,609	6,808	6,808	6,842	6,910	6,979
5	Gas	3,375	3,477	3,477	3,494	3,529	3,564
6	SMIP/GARP	25,000	25,000	25,000	25,000	25,000	25,000
7	Other	107,332	110,095	114,604	119,299	124,188	129,278
8	Subtotal	142,317	145,379	149,888	154,635	159,627	164,821
Materials and Supplies							
9	Chemicals	3,270	3,433	3,605	3,785	3,975	4,173
10	Other	15,527	15,978	16,441	16,918	17,408	17,913
11	Subtotal	18,797	19,411	20,046	20,703	21,383	22,087
12	Equipment	2,937	2,995	3,055	3,116	3,179	3,242
13	Indemnities and Transfers	7,824	7,868	7,913	7,958	8,003	8,049
14	Subtotal Expenses	341,768	353,011	365,083	377,531	389,834	401,962
15	Liquidated Encumbrances	(20,998)	(21,838)	(22,651)	(23,507)	(24,410)	(25,350)
16	Total Expenses	320,770	331,173	342,433	354,023	365,424	376,612

TABLE WW-3: PROJECTED CAPITAL IMPROVEMENT PROGRAM
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Wastewater Collection and Treatment							
1	Engineering and Administration (a)	8,665	7,487	6,556	5,606	4,655	3,705
2	Water Pollution Control Plant	70,000	200,000	110,000	160,000	110,000	60,000
3	Storm Flood Relief	10,000	15,000	15,000	15,000	15,000	15,000
4	Reconstruction of Sewers	67,800	72,460	67,860	67,860	67,860	67,860
5	Green Infrastructure	62,000	72,000	72,000	72,000	72,000	72,000
6	Vehicles	6,000	6,000	6,000	6,000	6,000	6,000
7	Total Improvements	224,465	372,947	277,416	326,466	275,515	224,565
8	Inflation Adjustment (b)	-	-	8,322	19,882	25,548	28,185
9	Inflated Total	224,465	372,947	285,739	346,348	301,063	252,750
10	Cash Flow Adjustment (c)	(25,262)	(107,040)	(26,332)	(110,613)	19,816	(40,575)
11	Net Cash Financing Required	199,203	265,907	259,407	235,735	320,879	212,174

(a) Beginning in FY 2017, Engineering and Administration Costs no longer include pension and benefits costs per City policy.

(b) Allowance for inflation of 3.0 percent per year after fiscal year 2021.

(c) Reflects adjustment to annual capital budget appropriations for project duration and contingency to reflect anticipated annual expenditures.

TABLE WW-4: PROJECTED FLOW OF FUNDS - CONSTRUCTION FUND & DEBT RESERVE ACCOUNT
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Disposition of Bond Proceeds							
1	Proceeds From Sale of Bonds	179,834	220,000	216,000	248,000	230,000	196,000
	Transfers:						
2	Debt Reserve Fund (a)	2,398	7,726	11,340	10,920	15,860	13,502
3	Cost of Bond Issuance (b)	1,030	1,298	1,274	1,463	1,357	1,156
4	Construction Fund (c)	176,406	210,976	203,386	235,616	212,783	181,341
5	Total Issue	179,834	220,000	216,000	248,000	230,000	196,000
Construction Fund							
6	Beginning Balance	150,949	171,910	158,049	144,037	189,373	126,651
7	Transfer From Bond Proceeds	176,406	210,976	203,386	235,616	212,783	181,341
8	Capital Account Deposit	15,952	17,228	18,607	20,095	21,703	23,439
9	Penn Vest Loan	-	-	-	-	-	-
10	Transfer from Residual Fund	26,200	22,200	21,900	23,700	22,100	24,900
11	Interest Income on Construction Fund	1,606	1,642	1,503	1,659	1,572	1,354
12	Total Available	371,113	423,956	403,444	425,107	447,530	357,685
13	Net Cash Financing Required	199,203	265,907	259,407	235,735	320,879	212,174
14	Ending Balance	171,910	158,049	144,037	189,373	126,651	145,511
Debt Reserve Fund							
15	Beginning Balance	133,751	123,710	131,437	142,777	153,697	169,557
16	Transfer From Bond Proceeds	2,398	7,726	11,340	10,920	15,860	13,502
17	Debt Service Reserve Release	(12,439)	-	-	-	-	-
18	Ending Balance	123,710	131,437	142,777	153,697	169,557	183,059
19	Interest Income on Debt Reserve Fund	1,287	1,276	1,371	1,482	1,616	1,763

(a) Amount of Debt Reserve Fund estimated based on outstanding and proposed debt service payments.

(b) Cost of bonds issuance assumed at 0.59 percent of issue amount.

(c) Deposits equal proceeds from sale of bonds less transfers to Debt Reserve Fund and Costs of Issuance.

TABLE WW-5: SUMMARY OF EXISTING AND PROPOSED DEBT SERVICE
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
Revenue Bonds							
1	Existing (a)	132,491	120,794	112,858	108,577	91,917	91,900
	Proposed						
2	Fiscal Year 2021 (b)		3,850	11,550	15,171	15,171	15,171
3	Fiscal Year 2022 (b)			3,780	11,340	14,895	14,895
4	Fiscal Year 2023 (b)				4,340	13,020	17,101
5	Fiscal Year 2024 (b)					4,025	12,075
6	Fiscal Year 2025 (b)						3,430
7	Total Proposed	-	3,850	15,330	30,851	47,110	62,672
8	Total Revenue Bonds	132,491	124,644	128,188	139,428	139,028	154,572
Pennvest Loans							
9	Parity Pennvest	6,278	6,278	6,278	6,278	6,278	6,278
10	Total Debt Service	138,768	130,922	134,465	145,705	145,305	160,850

(a) Projected debt service amounts for the Variable Rate Series 1997B and 2005B Bonds are based upon assumed interest rates of 3.0% and 4.53%, respectively. Projected amounts also include (i) debt service for the Series 2019B Bonds which issued in FY 2020; and (ii) savings from the Series 2019A Refunding Bonds and the Forward Refunding for the Series 2011A Bonds.

(b) Projected debt service amounts assume interest only payment for the first year of the bond authorization based on 5.25% interest rate; and assume issuance during the first quarter of the fiscal year.

TABLE WW-6: PROJECTED REVENUE AND REVENUE REQUIREMENTS
Base Rates
(in thousands of dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
OPERATING REVENUE							
1	Wastewater Service - Existing Rates (a)	438,395	437,910	435,507	432,522	429,503	426,500
2	Additional Service Revenue Required						
	Percent Increase						
	Months Effective						
3	FY 2021		23,780	28,902	28,700	28,496	28,293
4	FY 2022			25,195	30,583	30,365	30,149
5	FY 2023				16,993	20,649	20,528
6	FY 2024					16,936	20,584
7	FY 2025						16,771
8	Total Additional Service Revenue Required	-	23,780	54,097	76,275	96,446	116,324
9	Total Wastewater Service Revenue	438,395	461,690	489,604	508,797	525,949	542,824
	Other Income (b)						
10	Other Operating Revenue	26,721	14,468	14,425	14,377	14,330	14,283
11	Debt Reserve Fund Interest Income	-	-	-	-	-	-
12	Operating Fund Interest Income	571	620	691	676	711	665
13	Rate Stabilization Interest Income	871	717	689	694	703	678
14	Total Revenues	466,558	477,496	505,409	524,545	541,692	558,450
OPERATING EXPENSES							
15	Wastewater Operations	(320,770)	(331,173)	(342,433)	(354,023)	(365,424)	(376,612)
16	Water Treatment Plant Sludge (c)	13,232	14,561	15,573	16,266	16,997	17,919
17	Total Operating Expenses	(307,538)	(316,611)	(326,859)	(337,757)	(348,427)	(358,693)
18	Transfer From/(To) Rate Stabilization Fund	21,400	9,350	(3,700)	2,650	(4,350)	9,350
19	NET REVENUES AFTER OPERATIONS	180,420	170,234	174,850	189,438	188,915	209,107
DEBT SERVICE							
	Senior Debt Service						
	Revenue Bonds						
20	Outstanding Bonds	(132,491)	(120,794)	(112,858)	(108,577)	(91,917)	(91,900)
21	Pennvest Parity Bonds	(6,278)	(6,278)	(6,278)	(6,278)	(6,278)	(6,278)
22	Projected Future Bonds	-	(3,850)	(15,330)	(30,851)	(47,110)	(62,672)
23	Total Senior Debt Service	(138,768)	(130,922)	(134,465)	(145,705)	(145,305)	(160,850)
24	TOTAL SENIOR DEBT SERVICE COVERAGE (L20/L25)	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x
	Subordinate Debt Service						
25	Subordinate Debt Service	-	-	-	-	-	-
26	Transfer to Escrow	0	0	0	0	0	0
27	Total Debt Service on Bonds	(138,768)	(130,922)	(134,465)	(145,705)	(145,305)	(160,850)
28	CAPITAL ACCOUNT DEPOSIT	(15,952)	(17,228)	(18,607)	(20,095)	(21,703)	(23,439)
29	TOTAL COVERAGE (L19/(L23+L25+L28))	1.16 x	1.14 x	1.14 x	1.14 x	1.13 x	1.13 x
32	End of Year Revenue Fund Balance	25,700	22,084	21,778	23,637	21,908	24,818

(a) Revenue from rates effective September 1, 2019.

(b) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund. Includes Debt Service Reserve Fund Release in FY 2020.

(c) Cost to process the Water Treatment Sludge at the wastewater treatment plants based on wastewater cost of service analysis.

TABLE WW-7: ESTIMATED TEST YEAR COST OF SERVICE
(in thousands of dollars)
Test Year 2021

Line No.		(1)	(2)	(3)
		Operating Expense	Capital Cost	Total
		\$	\$	\$
REVENUE REQUIREMENTS				
1	Operations & Maintenance Expense	209,052		209,052
2	Direct Interdepartmental Charges	122,121		122,121
3	Water Treatment Plant Sludge	(11,098)	(3,634)	(14,732)
	Existing Bond Debt Service			
4	Revenue Bonds		127,072	127,072
	Subordinate Bonds		-	-
5	Proposed Bond Debt Service		3,850	3,850
6	Capital Account Deposit		17,228	17,228
7	Residual Fund Deposit	15,191	6,858	22,049
8	Deposit (From)/To Rate Stabilization Fund	(2,618)	(1,182)	(3,800)
9	Total	332,648	150,192	482,840
DEDUCTIONS OF FUNDS FROM OTHER SOURCES				
10	Other Operating Revenue	(14,468)	-	(14,468)
11	Interest Income	(971)	(422)	(1,393)
12	COST OF SERVICE TO BE DERIVED FROM RATES	317,209	149,770	466,979

TABLE WW - 8
WASTEWATER: TEST YEAR UNITS OF SERVICE BY CUSTOMER TYPE
Test Year 2021

Line No.	Customer Type	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		FY 2021 Test Year Volume	Capacity Flow Rate		Strength		Customer Costs		
			Collection System	Pumping and Treatment	Suspended Solids	BOD	Equiv. Meters	Equiv. Bills	Bills
		Mcf	Mcf/day	Mcf/day	1,000 lbs	1,000 lbs			
1	Residential	2,799,394	30,679	11,506	45,417	48,911	440,825	5,058,102	5,040,408
2	Commercial	1,438,578	15,765	5,912	23,339	25,135	92,550	490,505	429,648
3	Industrial	64,293	705	264	1,043	1,123	4,031	15,198	12,240
4	Public Utilities	8,826	97	36	143	154	1,209	3,239	2,040
5	Senior Citizens	116,742	1,279	480	1,894	2,040	23,460	281,374	281,364
6	Sewer Only	67,450	739	277	1,094	1,178	504	1,259	708
7	Groundwater	220,000	4,822	1,507	961	137	0	0	0
8	Surcharge	0	0	0	1,633	10,650	0	0	0
9	Water Treatment Plant Sludge	292,800	3,209	1,203	27,500	0	0	0	0
10	Housing Authority	149,342	1,637	614	2,423	2,609	8,462	72,030	68,844
11	Charities & Schools	148,439	1,627	610	2,408	2,594	14,813	40,212	24,612
12	Hospital/University	275,249	3,016	1,131	4,466	4,809	7,192	13,269	4,236
13	Hand Bill	417,677	4,577	1,716	6,776	7,298	4,718	8,486	2,604
14	Fire Meters	7,600	83	31	123	133	498	1,824	1,344
15	Scheduled (Flat Rate)	11	0	0	0	0	3	36	36
16	Subtotal Retail Service	6,006,400	68,235	25,287	119,220	106,771	598,265	5,985,534	5,868,084
17	Infiltration/Inflow	10,850,500	237,818	74,318	47,382	6,769	-	-	-
18	Total Retail Service	16,856,900	306,053	99,605	166,602	113,540	598,265	5,985,534	5,868,084
	Contract Service								
19	Sanitary	4,264,000	32,577	32,577	44,128	39,345			
20	Infiltration/Inflow	105,100	420	420	459	66			
21	Total Contract Service	4,369,100	32,997	32,997	44,587	39,411			
22	Total System	21,226,000	339,050	132,602	211,189	152,951	598,265	5,985,534	5,868,084

Mcf - Thousand cubic feet

lbs - pounds

TABLE WW - 9
WASTEWATER: TEST YEAR PLANT INVESTMENT
SUMMARY OF ALLOCATIONS TO
FUNCTIONAL COST COMPONENTS
Test Year 2021

Line No.	Cost Component	(1) Total Direct Investment	(2) Investment Allocated to Contract Service	(3) Investment Allocated to Retail Service
		\$	\$	\$
Collection System:				
1	Sewers-Capacity	1,649,393,000	17,991,000	1,631,402,000
2	Pumping Stations Capacity	28,659,000	252,000	28,407,000
3	LTCP Investment	132,401,000	19,288,000	113,113,000
4	Total Collection System	1,810,453,000	37,531,000	1,772,922,000
Water Pollution Control Plants				
	Northeast Plant Retail, Abington, Bensalem, Bucks Cty. W&SA, Cheltenham, Lower Moreland, & Lower Southampton			
5	Volume	64,809,000	18,049,000	46,760,000
6	Capacity	32,141,000	7,386,000	24,755,000
7	Suspended Solids	70,293,000	13,015,000	57,278,000
8	BOD	90,360,000	22,283,000	68,077,000
9	Total Northeast Plant	257,603,000	60,733,000	196,870,000
	Southwest Plant Retail, DELCORA, Lower Merion, Springfield (excluding Wyndmoor), & Upper Darby			
10	Volume	69,783,000	29,794,000	39,989,000
11	Capacity	43,445,000	7,689,000	35,756,000
12	Suspended Solids	56,363,000	15,905,000	40,458,000
13	BOD	49,947,000	24,488,000	25,459,000
14	Total Southwest Plant	219,538,000	77,876,000	141,662,000
	Southeast Plant Retail & Springfield (Wyndmoor)			
15	Volume	44,436,000	404,000	44,032,000
16	Capacity	49,635,000	277,000	49,358,000
17	Suspended Solids	23,729,000	73,000	23,656,000
18	BOD	23,584,000	65,000	23,519,000
19	Total Southeast Plant	141,384,000	819,000	140,565,000
20	Total Allocated Treatment Plants	618,525,000	139,428,000	479,097,000
21	Total Allocated System Investment	2,428,978,000	176,959,000	2,252,019,000

(a) Plant Investment as of 6/30/2019. Includes Administration & General Costs

TABLE WW - 9A
WASTEWATER: ALLOCATION OF TEST YEAR PLANT INVESTMENT FOR THE
NORTHEAST WATER POLLUTION CONTROL PLANT
Test Year 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)	(6)	
		Total Investment (a)	Retail, Abington, Bensalem, Bucks Cty W&SA	Volume	Retail, Abington, Bensalem, Bucks Cty W&SA, Cheltenham, Lower Moreland, and Lower Southampton	Capacity	Solids	BOD
			ower Southampton					
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	
NON-WATER POLLUTION ABATEMENT PROGRAM FACILITIES								
1	Primary Sedimentation Basins	5,523	-	5,523	-	-	-	
2	Pumping Station	1,367	-	-	1,367	-	-	
3	Aeration Facilities	18,250	-	-	-	-	18,250	
4	Primary Sludge Pumps	1,225	-	-	-	1,225	-	
5	Scum Ejectors	192	-	-	-	192	-	
6	Effluent Conduit	-	-	-	-	-	-	
7	Final Sedimentation Basins	9,605	-	9,605	-	-	-	
8	Recirculation Pumps	1,729	-	1,729	-	-	-	
9	Digesters	18,801	-	-	-	14,101	4,700	
10	Sludge Dewatering	4,088	-	-	-	3,066	1,022	
11	Frankford Grit Chamber	-	-	-	-	-	-	
12	Chlorination Facilities	5,148	-	-	5,148	-	-	
13	Aeration Tank No. 1	3,139	-	-	-	-	3,139	
14	Sludge Thickener Building	4,415	-	-	-	2,208	2,207	
15	Sludge Transfer Station	285	-	-	-	214	71	
16	Subtotal All Above	73,767	-	16,857	6,515	21,006	29,389	
	Administrative and General Facilities							
17	Administrative and General Plant	67,198	-	-	-	-	-	
18	Land	943	-	-	-	-	-	
19	Subtotal	68,141	1,897	17,621	7,323	18,303	22,997	
20	Total Non-Water Pollution Abatement Program Facilities	141,908	1,897	34,478	13,838	39,309	52,386	
WATER POLLUTION ABATEMENT PROGRAM FACILITIES								
21	New Preliminary Treatment Building	40,926	10,232	-	30,694	-	-	
22	Primary Sedimentation Tanks Modifications	52,657	-	52,657	-	-	-	
23	Blower Building	16,513	-	-	-	-	16,513	
24	Aeration Tank No. 1	38,501	-	-	-	-	38,501	
25	Chlorination Facilities	-	-	-	-	-	-	
26	New Sludge Thickener Building	41,152	-	-	-	20,576	20,576	
27	Effluent Conduits	2,286	-	-	2,286	-	-	
28	New Final Sedimentation Tanks	25,514	-	25,514	-	-	-	
29	Sludge Digestion System Modifications	34,358	-	-	-	25,769	8,589	
30	Composting Facilities	-	-	-	-	-	-	
31	Sludge Dewatering	11,947	-	-	-	8,960	2,987	
32	Sludge Transfer Station	24,400	-	-	-	18,300	6,100	
33	Loading Terminal/Barges	5,461	-	-	-	4,096	1,365	
34	Subtotal	293,715	10,232	78,171	32,980	77,701	94,631	
35	Admin. and General Facilities	47,434	1,321	12,266	5,098	12,741	16,008	
36	Adjustment for Joint Use Facilities	1,761	-	-	-	1,321	440	
37	Total Water Pollution Abatement Program Facilities	342,910	11,553	90,437	38,078	91,763	111,079	
38	TOTAL NORTHEAST WPC PLANT BOOK COST	484,818	13,450	124,915	51,916	131,072	163,465	
39	Less Federal Grants	227,215	7,867	60,106	25,358	60,779	73,105	
40	ADJUSTED TOTAL NORTHEAST WPC PLANT INVESTMENT	257,603	5,583	64,809	26,558	70,293	90,360	

(a) Plant Investment as of 6/30/2019.

TABLE WW - 9B
WASTEWATER: ALLOCATION OF TEST YEAR PLANT INVESTMENT FOR THE
SOUTHWEST WATER POLLUTION CONTROL PLANT
Test Year 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)	(6)
		Total Investment (a)	Retail Capacity	Retail, DELCORA, Lower Merion, Springfield (excluding Wyndmoor), and Upper Darby			
				Volume	Capacity	Suspended Solids	BOD
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
NON-WATER POLLUTION ABATEMENT PROGRAM FACILITIES							
1	Raw Wastewater Pumping Station	12,786	12,786	-	-	-	-
2	Sludge Digestion Facilities	5,076	-	-	-	3,704	1,372
3	Scum Incineration	1,942	-	-	-	1,942	-
4	Settling Tanks	30,505	-	30,505	-	-	-
5	Sludge Handling	7,847	-	-	-	5,885	1,962
6	Chlorination Facilities	1,214	-	-	1,214	-	-
7	Aeration Tanks	699	-	-	-	-	699
8	Oxygen Supply	3,628	-	-	-	-	3,628
9	Effluent Pump Station	203	-	-	203	-	-
10	Sludge Thickener Building	1,611	-	-	-	806	805
11	Composting Facilities	1,164	-	-	-	873	291
12	Sludge Gas Facilities	9,544	-	-	-	7,158	2,386
13	Subtotal	76,219	12,786	30,505	1,417	20,368	11,143
	Administrative and General Facilities						
14	Administrative and General Plant	81,261	-	-	-	-	-
15	Land	686	-	-	-	-	-
16	Subtotal	81,947	6,109	22,676	10,098	21,857	21,207
17	Adjustment for Joint Use Facilities	(2,553)	-	-	-	(2,022)	(531)
18	Total Non-Water Pollution Abatement Program Facilities	155,613	18,895	53,181	11,515	40,203	31,819
WATER POLLUTION ABATEMENT PROGRAM FACILITIES							
19	Influent Pumping Station	6,313	6,313	-	-	-	-
20	Preliminary Treatment Building	24,235	-	-	24,235	-	-
21	Primary Sedimentation Tanks	11,120	-	11,120	-	-	-
22	Aeration Tanks	16,378	-	-	-	-	16,378
23	Oxygen Supply System	14,085	-	-	-	-	14,085
24	Compressor Building	3,728	-	-	-	-	3,728
25	Final Tanks	29,275	-	29,275	-	-	-
26	Scum Concentration Building	1,371	-	-	-	1,371	-
27	Sludge Thickener Building	12,538	-	-	-	6,269	6,269
28	Sludge Digestion Facilities	31,084	-	-	-	22,680	8,404
29	Effluent Pumping Station	5,920	-	-	5,920	-	-
30	New Centrifuges	8,102	-	-	-	5,912	2,190
31	Composting Facilities	-	-	-	-	-	-
32	Sludge Dewatering	8,607	-	-	-	6,455	2,152
33	Sludge Gas Facilities	7,241	-	-	-	5,284	1,957
34	Subtotal	179,997	6,313	40,395	30,155	47,971	55,163
35	Admin. and Gen'l. Facilities	33,959	2,531	9,397	4,185	9,058	8,788
36	Adjust. for Joint Use Facilities	(6,979)	-	-	(608)	(4,746)	(1,625)
37	Total Water Pollution Abatement Program Facilities	206,977	8,844	49,792	33,732	52,283	62,326
38	TOTAL SOUTHWEST WPC PLANT BOOK COST	362,590	27,739	102,973	45,247	92,486	94,145
39	Less Federal Grants	143,052	5,187	33,190	24,354	36,123	44,198
40	ADJUSTED TOTAL SOUTHWEST WPC PLANT INVESTMENT	219,538	22,552	69,783	20,893	56,363	49,947

(a) Plant Investment as of 6/30/2019.

TABLE WW - 9C
WASTEWATER: ALLOCATION OF TEST YEAR PLANT INVESTMENT FOR THE
SOUTHEAST WATER POLLUTION CONTROL PLANT
Test Year 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)
		Total Investment (a)	Volume	Capacity	Suspended Solids	BOD
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
NON-WATER POLLUTION ABATEMENT PROGRAM FACILITIES						
1	Main Pumping Station	2,149	-	2,149	-	-
2	Grit Chambers	13,143	-	13,143	-	-
3	Outfall Line	1,999	-	1,999	-	-
4	Sludge Digestion Facilities	2,450	-	-	1,941	509
5	Settling Tanks & Floc. Channel	15,816	15,816	-	-	-
6	Sludge Force Main	5,010	-	-	3,758	1,252
7	Subtotal	40,567	15,816	17,291	5,699	1,761
	Administrative and General Facilities					
8	Administrative and General Plant	27,692	-	-	-	-
9	Land	156	-	-	-	-
10	Subtotal	27,848	8,339	9,375	4,395	5,739
11	Adjustment for Joint Use Facilities	2,553	-	-	2,022	531
12	Total Non-Water Pollution Abatement Program Facilities	70,968	24,155	26,666	12,116	8,031
WATER POLLUTION ABATEMENT PROGRAM FACILITIES						
13	Influent Pump. Stat. and Screen & Grit Chamber	24,936	-	24,936	-	-
14	Primary Sedimentation Tanks	21,134	21,134	-	-	-
15	Compressor Building	9,916	-	-	-	9,916
16	Air Supply Facilities	23,162	-	-	-	23,162
17	Final Sedimentation	26,056	26,056	-	-	-
18	Effluent Pumping Station	12,894	-	12,894	-	-
19	Effluent Conduit	11,593	-	11,593	-	-
20	Scum Concentration Facilities	2,816	-	-	2,816	-
21	Sludge Force Main	1,943	-	-	1,457	486
22	Preliminary Treatment Bldg.	4,123	-	4,123	-	-
23	Sludge Thickeners	4,656	-	-	2,328	2,328
24	Sludge Digesters	15,007	-	-	11,888	3,119
25	Sludge Disposal Facilities	3,912	-	-	3,099	813
26	Composting Facilities	-	-	-	-	-
27	Sludge Dewatering	4,197	-	-	3,148	1,049
28	Sludge Gas Facilities	3,497	-	-	2,770	727
29	Subtotal	169,842	47,190	53,546	27,506	41,600
30	Admin. and Gen'l. Facilities	43,265	12,956	14,566	6,828	8,915
31	Adjustment for Joint Use Facilities	5,218	-	608	3,425	1,185
32	Total Water Pollution Abatement Program Facilities	218,325	60,146	68,720	37,759	51,700
33	TOTAL SOUTHEAST WPC PLANT BOOK COST	289,293	84,301	95,386	49,875	59,731
34	Less Federal Grants	147,909	39,865	45,751	26,146	36,147
35	ADJUSTED TOTAL SOUTHEAST WPC PLANT INVESTMENT	141,384	44,436	49,635	23,729	23,584

(a) Plant Investment as of 6/30/2019.

TABLE WW - 10
WASTEWATER: OPERATION AND MAINTENANCE EXPENSE
SUMMARY OF ALLOCATIONS TO FUNCTIONAL COST COMPONENTS
Test Year 2021

Line No.	Cost Component	(1) Net Operation and Maintenance Expense	(2) Less Operation and Maintenance Expense Allocated to Contract Service	(3) Operation and Maintenance Expense Allocated to Retail Service	(4) Less Retail Operation & Maintenance Expense Deductions: Other Operating Revenue	(5) Net Operation and Maintenance Expense To Be Allocated To Retail Service
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
COLLECTION SYSTEM						
	Sewer Maintenance					
1	All Customers - Capacity	88,291	1,437	86,854	3,360	83,494
	Inlet Cleaning					
2	Retail - Storm Capacity	18,867	-	18,867	730	18,137
	Neill Drive Pumping Station Retail and Lower Merion					
3	Total Volume	7	1	6	-	6
4	Total Capacity	162	50	112	4	108
	Central Schuylkill Pumping Station Retail and Springfield (excl. Wyndmoor)					
5	Total Volume	43	2	41	2	39
6	Total Capacity	440	8	432	17	415
	All Other Pumping Stations Retail					
7	Total Volume	2,786	-	2,786	108	2,678
8	Total Capacity	19,528	-	19,528	756	18,772
9	Total Collection Systems	157,597	2,173	155,424	6,014	149,410
WATER POLLUTION CONTROL PLANTS						
	Northeast Plant: Retail and Cheltenham					
10	Volume	-	-	-	-	-
11	Capacity	-	-	-	-	-
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton					
12	Volume	601	152	449	17	432
13	Capacity	2,568	637	1,931	75	1,856
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton					
14	Volume	12,872	3,044	9,828	380	9,448
15	Capacity	4,180	975	3,205	124	3,081
16	Suspended Solids	22,723	4,419	18,304	707	17,597
17	BOD	18,399	4,776	13,623	527	13,096
	Southwest Plant: Retail					
18	Volume	56	-	56	2	54
19	Capacity	502	-	502	19	483
	Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby					
20	Volume	12,819	3,418	9,401	364	9,037
21	Capacity	4,570	1,736	2,834	110	2,724
22	Suspended Solids	17,494	5,587	11,907	461	11,446
23	BOD	11,268	4,265	7,003	271	6,732
	Southeast Plant: Retail and Springfield (Wyndmoor)					
24	Volume	9,004	53	8,951	346	8,605
25	Capacity	5,084	35	5,049	195	4,854
26	Suspended Solids	11,017	84	10,933	423	10,510
27	BOD	3,664	25	3,639	141	3,498
28	Total Water Pollution Control Plants	136,821	29,206	107,615	4,162	103,453
CUSTOMER COSTS						
	All Customers					
29	Equivalent Bills	33,279	228	33,051	1,279	31,772
	Equivalent Meters					
30	Industrial Waste Unit	4,350	68	4,282	166	4,116
31	Other	5,558	-	5,558	215	5,343
32	Stormwater - Direct	499	-	499	19	480
33	Excess Strength Wastewater - Direct	2,142	-	2,142	83	2,059
34	Total Customer Costs	45,828	296	45,532	1,762	43,770
35	Total Operation and Maintenance Expense	340,245	31,675	308,570	11,938	296,632

TABLE WW - 10A
WASTEWATER: ALLOCATION OF TEST YEAR OPERATION AND MAINTENANCE EXPENSE FOR THE
COLLECTION SYSTEM
Test Year 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Total	All Customers Capacity	Volume	Retail Capacity	Storm Capacity	Retail & Lower Merion Volume	Capacity	Retail & Springfield (excluding Wyndmoor) Volume	Capacity
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
1	Sewer Maintenance	31,051	31,051	-	-	-	-	-	-	-
2	Inlet Cleaning	12,781	-	-	-	12,781	-	-	-	-
	Pump Stations									
	Neill Drive									
3	Power	8	-	-	-	-	7	1	-	-
4	Gas	-	-	-	-	-	-	-	-	-
5	Other	109	-	-	-	-	-	109	-	-
	Central Schuylkill									
6	Power	50	-	-	-	-	-	-	43	7
7	Gas	-	-	-	-	-	-	-	-	-
8	Other	277	-	-	-	-	-	-	-	277
	All Other Pumping Stations									
9	Power	3,287	-	2,794	493	-	-	-	-	-
10	Gas	-	-	-	-	-	-	-	-	-
11	Other	13,482	-	-	13,482	-	-	-	-	-
12	GSI Maintenance	8,934	8,934	-	-	-	-	-	-	-
13	Total Collection System	69,979	39,985	2,794	13,975	12,781	7	110	43	284

TABLE WW - 10B
WASTEWATER: ALLOCATION OF OPERATION AND MAINTENANCE EXPENSE FOR THE
NORTHEAST WPC PLANT
Test Year 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Total	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton		Retail, Cheltenham, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton		Suspended	
		Operation & Maintenance Expense	Volume	Capacity	Volume	Capacity	Solids	BOD
		\$	\$	\$	\$	\$	\$	\$
Personal Services:								
1	Raw Wastewater Pumping	796,985	-	796,985	-	-	-	-
2	Preliminary Treatment	1,549,693	-	-	1,100,282	449,411	-	-
3	Primary Sedimentation	625,412	-	-	625,412	-	-	-
4	Aeration	2,584,667	-	-	-	-	-	2,584,667
5	Secondary Sedimentation	630,947	-	-	630,947	-	-	-
6	Recirculating Pumping	464,908	-	-	464,908	-	-	-
7	Chlorination	437,235	-	-	266,713	170,522	-	-
8	Primary Sludge Pumping	127,296	-	-	-	-	127,296	-
9	Secondary Sludge Thickening	309,939	-	-	-	-	154,970	154,969
10	Sludge Digestion	2,435,232	-	-	-	-	1,826,424	608,808
11	Sludge Holding Tanks	177,108	-	-	-	-	132,831	44,277
12	Sludge Dewatering	448,304	-	-	-	-	336,228	112,076
13	Grit and Screening Incineration	996,231	-	-	667,475	328,756	-	-
14	Scum and Grease Incineration	237,989	-	-	-	-	237,989	-
15	Laboratory	824,658	-	-	-	-	412,329	412,329
16	Subtotal Personal Services	12,646,604	-	796,985	3,755,737	948,689	3,228,067	3,917,126
Purchase of Services, Materials, Supplies, and Equipment:								
17	Raw Wastewater Pumping	646,571	-	646,571	-	-	-	-
18	Preliminary Treatment	1,021,742	-	-	-	1,021,742	-	-
19	Primary Sedimentation	478,941	-	-	478,941	-	-	-
20	Aeration	718,412	-	-	-	-	-	718,412
21	Secondary Sedimentation	550,783	-	-	550,783	-	-	-
22	Recirculating Pumping	207,541	-	-	207,541	-	-	-
23	Chlorination	2,417,068	-	-	2,417,068	-	-	-
24	Primary Sludge Pumping	87,806	-	-	-	-	87,806	-
25	Secondary Sludge Thickening	103,771	-	-	-	-	51,886	51,885
26	Sludge Digestion	1,349,018	-	-	-	-	1,011,764	337,254
27	Sludge Holding Tanks	191,577	-	-	-	-	143,683	47,894
28	Sludge Dewatering	151,665	-	-	-	-	113,749	37,916
29	Grit and Screening Incineration	431,047	-	-	-	431,047	-	-
30	Scum and Grease Incineration	119,735	-	-	-	-	119,735	-
31	Laboratory	925,953	-	-	-	-	462,977	462,976
32	Subtotal Purchase of Services, Materials, Supplies & Equipment	9,401,630	-	646,571	3,654,333	1,452,789	1,991,600	1,656,337
33	Subtotal All Above	22,048,234	-	1,443,556	7,410,070	2,401,478	5,219,667	5,573,463
Administrative and General:								
34	Personal Services	3,254,357	-	205,089	966,466	244,127	830,680	1,007,995
35	Other	1,229,444	-	84,552	477,874	189,980	260,440	216,598
36	Subtotal Administration & General	4,483,801	-	289,641	1,444,340	434,107	1,091,120	1,224,593
Power Requirements:								
37	Raw Wastewater Pumping	722,035	613,730	108,305	-	-	-	-
38	Preliminary Treatment	5,967	-	-	5,072	895	-	-
39	Primary Sedimentation	47,738	-	-	40,577	7,161	-	-
40	Aeration	3,956,272	-	-	-	-	-	3,956,272
41	Secondary Sedimentation	47,738	-	-	40,577	7,161	-	-
42	Recirculating Pumping	167,082	-	-	142,020	25,062	-	-
43	Chlorination	11,934	-	-	10,144	1,790	-	-
44	Primary Sludge Pumping	5,967	-	-	-	-	5,967	-
45	Secondary Sludge Thickening	447,542	-	-	-	-	223,771	223,771
46	Sludge Digestion	101,443	-	-	-	-	76,082	25,361
47	Sludge Dewatering	107,410	-	-	-	-	80,558	26,852
48	Grit and Screening Incineration	95,476	-	-	81,155	14,321	-	-
49	Scum and Grease Incineration	5,967	-	-	-	-	5,967	-
50	Subtotal Power Requirements	5,722,571	613,730	108,305	319,545	56,390	392,345	4,232,256
Gas Requirements:								
51	Raw Wastewater Pumping	53,148	-	53,148	-	-	-	-
52	Preliminary Treatment	83,986	-	-	-	83,986	-	-
53	Primary Sedimentation	39,369	-	-	39,369	-	-	-
54	Aeration	59,053	-	-	-	-	-	59,053
55	Secondary Sedimentation	45,274	-	-	45,274	-	-	-
56	Recirculating Pumping	17,060	-	-	17,060	-	-	-
57	Chlorination	7,218	-	-	7,218	-	-	-
58	Primary Sludge Pumping	7,218	-	-	-	-	7,218	-
59	Secondary Sludge Thickening	8,530	-	-	-	-	4,265	4,265
60	Sludge Digestion	110,888	-	-	-	-	83,166	27,722
61	Sludge Dewatering	12,467	-	-	-	-	9,350	3,117
62	Grit and Screening Incineration	35,432	-	-	-	35,432	-	-
63	Scum and Grease Incineration	9,842	-	-	-	-	9,842	-
64	Subtotal Gas Requirements	581,345	-	53,148	108,921	119,418	163,708	136,150
65	Sludge Disposal	12,668,362	-	-	-	-	9,501,271	3,167,091
66	Total Northeast WPC Plant Expense	45,504,312	613,730	1,894,650	9,282,876	3,011,393	16,368,111	14,333,553

TABLE WW - 10C
WASTEWATER: ALLOCATION OF OPERATION AND MAINTENANCE EXPENSE FOR THE
SOUTHWEST WPC PLANT
Test Year 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Total Operation & Maintenance Expense	Retail		Retail, DELCORA, Lower Merion, Springfield (w/o Wyndmoor) and Upper Darby		Suspended Solids	BOD
			Volume	Capacity	Volume	Capacity		
		\$	\$	\$	\$	\$	\$	\$
Personal Services								
1	Raw Wastewater Pumping	159,823	-	159,823	-	-	-	-
2	Preliminary Treatment	2,109,661	-	-	1,540,053	569,608	-	-
3	Flocculation	383,575	-	-	383,575	-	-	-
4	Primary Sedimentation	556,183	-	-	556,183	-	-	-
5	Aeration	1,131,546	-	-	-	-	-	1,131,546
6	Secondary Sedimentation	958,937	-	-	958,937	-	-	-
7	Recirculating Pumping	358,003	-	-	358,003	-	-	-
8	Chlorination	543,398	-	-	320,605	222,793	-	-
9	Effluent Pumping	447,504	-	-	-	447,504	-	-
10	Primary Sludge Pumping	409,146	-	-	-	-	409,146	-
11	Secondary Sludge Thickening	338,824	-	-	-	-	166,024	172,800
12	Sludge Digestion	1,294,564	-	-	-	-	970,923	323,641
13	Sludge Holding Tanks	220,555	-	-	-	-	165,416	55,139
14	Sludge Dewatering	1,006,884	-	-	-	-	755,163	251,721
15	Sludge Lagoon	9,589	-	-	-	-	7,192	2,397
16	Grit and Screening Incineration	887,017	-	-	603,172	283,845	-	-
17	Scum and Grease Incineration	225,350	-	-	-	-	225,350	-
18	Laboratory	818,293	-	-	-	-	409,147	409,146
19	Subtotal Personal Services	11,858,852	-	159,823	4,720,528	1,523,750	3,108,361	2,346,390
Purchase of Services, Materials, Supplies, and Equipment:								
20	Raw Wastewater Pumping	66,643	-	66,643	-	-	-	-
21	Preliminary Treatment	762,899	-	-	-	762,899	-	-
22	Flocculation	395,413	-	-	395,413	-	-	-
23	Primary Sedimentation	222,777	-	-	222,777	-	-	-
24	Aeration	434,129	-	-	-	-	-	434,129
25	Secondary Sedimentation	467,768	-	-	467,768	-	-	-
26	Recirculating Pumping	194,850	-	-	194,850	-	-	-
27	Chlorination	1,096,054	-	-	1,096,054	-	-	-
28	Effluent Pumping	22,214	-	-	-	22,214	-	-
29	Primary Sludge Pumping	250,703	-	-	-	-	250,703	-
30	Secondary Sludge Thickening	44,428	-	-	-	-	21,770	22,658
31	Sludge Digestion	438,413	-	-	-	-	328,810	109,603
32	Sludge Holding Tanks	154,706	-	-	-	-	116,030	38,676
33	Sludge Dewatering	926,809	-	-	-	-	695,107	231,702
34	Sludge Lagoon	8,568	-	-	-	-	6,426	2,142
35	Grit and Screening Incineration	196,120	-	-	-	196,120	-	-
36	Scum and Grease Incineration	62,834	-	-	-	-	62,834	-
37	Laboratory	500,772	-	-	-	-	250,386	250,386
38	Subtotal Purchase of Services, Materials, Supplies & Equipment	6,246,100	-	66,643	2,376,862	981,233	1,732,066	1,089,296
39	Subtotal All Above	18,104,952	-	226,466	7,097,390	2,504,983	4,840,427	3,435,686
Administrative & General								
40	Personal Services	2,865,200	-	38,615	1,140,519	368,151	751,007	566,908
41	Other	748,500	-	7,986	284,831	117,586	207,561	130,536
42	Subtotal Administration & General	3,613,700	-	46,601	1,425,350	485,737	958,568	697,444
Power Requirements								
43	Raw Wastewater Pumping	67,069	57,009	10,060	-	-	-	-
44	Preliminary Treatment	4,471	-	-	3,800	671	-	-
45	Flocculation	214,940	-	-	182,699	32,241	-	-
46	Primary Sedimentation	16,927	-	-	14,388	2,539	-	-
47	Aeration	2,094,148	-	-	-	-	-	2,094,148
48	Secondary Sedimentation	43,116	-	-	36,649	6,467	-	-
49	Recirculating Pumping	114,337	-	-	97,186	17,151	-	-
50	Chlorination	9,262	-	-	7,873	1,389	-	-
51	Effluent Pumping	28,105	-	-	23,889	4,216	-	-
52	Primary Sludge Pumping	2,555	-	-	-	-	2,555	-
53	Secondary Sludge Thickening	279,773	-	-	-	-	137,089	142,684
54	Sludge Digestion	65,392	-	-	-	-	49,044	16,348
55	Sludge Dewatering	47,906	-	-	-	-	35,930	11,976
56	Grit and Screening Incineration	29,702	-	-	25,247	4,455	-	-
57	Scum and Grease Incineration	4,551	-	-	-	-	4,551	-
58	Subtotal Power Requirements	3,022,254	57,009	10,060	391,731	69,129	229,169	2,265,156
Gas Requirements								
59	Raw Wastewater Pumping	20,775	-	20,775	-	-	-	-
60	Preliminary Treatment	237,819	-	-	-	237,819	-	-
61	Flocculation	123,262	-	-	123,262	-	-	-
62	Primary Sedimentation	69,446	-	-	69,446	-	-	-
63	Aeration	135,331	-	-	-	-	-	135,331
64	Secondary Sedimentation	145,817	-	-	145,817	-	-	-
65	Recirculating Pumping	60,741	-	-	60,741	-	-	-
66	Chlorination	20,775	-	-	20,775	-	-	-
67	Effluent Pumping	6,925	-	-	-	6,925	-	-
68	Primary Sludge Pumping	78,152	-	-	-	-	78,152	-
69	Secondary Sludge Thickening	13,850	-	-	-	-	6,787	7,063
70	Sludge Digestion	136,666	-	-	-	-	102,500	34,166
71	Sludge Dewatering	288,914	-	-	-	-	216,686	72,228
72	Grit and Screening Incineration	61,136	-	-	-	61,136	-	-
73	Scum and Grease Incineration	19,588	-	-	-	-	19,588	-
74	Subtotal Gas Requirements	1,626,200	-	20,775	420,041	305,880	539,939	339,565
75	Sludge Disposal	8,159,704	-	-	-	-	6,119,778	2,039,926
76	Total Southwest WPC Plant Expense	34,526,810	57,009	303,902	9,334,512	3,365,729	12,687,881	8,777,777

TABLE WW - 10D WASTEWATER: ALLOCATION OF OPERATION AND MAINTENANCE EXPENSE FOR THE SOUTHEAST WPC PLANT Test Year 2021						
Line No.	Description	(1) Total Operation & Maintenance Expense	(2)	(3)	(4)	(5)
			Retail and Springfield (Wyndmoor)		Suspended Solids	BOD
		\$	\$	\$	\$	\$
Personal Services						
1	Raw Wastewater Pumping	941,142	-	941,142	-	-
2	Preliminary Treatment	1,336,694	962,420	374,274	-	-
3	Flocculation	409,192	409,192	-	-	-
4	Primary Sedimentation	477,391	477,391	-	-	-
5	Aeration	477,391	-	-	-	477,391
6	Secondary Sedimentation	593,329	593,329	-	-	-
7	Recirculating Pumping	286,435	286,435	-	-	-
8	Chlorination	456,931	287,867	169,064	-	-
9	Effluent Pumping	361,453	-	361,453	-	-
10	Primary Sludge Pumping	381,913	-	-	381,913	-
11	Waste Sludge Pumping	279,615	-	-	237,673	41,942
12	Sludge Digestion	431,522	-	-	366,794	64,728
13	Sludge Holding Tanks	271,295	-	-	230,601	40,694
14	Sludge Dewatering	335,628	-	-	285,284	50,344
15	Sludge Lagoon	3,197	-	-	2,717	480
16	Grit and Screening Incineration	295,672	201,057	94,615	-	-
17	Scum and Grease Incineration	75,117	-	-	75,117	-
18	Scum Pumping	381,913	-	-	381,913	-
19	Primary Sludge Transfer Pumping	197,776	-	-	197,776	-
20	Waste Activated Sludge Xfer Pumping	184,136	-	-	156,516	27,620
21	Laboratory	654,707	-	-	327,354	327,353
22	Subtotal Personal Services	8,832,449	3,217,691	1,940,548	2,643,658	1,030,552
Purchase of Services, Materials, Supplies, and Equipment:						
23	Raw Wastewater Pumping	178,350	-	178,350	-	-
24	Preliminary Treatment	520,667	-	520,667	-	-
25	Flocculation	218,623	218,623	-	-	-
26	Primary Sedimentation	140,954	140,954	-	-	-
27	Aeration	218,623	-	-	-	218,623
28	Secondary Sedimentation	178,350	178,350	-	-	-
29	Recirculating Pumping	106,435	106,435	-	-	-
30	Chlorination	1,059,476	1,059,476	-	-	-
31	Effluent Pumping	92,052	-	92,052	-	-
32	Primary Sludge Pumping	166,844	-	-	166,844	-
33	Waste Sludge Pumping	106,435	-	-	90,470	15,965
34	Sludge Digestion	146,138	-	-	124,217	21,921
35	Sludge Holding Tanks	134,991	-	-	114,742	20,249
36	Sludge Dewatering	308,936	-	-	262,596	46,340
37	Sludge Lagoon	2,856	-	-	2,428	428
38	Grit and Screening Incineration	65,373	-	65,373	-	-
39	Scum and Grease Incineration	20,945	-	-	20,945	-
40	Scum Pumping	166,844	-	-	166,844	-
41	Primary Sludge Transfer Pumping	60,409	-	-	60,409	-
42	Waste Activated Sludge Xfer Pumping	57,532	-	-	48,902	8,630
43	Laboratory	233,006	-	-	116,503	116,503
44	Subtotal Purchase of Services, Materials, Supplies & Equipment	4,183,839	1,703,838	856,442	1,174,900	448,659
45	Subtotal All Above	13,016,288	4,921,529	2,796,990	3,818,558	1,479,211
Administrative & General						
46	Personal Services	2,482,504	904,385	545,423	743,043	289,653
47	Other	379,737	154,645	77,733	106,637	40,722
48	Gas	13,913	2,272	4,090	4,595	2,956
49	Subtotal Administration & General	2,876,154	1,061,302	627,246	854,275	333,331
Power Requirements						
50	Raw Wastewater Pumping	216,847	184,320	32,527	-	-
51	Flocculation	333,830	283,756	50,074	-	-
52	Primary Sedimentation	13,315	11,318	1,997	-	-
53	Aeration	289,129	-	-	-	289,129
54	Secondary Sedimentation	9,511	8,084	1,427	-	-
55	Recirculating Pumping	22,826	19,402	3,424	-	-
56	Chlorination	2,853	2,425	428	-	-
57	Effluent Pumping	25,679	21,827	3,852	-	-
58	Primary Sludge Pumping	951	-	-	951	-
59	Waste Sludge Pumping	2,853	-	-	2,425	428
60	Sludge Digestion	21,798	-	-	18,528	3,270
61	Sludge Dewatering	15,969	-	-	13,574	2,395
62	Grit and Screening Incineration	9,901	8,416	1,485	-	-
63	Scum and Grease Incineration	1,517	-	-	1,517	-
64	Scum Pumping	2,853	-	-	2,853	-
65	Primary Sludge Transfer Pumping	19,973	-	-	19,973	-
66	Waste Activated Sludge Xfer Pumping	10,462	-	-	8,893	1,569
67	Subtotal Power Requirements	1,000,267	539,548	95,214	68,714	296,791
Gas Requirements						
68	Raw Wastewater Pumping	8,136	-	8,136	-	-
69	Flocculation	9,973	9,973	-	-	-
70	Primary Sedimentation	6,430	6,430	-	-	-
71	Aeration	9,973	-	-	-	9,973
72	Secondary Sedimentation	8,136	8,136	-	-	-
73	Recirculating Pumping	4,855	4,855	-	-	-
74	Chlorination	1,968	1,968	-	-	-
75	Effluent Pumping	4,199	-	4,199	-	-
76	Primary Sludge Pumping	7,611	-	-	7,611	-
77	Waste Sludge Pumping	4,855	-	-	4,127	728
78	Sludge Digestion	45,556	-	-	38,723	6,833
79	Sludge Dewatering	96,305	-	-	81,859	14,446
80	Grit and Screening Incineration	20,379	-	20,379	-	-
81	Scum and Grease Incineration	6,529	-	-	6,529	-
82	Scum Pumping	7,611	-	-	7,611	-
83	Primary Sludge Transfer Pumping	2,756	-	-	2,756	-
84	Waste Activated Sludge Xfer Pumping	2,625	-	-	2,231	394
85	Subtotal Gas Requirements	303,051	31,362	56,466	174,419	40,804
86	Sludge Disposal	3,540,482	-	-	3,009,410	531,072
87	Total Southeast WPC Plant Expense	20,736,242	6,553,741	3,575,916	7,925,376	2,681,209

TABLE WW-10E
WASTEWATER: TEST YEAR OPERATION AND MAINTENANCE EXPENSE
SUMMARY OF ALLOCATIONS
Test Year 2021

Line No.	Cost Component	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Direct Operation & Maintenance Expense	Administrative & General Expenses		Total Operation & Maintenance Expense	O&M Expense Deductions		Net Operation & Maintenance Expense
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
COLLECTION SYSTEM								
	Sewer Maintenance							
1	All Customers - Capacity	31,051	26,689	30,801	88,541	250	-	88,291
	Inlet Cleaning							
2	Retail - Storm Capacity	12,781	632	5,507	18,920	53	-	18,867
	Neill Drive Pumping Station Retail and Lower Merion							
3	Total Volume	7	-	-	7	-	-	7
4	Total Capacity	110	-	52	162	-	-	162
	Central Schuylkill Pumping Station Retail and Springfield (excl. Wyndmoor)							
5	Total Volume	43	-	-	43	-	-	43
6	Total Capacity	284	-	157	441	1	-	440
	All Other Pumping Stations Retail							
7	Total Volume	2,794	-	-	2,794	8	-	2,786
8	Total Capacity	13,975	-	5,608	19,583	55	-	19,528
	Green Stormwater Infrastructure Maintenance							
9	All Customers - Capacity	8,934	10,194	8,423	27,551	78	-	27,473
10	Total Collection Systems	69,979	37,515	50,548	158,042	445	-	157,597
WATER POLLUTION CONTROL PLANTS								
	Northeast Plant: Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland & Lower Southampton							
11	Volume	614	-	-	614	2	11	601
12	Capacity	1,895	-	727	2,622	7	47	2,568
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton							
13	Volume	9,283	-	3,864	13,147	37	238	12,872
14	Capacity	3,011	-	1,258	4,269	12	77	4,180
15	Suspended Solids	16,368	53	6,788	23,209	66	420	22,723
16	BOD	14,334	-	4,458	18,792	53	340	18,399
	Southwest Plant: Retail							
17	Volume	57	-	-	57	-	1	56
18	Capacity	304	-	208	512	1	9	502
	Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby							
19	Volume	9,335	-	3,758	13,093	37	237	12,819
20	Capacity	3,366	-	1,301	4,667	13	84	4,570
21	Suspended Solids	12,688	54	5,129	17,871	52	325	17,494
22	BOD	8,778	-	2,731	11,509	33	208	11,268
	Southeast Plant: Retail and Springfield (Wyndmoor)							
23	Volume	6,554	-	2,643	9,197	26	167	9,004
24	Capacity	3,576	-	1,617	5,193	15	94	5,084
25	Suspended Solids	7,925	53	3,275	11,253	32	204	11,017
26	BOD	2,681	-	1,062	3,743	11	68	3,664
27	Total Water Pollution Control Plant:	100,769	160	38,819	139,748	397	2,530	136,821
CUSTOMER COSTS								
	All Customers							
28	Equivalent Bills	24,630	-	8,743	33,373	94	-	33,279
	Equivalent Meters							
29	Industrial Waste Unit	3,219	-	1,143	4,362	12	-	4,350
30	Other	4,114	-	1,460	5,574	16	-	5,558
31	Excess Strength Wastewater - Direct	1,585	-	563	2,148	6	-	2,142
32	Stormwater Incentive Programs	369	-	131	500	1	-	499
33	Total Customer Costs	33,917	-	12,040	45,957	129	-	45,828
34	Total Operation & Maintenance Expense	204,664	37,675	101,407	343,746	971	2,530	340,245

TABLE WW - 11
WASTEWATER: RETAIL UNIT COSTS OF SERVICE - (Part I)
Test Year 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Total	Collection System		Sanitary Sewers Capacity	Storm Costs	Water Pollution Control Plants			
			Pumping Station Volume	Capacity			Volume	Capacity	Suspended Solids	BOD
	Total Units of Service									
1	Units	\$	Mcf	Mcf/day	Mcf/day		Mcf	Mcf/day	1,000 lbs.	1,000 lbs.
2	Quantity		16,856,900	99,605	306,053		16,856,900	99,605	166,602	113,540
	Operation and Maintenance Expense									
3	Total Expense - \$	252,862,241	2,723,000	19,294,500	43,702,000	83,690,000	27,576,000	12,998,000	39,552,741	23,326,000
4	Unit Expense - \$/unit		0.1615	193.7102	142.7923		1.6359	130.4955	237.4086	205.4430
	Capital Costs									
5	Total Plant Investment - \$	2,252,019,000		28,407,000	628,025,400	1,116,489,600	130,781,000	109,869,000	121,392,000	117,055,000
6	Unit Plant Investment - \$/unit			285.1965	2,052.0152		7.7583	1,103.0470	728.6347	1,030.9583
7	Depreciable Plant Investment - \$	2,248,856,666		28,407,000	627,371,600	1,115,327,400	130,425,000	109,611,000	121,028,000	116,686,667
8	Unit Depreciable Plant Investment - \$/unit			285.1965	2,049.8789		7.7372	1,100.4568	726.4499	1,027.7142
9	Depreciation Expense - \$	47,507,900		710,200	12,547,400	22,306,500	3,260,600	2,740,300	3,025,700	2,917,200
10	Unit Depreciation Expense - \$/unit			7.1299	40.9976		0.1934	27.5114	18.1612	25.6929
	Unit Return on Investment									
11	Total Return - \$ (a)	94,875,400		1,196,800	26,458,100	47,036,600	5,509,700	4,628,700	5,114,100	4,931,400
12	Inside City - \$/Unit (a)			12.0150	86.4493		0.3268	46.4702	30.6966	43.4332
	Total Unit Capital Costs									
13	(Line 10 + Line 12) - \$/unit			19.1449	127.4469		0.5202	73.9816	48.8578	69.1261
	Total Unit Costs of Service									
14	Inside City (Line 4 + Line 13) - \$/unit		0.1615	212.8551	270.2392		2.1561	204.4771	286.2664	274.5691

(a) Retail rate of return = Retail allocation of Return on Investment / Retail Allocation of System Plant Investment = \$94,875,400 / \$2,252,019,000 = 4.2129 %.

Mcf - Thousand cubic feet

lbs - pounds

TABLE WW - 12
WASTEWATER: RETAIL UNIT COSTS OF SERVICE - (Part 2)
Test Year 2021

Line No.	Description	(1)	(2)	(3)	(4)	(5)	(6)
		Customer Costs			Industrial Waste Unit		
		Meter Costs	Billing		Retail Customers	Direct Excess	
			Sanitary	Stormwater		Strength Wastewater	Direct Stormwater
	Total Units of Service						
1	Units	Eq. Meters	Eq. Bills		Eq. Meters		
2	Quantity	598,265	5,985,534		598,265		
	Operation and Maintenance Expense						
3	Total Expense - \$	5,343,000	18,655,000	13,116,816	4,116,000	2,059,000	480,000
4	Unit Expense - \$/unit	8.9308	3.1167		6.8799		
	Capital Costs						
5	Total Plant Investment - \$						
6	Unit Plant Investment - \$/unit						
7	Depreciable Plant Investment - \$						
8	Unit Depreciable Plant Investment - \$/unit						
9	Depreciation Expense - \$						
10	Unit Depreciation Expense - \$/unit						
	Unit Return on Investment						
11	Total Return - \$						
12	Inside City - \$/Unit (a)						
	Total Unit Capital Costs						
13	(Line 10 + Line 12) - \$/unit						
	Total Unit Costs of Service						
14	Inside City (Line 4 + Line 13) - \$/unit	8.9308	3.1167		6.8799	-	

(a) Retail rate of return = Retail allocation of Return on Investment / Retail Allocation of System Plant Investment = \$94,875,400 / \$2,252,019,000 = 4.2129 %.

Mcf - Thousand cubic feet

lbs - pounds

TABLE WW - 13
WASTEWATER: RETAIL COSTS OF SERVICE (a)
(in thousands of dollars)
Test Year FY 2021

Line No.	Customer Type	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Allocated Cost of Service	Collection System			Treatment				Customer		Industrial Waste	
			Pumping Volume	Pumping Capacity	Sewer Capacity	Volume	Capacity	TSS	BOD	Meter	Billing & Collection	Surcharge	Meter
1	Residential	\$ 68,745	\$ 452	\$ 2,449	\$ 8,291	\$ 6,036	\$ 2,353	\$ 13,001	\$ 13,429	\$ 3,937	\$ 15,764	\$ -	\$ 3,033
2	Commercial	26,636	232	1,258	4,260	3,102	1,209	6,681	6,901	827	1,529	-	637
3	Industrial	1,168	10	56	191	139	54	299	308	36	47	-	28
4	Public Utilities	174	1	8	26	19	7	41	42	11	10	-	8
5	Senior Citizens	3,167	19	102	346	252	98	542	560	210	877	-	161
6	Wastewater Only	1,120	11	59	200	145	57	313	323	5	4	-	3
7	Groundwater	2,755	36	321	1,303	474	308	275	38	-	-	-	-
8	Surcharge	5,440	-	-	-	-	-	467	2,924	-	-	2,048	-
9	Housing Authority	2,813	24	131	442	322	126	694	716	76	224	-	58
10	Charities & Schools	2,799	24	130	440	320	125	689	712	132	125	-	102
11	Hospital/University	4,679	44	241	815	593	231	1,278	1,320	64	41	-	49
12	Hand Bill	6,966	67	365	1,237	901	351	1,940	2,004	42	26	-	32
13	Water Treatment Plant Sludge	9,920	47	256	867	631	246	7,872	-	-	-	-	-
14	Private Fire Connections	138	1	7	22	16	6	35	37	4	6	-	3
15	Scheduled (Flat Rate)	0	0	-	-	0	-	-	-	0	0	-	0
	Infiltration/Inflow												
16	Conveyance	64,268	-	-	64,268	-	-	-	-	-	-	-	-
17	Pumping & Treatment	71,587	1,753	15,819	-	23,396	15,196	13,564	1,859	-	-	-	-
18	Total	\$ 272,376	\$ 2,723	\$ 21,202	\$ 82,708	\$ 36,346	\$ 20,367	\$ 47,693	\$ 31,175	\$ 5,343	\$ 18,655	\$ 2,048	\$ 4,116

Notes: (a) Annual Cost of Service by component for each customer type based on the customer type units of service (Table WW-8) and the total unit cost for each component (Tables WW-11 and WW-12).

TABLE WW - 14
WASTEWATER: ADJUSTED COSTS OF SERVICE (AFTER ALLOCATION OF I/I AND DISCOUNTS)
(in thousands of dollars)
Test Year FY 2021

Line No.	Customer Type	(1)	(2) Re-allocation of I/I (a)		(4)	(5)	(6)	(7)	(8)
		Allocated Cost of Service	Sanitary Sewer	Stormwater	Adjusted Cost of Service	Discounts	Adjusted Cost of Service with	Recovery of Discounts (b)	Adjusted Cost of Service
1	Residential	\$ 68,745	\$ 60,214	\$ -	\$ 128,960	\$ -	\$ 128,960	\$ 3,089	\$ 132,049
2	Commercial	26,636	26,625		53,262		53,262	1,276	54,537
3	Industrial	1,168	1,187		2,354		2,354	56	2,411
4	Public Utilities	174	184		358		358	9	367
5	Senior Citizens	3,167	2,675		5,841	(1,460)	4,381	105	4,486
6	Wastewater Only	1,120	1,125		2,245		2,245	54	2,299
7	Groundwater	2,755	-		2,755		2,755	66	2,821
8	Surcharge	5,440	-		5,440		5,440	130	5,570
9	Housing Authority	2,813	2,727		5,540	(277)	5,263	126	5,389
10	Charities & Schools	2,799	2,917		5,716	(1,429)	4,287	103	4,390
11	Hospital/University	4,679	4,755		9,434	(2,359)	7,076	169	7,245
12	Hand Bill	6,966	7,017		13,982		13,982	335	14,317
13	Water Treatment Plant Sludge	9,920	4,812		14,732		14,732		14,732
14	Private Fire Connections	138	141		279		279	7	286
15	Scheduled	0	0		0		0	0	0
	Infiltration/Inflow								
16	Conveyance	64,268	(64,268)						
17	Pumping & Treatment	71,587	(50,111)	(21,476)	-	-	-	-	-
18	Total	272,376	-	(21,476)	250,900	(5,525)	245,375	5,525	250,900
Allocation of I/I									
19	Sanitary Sewer	272,376		(21,476)	250,900				
20	Stormwater	-	-	21,476	21,476	-	-	-	-
21	Total	\$ 272,376	\$ -	\$ -	\$ 272,376	\$ -	\$ -	\$ -	\$ -

Notes: (a) 70% of allocated I/I costs are recovered by sanitary sewer rates and charges. 30% of allocated I/I costs are recovered by stormwater rates and charges.
(b) Reflects current policy of recovering discounts from all customer types.

TABLE WW - 15
WASTEWATER: INSIDE CITY RETAIL SERVICE UNIT COSTS OF SERVICE FOR RATE DESIGN
Test Year 2021

		(1)	(2)	(3)	(4)	(5)	(6)
Line No.	Cost Component	Units	Unadjusted Unit Cost	COS Deficit Recovery Factor	Billing Units Conversion Factor	Total Adjustment Factor	Adjusted Unit Cost
			\$/Unit				\$/Unit
Collection System							
	Pumping Station						
1	Volume	Mcf	0.1615	1.0240	0.95	0.9728	0.1571
2	Capacity	Mcf/day	212.8551	1.0240	0.95	0.9728	207.0654
3	Sanitary Sewers - Capacity	Mcf/day	270.2392	1.0240	0.95	0.9728	262.8887
	WPC Plants						
4	Volume	Mcf	2.1561	1.0240	0.95	0.9728	2.0975
5	Capacity	Mcf/day	204.4771	1.0240	0.95	0.9728	198.9153
6	Suspended Solids	1,000 lbs	286.2664	1.0240	1.00	1.0240	293.1368
7	BOD	1,000 lbs	274.5691	1.0240	1.00	1.0240	281.1588
Customer Costs							
8	Meter Costs	Eq. Meters	8.9308	1.0240	1.00	1.0240	9.1451
	Billing Costs						
9	Sanitary	Eq. Bills	3.1167	1.0240	1.00	1.0240	3.1915
10	Industrial Waste Unit - Retail	Eq. Meters	6.8799	1.0240	1.00	1.0240	7.0450
11	Infiltration/Inflow - Customer Related	Eq. Meters	32.2273	1.0240	1.00	1.0240	33.0008
12	Infiltration/Inflow - Volume Related	Volume	16.4349	1.0240	0.95	0.9728	15.9879

Mcf - Thousand cubic feet

lbs - pounds

TABLE WW - 16
WASTEWATER: DEVELOPMENT OF COST OF SERVICE
MONTHLY SERVICE CHARGE FOR CUSTOMERS WITH 5/8-INCH METERS
Test Year 2021

Line No.	Cost Component	(1) Units	(2) Unit Cost \$/Unit	(3) Number of Units	(4) Total Cost \$
Customer Costs					
1	Meter Costs	Eq. Meter	0.7621	1.0	0.7621
2	Billing Costs	Eq. Bills	3.1915	1.0	3.1915
3	Industrial Waste Unit	Eq. Meter	0.5871	1.0	0.5871
4	Infiltration/Inflow Costs - Sanitary	Eq. Meter	2.7501	1.0	2.7501
5	Total Service Charge (a)				7.2908
6	Total Service Charge - Rounded (a)				7.29

(a) Prior to lag factor.

TABLE WW - 17
WASTEWATER: DEVELOPMENT OF COST OF SERVICE
VOLUME CHARGE PER MCF
OF NORMAL STRENGTH SANITARY WASTEWATER
Test Year 2021

Line No.	Cost Component	(1) Units	(2) Adjusted Unit Cost \$/Unit	(3) Number of Units	(4) Total Cost \$
Collection System					
	Pumping Stations				
1	Volume	Mcf	0.1571	1.0000	0.1571
2	Capacity (a)	Mcf/day/mo.	17.2555	0.0493	0.8507
3	Sanitary Sewers: Capacity (b)	Mcf/day/mo.	21.9074	0.1316	2.8830
Water Pollution Control Plants					
4	Volume	Mcf	2.0975	1.0000	2.0975
5	Capacity (a)	Mcf/day/mo.	16.5763	0.0493	0.8172
6	Suspended Solids (c)	1,000 lbs	293.1368	0.0162	4.7488
7	BOD (d)	1,000 lbs	281.1588	0.0175	4.9203
8	Total Cost per Mcf				16.4746
9	Infiltration/Inflow Cost	Mcf	15.9879	1.0000	15.9879
10	Total Cost + Infiltration/Inflow per Mcf (e)				32.4625
11	Total Cost per Mcf - Rounded (e)				32.46

(a) (1.0 Mcf * 1 month/30.4 days) * 1.5

(b) (1.0 Mcf * 1 month/30.4 days) * 4.0

(c) 1.0 Mcf @ 260 mg/l

(d) 1.0 Mcf @ 280 mg/l

(e) Prior to lag factor.

Mcf - Thousand cubic feet

Mcf/day - Thousand cubic feet/day

lbs - pounds

mg/l - milligram per liter

TABLE WW - 18 WASTEWATER: PROPOSED RATES FOR GENERAL SERVICE SANITARY SEWER

METER BASED SERVICE CHARGE			
Line No.	Meter Size	(1) FY 2021 Monthly Charge	(2) FY 2022 Monthly Charge
	Inches	\$	\$
1	5/8	7.61	8.15
2	3/4	9.75	10.44
3	1	14.36	15.39
4	1 1/2	25.40	27.23
5	2	39.23	42.08
6	3	70.85	76.01
7	4	120.31	129.06
8	6	237.29	254.58
9	8	375.66	403.06
10	10	542.09	581.62
11	12	986.67	1,058.80

QUANTITY CHARGE			
Line No.		FY 2021 Charge per Mcf	FY 2022 Charge per Mcf
		\$	\$
12	All billable water usage	33.88	36.50
13	Groundwater Charge	13.08	13.96

SURCHARGE RATES			
Line No.		FY 2021 Charge per lb	FY 2022 Charge per lb
		\$	\$
14	BOD (excess of 250 mg/l)	0.448	0.478
15	SS (excess of 350 mg/l)	0.468	0.501

SEPTIC HAULER RATE			
Line No.		FY 2021 Charge per Mgal	FY 2022 Charge per Mgal
		\$	\$
16	Sanitary Wastewater Delivered to WPCP (a)	66.45	71.02

(a) Based on BOD and SS Loading of 9,000 mg/l.

Mcf-Thousand cubic feet

mg/l-milligrams per liter

Mgal - Thousand gallons

WPCP - Water Pollution Control Plant

**In the Matter of the Philadelphia Water
Department's Proposed Change in Water,
Wastewater and Stormwater Rates and Related
Charges**

Fiscal Years 2021-2022

Philadelphia Water Department

Black & Veatch Management Consulting, LLC

Schedule BV-2

Dated: February 11, 2020

Schedule REF #		Schedule Name
BV-2 Black & Veatch Schedules		
1	TABLE WH-1	WASTEWATER WHOLESale: ALLOCATION OF TEST YEAR PLANT INVESTMENT
2	TABLE WH-2	WASTEWATER: TEST YEAR OPERATION AND MAINTENANCE EXPENSE SUMMARY OF ALLOCATIONS
3	TABLE WH-3	WASTEWATER WHOLESale: OUTSIDE CITY CONTRACT SERVICE UNITS OF SERVICE
4	TABLE WH-4	WASTEWATER: ESTIMATED AVERAGE WASTEWATER STRENGTH CONCENTRATIONS
5	TABLE WH-5	WASTEWATER WHOLESale: WATER POLLUTION CONTROL PLANT INVESTMENT PER UNIT OF CAPACITY
6	TABLE WH-6	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO ABINGTON TOWNSHIP
7	TABLE WH-7	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO BENSALEM TOWNSHIP
8	TABLE WH-8	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO BUCKS COUNTY
9	TABLE WH-9	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO CHELTENHAM TOWNSHIP
10	TABLE WH-10	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO DELCORA
11	TABLE WH-11	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO LOWER MERION TOWNSHIP
12	TABLE WH-12	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO LOWER MORELAND TOWNSHIP
13	TABLE WH-13	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO LOWER SOUTHAMPTON TOWNSHIP
14	TABLE WH-14	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO SPRINGFIELD (EXCL. WYNDMOOR) TOWNSHIP
15	TABLE WH-15	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO SPRINGFIELD (WYNDMOOR) TOWNSHIP
16	TABLE WH-16	WASTEWATER WHOLESale: SYSTEM INVESTMENT ALLOCATED TO UPPER DARBY

Schedule REF #		Schedule Name
BV-2	Black & Veatch Schedules	
17	TABLE WH-17	WASTEWATER WHOLESale: UNIT PUMPING AND TREATMENT OPERATION AND MAINTENANCE EXPENSE APPLICABLE TO CONTRACT SERVICE
18	TABLE WH-18	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO ABINGTON TOWNSHIP
19	TABLE WH-19	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO BENSALEM TOWNSHIP
20	TABLE WH-20	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO BUCKS COUNTY W&SA
21	TABLE WH-21	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO CHELTENHAM TOWNSHIP
22	TABLE WH-22	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO DELCORA
23	TABLE WH-23	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO LOWER MERION TOWNSHIP
24	TABLE WH-24	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO LOWER MORELAND TOWNSHIP
25	TABLE WH-25	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO LOWER SOUTHAMPTON TOWNSHIP
26	TABLE WH-26	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO SPRINGFIELD (EXCLUDING WYNDMOOR) TOWNSHIP
27	TABLE WH-27	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO SPRINGFIELD (INCLUDING WYNDMOOR) TOWNSHIP
28	TABLE WH-28	WASTEWATER WHOLESale: OPERATING EXPENSE ALLOCATED TO UPPER DARBY TOWNSHIP
29	TABLE WH-29	WASTEWATER WHOLESale: SUMMARY OF ALLOCATED COST OF SERVICE FOR CONTRACT CUSTOMERS TEST YEAR 2021
30	TABLE WH-30	WASTEWATER WHOLESale: SUMMARY OF ALLOCATED COST OF SERVICE FOR CONTRACT CUSTOMERS TEST YEAR 2022

TABLE WH - 1
WASTEWATER WHOLESALE: ALLOCATION OF TEST YEAR
PLANT INVESTMENT AND DEPRECIATION
Test Year 2021

Line No.	Cost Component	(1) Total Direct Investment (a)	(2) Annual Depreciation Expense (b)
		\$	\$
COLLECTION SYSTEM			
1	Sewers - Capacity	1,649,393,000	32,836,000
2	Pumping Stations - Capacity	28,659,000	712,000
3	LTCP Investment	132,401,000	2,648,000
4	Total Collection System	1,810,453,000	36,196,000
WATER POLLUTION CONTROL PLANTS			
	Northeast Plant:		
	Retail, Abington, Bensalem, Bucks Cty. W&SA, Lower Moreland, and Lower Southampton		
5	Capacity	5,583,000	
	Retail, Abington, Bensalem, Bucks Cty. W&SA, Cheltenham, Lower Moreland, & Lower Southampton		
6	Volume	64,809,000	
7	Capacity	26,558,000	
8	Suspended Solids	70,293,000	
9	BOD	90,360,000	
10	Total Northeast Plant	257,603,000	5,637,000
	Southwest Plant:		
	Retail		
11	Capacity	22,552,000	
	Retail, DELCORA, Lower Merion, Springfield excl. Wyndmoor), & Upper Darby		
12	Volume	69,783,000	
13	Capacity	20,893,000	
14	Suspended Solids	56,363,000	
15	BOD	49,947,000	
16	Total Southwest Plant	219,538,000	3,738,000
	Southeast Plant:		
	Retail and Springfield (Wyndmoor)		
17	Volume	44,436,000	
18	Capacity	49,635,000	
19	Suspended Solids	23,729,000	
20	BOD	23,584,000	
21	Total Southeast Plant	141,384,000	3,531,000
22	Total Water Pollution Control Plants	618,525,000	12,906,000
23	Total Investment	2,428,978,000	49,102,000

(a) Plant Investment as of 6/30/2019. Includes Administration & General Costs.

(b) Based upon 2 percent of the depreciable investment in the collection system and 2.5 percent of the depreciable investment in treatment and pumping facilities.

TABLE WH - 2
WASTEWATER: TEST YEAR OPERATION AND MAINTENANCE EXPENSE
SUMMARY OF ALLOCATIONS
Test Year 2021

Line No.	Cost Component	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Direct Operation & Maintenance Expense	Administrative & General Expenses Direct Assignment	Allocated	Total Operation & Maintenance Expense	O&M Expense Deductions Less Interest Income	Less Grants	Net Operation & Maintenance Expense
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
COLLECTION SYSTEM								
	Sewer Maintenance							
1	All Customers - Capacity	31,051	26,689	30,801	88,541	250	-	88,291
	Inlet Cleaning							
2	Retail - Storm Capacity	12,781	632	5,507	18,920	53	-	18,867
	Neill Drive Pumping Station							
	Retail and Lower Merion							
3	Total Volume	7	-	-	7	-	-	7
4	Total Capacity	110	-	52	162	-	-	162
	Central Schuylkill Pumping Station							
	Retail and Springfield (excl. Wyndmoor)							
5	Total Volume	43	-	-	43	-	-	43
6	Total Capacity	284	-	157	441	1	-	440
	All Other Pumping Stations							
	Retail							
7	Total Volume	2,794	-	-	2,794	8	-	2,786
8	Total Capacity	13,975	-	5,608	19,583	55	-	19,528
	Green Stormwater Infrastructure Maintenance							
9	All Customers - Capacity	8,934	10,194	8,423	27,551	78	-	27,473
10	Total Collection Systems	69,979	37,515	50,548	158,042	445	-	157,597
WATER POLLUTION CONTROL PLANTS								
	Northeast Plant:							
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland & Lower Southampton							
11	Volume	614	-	-	614	2	11	601
12	Capacity	1,895	-	727	2,622	7	47	2,568
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton							
13	Volume	9,283	-	3,864	13,147	37	238	12,872
14	Capacity	3,011	-	1,258	4,269	12	77	4,180
15	Suspended Solids	16,368	53	6,788	23,209	66	420	22,723
16	BOD	14,334	-	4,458	18,792	53	340	18,399
	Southwest Plant:							
	Retail							
17	Volume	57	-	-	57	-	1	56
18	Capacity	304	-	208	512	1	9	502
	Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby							
19	Volume	9,335	-	3,758	13,093	37	237	12,819
20	Capacity	3,366	-	1,301	4,667	13	84	4,570
21	Suspended Solids	12,688	54	5,129	17,871	52	325	17,494
22	BOD	8,778	-	2,731	11,509	33	208	11,268
	Southeast Plant:							
	Retail and Springfield (Wyndmoor)							
23	Volume	6,554	-	2,643	9,197	26	167	9,004
24	Capacity	3,576	-	1,617	5,193	15	94	5,084
25	Suspended Solids	7,925	53	3,275	11,253	32	204	11,017
26	BOD	2,681	-	1,062	3,743	11	68	3,664
27	Total Water Pollution Control Plants	100,769	160	38,819	139,748	397	2,530	136,821
CUSTOMER COSTS								
	All Customers							
28	Equivalent Bills	24,630	-	8,743	33,373	94	-	33,279
	Equivalent Meters							
29	Industrial Waste Unit	3,219	-	1,143	4,362	12	-	4,350
30	Other	4,114	-	1,460	5,574	16	-	5,558
31	Excess Strength Wastewater - Direct	1,585	-	563	2,148	6	-	2,142
32	Stormwater Incentive Programs	369	-	131	500	1	-	499
33	Total Customer Costs	33,917	-	12,040	45,957	129	-	45,828
34	Total Operation & Maintenance Expense	204,664	37,675	101,407	343,746	971	2,530	340,245

TABLE WH - 3
WASTEWATER WHOLESALE: OUTSIDE CITY CONTRACT SERVICE UNITS OF SERVICE
Test Year 2021

Line No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		Northeast WPC Plant									Southwest WPC Plant					Southeast WPC Plant
		Units	Abington	Bensalem	Bucks County	Cheltenham	Lower Moreland	Lower Southampton	Total Northeast	DELCORA	Lower Merion	Springfield (Excluding Wyndmoor)	Upper Darby	Total Southwest	Springfield Wyndmoor	Total
FY 2021 Test Year																
	Volume															
1	Sanitary Wastewater	(Mcf)	96,000	175,000	1,000,000	428,000	65,000	300,000	2,064,000	1,200,000	360,000	128,000	490,000	2,178,000	22,000	4,264,000
2	Infiltration	(Mcf)	4,500	5,600	35,100	15,000	2,800	7,500	70,500	-	14,900	2,200	16,600	33,700	900	105,100
3	Total	(Mcf)	100,500	180,600	1,035,100	443,000	67,800	307,500	2,134,500	1,200,000	374,900	130,200	506,600	2,211,700	22,900	4,369,100
	Suspended Solids															
4	Sanitary Wastewater	(1,000 lbs)	1,000	1,998	10,296	3,392	661	2,434	19,781	13,404	3,707	2,196	4,800	24,107	240	44,128
5	Infiltration	(1,000 lbs)	20	24	153	66	12	33	308	-	65	10	73	148	4	460
6	Total	(1,000 lbs)	1,020	2,022	10,449	3,458	673	2,467	20,089	13,404	3,772	2,206	4,873	24,255	244	44,588
	BOD															
7	Sanitary Wastewater	(1,000 lbs)	1,402	2,206	9,797	2,991	499	1,816	18,711	11,007	3,190	2,252	4,005	20,454	180	39,345
8	Infiltration	(1,000 lbs)	3	3	22	9	2	5	44	-	9	1	10	20	1	65
9	Total	(1,000 lbs)	1,405	2,209	9,819	3,000	501	1,821	18,755	11,007	3,199	2,253	4,015	20,474	181	39,410
Contract Maximum Units																
	Capacity															
10	Sanitary Wastewater	(Mcf/day)	824	1,014	6,416	2,743	508	1,364	12,869	13,392	2,728	397	3,024	19,541	167	32,577
11	Infiltration	(Mcf/day)	20	20	140	60	10	30	280	-	60	10	70	140	-	420
12	Total	(Mcf/day)	844	1,034	6,556	2,803	518	1,394	13,149	13,392	2,788	407	3,094	19,681	167	32,997
	Volume															
13	Sanitary Wastewater	(Mcf)	217,292	299,271	1,171,123	654,370	92,714	348,409	2,783,179	2,439,840	707,553	156,150	829,545	4,133,088	48,797	6,965,064
14	Infiltration	(Mcf)	4,500	5,600	35,100	15,000	2,800	7,500	70,500	-	14,900	2,200	16,600	33,700	900	105,100
15	Total	(Mcf)	221,792	304,871	1,206,223	669,370	95,514	355,909	2,853,679	2,439,840	722,453	158,350	846,145	4,166,788	49,697	7,070,164
	Suspended Solids															
16	Sanitary Wastewater	(1,000 lbs)	2,481	3,734	13,400	5,186	966	6,000	31,767	19,487	7,250	3,300	7,349	37,386	200	69,353
17	Infiltration	(1,000 lbs)	20	24	153	66	12	33	308	-	65	10	73	148	4	460
18	Total	(1,000 lbs)	2,501	3,758	13,553	5,252	978	6,033	32,075	19,487	7,315	3,310	7,422	37,534	204	69,813
	BOD															
19	Sanitary Wastewater	(1,000 lbs)	2,102	5,340	13,400	4,573	729	5,500	31,644	21,771	6,871	3,100	6,831	38,573	155	70,372
20	Infiltration	(1,000 lbs)	3	3	22	9	2	5	44	-	9	1	10	20	1	65
21	Total	(1,000 lbs)	2,105	5,343	13,422	4,582	731	5,505	31,688	21,771	6,880	3,101	6,841	38,593	156	70,437

Mcf - thousand cubic feet

Mcf/day - thousand cubic feet per day

lbs - pounds

TABLE WH - 4
WASTEWATER: ESTIMATED AVERAGE
WASTEWATER STRENGTH CONCENTRATIONS
Test Year 2021

Customer	(1)	(2)
	Average Wastewater Strength Concentration	
	Suspended Solids	BOD
	mg/l	mg/l
Abington	167	234
Bensalem	183	202
Bucks County	165	157
Cheltenham	127	112
DELCORA	179	147
Lower Merion	165	142
Lower Moreland	163	123
Lower Southhampton	130	97
Springfield (excluding Wyndoor)	275	282
Springfield (Wyndoor)	175	131
Upper Darby	157	131

mg/l - milligram per liter

TABLE WH - 5
WASTEWATER WHOLESALE: WATER POLLUTION CONTROL PLANT
INVESTMENT PER UNIT OF CAPACITY
Test Year 2021

Line No.	Cost Component	(1)	(2)		(3)	
		Direct Investment (a)	Units of Capacity		Unit Investment (a)	
		\$	\$			
	Northeast Water Pollution Control Plant					
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton					
1	- Capacity	5,583,000	370 mgd = 49,470 Mcf/day		112.8563	/Mcf/day
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton					
2	Volume	64,809,000	76,650 mg = 10,247,000 Mcf		6.3247	/Mcf
3	Capacity	26,558,000	420 mgd = 56,150 Mcf/day		472.9831	/Mcf/day
4	Suspended Solids	70,293,000		173,240,000 lbs	405.7550	/1,000 lbs
5	BOD	90,360,000		128,491,000 lbs	703.2399	/1,000 lbs
	Southwest Water Pollution Control Plant					
6	Retail - Capacity	22,552,000	50 mgd = 6,684 Mcf/day		3,374.0275	/Mcf/day
	Retail, DELCORA, Lower Merion, Springfield, (excluding Wyndmoor), and Upper Darby					
7	Volume	69,783,000	73,000 mg = 9,759,000 Mcf		7.1506	/Mcf
8	Capacity	20,893,000	400 mgd = 53,476 Mcf/day		390.6986	/Mcf/day
9	Suspended Solids	56,363,000		133,018,000 lbs	423.7242	/1,000 lbs
10	BOD	49,947,000		78,717,000 lbs	634.5141	/1,000 lbs
	Southeast Water Pollution Control Plant					
	Retail and Springfield (Wyndmoor)					
11	Volume	44,436,000	40,880 mg = 5,465,000 Mcf		8.1310	/Mcf
12	Capacity	49,635,000	224 mgd = 29,947 Mcf/day		1,657.4281	/Mcf/day
13	Suspended Solids	23,729,000		66,065,000 lbs	359.1766	/1,000 lbs
14	BOD	23,584,000		56,940,000 lbs	414.1904	/1,000 lbs

mg - million gallons

mgd - million gallons per day

Mcf - thousand cubic feet

Mcf/day - thousand cubic feet per day

lbs - pounds

TABLE WH - 6
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
ABINGTON TOWNSHIP
Test Year 2021

Line No.	Cost Component	(1) Units	(2) Investment Per Unit (a) \$	(3) Number of Contract Units	(4) Infiltration/Inflow Capacity Allocation Factor	(5) Allocated Investment (a) \$	(6) Allocated Investment Rounded (a) \$
Treatment							
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton						
1	Capacity	Mcf/day	112.8563	844	-	95,251	95,000
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton						
2	Volume	Mcf	6.3247	221,792	-	1,402,768	1,403,000
3	Capacity	Mcf/day	472.9831	844	-	399,198	399,000
4	SS	1,000 lbs	405.7550	2,501	-	1,014,793	1,015,000
5	BOD	1,000 lbs	703.2399	2,105	-	1,480,320	1,480,000
6	Total Treatment					4,392,330	4,392,000
Conveyance							
7	Shady Lane & City Line	cfs	58,421	1.3680	1.0225	81,718	82,000
8	Pennypack & City Line	cfs	49,045	7.6940	1.0225	385,843	386,000
9	Cottman and Orville	cfs	45,328	0.4800	1.0225	22,247	22,000
10	Total Conveyance					489,808	490,000
Long Term Control Plan (LTCP)							
Line No.	Cost Component	System Investment		Allocation		Allocated Investment (a)	Allocated Investment Rounded (a)
		\$				\$	\$
11	LTCP Infrastructure Investment	132,401,000		0.58244%		771,151	771,000
12	Total Allocated System Investment					\$ 5,653,289	\$ 5,653,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

TABLE WH - 7
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
BENSALEM TOWNSHIP
Test Year 2021

Line No.	Cost Component	(1) Units	(2) Investment Per Unit (a) \$	(3) Number of Contract Units	(4) Infiltration/Inflow Capacity Allocation Factor	(5) Allocated Investment (a) \$	(6) Allocated Investment Rounded (a) \$
Treatment							
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton						
1	Capacity	Mcf/day	112.8563	1,034	-	116,693	117,000
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton						
2	Volume	Mcf	6.3247	304,871	-	1,928,218	1,928,000
3	Capacity	Mcf/day	472.9831	1,034	-	489,065	489,000
4	SS	1,000 lbs	405.7550	3,758	-	1,524,827	1,525,000
5	BOD	1,000 lbs	703.2399	5,343	-	3,757,411	3,757,000
6	Total Treatment					7,816,214	7,816,000
Conveyance							
7	A-1	cfs	84,833	0.3700	1.02250	32,094	32,000
8	A-2	cfs	105,688	0.8800	1.02250	95,098	95,000
9	A-3	cfs	117,743	0.1200	1.02250	14,447	14,000
10	A-4	cfs	115,847	0.0800	1.02250	9,476	9,000
11	B	cfs	131,354	0.8400	1.02250	112,820	113,000
12	C	cfs	72,634	0.7500	1.02250	55,701	56,000
13	D	cfs	67,910	0.4600	1.02250	31,941	32,000
14	E	cfs	204,911	0.3800	1.02250	79,618	80,000
15	F	cfs	49,726	0.5800	1.02250	29,490	29,000
16	G-1	cfs	48,680	0.2700	1.02250	13,439	13,000
17	G-2	cfs	48,680	0.5100	1.02250	25,385	25,000
18	H	cfs	64,044	2.7200	1.02250	178,119	178,000
19	J-1	cfs	133,427	0.6760	1.02250	92,226	92,000
20	J-2	cfs	38,820	0.1610	1.02250	6,391	6,000
21	J-3	cfs	258,008	0.3830	1.02250	101,040	101,000
22	K-1	cfs	204,907	0.4300	1.02250	90,092	90,000
23	K-2	cfs	66,776	2.1300	1.02250	145,433	145,000
24	Total Conveyance					1,112,810	1,110,000
Long Term Control Plan (LTCP)							
Line No.	Cost Component	System Investment		Allocation		Allocated Investment (a) \$	Allocated Investment Rounded (a) \$
25	LTCP Infrastructure Investment	132,401,000		0.0000%		-	-
26	Total Allocated System Investment					\$ 8,929,024	\$ 8,926,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

cfs - cubic feet per second
Mcf - Thousand cubic feet
lbs - pounds

**TABLE WH - 8
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
BUCKS COUNTY
Test Year 2021**

Line No.	Cost Component	(1)	(2)	(3)	(4)	(5)	(6)
		Units	Investment Per Unit (a)	Number of Contract Units	Infiltration/Inflow Capacity Allocation Factor	Allocated Investment (a)	Allocated Investment Rounded (a)
			\$			\$	\$
Treatment							
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton						
1	Capacity	Mcf/day	112.8563	6,556	-	739,886	740,000
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton						
2	Volume	Mcf	6.3247	1,206,223	-	7,628,999	7,629,000
3	Capacity	Mcf/day	472.9831	6,556	-	3,100,877	3,101,000
4	SS	1,000 lbs	405.7550	13,553	-	5,499,198	5,499,000
5	BOD	1,000 lbs	703.2399	13,422	-	9,438,886	9,439,000
6	Total Treatment					26,407,846	26,408,000
Conveyance							
7	Large Sewers	cfs	18,000	85.08	1.02250	1,565,897	1,566,000
8	Total Conveyance					1,565,897	1,566,000
Long Term Control Plan (LTCP)							
Line No.	Cost Component	System Investment		Allocation		Allocated Investment	
						Investment (a)	Investment Rounded (a)
		\$				\$	\$
9	LTCP Infrastructure Investment	132,401,000		0.00000%		-	-
10	Total Allocated System Investment					27,973,743	27,974,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

**TABLE WH - 9
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
CHELTENHAM TOWNSHIP
Test Year 2021**

		(1)	(2)	(3)	(4)	(5)	(6)
Line No.	Cost Component	Units	Investment Per Unit (a)	Number of Contract Units	Infiltration/Inflow Capacity Allocation Factor	Allocated Investment (a)	Allocated Investment Rounded (a)
			\$			\$	\$
Treatment							
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton						
1	Capacity	Mcf/day	112.8563	NA	-	-	-
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton						
2	Volume	Mcf	6.3247	669,370	-	4,233,564	4,234,000
3	Capacity	Mcf/day	472.9831	2,803	-	1,325,772	1,326,000
4	SS	1,000 lbs	405.7550	5,252	-	2,131,025	2,131,000
5	BOD	1,000 lbs	703.2399	4,582	-	3,222,245	3,222,000
6	Total Treatment					10,912,606	10,913,000
Conveyance							
7	Cheltenham and Tacony Creek	cfs	15,378	29.00	1.02250	455,996	456,000
8	Bouvier Street	cfs	23,315	2.75	1.02250	65,559	66,000
9	Total Conveyance					521,555	522,000
Long Term Control Plan (LTCP)							
Line No.	Cost Component	System Investment		Allocation		Allocated Investment (a)	Allocated Investment Rounded (a)
		\$				\$	\$
10	LTCP Infrastructure Investment	132,401,000		2.42801%		3,214,703	3,215,000
11	Total Allocated System Investment					14,648,864	14,650,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

**TABLE WH - 10
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
DELCORA
Fiscal Year 2021**

(1)							(2)	(3)	(4)	(5)
Treatment										
Line No.	Cost Component	Units	Investment Per Unit (a)	Number of Contract Units	Allocated Investment (a)	Allocated Investment Rounded (a)				
			\$		\$	\$				
	SW Treatment Plant: Retail, DELCORA, Lower Merion, Springfield, (excluding Wyndmoor), and Upper Darby									
1	Volume	Mcf	7.1506	2,439,840	17,446,320	17,446,000				
2	Capacity	Mcf/day	390.6986	13,392	5,232,236	5,232,000				
3	SS	1,000 lbs	423.7242	19,487	8,257,113	8,257,000				
4	BOD	1,000 lbs	634.5141	21,771	13,814,006	13,814,000				
5	Total Treatment				44,749,675	44,749,000				
Long Term Control Plan (LTCP)										
Line No.	System Investment		Allocation	Allocated Investment (a)	Allocated Investment Rounded (a)					
		\$		\$	\$					
6	LTCP Infrastructure Investment	132,401,000		9.44287%	12,502,455	12,502,000				
7	Total Allocated System Investment				\$ 57,252,130	\$ 57,251,000				

(a) Estimated Plant Investment as of 6/30/2019. Includes Administration and General costs.

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

**TABLE WH - 11
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
LOWER MERION TOWNSHIP
Test Year 2021**

Line No.	Cost Component	(1) Units	(2) Investment Per Unit (a) \$	(3) Number of Contract Units	(4) Infiltration/Inflow Capacity Allocation Factor	(5) Allocated Investment (a) \$	(6) Allocated Investment Rounded (a) \$
Treatment							
	Retail, DELCORA, Lower Merion, Springfield, (excluding Wyndmoor), and Upper Darby						
1	Volume	Mcf	7.1506	722,453	-	5,165,972	5,166,000
2	Capacity	Mcf/day	390.6986	2,788	-	1,089,268	1,089,000
3	SS	1,000 lbs	423.7242	7,315	-	3,099,543	3,100,000
4	BOD	1,000 lbs	634.5141	6,880	-	4,365,457	4,365,000
5	Total Treatment					13,720,240	13,720,000
Conveyance							
6	City Avenue & 73rd Street	cfs	30,189	2.860	1.0225	88,283	88,000
7	City Avenue & 66th Street	cfs	35,407	15.880	1.0225	574,914	575,000
8	City Avenue & Overbrook Station	cfs	69,259	2.290	1.0225	162,172	162,000
9	City Avenue & 59th Street	cfs	132,481	0.330	1.0225	44,702	45,000
10	City Avenue & 54th Street	cfs	57,917	0.050	1.0225	2,961	3,000
11	City Avenue & 51st Street	cfs	60,355	8.470	1.0225	522,709	523,000
12	City Avenue & Conshohocken Avenue	cfs	103,583	0.390	1.0225	41,306	41,000
	City Avenue & Presidential Boulevard						
13	Sewers and Meter Station	cfs	134,831	1.300	1.0225	179,224	179,000
14	Neill Drive Pump Station	cfs	143,297	1.300	1.0225	190,478	190,000
	Barclay Building & Friends Central School						
15	Charged Inside Rates	cfs	43,227	0.052	1.0225	2,298	2,000
16	Total Conveyance					1,809,047	1,808,000

Long Term Control Plan (LTCP):

Line No.	Cost Component	System Investment	Allocation	Allocated Investment (a)	Allocated Investment Rounded (a)
		\$		\$	\$
17	LTCP Infrastructure Investment	132,401,000	0.00000%	-	-
18	Total Allocated System Investment			15,529,287	15,528,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

TABLE WH - 12
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
LOWER MORELAND TOWNSHIP
Test Year 2021

		(1)	(2)	(3)	(4)	(5)	(6)
Line No.	Cost Component	Units	Investment Per Unit (a)	Number of Contract Units	Infiltration/Inflow Capacity Allocation Factor	Allocated Investment (a)	Allocated Investment Rounded (a)
			\$			\$	\$
Treatment							
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton						
1	Capacity	Mcf/day	112.8563	518	-	58,460	58,000
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton						
2	Volume	Mcf	6.3247	95,514	-	604,097	604,000
3	Capacity	Mcf/day	472.9831	518	-	245,005	245,000
4	SS	1,000 lbs	405.7550	978	-	396,828	397,000
5	BOD	1,000 lbs	703.2399	731	-	514,068	514,000
6	Total Treatment					1,818,458	1,818,000
Conveyance							
7	Woodhaven Road and City Line	cfs	195,719	0.4140	1.0225	82,851	83,000
8	Erwin Street and County Line	cfs	94,589	0.0650	1.0225	6,287	6,000
9	Moreland Road and Pine Road	cfs	64,910	0.0350	1.0225	2,323	2,000
10	Pine Road and Radburn Road	cfs	66,406	0.0380	1.0225	2,580	3,000
11	Welsh Road and County Line	cfs	66,860	0.6060	1.0225	41,429	41,000
12	City Line and Red Lion	cfs	66,860	0.0170	1.0225	1,162	1,000
13	Conveyance Line	cfs	62,555	7.7960	1.0225	498,652	499,000
14	PC-30 Improvements (b)					70,102	70,000
15	Total Conveyance					705,386	705,000
Long Term Control Plan (LTCP):							
Line No.	System Cost Component	Investment		Allocation		Allocated Investment (a)	Allocated Investment Rounded (a)
			\$			\$	\$
16	LTCP Infrastructure Investment	132,401,000		0.35883%		475,093	475,000
17	Total Allocated System Investment					2,998,937	2,998,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

(b) Allocated 0.15 percent of the Sewer Fund's share of the project funding (\$46,734,645).

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

**TABLE WH - 13
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
LOWER SOUTHAMPTON TOWNSHIP
Test Year 2021**

		(1)	(2)	(3)	(4)	(5)	(6)
Line No.	Cost Component	Units	Investment Per Unit (a)	Number of Contract Units	Infiltration/Inflow Capacity Allocation Factor	Allocated Investment (a)	Allocated Investment Rounded (a)
			\$			\$	\$
Treatment							
	Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton						
1	Capacity	Mcf/day	112.8563	1,394	-	157,322	157,000
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton						
2	Volume	Mcf	6.3247	355,909	-	2,251,018	2,251,000
3	Capacity	Mcf/day	472.9831	1,394	-	659,338	659,000
4	SS	1,000 lbs	405.7550	6,033	-	2,447,920	2,448,000
5	BOD	1,000 lbs	703.2399	5,505	-	3,871,336	3,871,000
6	Total Treatment					9,386,934	9,386,000
Conveyance							
7	Trevoise and City Line	cfs	92,315	15.79	1.0225	1,490,451	1,490,000
8	PC-30 Improvements (b)					8,730,032	8,730,000
9	Total Conveyance					10,220,483	10,220,000

Long Term Control Plan (LTCP)

Line No.	Cost Component	System Investment	Allocation	Allocated Investment (a)	Allocated Investment Rounded (a)
		\$		\$	\$
10	LTCP Infrastructure Investment	132,401,000	0.96317%	1,275,250	1,275,000
11	Total Allocated System Investment			20,882,667	20,881,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

(b) Allocated 18.68 percent of the Sewer Fund's share of the project funding (\$4,6734,645).

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

TABLE WH - 14
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
SPRINGFIELD (EXCL. WYNDMOOR) TOWNSHIP
Test Year 2021

Line No.	Cost Component	(1) Units	(2) Investment Per Unit (a) \$	(3) Number of Contract Units	(4) Infiltration/Inflow Capacity Allocation Factor	(5) Allocated Investment (a) \$	(6) Allocated Investment Rounded (a) \$
Treatment							
	Retail, DELCORA, Lower Merion, Springfield, (excluding Wyndmoor), and Upper Darby						
1	Volume	Mcf	7.1506	158,350	-	1,132,298	1,132,000
2	Capacity	Mcf/day	390.6986	407	-	159,014	159,000
3	SS	1,000 lbs	423.7242	3,310	-	1,402,527	1,403,000
4	BOD	1,000 lbs	634.5141	3,101	-	1,967,628	1,968,000
5	Total Treatment					4,661,467	4,662,000
Conveyance (b)							
	Erdenheim and Stenton						
6	Sewers	cfs	139,780	2.00	1.0225	285,850	286,000
7	Central Schuylkill Pump Station	cfs	13,211	2.00	1.0225	27,016	27,000
8	Meter Station	ea	35,702	1.00	1.0225	36,505	37,000
9	Total					349,371	350,000
	Northwestern and Stenton						
10	Sewers	cfs	139,780	2.60	1.0225	371,605	372,000
11	Central Schuylkill Pump Station	cfs	13,211	2.60	1.0225	35,121	35,000
12	Meter Station	ea	10,270	1.00	1.0225	10,501	11,000
13	Total					417,227	418,000
14	Total Conveyance					766,598	768,000

Long Term Control Plan (LTCP)

Line No.	Cost Component	System Investment	Allocation	Allocated Investment (a)	Allocated Investment Rounded (a)
		\$		\$	\$
15	LTCP Infrastructure Investment	132,401,000	0.79320%	1,050,205	1,050,000
16	Total Allocated System Investment			6,478,270	6,480,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

(b) Excludes connection at Northwestern and Thomas which accounts for less than one half of one percent of township flow.

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

TABLE WH - 15
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
SPRINGFIELD (WYNDMOOR) TOWNSHIP
Test Year 2021

Line No.	Cost Component	(1)	(2)	(3)	(4)	(5)	(6)
		Units	Investment Per Unit (a)	Number of Contract Units	Infiltration/Inflow Capacity Allocation Factor	Allocated Investment (a)	Allocated Investment Rounded (a)
			\$			\$	\$
Treatment							
	Retail and Springfield (Wyndmoor)						
1	Volume	Mcf	8.1310	49,697	-	404,086	404,000
2	Capacity	Mcf/day	1,657.4281	167	-	276,790	277,000
3	SS	1,000 lbs	359.1766	204	-	73,272	73,000
4	BOD	1,000 lbs	414.1904	156	-	64,614	65,000
5	Total Treatment					818,762	819,000
Conveyance							
6		cfs	167,854	1.93	1.0225	331,247	331,000
7	Total Conveyance					331,247	331,000
8	Total Allocated System Investment					1,150,009	1,150,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

**TABLE WH - 16
WASTEWATER SYSTEM INVESTMENT
ALLOCATED TO
UPPER DARBY
Test Year 2021**

Line No.	Cost Component	(1)	(2)	(3)	(4)	(5)	(6)
		Units	Investment Per Unit (a)	Number of Contract Units	Infiltration/Inflow Capacity Allocation Factor	Allocated Investment (a)	Allocated Investment Rounded (a)
			\$			\$	\$
Treatment							
	Retail, DELCORA, Lower Merion, Springfield, (excluding Wyndmoor), and Upper Darby						
1	Volume	Mcf	7.1506	846,145	-	6,050,444	6,050,000
2	Capacity	Mcf/day	390.6986	3,094	-	1,208,821	1,209,000
3	SS	1,000 lbs	423.7242	7,422	-	3,144,669	3,145,000
4	BOD	1,000 lbs	634.5141	6,841	-	4,340,711	4,341,000
5	Total Treatment					14,744,645	14,745,000
Conveyance							
6	60th Street and Cobbs Creek Parkway	cfs	20,191	35.00	1.0225	722,585	723,000
7	Total Conveyance					722,585	723,000
Long Term Control Plan (LTCP)							
Line No.	Cost Component	System Investment	Allocation			Allocated Investment (a)	Allocated Investment Rounded (a)
			\$			\$	\$
8	LTCP Infrastructure Investment	132,401,000		0.00%		-	-
9	Total Allocated System Investment					15,467,230	15,468,000

(a) Plant Investment as of 6/30/2019. Includes Administration and General costs.

cfs - cubic feet per second

Mcf - Thousand cubic feet

lbs - pounds

TABLE WH - 17
WASTEWATER WHOLESALE: UNIT PUMPING AND TREATMENT OPERATION AND
MAINTENANCE EXPENSE APPLICABLE TO CONTRACT SERVICE
Test Year 2021

Line No.	Cost Component	(1) Net Operating Expense \$	(2) Projected TY Units of Service	(3) Unit Operating Expense \$/Unit
PUMPING STATIONS				
Neill Drive Pumping Station				
Retail and Lower Merion				
1	Total Volume	7,000	69,650 Mcf	0.1005
2	Total Capacity	161,500	370 Mcf/day	436.4865
Central Schuylkill Pumping Station				
Retail and Springfield (excl. Wyndmoor)				
3	Total Volume	43,000	2,715,700 Mcf	0.0158
4	Total Capacity	440,000	22,110 Mcf/day	19.9005
WATER POLLUTION CONTROL PLANTS				
Northeast Plant				
Retail and Cheltenham				
5	Volume	-	NA Mcf	-
6	Capacity	-	NA Mcf/day	-
Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton				
7	Volume	601,000	6,680,000 Mcf	0.0900
8	Capacity	2,568,000	41,730 Mcf/day	61.5385
Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton				
9	Volume	12,872,000	9,027,000 Mcf	1.4259
10	Capacity	4,180,000	56,393 Mcf/day	74.1227
11	Suspended Solids	22,723,000	103,303 1,000 lbs	219.9646
12	BOD	18,399,000	72,244 1,000 lbs	254.6786
Southwest Plant:				
Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby				
13	Volume	12,819,000	8,295,000 Mcf	1.5454
14	Capacity	4,570,000	51,820 Mcf/day	88.1899
15	Suspended Solids	17,493,741	75,942 1,000 lbs	230.3566
16	BOD	11,268,000	54,092 1,000 lbs	208.3118
Southeast Plant:				
Retail and Springfield (Wyndmoor)				
17	Volume	9,004,000	3,904,000 Mcf	2.3064
18	Capacity	5,084,000	24,389 Mcf/day	208.4546
19	Suspended Solids	11,017,000	31,944 1,000 lbs	344.8848
20	BOD	3,664,000	26,615 1,000 lbs	137.6667

NA - Not Applicable

Mcf - thousand cubic feet

Mcf/day - thousand cubic feet per day

lbs - pounds

**TABLE WH - 18
OPERATING EXPENSE
ALLOCATED TO
ABINGTON TOWNSHIP
Test Year 2021**

		(1)	(2)		(3)	(4)	(5)	
Collection System:								
Line No.	Cost Component	Allocated Investment				Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$				\$	\$	\$
1	Sewer Maintenance (a)	490,000	x	3.80%		18,620	-	18,620
Treatment:								
Line No.	Cost Component	Operating Expense Per Unit		Test Yr. No. of Units		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$				\$	\$	\$
	NE Treatment Plants: Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton							
2	Volume	0.0900	\$/Mcf	100,500	Mcf	9,045	-	9,045
3	Capacity	61.5385	\$/Mcf/day	844	Mcf/day	51,938	-	51,938
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton							
4	Volume	1.4259	\$/Mcf	100,500	Mcf	143,303	-	143,303
5	Capacity	74.1227	\$/Mcf/day	844	Mcf/day	62,560	-	62,560
6	Suspended Solids	219.9646	\$/1,000 lbs	1,020	1,000 lbs	224,364	-	224,364
7	BOD	254.6786	\$/1,000 lbs	1,405	1,000 lbs	357,823	-	357,823
8	Customer Costs					13,800	-	13,800
9	Total Treatment					881,453	-	881,453
Long Term Control Plan (LTCP)								
Line No.	LTCP O&M Costs	System Annual Cost		Allocation		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$				\$	\$	\$
10	Amortization of SMIP/GARP Expenses (b)	5,116,184		0.58244%		29,798		29,798
11	LTCP O&M Costs	4,634,035		0.58244%		26,990	-	26,990
12	Total Annual Operating Expense					938,241	-	938,241
13	Total - Rounded					938,000		938,000

(a) Based on investment in sewers serving Abington.

(b) Reflects amortization of SMIP/GARP costs over 20 years at 5.5% long term bond interest rate.

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 19
OPERATING EXPENSE
ALLOCATED TO
BENSALEM TOWNSHIP
Test Year 2021

(1)			(2)			(3)		(4)	(5)
Collection System:									
Line No.	Cost Component	Allocated Investment				Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
1	Sewer Maintenance (a)	1,110,000	x	3.80%		42,180	-	42,180	
Treatment:									
Line No.	Cost Component	Operating Expense Per Unit		Test Yr. No. of Units		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
	NE Treatment Plants: Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton								
2	Volume	0.0900	\$/Mcf	180,600	Mcf	16,254	-	16,254	
3	Capacity	61.5385	\$/Mcf/day	1,034	Mcf/day	63,631	-	63,631	
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton								
4	Volume	1.4259	\$/Mcf	180,600	Mcf	257,518	-	257,518	
5	Capacity	74.1227	\$/Mcf/day	1,034	Mcf/day	76,643	-	76,643	
6	Suspended Solids	219.9646	\$/1,000 lbs	2,022	1,000 lbs	444,768	-	444,768	
7	BOD	254.6786	\$/1,000 lbs	2,209	1,000 lbs	562,585	-	562,585	
8	Customer Costs					49,400	-	49,400	
9	Total Treatment					1,512,979	-	1,512,979	
Long Term Control Plan (LTCP):									
Line No.	LTCP O&M Costs	System Annual Cost		Allocation		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
10	Amortization of SMIP/GARP Expenses (b)	5,116,184		0.00000%		-	-	-	
11	LTCP O&M Costs	4,634,035		0.00000%		-	-	-	
12	Total					1,512,979	-	1,512,979	
13	Total - Rounded					1,513,000		1,513,000	

(a) Based on investment in sewers serving Bensalem.

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 20
OPERATING EXPENSE
ALLOCATED TO
BUCKS COUNTY W&SA
Test Year 2021

(1)			(2)			(3)		(4)	(5)
Collection System:									
Line No.	Cost Component	Allocated Investment				Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
1	Sewer Maintenance (a)	1,566,000	x	3.80%		59,508	-	59,508	
Treatment:									
Line No.	Cost Component	Operating Expense Per Unit		Test Yr. No. of Units		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
	NE Treatment Plants: Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton								
2	Volume	0.0900	\$/Mcf	1,035,100	Mcf	93,159	-	93,159	
3	Capacity	61.5385	\$/Mcf/day	6,556	Mcf/day	403,446	-	403,446	
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton								
4	Volume	1.4259	\$/Mcf	1,035,100	Mcf	1,475,949	-	1,475,949	
5	Capacity	74.1227	\$/Mcf/day	6,556	Mcf/day	485,948	-	485,948	
6	Suspended Solids	219.9646	\$/1,000 lbs	10,449	1,000 lbs	2,298,410	-	2,298,410	
7	BOD	254.6786	\$/1,000 lbs	9,819	1,000 lbs	2,500,689	-	2,500,689	
8	Customer Costs					16,200	-	16,200	
9	Total Treatment					7,333,309	-	7,333,309	
Long Term Control Plan (LTCP):									
Line No.	LTCP O&M Costs	System Annual Cost		Allocation		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
10	Amortization of SMIP/GARP Expenses (b)	5,116,184		0.00000%		-	-	-	
11	LTCP O&M Costs	4,634,035		0.00000%		-	-	-	
12	Total					7,333,309	-	7,333,309	
13	Total - Rounded					7,333,000		7,333,000	

(a) Based on investment in sewers serving Bucks County W&SA.

Mcf - Thousand cubic feet
lbs - pounds

**TABLE WH - 21
OPERATING EXPENSE
ALLOCATED TO
CHELTENHAM TOWNSHIP
Test Year 2021**

Collection System:								
Line No.	Cost Component	(1) Allocated Investment	(2)		(3) Allocated Operating Expense	(4) Adjustment for Contract	(5) Total Adjusted Operating Expense	
		\$			\$	\$		\$
1	Sewer Maintenance (a)	522,000	x	3.80%	19,836	-		19,836
Treatment:								
Line No.	Cost Component	Operating Expense Per Unit	Test Yr. No. of Units		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$			\$	\$		\$
	NE Treatment Plants: Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton							
2	Volume	0.0900	\$/Mcf	NA	Mcf	-	-	-
3	Capacity	61.5385	\$/Mcf/day	NA	Mcf/day	-	-	-
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton							
4	Volume	1.4259	\$/Mcf	443,000	Mcf	631,674	-	631,674
5	Capacity	74.1227	\$/Mcf/day	2,803	Mcf/day	207,766	-	207,766
6	Suspended Solids	219.9646	\$/1,000 lbs	3,458	1,000 lbs	760,638	-	760,638
7	BOD	254.6786	\$/1,000 lbs	3,000	1,000 lbs	764,036	-	764,036
8	Customer Costs					33,700	-	33,700
9	Total Treatment				2,417,650	-		2,417,650
Long Term Control Plan (LTCP):								
Line No.	Cost Component	System Annual Cost	Allocation		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$			\$	\$		\$
	LTCP O&M Costs							
10	Amortization of SMIP/GARP Expenses (b)	5,116,184		2.42801%	124,221			124,221
11	LTCP O&M	4,634,035		2.42801%	112,515			112,515
12	Total				2,654,386	-		2,654,386
13	Total - Rounded				2,654,000			2,654,000

(a) Based on investment in sewers serving Cheltenham.

(b) Reflects amortization of SMIP/GARP costs over 20 years at 5.5% long term bond interest rate.

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 22
OPERATING EXPENSE
ALLOCATED TO
DELCORA
Fiscal Year 2021

		(1)	(2)	(3)	(4)	(5)
Treatment:						
Line No.	Cost Component	Operating Expense Per Unit	Test Yr. No. of Units	Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$		\$	\$	\$
	SW Treatment Plant: Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby					
1	Volume	1.5454 \$/Mcf	1,200,000 Mcf	1,854,480	-	1,854,480
2	Capacity	88.1899 \$/Mcf/day	13,392 Mcf/day	1,181,039	-	1,181,039
3	Suspended Solids	230.3566 \$/1,000 lbs	13,404 1,000 lbs	3,087,700	-	3,087,700
4	BOD	208.3118 \$/1,000 lbs	11,007 1,000 lbs	2,292,888	-	2,292,888
5	Customer Costs			43,000	-	43,000
6	Total Treatment			8,459,107	-	8,459,107
Long Term Control Plan (LTCP):						
Line No.	Cost Component	System Annual Cost	Allocation	Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$		\$	\$	\$
	LTCP O&M Costs					
7	Amortization of SMIP/GARP Expenses (a)	5,116,184	9.44287%	483,115		483,115
8	LTCP O&M	4,634,035	9.44287%	437,586	-	437,586
9	Total Annual Operating Expense			9,379,808		9,379,808
10	Total - Rounded			9,380,000		9,380,000

(a) Reflects amortization of SMIP/GARP costs over 20 years at 5.5% long term bond interest rate.

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 23
OPERATING EXPENSE
ALLOCATED TO
LOWER MERION TOWNSHIP
Test Year 2021

		(1)	(2)		(3)	(4)	(5)	
Collection System:								
Line No.	Cost Component	Allocated Investment				Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$				\$	\$	\$
1	Sewer Maintenance (a)	1,808,000	x	3.80%		68,704	-	68,704
Treatment:								
Line No.	Cost Component	Operating Expense Per Unit		Test Yr. No. of Units		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$				\$	\$	\$
	Neill Drive Pump Station Retail and Lower Merion							
2	Volume	0.1005	\$/Mcf	14,700	Mcf	1,477	-	1,477
3	Capacity	436.4865	\$/Mcf/day	115	Mcf/day	50,196	-	50,196
	SW Treatment Plants: Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby							
4	Volume	1.5454	\$/Mcf	374,900	Mcf	579,370	-	579,370
5	Capacity	88.1899	\$/Mcf/day	2,788	Mcf/day	245,873	-	245,873
6	Suspended Solids	230.3566	\$/1,000 lbs	3,772	1,000 lbs	868,905	-	868,905
7	BOD	208.3118	\$/1,000 lbs	3,199	1,000 lbs	666,389	-	666,389
8	Customer Costs					53,900	-	53,900
9	Total Treatment					2,534,814	-	2,534,814
Long Term Control Plan (LTCP):								
Line No.	Cost Component	System Annual Cost		Allocation		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$				\$	\$	\$
	LTCP O&M Costs							
10	Amortization of SMIP/GARP Expenses (a)	5,116,184		0.00000%		-	-	-
11	LTCP O&M	4,634,035		0.00000%		-	-	-
12	Total Annual Operating Expense					2,534,814	-	2,534,814
13	Total - Rounded					2,535,000		2,535,000

(a) Based on investment in sewers serving Lower Merion.

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 24
OPERATING EXPENSE
ALLOCATED TO
LOWER MORELAND TOWNSHIP
Test Year 2021

		(1)	(2)		(3)	(4)	(5)	
Collection System:								
Line No.	Cost Component	Allocated Investment				Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
1	Sewer Maintenance (a)	\$ 705,000	x	3.80%		\$ 26,790	\$ -	\$ 26,790
Treatment:								
Line No.	Cost Component	Operating Expense Per Unit		Test Yr. No. of Units		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$				\$	\$	\$
	NE Treatment Plants: Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton							
2	Volume	0.0900	\$/Mcf	67,800	Mcf	6,102	-	6,102
3	Capacity	61.5385	\$/Mcf/day	518	Mcf/day	31,877	-	31,877
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton							
4	Volume	1.4259	\$/Mcf	67,800	Mcf	96,676	-	96,676
5	Capacity	74.1227	\$/Mcf/day	518	Mcf/day	38,396	-	38,396
6	Suspended Solids	219.9646	\$/1,000 lbs	673	1,000 lbs	148,036	-	148,036
7	BOD	254.6786	\$/1,000 lbs	501	1,000 lbs	127,594	-	127,594
8	Customer Costs					20,700	-	20,700
9	Total Treatment					496,171	-	496,171
Long Term Control Plan (LTCP):								
Line No.	LTCP O&M Costs	System Annual Cost		Allocation		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense
		\$				\$	\$	\$
10	Amortization of SMIP/GARP Expenses (b)	5,116,184		0.35883%		18,358		18,358
11	LTCP O&M Costs	4,634,035		0.35883%		16,628		16,628
12	Total Annual Operating Expense					531,157		531,157
13	Total - Rounded					531,000		531,000

(a) Based on investment in sewers serving Lower Moreland.

(b) Reflects amortization of SMIP/GARP costs over 20 years at 5.5% long term bond interest rate.

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 25
OPERATING EXPENSE
ALLOCATED TO
LOWER SOUTHAMPTON TOWNSHIP
Test Year 2021

		(1)	(2)	(3)	(4)	(5)
Collection System:						
Line No.	Cost Component	Allocated Investment			Allocated Operating Expense	Total Adjusted Operating Expense
		\$			\$	\$
1	Sewer Maintenance (a)	10,220,000	x	3.80%	388,360	388,360
Treatment:						
Line No.	Cost Component	Operating Expense Per Unit	Test Yr. No. of Units		Allocated Operating Expense	Total Adjusted Operating Expense
		\$			\$	\$
	NE Treatment Plants: Retail, Abington, Bensalem, Bucks County W&SA, Lower Moreland, and Lower Southampton					
2	Volume	0.0900 \$/Mcf	307,500 Mcf		27,675	27,675
3	Capacity	61.5385 \$/Mcf/day	1,394 Mcf/day		85,785	85,785
	Retail, Abington, Bensalem, Bucks County W&SA, Cheltenham, Lower Moreland, and Lower Southampton					
4	Volume	1.4259 \$/Mcf	307,500 Mcf		438,464	438,464
5	Capacity	74.1227 \$/Mcf/day	1,394 Mcf/day		103,327	103,327
6	Suspended Solids	219.9646 \$/1,000 lbs	2,467 1,000 lbs		542,653	542,653
7	BOD	254.6786 \$/1,000 lbs	1,821 1,000 lbs		463,770	463,770
8	Customer Costs				16,200	16,200
9	Total Treatment				2,066,234	2,066,234
Long Term Control Plan (LTCP):						
Line No.	LTCP O&M Costs	System Annual Cost	Allocation		Allocated Operating Expense	Total Adjusted Operating Expense
		\$			\$	\$
10	Amortization of SMIP/GARP Expenses (b)	5,116,184	0.96317%		49,278	49,278
11	LTCP O&M Costs	4,634,035	0.96317%		44,634	44,634
12	Total Annual Operating Expense				2,160,146	2,160,146
13	Total - Rounded				2,160,000	2,160,000

(a) Based on investment in sewers serving Lower Southampton.

(b) Reflects amortization of SMIP/GARP costs over 20 years at 5.5% long term bond interest rate.

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 26
OPERATING EXPENSE
ALLOCATED TO
SPRINGFIELD (EXCL. WYNDMOOR) TOWNSHIP
Test Year 2021

		(1)		(2)		(3)		(4)	(5)
Collection System:									
Line No.	Cost Component	Allocated Investment				Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
1	Sewer Maintenance (a)	\$ 768,000	x	3.80%		\$ 29,184	\$ -	\$ 29,184	
Treatment:									
Line No.	Cost Component	Operating Expense Per Unit		Test Yr. No. of Units		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
	Central Schuylkill Pump Station Retail and Springfield (excluding Wyndmoor)								
2	Volume	0.0158	\$/Mcf	130,200	Mcf	2,057	-	2,057	
3	Capacity	19.9005	\$/Mcf/day	407	Mcf/day	8,100	-	8,100	
	SW Treatment Plants: Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby								
4	Volume	1.5454	\$/Mcf	130,200	Mcf	201,211	-	201,211	
5	Capacity	88.1899	\$/Mcf/day	407	Mcf/day	35,893	-	35,893	
6	Suspended Solids	230.3566	\$/1,000 lbs	2,206	1,000 lbs	508,167	-	508,167	
7	BOD	208.3118	\$/1,000 lbs	2,253	1,000 lbs	469,326	-	469,326	
8	Customer Costs					27,200	-	27,200	
9	Total Treatment					1,281,138	-	1,281,138	
Long Term Control Plan (LTCP):									
Line No.	LTCP O&M Costs	System Annual Cost		Allocation		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
10	Amortization of SMIP/GARP Expenses (b)	5,116,184		0.79320%		40,582		40,582	
11	LTCP O&M Costs	4,634,035		0.79320%		36,757		36,757	
12	Total Annual Operating Expense					1,358,477		1,358,477	
13	Total - Rounded					1,358,000		1,358,000	

(a) Based on investment in sewers serving Springfield (excluding Wyndmoor).

(b) Reflects amortization of SMIP/GARP costs over 20 years at 5.5% long term bond interest rate.

Mcf - Thousand cubic feet

lbs - pounds

TABLE WH - 27
OPERATING EXPENSE
ALLOCATED TO
SPRINGFIELD (WYNDMOOR) TOWNSHIP
Test Year 2021

		(1)	(2)	(3)	(4)	(5)
Collection System:						
Line No.	Cost Component	Allocated Investment			Allocated Operating Expense	Total Adjusted Operating Expense
		\$			\$	\$
1	Sewer Maintenance (a)	331,000	x	3.80%	12,578	12,578
Treatment:						
Line No.	Cost Component	Operating Expense Per Unit		Test Yr. No. of Units	Allocated Operating Expense	Total Adjusted Operating Expense
		\$			\$	\$
	SE Treatment Plants: Retail, Springfield (Wyndmoor)					
2	Volume	2.3064	\$/Mcf	22,900	52,817	52,817
3	Capacity	208.4546	\$/Mcf/day	167	34,812	34,812
4	Suspended Solids	344.8848	\$/1,000 lbs	244	84,152	84,152
5	BOD	137.6667	\$/1,000 lbs	181	24,918	24,918
6	Customer Costs				7,700	7,700
7	Total				216,977	216,977
8	Total - Rounded				217,000	217,000

(a) Based on investment in sewers serving Springfield (Wyndmoor).

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 28
OPERATING EXPENSE
ALLOCATED TO
UPPER DARBY TOWNSHIP
Test Year 2021

(1)			(2)			(3)		(4)	(5)
Collection System:									
Line No.	Cost Component	Allocated Investment				Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
1	Sewer Maintenance (a)	723,000	x	3.80%		27,474	-	27,474	
Treatment:									
Line No.	Cost Component	Operating Expense Per Unit		Test Yr. No. of Units		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
	SW Treatment Plants: Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby								
2	Volume	1.5454	\$/Mcf	506,600	Mcf	782,900	-	782,900	
3	Capacity	88.1899	\$/Mcf/day	3,094	Mcf/day	272,860	-	272,860	
4	Suspended Solids	230.3566	\$/1,000 lbs	4,873	1,000 lbs	1,122,528	-	1,122,528	
5	BOD	208.3118	\$/1,000 lbs	4,015	1,000 lbs	836,372	-	836,372	
6	Customer Costs					13,800	-	13,800	
7	Total Treatment					3,055,934	-	3,055,934	
Long Term Control Plan (LTCP):									
Line No.	LTCP O&M Costs	System Annual Cost		Allocation		Allocated Operating Expense	Adjustment for Contract	Total Adjusted Operating Expense	
		\$				\$	\$	\$	
8	Amortization of SMIP/GARP Expenses (b)	5,116,184		0.00000%		-	-	-	
9	LTCP O&M Costs	4,634,035		0.00000%		-	-	-	
10	Total Annual Operating Expense					3,055,934	-	3,055,934	
11	Total - Rounded					3,056,000		3,056,000	

(a) Based on investment in sewers serving Upper Darby.

Mcf - Thousand cubic feet
lbs - pounds

TABLE WH - 29
WASTEWATER WHOLESALE: SUMMARY OF ALLOCATED COST OF SERVICE
FOR CONTRACT CUSTOMERS
Test Year 2021

Line No.	Customer	(1) Allocated Investment (a)	(2) Allocated Depreciable Investment (a)	(3) O&M Expense	(4) Depreciation Expense	(5) Return on Investment	(6) Allocated Cost of Service
		\$	\$	\$	\$	\$	\$
1	Abington	5,653,000	5,637,000	938,000	134,620	423,975	1,496,595
2	Bensalem	8,926,000	8,897,000	1,513,000	(a)	(a)	1,513,000
3	Bucks County (b)	27,974,000	27,877,000	7,333,000	96,125	288,375	7,717,500
4	Cheltenham	14,650,000	14,611,000	2,654,000	346,590	1,098,750	4,099,340
5	DELCORA (c)	57,251,000	57,111,000	9,380,000	340,430	1,207,425	10,927,855
6	Lower Merion	15,528,000	15,485,000	2,535,000	(a)	(a)	2,535,000
7	Lower Moreland	2,998,000	2,991,000	531,000	68,875	224,850	824,725
8	Lower Southampton (d)	20,881,000	20,847,000	2,160,000	386,416	1,305,063	3,851,479
9	Springfield (less Wyndmoor)	6,480,000	6,466,000	1,358,000	152,870	486,000	1,996,870
10	Springfield (Wyndmoor)	1,150,000	1,149,000	217,000	27,070	86,250	330,320
11	Upper Darby	15,468,000	15,422,000	3,056,000	(a)	(a)	3,056,000
12	Total	\$ 176,959,000	\$ 176,493,000	\$ 31,675,000	\$ 1,552,996	\$ 5,120,688	\$ 38,348,684

(a) It is assumed that Bensalem, Lower Merion and Upper Darby contribute their entire allocated plant investment, and therefore, are not allocated any depreciation expense or return on investment.

(b) Bucks County allocated Return on Investment and Depreciation Expense based on assets in service after 6/30/2007.

(c) DELCORA allocated Return on Investment and Depreciation Expense based on assets in service after 7/1/2011.

(d) Lower Southampton phased into Return on Investment and Depreciation Expense on total rate base uniformly over 18 years starting in FY 2007.

TABLE WH - 30
WASTEWATER WHOLESALE: SUMMARY OF ALLOCATED COST OF SERVICE
FOR CONTRACT CUSTOMERS
Test Year 2022

Line No.	Customer	(1) Allocated Investment (a)	(2) Allocated Depreciable Investment (a)	(3) O&M Expense	(4) Depreciation Expense	(5) Return on Investment	(6) Allocated Cost of Service
		\$	\$	\$	\$	\$	\$
1	Abington	5,653,000	5,637,000	993,000	134,620	423,975	1,551,595
2	Bensalem	8,926,000	8,897,000	1,605,000	(a)	(a)	1,605,000
3	Bucks County (b)	27,974,000	27,877,000	7,790,000	96,125	288,375	8,174,500
4	Cheltenham	14,650,000	14,611,000	2,803,000	346,590	1,098,750	4,248,340
5	DELCORA (c)	57,251,000	57,111,000	9,859,000	340,430	1,207,425	11,406,855
6	Lower Merion	15,528,000	15,485,000	2,677,000	(a)	(a)	2,677,000
7	Lower Moreland	2,998,000	2,991,000	561,000	68,875	224,850	854,725
8	Lower Southampton (d)	20,881,000	20,847,000	2,293,000	412,178	1,392,066	4,097,244
9	Springfield (less Wyndmoor)	6,480,000	6,466,000	1,432,000	152,870	486,000	2,070,870
10	Springfield (Wyndmoor)	1,150,000	1,149,000	230,000	27,070	86,250	343,320
11	Upper Darby	15,468,000	15,422,000	3,230,000	(a)	(a)	3,230,000
12	Total	\$ 176,959,000	\$ 176,493,000	\$ 33,473,000	\$ 1,578,758	\$ 5,207,691	\$ 40,259,449

(a) It is assumed that Bensalem, Lower Merion and Upper Darby contribute their entire allocated plant investment, and therefore, are not allocated any depreciation expense or return on investment.

(b) Bucks County allocated Return on Investment and Depreciation Expense based on assets in service after 6/30/2007.

(c) DELCORA allocated Return on Investment and Depreciation Expense based on assets in service after 7/1/2011.

(d) Lower Southampton phased into Return on Investment and Depreciation Expense on total rate base uniformly over 18 years starting in FY 2007.

**In the Matter of the Philadelphia Water
Department's Proposed Change in Water,
Wastewater and Stormwater Rates and Related
Charges**

Fiscal Years 2021-2022

Philadelphia Water Department

Black & Veatch Management Consulting, LLC

Schedule BV-3

Dated: February 11, 2020

Schedule REF #		Schedule Name
BV-3 Black & Veatch Schedules		
1	TABLE SW-1	STORMWATER: NON RESIDENTIAL MEAN GROSS AREA AND IMPERVIOUS AREA
2	TABLE SW-2	STORMWATER: DETERMINATION OF BILLABLE PARCELS
3	TABLE SW-3	STORMWATER: DETERMINATION OF BILLABLE GROSS AREA
4	TABLE SW-4	STORMWATER: DETERMINATION OF BILLABLE IMPERVIOUS AREA
5	TABLE SW-5	STORMWATER: CREDIT PROJECTIONS
6	TABLE SW-6	STORMWATER: SMIP/GARP PROGRAM ANNUAL COST ESTIMATES
7	TABLE SW-7	STORMWATER: SMIP/GARP PROGRAM AWARDED PROJECT PROJECTIONS
8	TABLE SW-8	STORMWATER: SMIP/GARP PROGRAM AS-BUILT & VERIFIED PROJECT PROJECTIONS
9	TABLE SW-9	STORMWATER: SMIP/GARP PROGRAM PROJECTED CREDIT IMPACT
10	TABLE SW-10	STORMWATER: PROJECTIONS OF BILLABLE PARCELS, GROSS AREA AND IMPERVIOUS AREA
11	TABLE SW-11	STORMWATER: GA AND IA MANAGED CREDIT PROJECTION FACTORS
12	TABLE SW-12	STORMWATER: PROJECTED NUMBER OF BILLABLE ACCOUNTS
13	TABLE SW-13	STORMWATER: SUMMARY OF STORMWATER COSTS
14	TABLE SW-14	STORMWATER: ESTIMATE OF GROSS AREA (GA) AND IMPERVIOUS AREA (IA) UNIT COSTS ADJUSTED FOR CUSTOMER ASSISTANCE PROGRAM (CAP)

Schedule REF #		Schedule Name
BV-3 Black & Veatch Schedules		
15	TABLE SW-15	STORMWATER: ESTIMATE OF CUSTOMER CLASS GA AND IA COST OF SERVICE ADJUSTED FOR CUSTOMER ASSISTANCE PROGRAM (CAP)
16	TABLE SW-16	STORMWATER: GA AND IA COST OF SERVICE RATES PRIOR TO DISCOUNT AND LAG FACTOR ADJUSTMENTS
17	TABLE SW-17	STORMWATER: STORMWATER BILLING and COLLECTION UNIT COSTS
18	TABLE SW-18	STORMWATER: STORMWATER ADJUSTED COSTS OF SERVICE (AFTER DISCOUNTS)
19	TABLE SW-19	STORMWATER: STORMWATER FINAL COST OF SERVICE RATES
20	TABLE SW-19A	STORMWATER: PROPOSED RATES FOR RESIDENTIAL SERVICES
20	TABLE SW-19B	STORMWATER: PROPOSED RATES FOR NON-RESIDENTIAL SERVICES

**TABLE SW-1: NON-RESIDENTIAL
MEAN GROSS AREA & IMPERVIOUS AREA (SF)**

Line No.	Description	FY 2021 MEAN GA	FY 2021 MEAN IA
1	All Residential Parcels	2,110	1,200
Non-Residential Sub-Classes			
	Non-Discount		
2	Water & Sewer	28,596	16,031
3	SW Only	8,562	2,529
	Discount: Senior, Education & Charities		
4	Water & Sewer	95,329	51,985
5	SW Only	23,021	13,472
	Discount: PHA		
6	Water & Sewer	56,353	30,970
7	SW Only	2,015	721
Condominiums Sub-Classes			
	Non-Discount		
8	Water & Sewer	15,996	11,499
9	SW Only	23,637	15,389
	Discount: Senior, Education & Charities		
10	Water & Sewer	40,951	19,489
11	SW Only	24,704	20,649
	Discount: PHA		
12	Water & Sewer	9,358	6,158
13	SW Only	-	-

FY 2021 Mean GA and Mean IA is based on fully transitioned stormwater parcel data. This dataset is based on 2015 aerial and infrared imagery obtained by the City of Philadelphia.

TABLE SW-2: DETERMINATION OF BILLABLE PARCELS

Line No.	Description	Fiscal Year Ending June 30,					
		2020	2021	2022	2023	2024	2025
Residential							
1	Initial Parcel Count	462,380	462,380	462,380	462,380	462,380	462,380
2	Less Residential Zero Rate ¹	0	1	1	1	2	2
3	Subtotal Residential	462,380	462,379	462,379	462,379	462,378	462,378
Non-Residential							
4	Initial Parcel Count	73,559	73,559	73,559	73,559	73,559	73,559
5	Less Non-Residential Zero Rate ²	39	77	116	155	193	232
6	Subtotal Non Residential	73,520	73,482	73,443	73,404	73,366	73,327
Condominium							
7	Initial Parcel Count	2,123	2,123	2,123	2,123	2,123	2,123
8	Less Stormwater Appeals Adjustments	-	-	-	-	-	-
9	Subtotal Condominium	2,123	2,123	2,123	2,123	2,123	2,123
10	TOTAL: System Billable Parcels	538,023	537,984	537,945	537,906	537,867	537,828

1: Comprises Community Gardens under Residential Category

2: Comprises Community Gardens under Non-Residential Category

TABLE SW-3: DETERMINATION OF BILLABLE GROSS AREA (sf)

Line		Fiscal Year Ending June 30,					
No.	Description	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Residential							
1	Initial GA	974,652,718	975,621,800	975,621,800	975,621,800	975,621,800	975,621,800
2	Less Residential Zero Rate ¹	2,424	4,847	7,271	9,695	12,119	14,542
3	Subtotal Residential Billable GA (sf)	974,650,294	975,616,953	975,614,529	975,612,105	975,609,681	975,607,258
Non-Residential							
4	Initial GA	1,433,455,727	1,433,455,727	1,433,455,727	1,433,455,727	1,433,455,727	1,433,455,727
5	Less Credits Adjustments	338,727,127	360,127,734	375,827,520	394,412,526	412,888,315	431,257,171
6	Less Stormwater Appeals	1,213,315	2,116,620	2,709,915	2,993,200	2,993,200	2,993,200
7	Less Non-Residential Zero Rate ²	486,035	972,071	1,458,106	1,944,141	2,430,176	2,916,212
8	Subtotal Non Residential Billable GA (sf)	1,093,029,250	1,070,239,302	1,053,460,186	1,034,105,860	1,015,144,036	996,289,145
Condominium							
9	Initial GA	35,297,417	35,297,417	35,297,417	35,297,417	35,297,417	35,297,417
10	Less Credits Adjustments	7,114,533	7,564,026	7,893,780	8,284,134	8,672,195	9,058,009
11	Subtotal Condominium Billable GA (sf)	28,182,884	27,733,391	27,403,637	27,013,283	26,625,222	26,239,408
12	TOTAL: System Billable GA (sf)	2,095,862,428	2,073,589,646	2,056,478,352	2,036,731,248	2,017,378,939	1,998,135,810

1: Comprises Community Gardens under Residential Category

2: Comprises Community Gardens in the Non-Residential Category.

TABLE SW-4: DETERMINATION OF BILLABLE IMPERVIOUS AREA (sf)

Line		Fiscal Year Ending June 30,					
No.	Description	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Residential							
1	Initial IA	553,534,361	554,856,000	554,856,000	554,856,000	554,856,000	554,856,000
2	Less Residential Zero Rate ¹	580	1,161	1,741	2,321	2,902	3,482
3	Subtotal Residential Billable IA (sf)	553,533,781	554,854,839	554,854,259	554,853,679	554,853,098	554,852,518
Non-Residential							
4	Initial IA	704,894,260	717,806,354	717,806,354	717,806,354	717,806,354	717,806,354
5	Less Credits Adjustments	102,387,884	113,057,738	118,147,098	126,060,780	133,867,559	141,569,643
6	Less Stormwater Appeals	909,135	1,585,980	2,030,535	2,242,800	2,242,800	2,242,800
7	Less Non-Residential Zero Rate ²	18,946	37,891	56,837	75,783	94,728	113,674
8	Subtotal Non Residential Billable IA (sf)	601,578,295	603,124,745	597,571,884	589,426,992	581,601,266	573,880,237
Condominium							
9	Initial IA	24,452,127	24,903,347	24,903,347	24,903,347	24,903,347	24,903,347
10	Less Credits Adjustments	4,404,236	4,863,202	5,082,122	5,422,530	5,758,341	6,089,647
11	Subtotal Condominium Billable IA (sf)	20,047,891	20,040,145	19,821,225	19,480,817	19,145,006	18,813,700
12	TOTAL: System Billable IA (sf)	1,175,159,967	1,178,019,729	1,172,247,368	1,163,761,487	1,155,599,371	1,147,546,455

1: Comprises Community Gardens under Residential Category

2: Comprises Community Gardens in the Non-Residential Category.

TABLE SW-5: CREDITS PROJECTIONS

Line		Fiscal Year Ending June 30,					
No.	Description	2020	2021	2022	2023	2024	2025
Parcels (#)							
1	IAR Practices	662	727	792	857	922	987
2	GA/IA Management Practices ¹	1,135	1,180	1,225	1,270	1,315	1,360
3	SMIP/GARP	149	196	217	238	259	280
4	Subtotal	1,946	2,103	2,234	2,365	2,496	2,627
Impervious Area (sf)							
5	IAR Practices	6,805,377	7,569,672	8,333,967	9,098,262	9,862,557	10,626,852
6	GA/IA Management Practices ¹	83,400,908	87,944,890	92,488,872	97,032,854	101,576,836	106,120,818
7	SMIP/GARP	16,543,786	22,328,786	22,328,786	25,274,604	28,108,908	30,834,022
8	Subtotal	106,750,071	117,843,348	123,151,625	131,405,720	139,548,301	147,581,692
Gross Area (sf)							
9	IAR Practices	-	-	-	-	-	-
10	GA/IA Management Practices ¹	325,007,541	341,037,089	357,066,637	373,096,185	389,125,733	405,155,281
11	SMIP/GARP	20,792,065	26,577,065	26,577,065	29,522,883	32,357,187	35,082,301
12	Subtotal	345,799,606	367,614,154	383,643,702	402,619,068	421,482,920	440,237,582

Notes

1: GA/IA Management Practices Credits include Surface and Non-Surface Discharge credits for IA managed and open space. Refer to Table SW-11 for additional information.

TABLE SW-6: SMIP/GARP PROGRAM - ANNUAL COST ESTIMATES

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Annual (Remaining) Grant Budget (a)	\$ -	\$ 25,000,000	\$ 25,000,000	\$ 25,000,000	\$ 25,000,000	\$ 25,000,000
2	PIDC Annual Administration Fee (b)		\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
3	Service Fee % (c)		2.0%	2.0%	2.0%	2.0%	2.0%
4	PIDC Estimated Service Fee Cost (Line 1 - Line 2) X Line 3	\$ -	\$ 498,000	\$ 498,000	\$ 498,000	\$ 498,000	\$ 498,000
5	TOTAL PIDC SMIP/GARP FEE (Line 2 + Line 4)	\$ -	\$ 598,000	\$ 598,000	\$ 598,000	\$ 598,000	\$ 598,000
6	Available Award Amount (Line 1 - Line 5)	\$ -	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000

Notes:

(a) Amount available in each fiscal year for new "Greened Acres" after accounting for amendments to previously awarded projects.

(b) Annual Administration Fee for SMIP/GARP Program is \$100K. Paid to PIDC each fiscal year.

(c) Service Fee is calculated as 2% of annual grant budget less the annual administration fee paid to PIDC.

TABLE SW-7: SMIP/GARP PROGRAM -AWARDED PROJECT PROJECTIONS

Line No.	Description	2020	2021	2022	2023	2024	2025
INPUT PARAMETERS							
1	Available Award Amount (a)	\$ -	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000
2	\$/Greened Acre	\$ 185,000	\$ 192,400	\$ 200,096	\$ 208,100	\$ 216,424	\$ 225,081
3	% of Award Amount	100%	100%	100%	100%	100%	100%
4	Acre conversion to square feet	43,560	43,560	43,560	43,560	43,560	43,560
5	Runoff Depth Managed per Greened Acre (inches)	1.5	1.5	1.5	1.5	1.5	1.5
Stormwater GA/IA Managed Area Projections - Anticipated Awards							
Anticipated SMIP/ GARP Projects (b)							
6	Anticipated Award Amount (Line 1 x Line 4)	\$ -	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000	\$ 24,402,000
7	Greened Acres (Line 6 / Line 2)	-	126.8	122.0	117.3	112.8	108.4
8	Gross Area to be Managed (sf)	-	3,682,272	3,542,880	3,406,392	3,275,712	3,147,936
9	Impervious Area to be Managed (sf)	-	3,682,272	3,542,880	3,406,392	3,275,712	3,147,936
Annual Totals							
10	GA to be Managed (sf)	-	3,682,272	3,542,880	3,406,392	3,275,712	3,147,936
11	IA to be Managed (sf)	-	3,682,272	3,542,880	3,406,392	3,275,712	3,147,936
12	Total Greened Acres	-	126.8	122.0	117.3	112.8	108.4

Notes:

(a) See Line 6 - Table SW-6: SMIP/GARP Program - Annual Cost Estimates

(b) Anticipated SMIP/GARP projects with a cost (\$185,000 in FY 2020 and escalated at 4% thereafter) per greened acre and with a 24 months average project completion time.

TABLE SW-8: SMIP/GARP PROGRAM AS-BUILT & VERIFIED PROJECT PROJECTIONS
As-Built & Verified Projections

Line No.	Description	2020	2021	2022	2023	2024	2025
Awarded Projects Pre-FY2021 (a)		23	27				
1	Greened Acres	78.62	250.54				
2	Gross Area Managed (sf)	2,283,125	7,275,682	-			
3	Impervious Area Managed (sf)	2,283,125	7,275,682	-			
Estimated Awarded Projects Post FY2021							
Anticipated New Projects (b)							
4	Greened Acres		-	-	126.8	122.0	117.3
5	Gross Area Managed (sf)		-	-	3,682,272	3,542,880	3,406,392
6	Impervious Area Managed (sf)		-	-	3,682,272	3,542,880	3,406,392
Annual Totals							
7	Greened Acres (Line 1 + Line 4 + Line 7)	78.6	250.5	-	126.8	122.0	117.3
8	Gross Area Managed (sf)	2,283,125	7,275,682	-	3,682,272	3,542,880	3,406,392
9	Impervious Area Managed (sf)	2,283,125	7,275,682	-	3,682,272	3,542,880	3,406,392
10	Cummulative Greened Acres	78.6	329.2	329.2	456.0	578.0	695.3

Notes:

(a) Completed Greened Acres based upon actuals from PWD's SMIP/GARP Grant Tracking.

FY2020 - FY 2021 estimated based upon projects awarded prior to FY21 but not yet completed/verified.

(b) From Table SW-7: SMIP/GARP Program - Project Projections. Projects are expected to be completed and verified within 24 months.

TABLE SW-9: SMIP/GARP PROGRAM PROJECTED CREDIT IMPACTS
Credit Impact Projections

Line No.	Description	2020	2021	2022	2023	2024	2025
INPUT PARAMETERS							
1	% of GA and IA Credits (a)	80%	80%	80%	80%	80%	80%
Annual Total Credits							
2	GA Managed Credit (sf) (Line 1 X Table SW-8: Line 8)	1,826,500	5,820,545	-	2,945,818	2,834,304	2,725,114
3	IA Managed Credit (sf) (Line 1 X Table SW-8: Line 9)	1,826,500	5,820,545	-	2,945,818	2,834,304	2,725,114
Cumulative Total Credits							
4	GA Managed Credit (sf)	1,826,500	7,647,045	7,647,045	10,592,863	13,427,167	16,152,281
5	IA Managed Credit (sf)	1,826,500	7,647,045	7,647,045	10,592,863	13,427,167	16,152,281

Notes:

(a) Assumes all SMIP/GARP projects will be granted Non-Surface Discharge Credit based upon 80% of managed IA and 80% of managed GA.

TABLE SW-10: PROJECTIONS OF BILLABLE PARCELS, GROSS AREA, AND IMPERVIOUS AREA

Line		Fiscal Year Ending June 30,					
No.	Customer Type	2020	2021	2022	2023	2024	2025
	Section A: Number of Billable Parcels (Projected)						
1	Residential	462,380	462,379	462,379	462,379	462,378	462,378
2	Non-Residential	73,520	73,482	73,443	73,404	73,366	73,327
3	Condominium	2,123	2,123	2,123	2,123	2,123	2,123
4	Total: Number of Billable Parcels	538,023	537,984	537,945	537,906	537,867	537,828
	Section B: Billable Gross Area (Projected - sf)						
5	Residential	974,650,294	975,616,953	975,614,529	975,612,105	975,609,681	975,607,258
6	Non-Residential	1,093,029,250	1,070,239,302	1,053,460,186	1,034,105,860	1,015,144,036	996,289,145
7	Condominium	28,182,884	27,733,391	27,403,637	27,013,283	26,625,222	26,239,408
8	Total: Billable Gross Area	2,095,862,428	2,073,589,646	2,056,478,352	2,036,731,248	2,017,378,939	1,998,135,810
	Section C: Billable Impervious Area (Projected - sf)						
9	Residential	553,533,781	554,854,839	554,854,259	554,853,679	554,853,098	554,852,518
10	Non-Residential	601,578,295	603,124,745	597,571,884	589,426,992	581,601,266	573,880,237
11	Condominium	20,047,891	20,040,145	19,821,225	19,480,817	19,145,006	18,813,700
12	Total: Billable Impervious Area	1,175,159,967	1,178,019,729	1,172,247,368	1,163,761,487	1,155,599,371	1,147,546,455

TABLE SW-11: GA/IA MANAGEMENT CREDIT PROJECTION FACTORS

Line No.	Description	Annual Increase in Parcels	Annual Average GA Credit	Annual Average IA Credit
	Credit Type- IAR		(sf)	(sf)
1	Impervious Area Reduction	65		11,758
	Credit Type-Non Surface Discharge		(sf)	(sf)
2	Area Managed	26	19,962	21,692
3	Open Space		86,253	
4	NPDES			
	Credit Type		(sf)	(sf)
5	Area Managed	19	200,228	207,035
6	Open Space		491,536	
7	NPDES		6,550	2,439

Annual Increase in parcels is applied to the annual average IA and GA credit to project credits for the Study Period.

Annual Increase in parcels and the annual average IA and GA credit are based on 5-year average (FY 2015-FY 2019) historical data provided by PWD.

TABLE SW-12: PROJECTED NUMBER OF BILLABLE ACCOUNTS

Line		Fiscal Year Ending June 30,					
No.	CUSTOMER TYPE	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
1	Residential	464,172	464,171	464,171	464,171	464,170	464,170
2	Non-Residential	80,529	80,491	80,452	80,413	80,375	80,336
3	Condominium	4,969	4,969	4,969	4,969	4,969	4,969
4	Total	549,670	549,631	549,592	549,553	549,514	549,475

TABLE SW-13: SUMMARY OF STORMWATER COSTS
(in thousands of dollars)
TEST YEAR FY 2021

Line No.	Cost Component	(1) Allocated Cost of Service	
1	Billing & Collection Costs	\$	12,859
2	Impervious Area and Gross Area Costs <i>(Excluding CAP Costs)</i>		174,349
3	Total	\$	187,208

**TABLE SW-14: ESTIMATE OF GROSS AREA (GA) AND
IMPERVIOUS AREA (IA) UNIT COSTS
ADJUSTED FOR CUSTOMER ASSISTANCE PROGRAM (CAP)**

Line No.	DESCRIPTION	(1)	(2)	(3)
		FY 2021		Total
		GA	IA	
		20%	80%	
1	Annual Cost of Service (\$ 1000) from GA & IA (Excluding CAP)	\$ 34,870	\$ 139,479	\$ 174,349
2	Stormwater Units of Service (500 Square Feet)	4,147,179	2,356,039	
3	System Annual Unit Cost (\$/500 Square Feet)	8.41	59.20	
4	System Monthly Unit Cost (\$/500 Square Feet)	0.70	4.93	

**TABLE SW-15: ESTIMATE OF CUSTOMER CLASS GA AND IA COST OF SERVICE
ADJUSTED FOR CUSTOMER ASSISTANCE PROGRAM (CAP)
(in thousands of dollars)**

		(1)	(2)	(3)
		FY 2021		
Line No.	DESCRIPTION	GA	IA	Total
RESIDENTIAL				
1	Residential Cost of Service (a)	\$ 16,407	\$ 65,696	\$ 82,103
NON-RESIDENTIAL				
2	Initial Non-Residential Cost of Service (b)	18,463	73,783	92,246
3	Adjustment for CAP (c)	401	1,602	2,003
4	Adjusted Non-Residential Cost of Service	18,864	75,385	94,249
5	Total GA & IA Cost of Service	\$ 35,271	\$ 141,081	\$ 176,352

(a) Calculated as Residential GA and IA square footage times the GA and IA unit cost.

(b) Total GA and IA Cost of Service LESS Residential cost of service.

(c) To recover Non-residential CAP Loss from the Non-residential stormwater customer class.

**TABLE SW-16: GA AND IA COST OF SERVICE RATES
PRIOR TO DISCOUNT AND LAG FACTOR ADJUSTMENTS**

Line No.	DESCRIPTION	(1)	(2)	(3)
		FY 2021		
		GA	IA	Total
1	Residential Monthly GA & IA Charge (a)	\$ 2.96	\$ 11.84	\$ 14.80
2	Non-Residential Monthly GA & IA Unit Cost (Adjusted for CAP)	0.72	5.04	
3	Impact of CAP on Non-Residential GA & IA Rate	0.02	0.11	

(a) Calculated based on Residential Mean GA (2,110 sf) and Mean IA (1,200 sf).

TABLE SW-17: STORMWATER BILLING and COLLECTION UNIT COSTS

Line No.	Description	Units	(1) FY 2021
1	Stormwater Billing & Collection Annual Revenue Requirements	\$	12,859,192
2	Monthly Billable Accounts: Residential	# Accounts	464,171
3	Non-Residential Cost Weighting Factor (a)		1.3
4	Weighted Monthly Billable Accounts: Non-Residential	# Accounts	111,098
5	Total Weighted Monthly Billable Accounts (Line 2 + Line 4)	# Accounts	575,269
6	Annual Billable Accounts: Residential (Line 2 x 12)	# Accounts	5,570,056
7	Weighted Annual Billable Accounts: Non-Residential (Line 4 x 12)	# Accounts	1,333,171
8	Total Weighted Annual Billable Accounts (Line 6 + Line 7)	# Accounts	6,903,227
9	Residential Billing & Collection Unit Cost per Billing Cycle	\$/Unit	1.86
10	Non-Residential Billing & Collection Unit Cost per Billing Cycle (Line 9 x Line 3)	\$/Unit	2.42

(a) A higher weighting factor is assigned to non-residential due to the additional time and effort needed to address billing issues and parcel data issues for non-residential class, as the charges are individually calculated for each parcel.

TABLE SW-18: STORMWATER ADJUSTED COSTS OF SERVICE (AFTER DISCOUNTS)
(in thousands of dollars)
TEST YEAR FY 2021

		(1)	(2)	(3)	(4)	(5)
Line No.	Customer Class	Allocated Cost of		Adjusted Cost of		Adjusted Cost
		Service (a)	Discounts	Service with Discounts	All (b)	of Service
Residential						
1	Non-Discount	\$ 86,919,403	\$ -	\$ 86,919,403	\$ 2,005,699	\$ 88,925,102
2	Discount - Non-PHA	4,715,364	(1,178,841)	3,536,523	81,607	3,618,129
3	Discount - PHA	844,101	(42,205)	801,896	18,504	820,400
Non-Residential						
4	Non-Discount	80,461,929		80,461,929	1,856,690	82,318,619
5	Discount - Non-PHA	11,803,839	(2,950,960)	8,852,879	204,284	9,057,163
6	Discount - PHA	1,414,712	(70,736)	1,343,976	31,013	1,374,989
Condominiums						
7	Non-Discount	2,945,086		2,945,086	67,959	3,013,045
8	Discount - Non-PHA	98,786	(24,697)	74,090	1,710	75,799
9	Discount - PHA	935	(47)	888	20	908
10	Total	\$ 189,204,154	\$ (4,267,485)	\$ 184,936,670	\$ 4,267,485	\$ 189,204,154

Notes:

(a) Non-Residential Customer cost of service includes the cost of CAP.

(b) Reflects current policy of recovering discounts from all customer classes.

**TABLE SW-19: STORMWATER FINAL COST OF SERVICE RATES
TEST YEAR FY 2021**

		(1)	(2)	(3)	(4)	(5)
Line No.	Service Type	Discount Recovery			Lag Factor	Proposed Rate
		Cost of Service Rate	Factor	Cost of Service Rate	Adjustment	
Billing & Collection Charge						
1	Residential	\$ 1.86	\$ 1.02	\$ 1.90	\$ 1.04	\$ 1.99
2	Non-Residential	2.42	1.02	2.47	1.04	2.58
3	Condominiums	2.42	1.02	2.47	1.04	2.58
IA/GA Charge						
4	Residential	14.80	1.02	15.14	1.04	15.81
	Non-Residential					
5	IA Charge	5.04	1.02	5.16	1.04	5.38
6	GA Charge	0.72	1.02	0.73	1.04	0.76
	Condominiums					
7	IA Charge	5.04	1.02	5.16	1.04	5.38
8	GA Charge	0.72	1.02	0.73	1.04	0.76

Notes: Non-Residential and Condominium have the same Billing & Collection and GA/IA rate.

TABLE SW-19A STORMWATER: PROPOSED RATES FOR RESIDENTIAL SERVICE

		(1)	(2)
		FY 2021	FY 2022
		Monthly	Monthly
Line No.	Description	Charge	Charge
STORMWATER MANAGEMENT SERVICE CHARGE			
1	Charge Per Parcel	\$ 15.81	\$ 17.03
BILLING AND COLLECTION CHARGE			
2	Charge Per Bill	\$ 1.99	\$ 2.12

TABLE SW-19B STORMWATER: PROPOSED RATES FOR NON-RESIDENTIAL SERVICE

		(1) FY 2021 Monthly Charge	(2) FY 2022 Monthly Charge
Line No.	Description		
STORMWATER MANAGEMENT SERVICE CHARGE			
1	Min Charge	\$ 15.81	\$ 17.03
2	GA (per 500 sf)	0.765	0.825
3	IA (per 500 sf)	5.383	5.790
BILLING AND COLLECTION CHARGE			
4	Charge Per Bill	\$ 2.58	\$ 2.76

**In the Matter of the Philadelphia Water
Department's Proposed Change in Water,
Wastewater and Stormwater Rates and Related
Charges**

Fiscal Years 2021-2022

Philadelphia Water Department

Black & Veatch Management Consulting, LLC

Schedule BV-4

Dated: February 11, 2020

Schedule REF #		Schedule Name
BV-4	Black & Veatch Schedules	
1	TABLE M-1	Summary of Miscellaneous Charges (Regular Hours)

TABLE M-1: Summary of Miscellaneous Charges (Regular Business Hours)

#	Miscellaneous Charge Description	PWD Section Reference	1 PWD Existing Charges	2 New - Calculated Charges	3 PWD Miscellaneous Charges (Proposed-FY 2021)	4 PWD Miscellaneous Charges (Proposed-FY 2022)
Section 6- Miscellaneous Water Charges						
4	Shut-Off and Restoration of Water Service	6.4				
	Restoration of Water Service	6.4 (c)				
	Operating service valve 2" and smaller service lines	6.4 (c) (1) (i)	\$60.00	\$101.07	\$100.00	\$100.00
	Operating service valve larger than 2" service lines	6.4 (c) (1) (ii)	\$200.00	\$444.95	\$280.00	\$395.00
	TAP Customers - Shut-off and Restoration of Water Service	Proposed 6.4 (e)				
	Shut off service for non-payment; and, payment is tendered at the time of the shut-off	6.4 (e) (1)	NA	NA	\$12.00	\$12.00
	Restore water service after termination for non-payment or violation of service requirements.	6.4 (e) (2)	NA	NA	\$12.00	\$12.00
9	Hydrant Permits	6.9				
	One Week	6.9 (b) (1)	\$525.00	\$859.47	\$735.00	\$860.00
10	Flow Tests	6.10	\$690.00	\$878.13	\$880.00	\$880.00
Section 7- Miscellaneous Sewer Charges						
5	Manhole Pump-out Permit	7.5	\$1,960.00	\$4,206.22	\$2,745.00	\$3,845.00
6	Trucked or Hauled Wastewater Permit	7.6	\$1,960.00	\$2,305.79	\$2,310.00	\$2,310.00
Section 8- Miscellaneous Stormwater Charges						
2	Stormwater Management Fee in Lieu	8.2				
	Exemption to Water Quality Requirement	8.2 (c) (1)	\$15.00	\$26.16	\$25.00	\$25.00
Other- Not in the Miscellaneous Charges Section (Section 3- Rates and Charges)						
1	Sewer Credit Application Fee	3.5 (c)	\$295.00	\$1,618.64	\$415.00	\$585.00
3	Stormwater Credit Application Fee Renewal	4.5 (f) (4)	\$100.00	\$1,238.76	\$140.00	\$200.00

Column Notes

- 1 From the PWD Regulations Attachment C-Rates and Charges Effective September 1, 2019 (FY 2020 Charges)
- 2 Calculated charges for work performed during Water Department's regular business hours (9:00 a.m. to 4:45 p.m.) (i.e. not including overtime)
- 3,4 Proposed FY 2021 -FY 2022 Miscellaneous charges.

**In the Matter of the Philadelphia Water
Department's Proposed Change in Water,
Wastewater and Stormwater Rates and Related
Charges**

Fiscal Years 2021-2022

Philadelphia Water Department

Black & Veatch Management Consulting, LLC

Schedule BV-5

Dated: February 11, 2020

PHILADELPHIA WATER DEPARTMENT

WATER AND WASTEWATER COST OF SERVICE REPORT FEBRUARY 2020



BLACK & VEATCH

TABLE OF CONTENTS

ACRONYMS AND GLOSSARY	1
1. EXECUTIVE SUMMARY	4
1.1 Revenue Under Existing Rates	4
1.2 Revenue Requirements.....	5
1.3 Proposed Combined System Adjustments	7
1.4 Cost of Service Allocations	8
1.5 Proposed Water, Sanitary Sewer and Stormwater Rates.....	10
1.6 The Combined System Operating Results	13
1.7 Recommendations	16
2. INTRODUCTION.....	18
2.1. Purpose	18
2.2. Scope of Work.....	19
2.3. General Assumptions	20
2.3.1. Revenue	20
2.3.2. Operating Expenses.....	22
2.3.3. Other Adjustments and Expenditures.....	23
2.3.4. Debt Service.....	24
2.3.5. Bond Covenants, Transfers, and Fund Balances	24
2.3.6. Capital Improvement Program.....	25
3. COMBINED SYSTEM SUMMARY	26
3.1. Cost of Service Study.....	26
3.2. Revenue.....	27
3.2.1. Other Operating Income	27
3.2.2. Non-Operating Income.....	28
3.2.3. Tiered Assistance Program Rate Rider Surcharge.....	28
3.3. Revenue Requirements.....	28
3.3.1. O&M Expenses	29
3.3.2. Bond Covenants, Transfers, and Fund Balances	30
3.3.3. Capital Improvements	31
3.3.4. Debt Service.....	32
3.4. Sources and Uses of Funds	33
3.5. Summary of Revenue and Revenue Requirements.....	35
3.6. Compliance with General Bond Ordinance and Rate Ordinance Requirements	39
3.7. Proposed Rates	42

3.7.1. Residential and Senior Citizen Typical Bills	43
3.7.2. Non-Residential Typical Bills.....	44
4. WATER SYSTEM REVENUE AND REVENUE REQUIREMENTS.....	46
4.1. Water Revenue	46
4.1.1. Customers and Growth	46
4.1.2. Billed Volume.....	47
4.1.3. Bill Tabulation	48
4.1.4. Water Revenue.....	48
4.1.5. Tiered Assistance Program Rate Rider Surcharge.....	52
4.1.6. Other Operating Revenues.....	52
4.2. Water Revenue Requirements.....	53
4.2.1. O&M Expenses	53
4.2.2. Fire Protection	54
4.2.3. Debt Service.....	54
4.2.4. Capital Improvements	55
4.2.5. Capital Flow of Funds	56
4.3. Water System Summary of Revenue and Revenue Requirements.....	57
4.4. Projected Water System Operating Results	57
5. WATER SYSTEM COST OF SERVICE ALLOCATIONS.....	60
5.1. General	60
5.2. Identification of Net Revenue Requirements by Cost Category	61
5.3. Cost of Service to be Allocated	63
5.3.1. Overall Water System.....	63
5.3.2. Wholesale Water	63
5.4. Functional Cost Components.....	64
5.5. Allocation to Cost Components	65
5.5.1. Base, Maximum Day, and Maximum Hour	65
5.5.2. Units of Service.....	66
5.6. Allocation of O&M Expenses	70
5.6.1. Retail.....	70
5.6.2. Wholesale	74
5.7. Allocation of Net Plant Investment.....	74
5.7.1. Retail.....	74
5.7.2. Wholesale	76
5.8. Allocation of Depreciation Expense	76

5.9. Wholesale Cost of Service Allocations	78
5.10. Distribution of Costs to Customer Types	78
6. WATER SYSTEM RATE DESIGN	83
6.1. Proposed Retail Water Rates	83
6.1.1. General Service	83
6.1.2. Fire Protection	84
7. WASTEWATER SYSTEM REVENUE AND REVENUE REQUIREMENTS	85
7.1. Wastewater Revenue	85
7.1.1. Stormwater Services Background	85
7.1.2. Customers and Growth	86
7.1.3. Sanitary Sewer Retail Billed Volume	88
7.1.4. Wholesale Volume, Capacity, and Strength Loadings	89
7.1.5. Stormwater Impervious and Gross Area	90
7.1.6. Bill Tabulation	94
7.1.7. Wastewater Revenue	94
7.1.8. Tiered Assistance Program Rate Rider Surcharge	98
7.1.9. Other Revenue and Adjustments	99
7.2. Wastewater Revenue Requirements	99
7.2.1. O&M Expenses	99
7.2.2. Debt Service	100
7.2.3. Capital Improvements	101
7.2.4. Capital Flow of Funds	102
7.3. Wastewater System Summary of Revenue and Revenue Requirements	103
7.4. Projected Wastewater System Operating Results	104
8. WASTEWATER SYSTEM COST OF SERVICE ALLOCATIONS	106
8.1. General	106
8.2. Cost of Service to be Allocated	106
8.2.1. Overall Wastewater System	106
8.2.2. Wholesale Wastewater	107
8.3. Functional Cost Components	108
8.3.1. Wastewater System Facilities	108
8.3.2. Wastewater System Design Basis	108
8.3.3. Units of Service	108
8.4. Allocation to Cost Components	113
8.5. Allocation of O&M Expenses	113

8.5.1. Retail	113
8.5.2. Wholesale	130
8.6. Allocation of Net Plant Investment.....	131
8.6.1. Retail	132
8.6.2. Wholesale	137
8.7. Allocation of Depreciation Expense	138
8.8. Wholesale Cost of Service Allocations	138
8.9. Distribution of Costs to Customer Types	139
8.9.1. Infiltration/Inflow Adjustments.....	140
8.9.2. Fee Discounts	145
8.10.Stormwater Cost of Service Allocations	145
8.10.1. Test Year Revenue Requirements.....	145
8.10.2. Allocation to Customer Types.....	146
9. WASTEWATER SYSTEM RATE DESIGN.....	151
9.1. Proposed Sanitary Sewer Rates	152
9.2. Proposed Stormwater Rates	154

LIST OF TABLES

Table 1-1	Projected Receipts Under Existing Rates	5
Table 1-2	Combined System Revenue Requirements	6
Table 1-3	Required Base Rate Service Revenue Adjustments.....	7
Table 1-4	Required Total Service Revenue Adjustments	7
Table 1-5	Test Year 1 Distribution of Water Cost of Service to Customer Types [Schedule BV-1: Table W-17]	8
Table 1-6	Test Year 1 Distribution of Sanitary Sewer Cost of Service to Customer Types	9
Table 1-7	Test Year 1 Distribution of Stormwater Cost of Service to Customer Types	9
Table 1-8	Existing and Proposed Retail Rates (excluding TAP-R rates)	11
Table 1-9	Typical Bill Impacts	12
Table 1-10	Projected Revenue and Revenue Requirements: Base Rates and TAP-R Rates [Schedule BV-1: Table C-1].....	14
Table 1-11	General Bond Ordinance Covenants – Performance Metrics [Schedule BV-1: Table C- 2].....	15
Table 1-12	Rate Board Ordinance Requirements – Performance Metrics [Schedule BV-1: Table C- 2].....	16
Table 2-1	Projected Collection Factors [Schedule BV-6: WP-1, Table 2]	21
Table 2-2	Projected Miscellaneous and Contra Revenues [Schedule BV-6: WP-1, Table 3]	21
Table 2-3	Annual Escalation Factors [Schedule BV-6: WP-1, Table 5]	22
Table 2-4	Additional Adjustments for Projected Operating Expenses [Schedule BV-6: WP-1, Table 6]	23
Table 3-1	Projected Receipts Under Existing Rates [Schedule BV-1: Table C-3].....	27
Table 3-2	O&M Expense Categories	29
Table 3-3	Projected Operation and Maintenance Expense [Schedule BV-1: Table C-6]	30
Table 3-4	Water and Wastewater Funds	30
Table 3-5	Combined System Performance Targets	31
Table 3-6	Projected Capital Program Budget and Annual Expenditures [Schedule BV-1: Table 7]	32
Table 3-7	Summary of Existing and Proposed Debt Service [Schedule BV-1: Table C-9].....	33
Table 3-8	Projected Flow of Funds – Construction Fund & Debt Reserve Account [Schedule BV- 1: Table C-8]	34
Table 3-9	Projected Revenue and Revenue Requirements: Base Rates Only [Schedule BV-1: Table C-1A]	36
Table 3-10	Projected Revenue and Revenue Requirements: TAP-R Rates Only [Schedule BV-1: Table C-1B]	37
Table 3-11	Projected Revenue and Revenue Requirements: Base Rates and TAP-R Rates [Schedule BV-1: Table C-1].....	38

Table 3-12	Projected Rate Stabilization Fund and Covenants Metrics Performance: Base Rates and TAP-R Rates [Schedule BV-1: Table C-2]	41
Table 3-13	Proposed FY 2021 and FY 2022 Rates	43
Table 3-14	Comparison of Typical Bill for Residential Customers Under Existing and Proposed Rates [Schedule BV-1: Table C-4]	44
Table 3-15	Comparison of Typical Bill for Non-Residential Customers Under Existing and Proposed Rates [Schedule BV-1: Table C-5]	45
Table 4-1	Water System Customer Types	46
Table 4-2	Number of Customer Accounts	47
Table 4-3	Historical Usage per Account for General Service Customers with 5/8-inch meters [Schedule BV-6: WP-1, Table 1]	47
Table 4-4	Projected Billed Volumes	48
Table 4-5	Existing FY 2020 Water Rates	49
Table 4-6	Current Customer Discounts	50
Table 4-7	Billings Under Existing Rates	50
Table 4-8	Projected Water Receipts Under Existing Rates [Schedule BV-6: Table W-1]	52
Table 4-9	Other Projected Receipts [Schedule BV-1: Table W-1A]	53
Table 4-10	Projected O&M Expense [Schedule BV-1: Table W-2]	54
Table 4-11	Summary of Existing and Proposed Water System Debt Service [Schedule BV-1: Table W-5]	55
Table 4-12	Projected Water System CIP [Schedule BV-1: Table W-3]	56
Table 4-13	Projected Flow of Funds – Water: Construction Fund & Debt Reserve Account [Schedule BV-1: Table W-4]	57
Table 4-14	Projected Water System Revenue and Revenue Requirements: Base Rates [Schedule BV-1: Table W-6]	58
Table 5-1	Water Estimated Test Year 1 Cost of Service [Schedule BV-1: Table W-7]	63
Table 5-2	Equivalent Meter and Bill Ratios [Schedule BV-1: Table W-12]	67
Table 5-3	Test Year 1 Retail Units of Service [Schedule BV-1: Table W-11]	69
Table 5-4	Allocation of Test Year 1 O&M Expense [Schedule BV-1: Table W-10]	71
Table 5-5	Allocation of Test Year 1 Net Plant Investment to Functional Cost Components [Schedule BV-1: Table W-8]	75
Table 5-6	Allocation of Test Year 1 Depreciation Expense [Schedule BV-1: Table W-9]	77
Table 5-7	Summary of Test Year 1 Cost of Service Allocated to Aqua Pennsylvania [Schedule BV-1: Table W-13A]	78
Table 5-8	Test Year 1 Retail Unit Costs of Service [Schedule BV-1: Table W-14]	79
Table 5-9	Test Year 1 Distribution of Costs of Service by Functional Cost Component to Customer Types [Schedule BV-1: Table W-15]	80

Table 5-10	Test Year 1 Adjusted Cost of Service [Schedule BV-1: Table W-16]	81
Table 5-11	Comparison of Test Year 1 Cost of Service and Adjusted Cost of Service with Revenues Under Existing Rates [Schedule BV-1: Table W-17]	82
Table 6-1	Proposed FY 2021 and FY 2022 General Service Water Rates [Schedule BV-1: Table W-18]	84
Table 6-2	Proposed Rates for Fire Protection [Schedule BV-1: Table W-19 and W-19A]	84
Table 7-1	Wastewater System Customer Types	86
Table 7-2	Number of Customer Accounts	87
Table 7-3	Number of Billable Parcels [Schedule BV-3: Table SW-2]	88
Table 7-4	Retail Billed Volumes	88
Table 7-5	Projections for Wholesale Customer Volumes, Capacities, and Strength Loadings	89
Table 7-6	FY 2021 Mean GA and Mean IA [Schedule BV-3: Table SW-1]	91
Table 7-7	Determination of Billable Gross Area [Schedule BV-3: Table SW-3]	92
Table 7-8	Determination of Billable Impervious Area [Schedule BV-3: Table SW-4]	93
Table 7-9	Existing Sanitary Sewer and Stormwater Rates	95
Table 7-10	Billings Under Existing Rates	96
Table 7-11	Projected Receipts Under Existing Sanitary Sewer Rates [Schedule BV-1: Table WW-1A]	97
Table 7-12	Projected Receipts Under Existing Stormwater Rates [Schedule BV-1: Table WW-1B]	97
Table 7-13	Projected Receipts for Wholesale Contract Customers	98
Table 7-14	Projected Receipts under Existing Rates [Schedule BV-1: Table WW-1]	98
Table 7-15	Other Revenue Projected Receipts [Schedule BV-1: Table WW-1C]	99
Table 7-16	Projected O&M Expenses [Schedule BV-1: Table WW-2]	100
Table 7-17	Summary of Existing and Proposed Debt Service [Schedule BV-1: Table WW-5]	101
Table 7-18	Projected Wastewater System CIP [Schedule BV-1: Table WW-3]	102
Table 7-19	Projected Flow of Funds – Wastewater: Construction Fund & Debt Reserve Account [Schedule BV-1: Table WW-4]	103
Table 7-20	Projected Revenue and Revenue Requirements: Base Rates [Schedule BV-1: Table WW-6]	104
Table 8-1	Estimated Wastewater System Test Year 1 Cost of Service [Schedule BV-1: Table WW-7]	107
Table 8-2	Test Year 1 Sanitary Sewer Units of Service [Schedule BV-1: Table WW-8]	109
Table 8-3	Test Year 1 Wholesale Customer Units of Service [Schedule BV-2: Table WH-3]	110
Table 8-4	Estimated Average Wastewater Strengths for Wholesale Customers [Schedule BV-2: Table WH-4]	112
Table 8-5	Test Year 1 Allocation of O&M to Functional Cost Components [Schedule BV-1: Table WW-10]	114

Table 8-6	Test Year 1 Allocation of O&M for the Collection System [Schedule BV-1: Table WW-10A]	117
Table 8-7	Test Year 1 Allocation of O&M for the Northeast WPC Plant [Schedule BV-1: Table WW-10B]	118
Table 8-8	Test Year 1 Allocation of O&M for the Southeast WPC Plant [Schedule BV-1: Table WW-10C]	121
Table 8-9	Test Year 1 Allocation of O&M for the Southeast WPC Plant [Schedule BV-1: Table WW-10D]	125
Table 8-10	Summary of Test Year 1 Plant Investment Allocations to Functional Cost Components [Schedule BV-1: Table WW-9]	132
Table 8-11	Test Year 1 Allocation of Plant Investment for the Northeast WPC Plant [Schedule BV-1: Table WW-9A]	134
Table 8-12	Test Year 1 Allocation of Plant Investment for the Southwest WPC Plant [Schedule BV-1: Table WW-9B]	135
Table 8-13	Test Year 1 Allocation of Plant Investment for Southeast WPC Plant [Schedule BV-1: Table WW-9C]	136
Table 8-14	Summary of Test Year 1 Allocated Cost of Service for Wholesale Customers [Schedule BV-2: Table WH-29]	139
Table 8-15	Test Year 1 Retail Unit Costs of Service [Schedule BV-1: Table WW-11 and Table WW-12]	141
Table 8-16	Wastewater Retail Costs of Service [Schedule BV-1: Table WW-13]	143
Table 8-17	Adjusted Costs of Service After Allocation of I/I and Discounts [Schedule BV-1: Table WW-14]	144
Table 8-18	Summary of Test Year 1 Stormwater Costs [Schedule BV-3: Table SW-13]	146
Table 8-19	Test Year 1 Estimate of GA and IA Unit Costs Adjusted for CAP [Schedule BV-3: Table SW-14]	147
Table 8-20	Test Year 2021 Estimate of Customer Type GA and IA Cost of Service Adjusted for CAP [Schedule BV-3: Table SW-15]	148
Table 8-21	Test Year 1 Estimate of Customer Type GA and IA Cost of Service Rates Prior to Discount and Lag Factor Adjustments [Schedule BV-3: Table SW-16]	148
Table 8-22	Test Year 1 Stormwater Billing and Collection Unit Costs [Schedule BV-3: Table SW-17]	148
Table 8-23	Test Year 1 Stormwater Adjusted Costs of Service After Discounts [Schedule BV-3: Table SW-18]	149
Table 8-24	Test Year 1 Distribution of Sanitary Sewer Cost of Service to Customer Types	150
Table 8-25	Test Year 1 Distribution of Stormwater Cost of Service to Customer Types	150
Table 9-1	Inside City Retail Service Unit Costs of Service for Rate Design [Schedule BV-1: Table WW-15]	152

Table 9-2	Development of Cost of Service Monthly Service Charge for 5/8-inch Meter Customers [Schedule BV-1: Table WW-16]	153
Table 9-3	Development of Cost of Service Quantity Charge for Normal Strength Sanitary Wastewater [Schedule BV-1: Table WW-17]	153
Table 9-4	Proposed FY 2021 and FY 2022 General Service Sanitary Sewer Rates [Schedule BV-1: Table WW-18]	154
Table 9-5	Development of Test Year 1 Stormwater Cost of Service Rates [Schedule BV-3: Table SW-19]	155
Table 9-6	Proposed FY 2021 and FY 2022 Residential Stormwater Rates [Schedule BV-3: Table SW-19A]	155
Table 9-7	Proposed FY 2021 and FY 2022 Non-Residential Stormwater Rates [Schedule BV-3: Table SW-19B]	155

LIST OF FIGURES

Figure 1-1	Combined Rate Stabilization and Residual Fund Balance Performance	16
Figure 3-1	Elements of a Cost of Service Study	26
Figure 3-2	General Flow of Funds	31
Figure 4-1	Projecting Revenues Under Existing Rates	49
Figure 4-2	Sample Calculation for Application of Collection Factors to Billings for Derivation of Receipts	51
Figure 5-1	Multi-Layer Allocation of Costs	60
Figure 5-2	Seven Analytical Steps for Determining the Cost of Service	61
Figure 5-3	Functional Cost Centers	61
Figure 5-4	Relationship Between Cash-Needs Basis and Utility-Basis	62
Figure 5-5	Functional Cost Components	64
Figure 5-6	Cost of Service Steps 5 through 7	70
Figure 8-1	Wastewater Cost of Service Steps	106

ACRONYMS AND GLOSSARY

ADD	Average daily demand
AMI	Advanced Metering Infrastructure
AWWA	American Water Works Association
Base Rates	Rate revenues that exclude revenue losses associated with providing TAP discounts and the TAP-R surcharge revenues.
Base-Extra Capacity Method	A cost allocation method that considers base costs (O&M expenses, capital costs), extra capacity costs (additional costs for maximum day and maximum hour demands), customer costs (meter maintenance and reading, billing, collection, accounting), and fire protection costs (hydrants, water towers, oversized mains, pumps) to determine rates for various customer types
Billing Year	All payments associated with a given fiscal year's billing and received within the 12 months following the beginning of the fiscal year.
Billing Year Plus 1	All payments associated with a given fiscal year's billing and received within 13-24 months following the beginning of the fiscal year. For this Study, the billing database reflects available data from FY 2012 to FY 2019.
Billing Year Plus 2 and Beyond	All payments associated with a given fiscal year's billing and received after 24 months following the beginning of the fiscal year. For this Study, the billing database reflects available data from FY 2012 to FY 2019.
Black & Veatch	Black & Veatch Management Consulting, LLC
BOD	Biological oxygen demand
CAP	Customer Assistance Program
cfs	Cubic feet per second
City Charter	Philadelphia Home Rule Charter
COA	Consent Order Agreement
Collection Factors	Represent the multi-year payment pattern for Billing Year, Billing Year 1, and Billing Year 2 and Beyond. For this Study, the billing database reflects available data from FY 2012 to FY 2019.
Combined System	The City of Philadelphia's Water and Wastewater Systems
Community Gardens	Parcels, as defined by, Section 19-1603, which receive a 100 percent discount on all stormwater management service charges once approved.
DELCORA	Delaware County Regional Water Authority
FPL	Federal Poverty Level
GA	Gross Area

General Bond Ordinance	The Restated General Water and Wastewater Revenue Bond Ordinance of 1989, approved by the Mayor on June 24, 1993, as supplemented and amended
gpm	Gallons per minute
Hand Bill	Hand-billed accounts are “H”-coded customers in the Basis2 billing system that receive surcharge and/or sewer credits. The adjustments to these accounts are made manually.
I/I	Infiltration/Inflow
IA	Impervious Area
IAR	Impervious Area Reduction
L&I	License and Inspection
Lag Factor	Factor that recognizes the fact that there will be a proration of billings between the existing and proposed rates during the first month following the effective date of the rate increase, as well as the fact that the fiscal year billings will not be fully collected within that fiscal year.
LTCP	Long-Term Control Plan
M1 Manual	AWWA's Principles of Water Rates, Fees, and Charges” Manual of Water Supply Practices M1. The M1 Manual is the utility industry's guidance manual for water rate-making.
Mcf	Thousand cubic feet
mg/l	Milligrams per liter
MGD	Million gallons per day
MoP 27	WEF's Financing and Charges for Wastewater Systems Manual of Practice 27. This is the wastewater industry's manual for sewer rate-making.
MOU	Memorandum of Understanding
O&M	Operation and Maintenance
PennVest	Pennsylvania Infrastructure Investment Authority
PHA	Philadelphia Housing Authority
PPI	Producer Price Index
R&R	Renewal and Replacement
Rate Compression Factor	Factor that recognizes impact of not receiving a full year's worth of revenues due to an effective rate implementation date that is not on the first day of the fiscal year.
Rate Ordinance	Refers to Section 13-101(4)(a) of the Philadelphia Code
Retail	All customers excluding wholesale
RSF	The Rate Stabilization Fund
SMIP/GARP	Stormwater Management Incentive Program/Greened Acre Retrofit Program
SS	Suspended solids
SWMS	Stormwater management service charge

TAP	Tiered Assistance Program
TAP-R	TAP Rate Rider Surcharge Rate included with the water and sewer quantity charges
The System	The City of Philadelphia's Water and Wastewater Systems
TY	Test Year
UESF	Utility Emergency Services Fund
US	United States
Utility-Basis	Restatement of annual revenue requirements in terms of O&M, depreciation, and return on rate base
Water Fund	An accounting convention established pursuant to the Charter for accounting for the assets, liabilities, revenues, expenses, and Rate Covenant compliance for the City's water and wastewater systems. The operations of the Water Department are accounted for in the Water Fund, which is an enterprise fund of the City.
WEF	Water Environment Federation
WRB	Water Revenue Bureau

1. EXECUTIVE SUMMARY

This Water and Wastewater Cost of Service Report (the “Report”) is prepared on behalf of the Water Department in connection with its application to increase rates and charges for water, sanitary sewer and stormwater service for fiscal year (“FY”) 2021 and FY 2022 (the “Rate Period”). Revenue and revenue requirements are projected for FY 2020 through FY 2025 (the “Study Period”). Proposed rate schedules for water, sanitary sewer and stormwater services are presented for the Rate Period.

The Report assesses the Water and Wastewater Systems’ (together, the “System” or “Combined System”) ability to meet current and future anticipated financial obligations, develops a financial plan and proposes water, sanitary and stormwater rates for FY 2021 and FY 2022 sufficient to fund operations and capital financing needs for the Combined System. The forecast consists of implementing annual revenue increases and leveraging available funds from the Water Department’s Rate Stabilization Fund (“RSF”) during the Study Period. The financing plan requires annual Combined System Service Revenue increases from Base Rates ranging from 6.20 percent to 6.75 percent during the Study Period.

This Report includes a cost of service analysis, conducted using cost causative approaches endorsed by industry recognized manuals of practices, which produce cost of service allocations recognizing the projected customer service requirements. Proposed rates are designed in accordance with allocated cost of service and local policy considerations. For the analyses defined and presented herein, FY 2021 and FY 2022 serve as the fully projected test years (the “Test Years” or “TYs”) for allocating costs to customer types and for designing the base rate¹ schedules.

1.1 REVENUE UNDER EXISTING RATES

In FY 2019, the Water System provided treated water services to approximately 498,000 customer accounts (excluding private fire and fire hydrants). The total number of Water System customer accounts are projected to remain stable during the Study Period. However, the projected water consumption is projected to decrease from approximately 6.0 million thousand cubic feet (“Mcf”) in FY 2020 to 5.7 million Mcf in FY 2025, which reflects an average annual decrease of 0.9 percent.

In FY 2019, the Wastewater System provided sanitary sewer services to approximately 489,000 customer accounts. The total number of Wastewater System customer accounts are projected to remain stable during the Study Period. However, the projected billed water volume for sanitary sewer service is projected to decrease over this period from approximately 10.3 million Mcf in FY 2020 to 10.0 million Mcf in FY 2025, which reflects an average annual decrease of 0.6 percent.

The Wastewater System also includes Stormwater services. In FY 2019, the Wastewater System provided stormwater services to approximately 549,700 accounts. A slight decrease is projected in the number of stormwater accounts during the Study Period to reflect an increase in the number of

¹ Excluding Tiered Assistance Program (TAP) Rate Rider Surcharges.

community gardens². The number of stormwater accounts is projected to decrease from approximately 549,700 accounts in FY 2020 to approximately 549,500 accounts in FY 2025. Projections of billable impervious and gross areas for the Study Period reflect the following adjustments:

- **Updated Billing Data Implementation.** Based upon the updated Stormwater Billing Data, the overall impervious area (“IA”) has increased 86 million square feet compared to the prior data set. Most of this increase in IA is attributable to residential parcels, which reflect a total increase in IA of 72 million square feet. Overall non-residential impervious area increased 14 million square feet. Minimal changes to gross area (“GA”) were observed.
- **Credits.** Projections of billable IA and GA reflect an average annual reduction of 18.7 million square feet of gross area per year and 7.9 million square feet of impervious area per year for additional credits.

Revenues under existing rates are projected based on previously adopted rates for FY 2019 and FY 2020, projections of relative billing statistics (customer accounts by service, billed water and sewer volumes, and billable impervious and gross areas), and projected collection factors. Table 1-1 summarizes the projection of revenue under existing rates. During the Study Period, revenues under existing rates are projected to decrease from \$715.4 Million in FY 2020 to \$690.7 Million in FY 2025.

Table 1-1 Projected Receipts Under Existing Rates

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
1	Water Sales Receipts	\$ 276,970	\$ 273,936	\$ 271,454	\$ 269,033	\$ 266,630	\$ 264,236
2	Wastewater Sales Receipts						
3	Sanitary Sewer	264,188	262,733	261,052	259,320	257,582	255,852
4	Stormwater	174,207	175,178	174,455	173,202	171,922	170,648
5	Subtotal Wastewater Receipts	438,395	437,910	435,507	432,522	429,503	426,500
6	Total Water & Wastewater Receipts	\$ 715,366	\$ 711,846	\$ 706,961	\$ 701,554	\$ 696,133	\$ 690,736

In addition to revenues under existing rates, the Water Department receives other operating and non-operating income. During the Study Period, other operating and non-operating revenues average \$31.8 Million annually. In FY 2020, a projected release from the debt service reserve will provide an additional \$18.5 Million.

1.2 REVENUE REQUIREMENTS

Costs of service recovered from water and wastewater service charges include operation and maintenance (“O&M”) expenses, debt service payments, and transfers for cash funded capital and reserves.

Operating expenses consist of all costs of the Water Department necessary and appropriate for the operation, maintenance, and administration of the Water and Wastewater Systems during each year.

² Community Gardens, as defined by, Section 19-1603 of the Philadelphia code, are parcels which receive a 100 percent discount on all stormwater management service charges once approved.

Projections of operating expenses include expenses such as personal services, purchased services including power, materials and supplies, equipment, pensions and benefits, as well as indemnities and liquidated encumbrances. Projected O&M expenses for the Water System will increase from \$210.7 Million in FY 2020 to \$250.0 Million in FY 2025. The projected O&M expenses for the Wastewater System show an increase from \$307.5 Million in FY 2020 to \$358.7 Million in FY 2025. On a Combined System basis, the O&M expenses increase from \$518.3 Million in FY 2020 to \$608.7 Million in FY 2025.

Annual debt service, including principal and interest payments, for the Combined System is approximately \$206.9 Million for FY 2020. The Water Department anticipates issuing water and wastewater revenue bonds during each year of the Study Period (beginning in FY 2021), in the following amounts: \$400 Million, \$445 Million, \$480 Million, \$525 Million, and \$520 Million, respectively. In addition, the Water Department anticipates receiving a PennVest loan for the Torresdale Pump Station Rehabilitation project. Because of the projected capital needs, annual debt service payments on existing and projected revenue bonds increase from \$206.9 Million in FY 2020 to \$282.6 Million in FY 2025.

During the Study Period, in accordance with the City's Restated General Water and Wastewater Revenue Bond Ordinance of 1989, as amended (the "General Bond Ordinance"), the Water Department is projected to make transfers from the Revenue Fund to the Capital Account and Residual Fund. The Capital Account Deposit is projected to increase from \$27.1 Million in FY 2020 to \$39.8 Million in FY 2025. The projected end of year transfers from the Revenue Fund to the Residual Fund, attributable to Base Rates are projected to increase from \$35.1 Million in FY 2020 to \$45.0 Million in FY 2025. In addition, during the Study Period, the Water Department would leverage nearly \$187.3 Million in RSF balance to help manage revenue adjustments as well as meet overall revenue requirements.

Table 1-2 summarizes the Combined System Revenue Requirements during the Study Period.

Table 1-2 Combined System Revenue Requirements

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
Revenue Requirements							
1	Operations & Maintenance Expense Existing Bond Debt Service	\$ 518,271	\$ 534,165	\$ 552,364	\$ 571,485	\$ 590,284	\$ 608,717
2	Revenue Bonds	206,897	188,351	178,368	174,815	154,534	154,598
3	Proposed Bond Debt Service	0	7,000	28,788	59,345	92,657	128,031
4	Capital Account Deposit	27,065	29,230	31,569	34,094	36,822	39,767
5	Residual Fund Deposit	35,055	29,416	30,625	36,200	37,394	45,047
6	Deposit (From)/To Rate Stabilization Fund	(21,600)	(8,200)	(900)	(9,200)	4,500	(7,700)
7	Total	765,687	779,962	820,813	866,740	916,191	968,461
Deductions of Funds from Other Sources							
8	Other Operating Revenue	(47,656)	(29,445)	(29,365)	(29,280)	(29,196)	(29,112)
9	Interest Income	(2,665)	(2,567)	(2,576)	(2,524)	(2,589)	(2,565)
10	COST OF SERVICE TO BE DERIVED FROM RATES	\$ 715,366	\$ 747,951	\$ 788,872	\$ 834,935	\$ 884,406	\$ 936,783

1.3 PROPOSED COMBINED SYSTEM ADJUSTMENTS

Table 1-3 summarizes the overall annual revenue increases required from Base Rates during the Study Period. The rates proposed for the Water System are based on an increase of 5.50 percent in both FY 2021 and FY 2022. The rates proposed for the Wastewater System are based on an increase of 6.64 percent in FY 2021 and 6.63 percent in FY 2022. The aggregate increase for the Combined System is 6.20 percent for each year. As discussed below, the proposed increases are needed to meet future revenue requirements, maintain/improve System infrastructure, meet targeted debt service coverage ratios, maintain fund balances and other relevant financial metrics and ordinance obligations.

Table 1-3 Required Base Rate Service Revenue Adjustments

ADDITIONAL BASE RATE REVENUE REQUIRED			
FISCAL YEAR	WATER	WASTEWATER	COMBINED
2021	5.50%	6.64%	6.20%
2022	5.50%	6.63%	6.20%
2023	10.90%	4.23%	6.75%
2024	10.90%	4.07%	6.75%
2025	10.90%	3.90%	6.75%

Table 1-4 summarizes the additional service revenue required for the Combined System during the Study Period in the context of overall system revenues including both Base Rates and TAP-R rates³. This table summarizes the overall level of total service revenue adjustments required to meet operating and capital financing needs of the Combined System as well as all other legal and financial requirements discussed herein.

Table 1-4 Required Total Service Revenue Adjustments

ADDITIONAL SERVICE REVENUE REQUIRED	
FISCAL YEAR	COMBINED
2021	6.11%
2022	6.12%
2023	6.71%
2024	6.72%
2025	6.73%

³ Overall Additional Service Revenue Required reflects TAP-R revenues based upon existing rates, which are subject to a separate annual reconciliation proceeding.

These revenue adjustments, coupled with planned withdrawals from the RSF, will allow the Water Department to meet the overall revenue and revenue requirements of the Combined System as well as sustain financial metrics and ordinance obligations and requirements as further described in this Report.

1.4 COST OF SERVICE ALLOCATIONS

Allocating the Combined System's cost of service to customers types in accordance with their respective water, sanitary sewer and stormwater service demands provide a basis for evaluating the equity of existing rates and designing proposed rates. The underlying cost of service allocation methodology, as utilized during the FY 2018 Rate Determination has not changed. The various allocation factors were updated to reflect more current system operating conditions when applicable and where updated data was available. Table 1-5, Table 1-6, and Table 1-7 present the total costs of service allocated to applicable customer types for water, sanitary sewer and stormwater service for Fiscal Year 2021 (Test Year 1). Section 5 (Water) and Section 8 (Wastewater) provide summaries of the respective cost of service allocations for each system.

Table 1-5 Test Year 1 Distribution of Water Cost of Service to Customer Types [Schedule BV-1: Table W-17]

LINE NO.	CUSTOMER TYPE	(1) REVENUE UNDER EXISTING RATES	(2) ADJUSTED COST OF SERVICE	(3) INDICATED INCREASE (DECREASE) REQUIRED
		\$	\$	%
Retail				
General Service				
1	Senior Citizens	\$ 5,058,165	\$ 5,279,000	4.40%
2	Residential	152,512,645	160,995,000	5.60%
3	Commercial	61,728,805	65,952,000	6.80%
4	Industrial	4,259,578	4,573,000	7.40%
5	Public Utilities	378,582	369,000	-2.50%
6	Subtotal General Service	223,937,776	237,168,000	5.90%
7	PHA	6,020,520	6,771,000	12.50%
8	Charities & Schools	4,736,465	4,982,000	5.20%
9	Hospitals & University	7,345,739	8,344,000	13.60%
10	Hand Billed	14,326,243	18,059,000	26.10%
11	Scheduled (Flat Rate)	672	-	-100.00%
Fire Protection				
12	Private	4,279,533	2,726,000	-36.30%
	Public			
13	Standard Pressure	9,235,000	7,611,000	-17.60%
14	Subtotal	13,514,533	10,337,000	-23.50%
15	Total Retail Service	269,881,948	285,661,000	5.80%
16	Total Wholesale	3,819,124	3,033,000	-20.60%
17	Total System	\$ 273,701,072	\$ 288,694,000	5.50%

Table 1-6 Test Year 1 Distribution of Sanitary Sewer Cost of Service to Customer Types

LINE NO.	CUSTOMER TYPE	(1) REVENUE UNDER EXISTING RATES	(2) ADJUSTED COST OF SERVICE	(3) INDICATED INCREASE (DECREASE) REQUIRED
Sanitary Sewer (\$000s)				
1	Residential	\$ 125,152	\$ 132,049	5.5%
2	Commercial	51,703	54,537	5.5%
3	Industrial	2,303	2,411	4.7%
4	Public Utilities	346	367	5.9%
5	Senior Citizens	4,251	4,486	5.5%
6	Sewer Only	2,181	2,299	5.4%
7	Groundwater	2,968	2,821	-5.0%
8	Surcharge	4,862	5,581	14.8%
9	PHA	5,111	5,389	5.4%
10	Charities & Schools	4,152	4,390	5.7%
11	Hospital/University	6,879	7,245	5.3%
12	Hand Bill	13,591	14,317	5.3%
13	Private Fire	243	286	17.4%
14	Scheduled (Flat Rate)	1	0	-20.2%
15	Total Retail Service	223,744	236,178	5.6%
16	Total Wholesale	38,982	42,655	9.4%
17	Total System	\$ 262,726	\$ 278,833	6.1%

Table 1-7 Test Year 1 Distribution of Stormwater Cost of Service to Customer Types

LINE NO.	CUSTOMER TYPE	(1) REVENUE UNDER EXISTING RATES	(2) ADJUSTED COST OF SERVICE	(3) INDICATED INCREASE (DECREASE) REQUIRED
Stormwater (\$000s)				
Residential				
1	Non-Discount	\$ 79,913	\$ 88,925	11.3%
2	Discount - Non-PHA	3,261	3,618	11.0%
3	Discount - PHA	732	820	12.1%
Non-Residential				
4	Non-Discount	77,844	82,319	5.7%
5	Discount - Non-PHA	9,036	9,057	0.2%
6	Discount - PHA	1,309	1,375	5.0%
Condominiums				
7	Non-Discount	3,007	3,013	0.2%
8	Discount - Non-PHA	75	76	1.4%
9	Discount - PHA	1	1	0.1%
10	Total	\$ 175,178	\$ 189,204	8.0%

1.5 PROPOSED WATER, SANITARY SEWER AND STORMWATER RATES

The cost of service analysis provides the basis for the design of the water and wastewater rate schedules to recover the allocated cost of service from each respective system and service (including stormwater). The proposed rates are consistent with the existing rate structure as described in the Water Department's existing Rates and Charges (effective September 1, 2019) and no rate structure changes are proposed at this time.

The proposed rates and charges for water, sanitary and stormwater service are applicable to General Service retail customers and recognize: 1) adjustments to account for the recovery of discounts provided to certain retail customers⁴; and 2) the application of a "lag factor" to account proration of billings between the existing and proposed rates⁵. The proposed rates do not include a "rate compression"⁶ factor addressing the impact of reduced billings and receipts in the initial fiscal year.

Table 1-8 summarizes the existing and proposed rates for the requested Test Years of FY 2021 and FY 2022.

This Report does not address the TAP-R rates as they are subject to a separate reconciliation proceeding.

⁴ Discounts are provided to qualifying customers including senior citizens, charities and schools, and the Philadelphia Housing Authority (PHA).

⁵ The "lag factor" recognizes the fact that there will be a proration of billings between the existing and proposed rates during the first month following the effective date of the rate increase, as well as the fact that the fiscal year billings will not be fully collected within that fiscal year.

⁶ The proposed revenue increases are effective for 10 out of 12 months. By not implementing increases for a full fiscal year, during the first fiscal year of a revenue increase, billings and revenues are reduced and reflect about 98.16% of total combined revenues. The shortfall in additional revenues is offset by higher withdrawals from the Rate Stabilization Fund to meet fiscal year revenue requirements.

Water			
	Existing	Proposed	
Description	FY 2020	FY 2021	FY 2022
Monthly Water Service Charge (\$/bill)			
Meter Size (Inches)			
5/8	\$5.21	\$5.08	\$5.19
3/4	\$5.55	\$5.40	\$5.52
1	\$6.70	\$6.47	\$6.63
1-1/2	\$8.88	\$8.51	\$8.73
2	\$12.32	\$11.73	\$12.06
3	\$19.44	\$18.37	\$18.94
4	\$35.39	\$33.60	\$34.58
6	\$66.29	\$62.74	\$64.64
8	\$100.66	\$95.03	\$98.00
10	\$147.50	\$139.39	\$143.70
12	\$239.52	\$224.76	\$232.22
Base Rate - Water Quantity Charges (\$/Mcf)			
Monthly Water Usage			
First 2 Mcf	\$44.80	\$48.57	\$51.02
Next 98 Mcf	\$38.56	\$42.67	\$46.05
Next 1,900 Mcf	\$29.88	\$33.07	\$35.47
Over 2,000 Mcf	\$29.06	\$32.17	\$34.49

Wastewater			
	Existing	Proposed	
Description	FY 2020	FY 2021	FY 2022
Monthly Sanitary Sewer Service Charge (\$/bill)			
Meter Size (Inches)			
5/8	\$7.01	\$7.61	\$8.15
3/4	\$8.93	\$9.75	\$10.44
1	\$13.07	\$14.36	\$15.39
1-1/2	\$22.97	\$25.40	\$27.23
2	\$35.42	\$39.23	\$42.08
3	\$63.82	\$70.85	\$76.01
4	\$108.49	\$120.31	\$129.06
6	\$213.81	\$237.29	\$254.58
8	\$338.27	\$375.66	\$403.06
10	\$488.25	\$542.09	\$581.62
12	\$887.22	\$986.67	\$1,058.80
Base Rate - Sanitary Sewer Quantity Charges (\$/Mcf)			
Monthly Usage			
All Billable Water Usage	\$31.25	\$33.88	\$36.50
Groundwater Charge	\$13.86	\$13.08	\$13.96

Sanitary - Surcharge Rates (\$/lb)			
BOD (\$/lb in excess of 250 mg/	\$0.397	\$0.448	\$0.478
SS (\$/lb in excess of 350 mg/l)	\$0.388	\$0.468	\$0.501

Residential Stormwater Charges			
Monthly Stormwater Management Service Charge			
Charge Per Parcel	\$14.03	\$15.81	\$17.03
Monthly Billing & Collection Charge			
Charge Per Bill	\$1.77	\$1.99	\$2.12
Non-Residential Stormwater Charges			
Monthly Stormwater Management Service Charge			
Gross Area (\$/500 sf)	\$0.717	\$0.765	\$0.825
Impervious Area (\$/500 sf)	\$5.410	\$5.383	\$5.790
Monthly Billing & Collection Charge			
Charge Per Bill	\$2.30	\$2.58	\$2.76




All charges (existing and proposed) are effective September 1st of the respective Fiscal Year.

Non-Residential Stormwater Charges includes Condominiums.




The proposed rates will result in increased bills for the majority of customers. The Typical Bill impacts for Residential, Senior Citizen and Small Business Customers are shown in Table 1-9.

Table 1-9 Typical Bill Impacts⁷




RESIDENTIAL CUSTOMER⁸

 CURRENT TYPICAL BILL	 PROPOSED FY2021 TYPICAL BILL	 PROPOSED FY2022 TYPICAL BILL
Water \$22.76	Water \$24.64	Water \$25.87
Wastewater \$16.21	Wastewater \$17.52	Wastewater \$18.83
Stormwater \$15.80	Stormwater \$17.80	Stormwater \$19.15
Service \$12.22	Service \$12.69	Service \$13.34
\$66.99	\$72.65 8.4% increase	\$77.19 6.2% increase

SENIOR CITIZEN WITH DISCOUNTED BILL⁹

 CURRENT TYPICAL BILL	 PROPOSED FY2021 TYPICAL BILL	 PROPOSED FY2022 TYPICAL BILL
Water \$13.65	Water \$14.78	Water \$15.52
Wastewater \$9.72	Wastewater \$10.51	Wastewater \$11.30
Stormwater \$15.80	Stormwater \$17.80	Stormwater \$19.15
Service \$12.22	Service \$12.69	Service \$13.34
Senior Discount (-\$12.85)	Senior Discount (-\$13.95)	Senior Discount (-\$14.83)
\$38.54	\$41.83 8.5% increase	\$44.48 6.3% increase

SMALL BUSINESS CUSTOMER¹⁰

 CURRENT TYPICAL BILL	 PROPOSED FY2021 TYPICAL BILL	 PROPOSED FY2022 TYPICAL BILL
Water \$27.31	Water \$29.57	Water \$31.04
Wastewater \$19.45	Wastewater \$21.02	Wastewater \$22.60
Stormwater \$53.47	Stormwater \$54.06	Stormwater \$58.16
Service \$12.22	Service \$12.69	Service \$13.34
\$112.45	\$117.34 4.4% increase	\$125.14 6.6% increase

⁷ Proposed rates are assumed effective September 1st of each respective fiscal year. All typical bill impacts for FY 2021 and FY 2022, reflect current TAP-R rates of \$0.71/Mcf for water quantity charges and \$1.16/Mcf for sewer quantity charges.

⁸ "Typical" residential account with 5/8" meter using 5 hundred cubic feet (ccf) of water monthly.

⁹ "Typical" senior citizen discounted bill account with 5/8" meter using 3ccf of water monthly. Bill amounts reflect a 25% discount on all fees and charges.

¹⁰ "Typical" small business account with 5/8" meter using 6 ccf of water monthly and a parcel with GA of 5,500 sf and IA of 4,000 sf.

Typical residential and senior citizen customers will see bill impacts higher than the proposed service revenue increases due to: (i) the influence of customer cost of service allocations; (ii) the impacts of projected declines in billed water and sewer volumes associated with declining consumption; and (iii) the impact from updated stormwater billing data, which indicates residential customer account for a greater portion of the overall billable stormwater units, than in prior studies.

Based on the analyses conducted, the adoption of the increased water, sewer and stormwater rates for FY 2021 and FY 2022 is recommended, as discussed below.

1.6 THE COMBINED SYSTEM OPERATING RESULTS

Table 1-10 provides a summary of the overall Combined System Projected Revenue and Revenue Requirements during the Study Period. The proposed rates, coupled with planned use of available RSF balance, presented in this Report allows all the Combined System to meet projected revenue requirements, fulfills the bond coverage and other ordinance requirements, and maintains target fund balances for the RSF as well as the Residual Fund. For this analysis, an effective increase date of September 1st for each fiscal year is assumed.

Table 1-11 summarize Combined System performance with respect to the General Bond Ordinance Covenants. Table 1-12 summarizes performance with respect to the Rate Board Ordinance Requirements. Figure 1-1 summarizes the overall fund balance performance against the combined RSF and Residual Fund target balance of \$150 Million, in accord with the decision of the Philadelphia Water, Sewer and Storm Water Rate Board (“Rate Board”), dated July 12, 2018 (the “2018 Rate Determination”). The proposed rates presented in this Report are necessary to meet Combined System (i) projected revenue requirements, (ii) targeted debt service coverage, as well as, (iii) other ordinance requirements, and (iv) transition to targeted fund balances for the RSF and Residual Fund.

Table 1-10 Projected Revenue and Revenue Requirements: Base Rates and TAP-R Rates [Schedule BV-1: Table C-1]

LINE NO.			FISCAL YEAR ENDING JUNE 30,					
	DESCRIPTION		2020	2021	2022	2023	2024	2025
Combined System (\$000s)								
Operating Revenues								
1	Water Service - Existing Rates		\$ 280,747	\$ 277,861	\$ 275,363	\$ 272,903	\$ 270,460	\$ 268,028
2	Wastewater Service - Existing Rates		444,265	444,209	441,805	438,760	435,677	432,609
3	Total Service Revenue - Existing Rates		725,012	722,070	717,168	711,663	706,137	700,637
Additional Service Revenue Required								
	Year	Percent Increase	Months Effective					
4	FY 2021	6.11%	10	36,104	43,832	43,496	43,160	42,826
5	FY 2022	6.12%	10		38,079	46,193	45,836	45,481
6	FY 2023	6.71%	10			43,691	52,996	52,585
7	FY 2024	6.72%	10				46,280	56,135
8	FY 2025	6.73%	10					49,021
9	Total Additional Service Revenue Required		0	36,104	81,911	133,381	188,272	246,047
10	Total Water & Wastewater Service Revenue		725,012	758,174	799,079	845,043	894,410	946,684
Other Income (a)								
11	Other Operating Revenue		37,728	19,516	19,437	19,352	19,267	19,184
12	Debt Reserve Fund Interest Income		0	0	0	0	0	0
13	Operating Fund Interest Income		985	1,035	1,089	1,089	1,177	1,169
14	Rate Stabilization Interest Income		1,681	1,532	1,486	1,436	1,412	1,396
15	Total Revenues		765,405	780,257	821,091	866,919	916,266	968,433
Operating Expenses								
16	Total Operating Expenses		(518,271)	(534,165)	(552,364)	(571,485)	(590,284)	(608,717)
Net Revenues								
17	Transfer From/(To) Rate Stabilization Fund		21,883	7,905	622	9,021	(4,575)	7,728
18	NET REVENUES AFTER OPERATIONS		269,017	253,997	269,349	304,455	321,406	367,443
Debt Service								
Senior Debt Service								
Revenue Bonds								
19	Outstanding Bonds		(196,266)	(177,586)	(167,288)	(161,204)	(140,923)	(140,987)
20	Pennvest Parity Bonds		(10,631)	(10,765)	(11,080)	(13,611)	(13,611)	(13,611)
21	Projected Future Bonds		0	(7,000)	(28,788)	(59,345)	(92,657)	(128,031)
22	Total Senior Debt Service		(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
23	TOTAL SENIOR DEBT SERVICE COVERAGE (L18/L22)		1.30 x	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x
24	Subordinate Debt Service		0	0	0	0	0	0
25	Transfer to Escrow		0	0	0	0	0	0
26	Total Debt Service on Bonds		(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
27	CAPITAL ACCOUNT DEPOSIT		(27,065)	(29,230)	(31,569)	(34,094)	(36,822)	(39,767)
28	TOTAL COVERAGE (L18/(L22+L24+L27))		1.14 x	1.13 x	1.12 x	1.13 x	1.13 x	1.13 x

Table 1-10 Projected Revenue and Revenue Requirements: Base Rates and TAP-R Rates (continued)

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
Residual Fund							
29	Beginning of Year Balance	\$ 15,666	\$ 15,073	\$ 15,039	\$ 15,014	\$ 15,063	\$ 15,007
30	Interest Income	153	150	150	150	150	149
Plus:							
31	End of Year Revenue Fund Balance	35,055	29,416	30,625	36,200	37,394	45,047
32	Deposit for Transfer to City General Fund (b)	1,922	1,920	2,107	2,330	2,616	2,977
Less:							
33	Transfer to Construction Fund	(35,800)	(29,600)	(30,800)	(36,300)	(37,600)	(45,200)
34	Transfer to City General Fund	(1,922)	(1,920)	(2,107)	(2,330)	(2,616)	(2,977)
35	Transfer to Debt Service Reserve Fund	0	0	0	0	0	0
36	End of Year Balance	15,073	15,039	15,014	15,063	15,007	15,003
Rate Stabilization Fund							
37	Beginning of Year Balance	177,971	156,089	148,184	147,561	138,541	143,116
38	Deposit From/(To) Revenue Fund	(21,883)	(7,905)	(622)	(9,021)	4,575	(7,728)
39	End of Year Balance	\$ 156,089	\$ 148,184	\$ 147,561	\$ 138,541	\$ 143,116	\$ 135,388

(a) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund and reflects projected contra revenue credits for Affordability Program Discounts (TAP Costs). Includes Debt Service Reserve Fund Release in FY 2020.

(b) Transfer of interest earnings from the Bond Reserve Account to the Residual Fund as shown in Line 32 to satisfy the requirements for the transfer to the City General Fund shown on Line 34.

(c) FY 2020 beginning balance is estimated based on preliminary FY 2019 results.

Table 1-11 General Bond Ordinance Covenants – Performance Metrics [Schedule BV-1: Table C-2]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
General Bond Ordinance Covenants							
1	Senior Debt Coverage (a)	1.30	1.30	1.30	1.30	1.30	1.30
2	Total Debt Coverage (b)	1.14	1.13	1.12	1.13	1.13	1.13
	90% Test - Senior Debt Coverage from						
3	Current Revenues (c)	1.19	1.25	1.29	1.26	1.30	1.27

(a) Senior Debt Coverage = (Total Revenues - Operating Expenses + Transfer From (to) Rate Stabilization) divided by Senior Debt. The General Bond Ordinance requires the minimum Senior Debt Service Coverage of 1.20.

(b) Total Debt Coverage = (Total Revenues - Operating Expenses + Rate Stabilization Transfer) divided by (Senior Debt + Subordinate Debt + Capital Account Deposit). The General Bond Ordinance requires the minimum Total Debt Service Coverage of 1.00.

(c) Senior Debt Coverage from Current Revenues = (Total Revenues - Operating Expenses - Transfer to Rate Stabilization Fund) divided by Senior Debt. Transfers from Rate Stabilization are excluded from the Total Revenues. The General Bond Ordinance requires a minimum Senior Debt Service Coverage of 0.90 from current revenues.

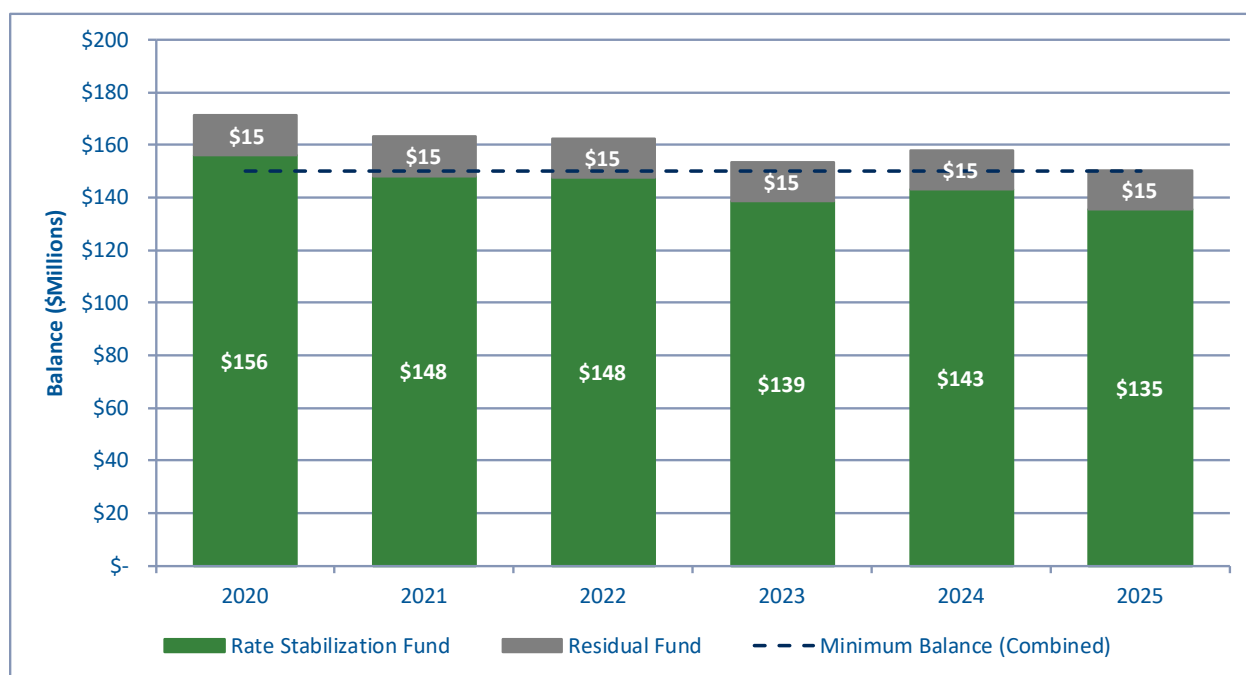
Table 1-12 Rate Board Ordinance Requirements – Performance Metrics [Schedule BV-1: Table C-2]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Rate Ordinance Requirements (\$000s)							
1	Projected Total Revenues	\$ 765,405	\$ 780,257	\$ 821,091	\$ 866,919	\$ 916,266	\$ 968,433
2	Projected Total Appropriations (a)	\$ 859,458	\$ 866,189	\$ 902,236	\$ 959,087	\$ 1,002,095	\$ 1,064,924
3	Ordinance Requirement Compliance (b)	Yes	Yes	Yes	Yes	Yes	Yes

(a) Total Appropriation = Total O&M Budget + Senior Debt + Subordinate Debt + Transfer to Escrow + Capital Account Deposit + Transfer to Rate Stabilization Fund + Transfer to Residual Fund. Costs to service the City included as required by the General Bond Ordinance rate covenants.

(b) Rate Ordinance requires that Total Revenues not exceed Total Appropriations.

Figure 1-1 Combined Rate Stabilization and Residual Fund Balance Performance



1.7 RECOMMENDATIONS

Based on the analyses performed for this Report, the following findings are presented for the Rate Board's consideration:

1. Revenues under existing rates will not be sufficient to fund the Combined System needs over the Rate Period and action is needed to offset anticipated reductions in revenues resulting from:
 - (i) A projected continued decline in billed water and sewer volumes; and
 - (ii) Losses of stormwater billing units related to credits and appeals.
2. In addition, the total projected expenses will exceed revenues under existing rates during the Rate Period and will require additional service revenues as recommended in this Report;

3. The proposed rate filing includes the use of RSF balance to forgo rate compression, help manage customer bill impacts, and meet the financial obligations and metrics of the Combined System. No deposits are planned during the Rate Period. Once utilized, these funds may no longer be available to help manage future revenue adjustments unless replenished.
4. Based on the above, among other factors, explained herein, it is recommended that the proposed water, sanitary sewer and stormwater rates for FY 2021 and FY 2022 be adopted so as to become effective September 1st of each fiscal year.

2. INTRODUCTION

The City of Philadelphia (City) owns, operates, maintains, repairs, and improves the water system (“Water System”) and wastewater system (“Wastewater System”) serving the City and 10 wholesale wastewater contract customers and one wholesale water contract customer, as a self-supporting enterprise fund utility. Collectively, the Water System and the Wastewater System are known as the “Water and Wastewater Systems,” “the System,” or the “Combined System.”

On April 17, 1951, the Philadelphia Home Rule Charter (the “Charter”) established the Philadelphia Water Department (“PWD” or the “Water Department”) as one of the City’s ten operating departments. The Water Department is responsible for the planning, construction, operation, and maintenance of the Water and Wastewater Systems; for complying with regulatory requirements; for rate setting and stakeholder engagement; budgeting and detailed cost accounting; and preparation of financial statements for the System. The City’s combined Comprehensive Annual Financial Report includes the data from the Water Department’s annual financial statements.

Section 5-800 of the Charter conveys the authority to the Water Department to operate the Water and Wastewater System. In addition, Section 5-801 authorizes the regulation of rates and charges for utility services. In November 2012, Philadelphia voters approved an amendment to the Charter to allow Philadelphia City Council (“City Council”) to establish, by ordinance, an independent ratemaking board responsible for fixing and regulating rates and charges for water, sanitary sewer and stormwater services. Consistent with the foregoing, City Council enacted, effective January 20, 2014, Ordinance 130251-A (the “Rate Ordinance”) which created the Rate Board and prescribed certain ratemaking standards.

The Water Revenue Bureau (WRB), which is a division within the City’s Revenue Department, is responsible for billing, collection, and customer accounting for the Water and Wastewater Systems. Functions such as customer care and delinquent enforcement are joint responsibilities of the Water Department and the WRB. The City’s Revenue Commissioner oversees the activities of the WRB. The City’s Finance Director has the ultimate oversight of the WRB.

The Water Commissioner, who is appointed by the City’s Managing Director with approval of the Mayor, leads the Water Department. In June 2019, the City appointed Mr. Randy Hayman as Water Commissioner. Mr. Hayman is an environmental attorney and prior to his appointment as Commissioner, he served as a partner at Beveridge & Diamond, and as an attorney for the District of Columbia Water and Sewer Authority and the Metropolitan St. Louis Sewer District.

Under Ordinance No. 130251-A, known as the Rate Ordinance, an amendment to the Philadelphia Code established an independent rate-making body, the Philadelphia Water, Sewer, and Storm Water Rate Board (the “Rate Board”). The Rate Board is responsible for setting and regulating rates and charges for supplying water, sewer, and stormwater services.

2.1. PURPOSE

At the direction of the Water Department, Black & Veatch Management Consulting, LLC (“Black & Veatch”) conducted a comprehensive rates, fees, and charges cost of service study. The purpose of this

Report is (1) to project and examine the future operating and capital financing requirements of the utilities and the ability of existing rates to recover the requirements, and (2) to develop rates and charges to recover these revenue requirements.

In conducting these analyses and in forming an opinion of the projection of future financial operations summarized in this Report, Black & Veatch made certain assumptions on the conditions, events, and circumstances that may occur in the future. The methodology utilized in performing the analyses follows generally accepted practices for such projections. Such assumptions and methodologies are reasonable and appropriate for the purpose for which they are used. While we believe the assumptions are reasonable and the projection methodology valid, actual results may differ materially from those projected, as influenced by the conditions, events, and circumstances that occur. Such factors may include the utilities' ability to execute the capital improvement program as scheduled and within budget, regional climate and weather conditions affecting the demand for water, discharge of wastewater flow and adverse legislative, regulatory, or legal decisions (including environmental laws and regulations) affecting the utilities' ability to manage the system and meet water quality requirements.

2.2. SCOPE OF WORK

This Report presents the results of a comprehensive study of projected revenue requirements, cost of service, and proposed rates and charges for water, sanitary sewer, and stormwater service. Revenue and revenue requirements cover the Study Period beginning July 1, 2019 and ending June 30, 2025 (the "Study Period"). The analyses recognize growth patterns and water consumption patterns throughout the Water Department's service territory. The Water Department authorized the comprehensive study to assess the Water and Wastewater Systems' ability to meet current and future anticipated financial obligations and to develop a financing plan and proposed rates sufficient to fund operations and support capital financing needs.

The cost of service analysis conducted herein utilizes a cost causative approach endorsed by the American Water Works Association (AWWA) "Principles of Water Rates, Fees, and Charges" Manual of Water Supply Practices M1 ("M1 Manual") and Water Environment Federation ("WEF") "Financing and Charges for Wastewater Systems" Manual of Practice ("MoP") No. 27; as well as WEF's "User Fee Funded Stormwater Program" manual. These allocation methodologies produce cost of service allocations recognizing the projected customer service requirements for the City. Proposed rates are designed in accordance with allocated cost of service and local policy considerations.

As part of the Water Department's Rate Filing, the Water Department, Black & Veatch, and others produced several papers that are included as schedules and exhibits supporting the Rate Filing. This Report reflects a compilation of these papers and cross-references to the appropriate testimony, schedules, and exhibits are noted to facilitate reading between the Rate Filing and this Report.

2.3. GENERAL ASSUMPTIONS

The following discussion summarizes the general assumptions used in the analyses of projected revenues and revenue requirements for the Study Period.

2.3.1. Revenue

- Projected FY 2020 service revenues under existing rates reflect the adopted FY 2019 rates (effective September 1, 2018) and the adopted FY 2020 rates (effective September 1, 2019).
- Projected FY 2021 to FY 2025 service revenues under existing rates reflect the adopted FY 2020 rates (effective September 1, 2019).
- Total system accounts are anticipated to remain stable during the Study Period.
- Projected water usage reflects the current number of accounts and the average usage per account based on historical demand trends.
- For 5/8-inch meter General Service Customers usage per account is projected to decrease 2.00 percent per year during the Study Period.
- For all other General Service Customers, usage per account is based upon the 2-year average billed volume per account and projected to remain flat.
- FY 2020 revenue projections for stormwater reflect: 1) the current initial billing data of Impervious Area (IA) and Gross Area (GA), as of June 2019; 2) FY 2021 projections and beyond reflect full implementation of the updated IA and GA stormwater billing data; 3) reductions in billable IA and GA square footage resulting from stormwater credits and appeals.
- Projected revenues under existing rates reflect the anticipated cumulative receipts for the water, sanitary sewer, and stormwater services (including retail and wholesale receipts) each fiscal year. The receipts for each fiscal year are estimated based on the projected system billings and the associated projected collection factors.
 - Projected collection factors for retail Non-Stormwater Only and Stormwater Only Customers are based historical collections data for FY 2012 through FY 2019¹¹. The collection factors represent the multi-year payment pattern for the following periods:
 - **Billing Year** – All payments associated with a given fiscal year’s billing and received within the 12 months following the beginning of the fiscal year.
 - **Billing Year Plus 1** - All payments associated with a given fiscal year’s billing and received within 13-24 months following the beginning of the fiscal year.
 - **Billing Year Plus 2 and Beyond** - All payments associated with a given fiscal year’s billing and received after 24 months following the beginning of the fiscal year.

¹¹ As provided by Raftelis. See Schedule BV-6: WP-1, Appendix C. Refer to Raftelis Report 4 for additional background data regarding historic billing and collections for FY 2012 to FY 2019.

o Collection factors used in the financial plan analysis reflect the average collection factors for these periods based upon the historical fiscal years and represent the multi-year payment pattern¹². The collection factors used in the analysis are presented in Table 2-1.

Table 2-1 Projected Collection Factors [Schedule BV-6: WP-1, Table 2]

	BILLING YEAR	BILLING YEAR PLUS 1	BILLING YEAR PLUS 2 AND BEYOND
Non-Stormwater Only	86.68%	8.74%	1.90%
Stormwater Only	63.19%	7.88%	6.57%

- Operating Fund and Rate Stabilization Fund interest earnings are estimated based on projected fund balances and 1.0 percent annual interest earnings rate.
- Miscellaneous and contra revenues are projected based on historical and budgeted levels as summarized in Table 2-2.

Table 2-2 Projected Miscellaneous and Contra Revenues [Schedule BV-6: WP-1, Table 3]

DESCRIPTION	FISCAL YEARS	PROJECTION
Penalties [1]	2020 – 2025	\$10.1 Million / Year to \$9.7 Million / Year
Other Miscellaneous Revenue [2]	2020 2021 – 2025	\$13.0 Million / Year \$13.4 Million / Year
Debt Service Reserve Release	2020	\$18.5 Million
State and Federal Grants [3]	2020 – 2025	\$1.0 Million / Year
License and Inspection Permits [3]	2020 – 2025	\$4.6 Million / Year
UESF Grants [4]	2020 – 2025	\$0.3 Million / Year
Stormwater Customer Assistance Program (CAP) [5]	2020 – 2025	(\$2.0) Million / Year

Notes:

1. Reflects 1.5 percent of billings under existing rates based on the two-year historical average from FY 2018 to FY 2019.
2. FY 2020 reflects budgeted amount. FY 2021 to FY 2025 are anticipated to remain essentially flat.
3. Reflects FY 2020 Budget amount.
4. FY 2020 to FY 2025 projection reflects anticipated UESF grants.
5. Stormwater CAP revenue loss is anticipated to remain constant due to the implementation of the updated stormwater billing data.

¹² The application of collection factors to projected billings results in estimated receipts used to develop projections of anticipated revenues fiscal year revenues. Collection factors do not represent all billings or receipts and they are limited by available data from FY 2012 to FY 2019.

2.3.2. Operating Expenses

- For FY 2020, projected operating expenses based on the Water Department’s approved FY 2020 budget with adjustments to include ongoing major maintenance and application of the actual-to-budget factors to estimate anticipated expenses.
- For FY 2021 through FY 2025, projected operating expenses are based on escalation of the FY 2020 projected operating expenses and include additional adjustments for planned increases in operating expenses.
- Operating Expenses for FY 2021 through 2025 are projected by applying the annual escalation factors to the projected FY 2020 operating expenses by category as presented in
- Table 2-3.

Table 2-3 Annual Escalation Factors [Schedule BV-6: WP-1, Table 5]

CLASS	DESCRIPTION	ANNUAL ESCALATION FACTOR				
		FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
100	Labor Costs	2.90%	2.90%	2.90%	2.90%	2.90%
191	Pension	2.53%	1.45%	2.86%	1.39%	0.00%
190	Pension Obligations	0.00%	0.00%	0.00%	0.00%	0.00%
1xx	Benefits	5.27%	4.66%	4.51%	4.39%	4.29%
220	Power	3.00%	0.00%	0.50%	1.00%	1.00%
221	Gas	3.00%	0.00%	0.50%	1.00%	1.00%
200	Services	4.15%	4.15%	4.15%	4.15%	4.15%
200	Public Property - Leases	2.00%	2.00%	2.00%	2.00%	2.00%
307	Chemical Costs	5.00%	5.00%	5.00%	5.00%	5.00%
300	Materials and Supplies	2.90%	2.90%	2.90%	2.90%	2.90%
400	Equipment	2.00%	2.00%	2.00%	2.00%	2.00%
500	Indemnities	0.00%	0.00%	0.00%	0.00%	0.00%
800	Transfers	0.90%	0.90%	0.90%	0.90%	0.90%

- The escalation factors for Labor costs are based on the prior average annual salary increases under the current labor agreement.
- The pension and benefit cost escalation factors are based on the cost increases reflected in the City’s current projections.
- The escalation factors for Power and Gas are based on City Energy Office estimates and provided in Schedule BV-6: WP-1, Appendix I.
- The escalation factors for Chemicals are based on a review of the 2-year and 3-year average annual increase per the Water Department’s recent experience and the 2-year and 3-year average increase per Producer Price Index (“PPI”) for Industrial Chemicals.

- The escalation factors for Public Property – Leases are based on a comparison of the 2-year and 3-year average annual increase per the Water Department’s recent experience.
- The escalation factor for equipment is based upon the 2-year and 3-year average increase per PPI for Construction Equipment and Machinery.
- The escalation factor for Materials and Supplies is based upon the 5-year average annual increase per the Water Department’s experience.
- No escalation factor is applied for Indemnities for FY 2021 through FY 2025.
- The escalation factor for Transfers is based upon the 5-year average annual increase per the Water Department’s experience.

2.3.3. Other Adjustments and Expenditures

Projected Operating Expenses also include adjustments as presented in Table 2-4.

Table 2-4 Additional Adjustments for Projected Operating Expenses [Schedule BV-6: WP-1, Table 6]

DEPARTMENT	CLASS	FISCAL YEARS	ADJUSTMENT AMOUNT	PURPOSE
Operations	100	2021 to 2025	\$0.5 to \$0.9 Million	Additional Water Department staff costs related to regulatory compliance.
Construction & Engineering	100	2021 to 2025	\$1.1 Million to \$7.8 Million	Transition of staff salaries from Capital Funded Positions to Operations Funded.
Planning & Environmental Services	100	2021 to 2025	\$0.7 Million to \$2.1 Million	Transition of staff salaries from Capital Funded Positions to Operations Funded.
Operations	100	2020 to 2025	\$3.0 Million to \$3.5 Million	Functional fire hydrant testing as provided by the Fire Department.
Division of Technology	200	2020	\$3.2 Million	Various Advanced Metering Infrastructure related matters.
City Finance	100	2021 to 2025	\$0.4 to \$0.8 Million	Additional pension and benefits costs for additional staff noted above. Costs are estimated as 83 percent of salaries based upon the City’s FY 2019 estimate of fringe costs as a percentage of salaries.

- Liquidated encumbrances for FY 2020 thru FY 2025 are estimated as 17.2 percent of projected Services (Class 200) and Materials and Supplies (Class 300) expenses excluding Stormwater Management Incentive Program/Greened Acre Retrofit Program (“SMIP/GARP”). The projection is based on the average of the actual ratio of liquidated encumbrances to expenses for Services (Class 200) and Materials and Supplies (Class 300) experienced in FY 2017 to FY 2019. SMIP/GARP is excluded from this ratio as the budget has been fully expended.

2.3.4. Debt Service

- Existing debt service reflects the actual debt service schedules for the following issuances:
 - All Water and Wastewater Revenue Bonds and Revenue Refunding Bonds issued prior to July 1, 2019.
 - Water and Wastewater Revenue Refunding Bonds Series 2019A (issued in FY 2020).
 - Forward refunding of Water and Wastewater Revenue Bonds Series 2011A (to be issued in FY 2021).
- Projected debt service reflects anticipated bond issues for each fiscal year of the Study Period and assumed interest rates of 5.25 percent for a 30-year tenure.
- Projected debt service for the anticipated bond issues in FY 2021 to 2025 reflect:
 - Bond issuance in the first quarter of the fiscal year with November and May interest payments;
 - Interest only payments for the first year of the bond amortization; and
 - Bond issuance cost of 0.59 percent based upon the Water and Wastewater Revenue Bonds Series 2019A and 2019B issues.

2.3.5. Bond Covenants, Transfers, and Fund Balances

- The General Bond Ordinance rate covenant requires the following:
 - Minimum senior debt service coverage of 1.20;
 - Net Revenues, excluding amounts transferred from the Rate Stabilization Fund into the Revenue Fund during, or as of the end of, such fiscal year, must equal to at least 90 percent of the Debt Service Requirements (excluding debt service on any Subordinated Bonds) payable in such fiscal year (this is referred to herein as the “90% Test”); and
 - Minimum total debt coverage of 1.00.
- In accordance with the 2018 Rate Determination, the Water Department has targeted a senior debt service coverage of 1.30 for the Study Period.
- Projected FY 2021 to FY 2025 Capital Account Deposits are based on the following assumptions:
 - Inflated net plant investment of 8.0 percent per year based on the average annual increase in net plant investment during FY 2018 and FY 2019.
 - Annual Capital Account Deposit is based on 1.0 percent of the prior year projected net plant investment (original cost less depreciation).
- In accordance with the 2018 Rate Determination, the Water Department has a Rate Stabilization Fund balance target of approximately \$135 Million.
- Residual Transfer to Construction Fund transfers are made as available.
- The end-of-year Residual Fund balance is maintained at \$15.0 Million for the Study Period.
- The FY 2020 beginning fund balances are based on the preliminary FY 2019 financial results.

2.3.6. Capital Improvement Program

- The projected capital program is based on the Water Department's adopted FY 2020 Capital Improvement Program ("CIP") Budget and proposed FY 2021 through FY 2025 CIP budget.
- The Water Department's CIP budget is an appropriation-based budget and reflects the following:
 - The budget for each respective fiscal year represents the total cost of the capital improvements expected to be let in that fiscal year;
 - The total CIP Budget does not represent expected project duration or anticipated cashflows;
 - The CIP Budget includes contingencies; and
 - The CIP Budget does not include inflation.
- The CIP Budget includes improvements related to the Water Department's Drinking Water Master Plan for which detailed project plans and cashflows have been developed.
- Taking the above factors into consideration, the Water Department's CIP Budget was adjusted to develop projected spending for each fiscal year to reflect the following:
 - The shift in positions from the Capital Fund to Operating;
 - Annual inflation of 3.0 percent based on industry construction cost indices, for FY 2022 to FY 2025 capital program costs (relevant capital cost industry indices are provided in Schedule BV Schedule 6: WP-1, Appendix H);
 - Estimated cashflows for Drinking Water Master Plan improvements as provided by the Water Department;
 - Anticipated program level project durations, for improvements without detailed cashflow estimates, as follows:
 - Water Conveyance – 2 years;
 - Sewer Collection – 3 years;
 - Facilities Improvements – 5 years; and
 - Removal of contingency, by applying an estimated 90 percent spend factor to the estimated annual cash need.

3. COMBINED SYSTEM SUMMARY

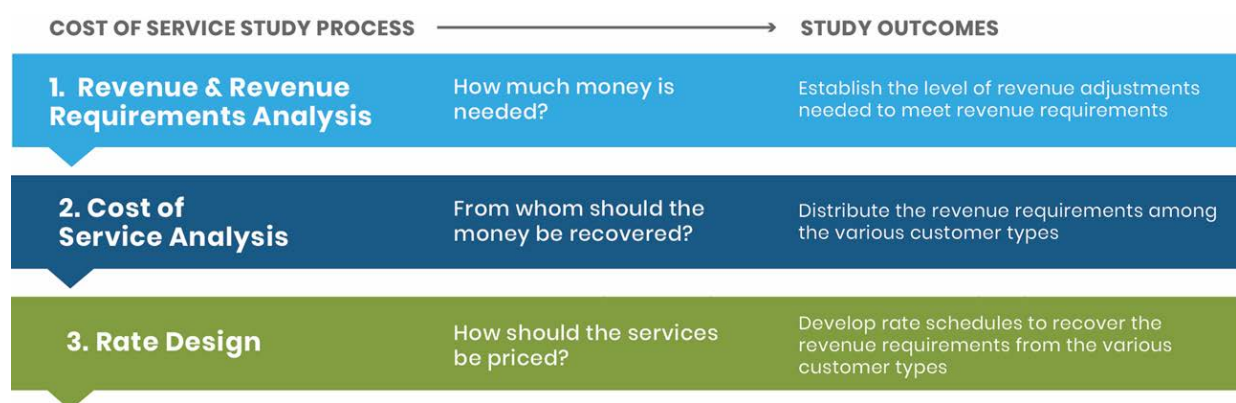
The Water Department is a self-supporting enterprise fund dedicated to providing high-quality water and wastewater services (which includes stormwater services) to the City's residents and businesses. Water operations provide potable water for its residential, commercial, and industrial water demands. Wastewater operations provide sanitary sewer treatment and collection services to its residential, commercial, and industrial customers. The Water Department performs many of the City's stormwater activities, including maintenance of the City's 750 miles of separate storm sewers, 1,850 miles of combined sewers, and 72,000 stormwater inlets. Service to customers located outside the City is on a wholesale basis through contracts with various entities. The respective contracts for service to each wholesale customer set forth the present bases for charges.

3.1. COST OF SERVICE STUDY

To provide these services and fulfill all of its regulatory obligations, the Water Department fully funds its operations through its rates and charges imposed on its retail and wholesale customer base. Thus, the Water Department not only performs a multi-year financial plan that supports revenue sufficiency, but it also conducts retail and wholesale cost of service studies and goes through a rate case process which concludes with the determination by the Rate Board. A Cost of Service study serves as the foundation for establishing rates and charges. Figure 3-1 illustrates the three parts of such a study. This section presents the results for the Combined System. Specifically, it summarizes the proposed financial plan for the Combined System during the Study Period and presents the FY 2021 and FY 2022 proposed schedule of rates for water, sanitary sewer, and stormwater services.

To assist the reader with understanding potential impacts customer impacts associated with the proposed rates, typical monthly bills for select customer types are included using a range of volumes at the recommended FY 2021 and FY 2022 rates. Details regarding the cost of service study for the Water System and Wastewater System are presented in subsequent sections of this Report. PWD Exhibit 6 includes the full model workpapers for FY 2021 in support of the Rate Filing.

Figure 3-1 Elements of a Cost of Service Study



3.2. REVENUE

Using the assumptions discussed in Section 2 and the details derived for the Water System and the Wastewater System presented later in this Report, Table 3-1 presents the Projected Revenues (receipts) for the Combined System. These revenues reflect the application of the billing collection factors presented in Table 2-1 to gross billings, which are the result of applying the existing rate schedules to projections of customer accounts, consumption, billed volume, and impervious and gross areas. Specifics regarding the projection of gross billings is described later in this Report.

Table 3-1 Projected Receipts Under Existing Rates [Schedule BV-1: Table C-3]

LINE NO.	DESCRIPTION	FISCAL YEAR ENDING JUNE 30,					
		2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
1	Water Sales Receipts	\$ 276,970	\$ 273,936	\$ 271,454	\$ 269,033	\$ 266,630	\$ 264,236
2	Wastewater Sales Receipts						
3	Sanitary Sewer	264,188	262,733	261,052	259,320	257,582	255,852
4	Stormwater	174,207	175,178	174,455	173,202	171,922	170,648
5	Subtotal Wastewater Receipts	438,395	437,910	435,507	432,522	429,503	426,500
6	Total Water & Wastewater Receipts	\$ 715,366	\$ 711,846	\$ 706,961	\$ 701,554	\$ 696,133	\$ 690,736
Other Income							
7	Penalties	10,130	10,065	9,985	9,900	9,816	9,732
8	Miscellaneous City Revenue	1,720	1,720	1,720	1,720	1,720	1,720
9	Other	10,900	11,300	11,300	11,300	11,300	11,300
10	State & Federal Grants	1,000	1,000	1,000	1,000	1,000	1,000
11	Permits Issued by L&I	4,640	4,640	4,640	4,640	4,640	4,640
12	Miscellaneous (Procurement)	420	420	420	420	420	420
13	City & UESF Grants	300	300	300	300	300	300
14	Affordability Program Discount Cost (a)	0	0	0	0	0	0
15	Release from Debt Service Reserve (b)	18,546	0	0	0	0	0
16	Other Operating Income	47,656	29,445	29,365	29,280	29,196	29,112
17	Debt Service Reserve Fund Interest (c)	0	0	0	0	0	0
18	Operating Fund	985	1,035	1,089	1,089	1,177	1,169
19	Rate Stabilization Fund	1,681	1,532	1,486	1,436	1,412	1,396
20	Total Nonoperating Income	2,665	2,567	2,576	2,524	2,589	2,565
21	Total Receipts	\$ 765,687	\$ 743,858	\$ 738,902	\$ 733,359	\$ 727,918	\$ 722,413

(a) Affordability Program Discounts represent anticipated lost revenue due to the Tiered Assistance Program (TAP).

Beginning in FY 2019, TAP Revenue Loss is recovered via the TAP Rate Rider Surcharge.

(b) Projected Release from Debt Reserve Fund based on outstanding and proposed debt service payments.

(c) Excludes deposit into Residual Fund for Transfer to City General Fund.

In addition to rates and charges, the Water Department also has wholesale service contracts for water and wastewater service, provides private fire protection to certain customers who maintain private fire systems, and assesses surcharges for customers with high strength wastewater.

3.2.1. Other Operating Income

The Water Department has several sources of other revenues including miscellaneous fees, City and Utility Emergency Services Fund ("UESF") grants, License and Inspection ("L&I") permits, penalties,

and releases from the Debt Service Reserve Fund. These revenues are shown on Lines 7 through 16 of Table 3-1.

3.2.2. Non-Operating Income

The Water Department's non-operating income consists primarily of interest earnings on the amounts within certain funds and accounts. In accordance with the authorizing revenue bond ordinance, the analysis credits interest earnings in the Debt Reserve Fund, Revenue Fund, and the Rate Stabilization Fund as revenue to the Revenue Fund. Interest Earnings in the Debt Reserve Fund are first credited to the extent that they are needed to fulfill the Debt Service Reserve Requirement. Once the Debt Service Reserve Requirement is met, any remaining monies, up to a maximum of \$4,994,000 is permitted to be transferred to the City's General Fund.

Actual annual fund valuations and interest earnings are based on a mark-to-market valuation which the City performs at the end of the fiscal year. The differential between mark-to-market and the Debt Reserve Fund requirement results in:

- Either a transfer from the Operating Fund of the Water Department to the Debt Reserve Fund, if there is a deficiency in the Debt Reserve Fund, or
- A transfer from the Debt Reserve Fund to the Operating Fund of the Water Department, if there is an excess in the Debt Reserve Fund.

Projected transfers from the Debt Reserve Fund to the Operating Fund are included as Other Operating Revenue.

3.2.3. Tiered Assistance Program Rate Rider Surcharge

Revenue figures for the Study Period exclude current Tiered Assistance Program ("TAP") Rate Rider Surcharge Rates ("TAP-R"), of \$0.71 per thousand cubic feet (Mcf) for water and \$1.16/Mcf for sanitary sewer. The Water Department established TAP in 2017 to assist low-income households at or below 150 percent of the Federal Poverty Level ("FPL") and those experiencing special hardship. As part of the 2018 Rate Determination, the Rate Board approved the implementation of a TAP Rate Rider. This rider provides a mechanism to (i) timely reconcile actual TAP costs with estimated TAP-R revenues and (ii) update projected TAP costs for the next rate period. The TAP-R currently recovers the cost of providing discounts to TAP customers from Non-TAP customers and is subject to an annual reconciliation.

The Water Department is proposing to handle the reconciliation of TAP discounts and TAP-R billings as part of a separate proceeding. Consequently, the revenues developed in this Cost of Service study are referred to as the "Base Rate Revenues" because they do not include the impact of providing discounts to TAP customers and associated TAP-R surcharge revenues.

3.3. REVENUE REQUIREMENTS

Projections for the Water Department's revenue requirements for the Combined System make use of the assumptions discussed in Section 2.3.

3.3.1. O&M Expenses

The operation and maintenance (“O&M”) expenses incurred by the Water Department are necessary for the effective operation of the Combined System. Not performing timely O&M activities may result in System inefficiencies, affects the level of service provided to customers, and puts the Water Department at risk of not meeting regulatory requirements. Table 3-2 summarizes the general O&M expense categories used by the Water Department for budgeting and reporting purposes.

Table 3-2 O&M Expense Categories

CLASS	CATEGORY	DESCRIPTION
100	Personal Services	Expenses related to salaries, fringe benefits, pension costs, overtime, and other employee-related costs
200	Purchase of Services	Expenses related to contracts or services from outside entities, including electricity and natural gas service
300	Materials and Supplies	Miscellaneous materials and supplies, including water treatment chemicals
400	Equipment	Costs of heavy equipment, trucks, vehicles, boats, trailers, and other related items.
500	Contributions, Indemnities, and Taxes	Includes payments made by the Law Department on behalf of the Water Department for liabilities, claims and property damages. This category also includes taxes and other contributions.
800	Payments to Other Funds	O&M payment to the General Fund associated with the direct interdepartmental services provided to the Water Department by other City Departments

Prior to estimating future O&M expenses, Black & Veatch shifted \$5.0 Million in the budget from Power to Other Services to move available appropriation from Power and provide additional budget required for ongoing major maintenance activities related to Water Department infrastructure. Additional adjustments include line items identified on Table 2-4.

Table 3-3 shows the operating expenses for the Combined System incorporating the adjustments to the budgeted O&M, application of the actual-to-budget spend factors, inclusion of additional operating expenses, and adjustments for escalation as discussed in Section 2.3.2.

Table 3-3 Projected Operation and Maintenance Expense [Schedule BV-1: Table C-6]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
1	Personal Services	\$ 147,363	\$ 153,861	\$ 160,524	\$ 167,042	\$ 173,804	\$ 180,818
2	Pension and Benefits	140,205	145,346	149,587	154,522	158,506	161,548
3	Subtotal	287,568	299,207	310,111	321,563	332,310	342,366
	Purchase of Services						
4	Power	13,914	14,332	14,332	14,403	14,547	14,693
5	Gas	3,987	4,107	4,107	4,128	4,169	4,211
6	SMIP/GARP	25,000	25,000	25,000	25,000	25,000	25,000
7	Other	153,457	156,401	162,798	169,459	176,394	183,615
8	Subtotal	196,359	199,840	206,237	212,990	220,110	227,518
	Materials and Supplies						
9	Chemicals	22,266	23,379	24,548	25,776	27,064	28,418
10	Other	25,960	26,713	27,487	28,284	29,105	29,949
11	Subtotal	48,226	50,092	52,036	54,060	56,169	58,366
12	Equipment	5,393	5,501	5,611	5,723	5,837	5,954
13	Indemnities and Transfers	12,395	12,464	12,534	12,605	12,676	12,747
14	Subtotal Expenses	549,941	567,104	586,528	606,941	627,102	646,952
15	Liquidated Encumbrances	(31,671)	(32,939)	(34,164)	(35,456)	(36,818)	(38,235)
16	Total O&M Expenses	\$ 518,271	\$ 534,165	\$ 552,364	\$ 571,485	\$ 590,284	\$ 608,717

3.3.2. Bond Covenants, Transfers, and Fund Balances

The Water Department primarily uses long-term debt financing to pay for necessary capital improvement projects. The Water Department's flow of funds is dictated by the requirements of the General Bond Ordinance. The Water System and the Wastewater System are treated as one combined utility for the purpose of revenue bond financing, pursuant to the General Bond Ordinance

The General Bond Ordinance establishes the funds and accounts shown in Table 3-4, which are collectively known as the "Water and Wastewater Funds" or the "Water Fund."¹³

Table 3-4 Water and Wastewater Funds

FUNDS AND ACCOUNTS	
Revenue Fund	Rate Stabilization Fund
Sinking Fund	Construction Fund
<ul style="list-style-type: none"> Debt Service Account Debt Reserve Account Charges Account 	<ul style="list-style-type: none"> Existing Project Account Bond Proceeds Account Capital Account
Subordinated Bond Fund	Residual Fund
	<ul style="list-style-type: none"> Special Water Infrastructure Account

¹³ The operations of the Water Department are accounted for in the Water Fund, which is an enterprise fund of the City. The Water Fund is an accounting convention established for the purposes of accounting for the assets, liabilities, revenues, expenses of and to measure Rate Covenant compliance for, the Water and Wastewater Systems.

Revenues collected by the Water Department cascade through the Revenue Fund in the priority order shown in Figure 3-2.

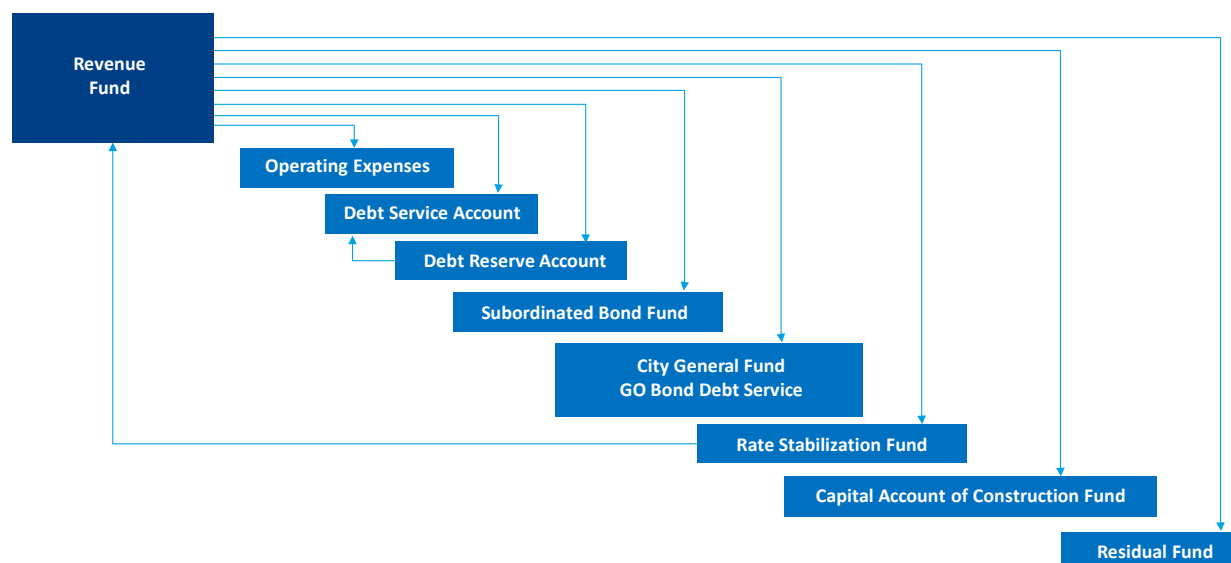


Figure 3-2 General Flow of Funds

Table 3-5 summarizes the performance targets of the General Bond Ordinance and the 2018 Rate Determination described in Section 2.3.

Table 3-5 Combined System Performance Targets

DESCRIPTION	PERFORMANCE TARGET
GENERAL BOND ORDINANCE PERFORMANCE TARGETS	
Debt Coverage	Minimum Senior Debt Coverage: 1.20. Senior Debt Coverage from Current Revenues: 0.90x Minimum Total Debt Coverage: 1.00x
Capital Account Deposit	1.0 percent of prior year net plant investment
2018 RATE DETERMINATION PERFORMANCE TARGETS	
Debt Coverage	Senior Debt Service Coverage 1.30x
Cash Funded Capital	20 Percent of Annual Capital Expenditures
Rate Stabilization Fund Transfer	Target of \$135 Million
Residual Fund Transfer to Construction Fund	Annual target of \$15 Million

3.3.3. Capital Improvements

The Water Department's CIP reflects planned improvements to the Combined System required to meet regulatory requirements and maintain existing levels of service. The CIP includes projects developed in the Water Department's Drinking Water Master Plan and major renewal and replacement ("R&R")

projects at Baxter, Queen Lane, and Belmont water facilities. It also includes projects such as the implementation of Advanced Metering Infrastructure (“AMI”), Green Stormwater Infrastructure, and wastewater treatment facility improvements.

As discussed in Section 2.3, the Water Department’s CIP is an appropriations-based projection that is not inflation-adjusted and contains contingencies. An appropriation-based budget means that the Water Department budgets the full amount of a proposed project in the year in which it is expected to be contracted. This type of budgeting does not reflect the actual cash expenditures as the project is executed.

The overall resulting CIP spending estimate, reflecting the adjustments and refinement of the spend factor approach is reflected in Table 3-6.

Table 3-6 Projected Capital Program Budget and Annual Expenditures [Schedule BV-1: Table 7]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
1	Engineering and Administration (a)	\$ 16,047	\$ 13,865	\$ 12,141	\$ 10,381	\$ 8,621	\$ 6,861
2	Plant Improvements	120,000	328,000	259,200	356,500	190,200	301,200
3	Distribution System Rehabilitation	78,060	93,060	101,060	172,160	117,460	108,060
4	Large Meter Replacement	35,000	5,000	5,000	5,000	5,000	5,000
5	Storm Flood Relief	10,000	15,000	15,000	15,000	15,000	15,000
6	Reconstruction of Sewers	67,800	72,460	67,860	67,860	67,860	67,860
7	Green Infrastructure	62,000	72,000	72,000	72,000	72,000	72,000
8	Vehicles	12,000	12,000	12,000	12,000	12,000	12,000
9	Total Improvements	400,907	611,385	544,261	710,901	488,141	587,981
10	Inflation Adjustment (b)	0	0	16,328	43,294	45,264	73,797
11	Inflated Total	400,907	611,385	560,589	754,195	533,405	661,778
12	Cash Flow Adjustment (c)	(45,120)	(175,475)	(51,660)	(240,867)	35,109	(106,239)
13	Net Cash Financing Required	\$ 355,787	\$ 435,911	\$ 508,928	\$ 513,328	\$ 568,514	\$ 555,538

(a) Beginning in FY 2017, Engineering and Administration Costs no longer include pension and benefits costs per City policy.

(b) Allowance for inflation of 3.0 percent per year after fiscal year 2021.

(c) Reflects adjustment to annual capital budget appropriations for project duration and contingency to reflect anticipated annual expenditures.

3.3.4. Debt Service

Table 3-7 summarizes the existing and proposed debt service payments during the Study Period and reflects the assumptions outlined in Section 2.3.4. For the analyses conducted herein, Black & Veatch worked with the Water Department, and the City’s financial advisors to estimate anticipated bond issue sizes, interest rates for a 30-year term, and issuance costs.

In late 2019, the Water Department applied for a Pennsylvania Infrastructure Investment Authority (“PennVest”) loan. PennVest provides low-interest loans and grants for new construction or improvements to publicly or privately-owned drinking water, stormwater, or sewerage treatment facilities. The PennVest loan, if awarded, will be parity debt.

As of the date of this Report, the Water Department has no subordinate debt.

Table 3-7 Summary of Existing and Proposed Debt Service [Schedule BV-1: Table C-9]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
Revenue Bonds							
1	Existing (a)	\$ 196,266	\$ 177,586	\$ 167,288	\$ 161,204	\$ 140,923	\$ 140,987
	Proposed						
2	Fiscal Year 2021 (b)		7,000	21,000	27,583	27,583	27,583
3	Fiscal Year 2022 (b)			7,788	23,363	30,686	30,686
4	Fiscal Year 2023 (b)				8,400	25,200	33,100
5	Fiscal Year 2024 (b)					9,188	27,563
6	Fiscal Year 2025 (b)						9,100
7	Total Proposed	0	7,000	28,788	59,345	92,657	128,031
8	Total Revenue Bonds	196,266	184,586	196,076	220,550	233,580	269,018
PennVest Loans							
9	PennVest Loans - Parity PennVest (c)	10,631	10,765	11,080	13,611	13,611	13,611
10	Total Debt Service	\$ 206,897	\$ 195,351	\$ 207,155	\$ 234,161	\$ 247,191	\$ 282,629

(a) Projected debt service amounts for the Variable Rate Series 1997B and 2005B Bonds are based upon assumed interest rates of 3.0% and 4.53%, respectively. Projected amounts also include (i) debt service for the Series 2019B Bonds which issued in FY 2020; and (ii) savings from the Series 2019A Refunding Bonds and the Forward Refunding for the Series 2011A Bonds.

(b) Projected debt service amounts assume interest only payment for the first year of the bond authorization based on 5.25% interest rate; and assume issuance during the first quarter of the fiscal year.

(c) Includes projected Pennvest Loan for the Torresdale Pump Station Rehabilitation.

3.4. SOURCES AND USES OF FUNDS

Table 3-8 summarizes the sources and uses of funds for financing of the Combined System CIP. Line 1 of the table shows the projected total revenue bond principal amounts projected to be issued FY 2020 through FY 2025, to finance the proposed capital improvements of the Water and Wastewater Systems. FY 2020 bonds reflect the actual issuance amount.

Table 3-8 Projected Flow of Funds – Construction Fund & Debt Reserve Account [Schedule BV-1: Table C-8]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
Disposition of Bond Proceeds							
1	Proceeds From Sale of Bonds	\$ 305,834	\$ 400,000	\$ 445,000	\$ 480,000	\$ 525,000	\$ 520,000
	Transfers:						
2	Debt Reserve Fund (a)	4,078	14,048	23,363	21,136	36,203	35,822
3	Cost of Bond Issuance (b)	1,752	2,360	2,626	2,832	3,098	3,068
4	Construction Fund (c)	300,004	383,592	419,012	456,032	485,700	481,110
5	Total Issue	305,834	400,000	445,000	480,000	525,000	520,000
Construction Fund							
6	Beginning Balance	270,235	280,055	309,374	311,415	334,350	329,259
7	Transfer From Bond Proceeds	300,004	383,592	419,012	456,032	485,700	481,110
8	Capital Account Deposit	27,065	29,230	31,569	34,094	36,822	39,767
9	Penn Vest Loan	0	19,875	26,500	6,625	0	0
10	Transfer from Residual Fund	35,800	29,600	30,800	36,300	37,600	45,200
11	Interest Income on Construction Fund	2,738	2,932	3,089	3,213	3,302	3,345
12	Total Available	635,842	745,285	820,344	847,679	897,774	898,682
13	Net Cash Financing Required	355,787	435,911	508,928	513,328	568,514	555,538
14	Ending Balance	280,055	309,374	311,415	334,350	329,259	343,144
Debt Reserve Account							
15	Beginning Balance	199,460	184,992	199,040	222,402	243,539	279,741
16	Transfer From Bond Proceeds	4,078	14,048	23,363	21,136	36,203	35,822
17	Debt Service Reserve Release	(18,546)	0	0	0	0	0
18	Ending Balance	184,992	199,040	222,402	243,539	279,741	315,563
19	Interest Income on Debt Reserve Fund	\$ 1,922	\$ 1,920	\$ 2,107	\$ 2,330	\$ 2,616	\$ 2,977

(a) Amount of Debt Reserve Fund estimated based on outstanding and proposed debt service payments.

(b) Cost of bonds issuance assumed at 0.59 percent of issue amount.

(c) Deposits equal proceeds from sale of bonds less transfers to Debt Reserve Fund and Costs of Issuance.

As shown in Lines 2 through 4, in addition to funding capital construction costs, the bond issuance proceeds are also used to fund required deposits into the Debt Reserve Fund and pay the costs of bond issuance. The annual Debt Reserve Fund balance must equal the maximum future annual debt service estimated for the outstanding and proposed bonds.

The projected bond issuances are as discussed above and consistent with the general assumptions outlined in Section 2.3.

The General Bond Ordinance requires two transfers that impact net revenue requirements: Interest Earnings Payment and the Capital Account Deposit. The Interest Earnings Payment is discussed later in this Report. The Capital Account Deposit is shown on Line 8 and the Residual Fund Transfer is found on Line 10.

Interest income on annual average balances in the Construction Fund and the Debt Reserve Fund are shown in Lines 11 and 19. The interest earnings in the Construction Fund, which primarily consists of bond proceeds, are not available to the Revenue Fund as a part of the overall project revenues available

for meeting annual revenue requirements of the Water Department. An assumed interest rate of 1.0 percent is used to determine the interest income for FY 2020 through FY 2025.

3.5. SUMMARY OF REVENUE AND REVENUE REQUIREMENTS

In this section, three tables are presented to provide the statement of financial operations for the Combined System. The first, Table 3-9, is the Water Department's financial plan reflecting only Base Rates. That is, TAP discounts and TAP-R revenues are not included. Table 3-10 presents the cashflows for the TAP discounts and TAP-R revenues. Finally, Table 3-11, combines Table 3-9 and Table 3-10 to show a cashflow for the Combined System accounting for all revenues and revenue requirements. Compliance with the requirements of the General Bond Ordinance and metrics set by the Rate Board is based on Table 3-11. For all three tables, the proposed revenue increases do not reflect any rate compression as discussed in Section 1.5.

As indicated on Lines 4 through 9 of Table 3-9 and Table 3-11, annual increases in revenue are required beginning in FY 2021. Revenue increases presented on Lines 4 to 9 of Table 3-9 reflect the overall needed increase to the Base Rates. The resulting percentage increases on Table 3-11 are lower because the additional revenue is relative to the total service revenue shown there.

Table 3-9 Projected Revenue and Revenue Requirements: Base Rates Only [Schedule BV-1: Table C-1A]

LINE NO.	DESCRIPTION	FISCAL YEAR ENDING JUNE 30,					
		2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
Operating Revenues							
1	Water Service - Existing Rates	\$ 276,970	\$ 273,936	\$ 271,454	\$ 269,033	\$ 266,630	\$ 264,236
2	Wastewater Service - Existing Rates	438,395	437,910	435,507	432,522	429,503	426,500
3	Total Service Revenue - Existing Rates	715,366	711,846	706,961	701,554	696,133	690,736
	Additional Service Revenue Required						
		Percent	Months				
	Year	Increase	Effective				
4	FY 2021	6.20%	10	36,104	43,832	43,160	42,826
5	FY 2022	6.20%	10	38,079	46,193	45,836	45,481
6	FY 2023	6.75%	10		43,691	52,996	52,585
7	FY 2024	6.75%	10			46,280	56,135
8	FY 2025	6.75%	10				49,021
9	Total Additional Service Revenue Required	0	36,104	81,911	133,381	188,272	246,047
10	Total Water & Wastewater Service Revenue	715,366	747,951	788,872	834,935	884,406	936,783
	Other Income (a)						
11	Other Operating Revenue	47,656	29,445	29,365	29,280	29,196	29,112
12	Debt Reserve Fund Interest Income	0	0	0	0	0	0
13	Operating Fund Interest Income	985	1,035	1,089	1,089	1,177	1,169
14	Rate Stabilization Interest Income	1,681	1,532	1,486	1,436	1,412	1,396
15	Total Revenues	765,687	779,962	820,813	866,740	916,191	968,461
Operating Expenses							
16	Total Operating Expenses	(518,271)	(534,165)	(552,364)	(571,485)	(590,284)	(608,717)
Net Revenues							
17	Transfer From/(To) Rate Stabilization Fund	21,600	8,200	900	9,200	(4,500)	7,700
18	NET REVENUES AFTER OPERATIONS	269,017	253,997	269,349	304,455	321,406	367,443
Debt Service							
Senior Debt Service							
Revenue Bonds							
19	Outstanding Bonds	(196,266)	(177,586)	(167,288)	(161,204)	(140,923)	(140,987)
20	Pennvest Parity Bonds	(10,631)	(10,765)	(11,080)	(13,611)	(13,611)	(13,611)
21	Projected Future Bonds	0	(7,000)	(28,788)	(59,345)	(92,657)	(128,031)
22	Total Senior Debt Service	(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
23	TOTAL SENIOR DEBT SERVICE COVERAGE (L18/L22)	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x
24	Subordinate Debt Service	0	0	0	0	0	0
25	Transfer to Escrow	0	0	0	0	0	0
26	Total Debt Service on Bonds	(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
27	CAPITAL ACCOUNT DEPOSIT	(27,065)	(29,230)	(31,569)	(34,094)	(36,822)	(39,767)
28	TOTAL COVERAGE (L18/(L22+L24+L27))	1.14 x	1.13 x	1.12 x	1.13 x	1.13 x	1.13 x
29	End of Year Revenue Fund Balance	\$ 35,055	\$ 29,416	\$ 30,625	\$ 36,200	\$ 37,394	\$ 45,047

(a) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund. Includes Debt Service Reserve Fund Release in FY 2020.

Table 3-10 Projected Revenue and Revenue Requirements: TAP-R Rates Only [Schedule BV-1: Table C-1B]

LINE	FISCAL YEAR ENDING JUNE 30,						
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
Operating Revenues							
1	Water Service - Existing Rates	\$ 3,777	\$ 3,925	\$ 3,909	\$ 3,870	\$ 3,831	\$ 3,791
2	Wastewater Service - Existing Rates	5,870	6,299	6,298	6,238	6,174	6,109
3	Total Service Revenue - Existing Rates	9,646	10,224	10,206	10,108	10,004	9,901
Additional Service Revenue Required							
	Year	Percent Increase	Months Effective				
4	FY 2021	0.00%	10	0	0	0	0
5	FY 2022	0.00%	10	0	0	0	0
6	FY 2023	0.00%	10		0	0	0
7	FY 2024	0.00%	10			0	0
8	FY 2025	0.00%	10				0
9	Total Additional Service Revenue Required	0	0	0	0	0	0
10	Total Water & Wastewater Service Revenue	9,646	10,224	10,206	10,108	10,004	9,901
Other Income (a)							
11	Other Operating Revenue	(9,929)	(9,929)	(9,929)	(9,929)	(9,929)	(9,929)
12	Debt Reserve Fund Interest Income	0	0	0	0	0	0
13	Operating Fund Interest Income	0	0	0	0	0	0
14	Rate Stabilization Interest Income	0	0	0	0	0	0
15	Total Revenues	(283)	295	278	179	75	(28)
Operating Expenses							
16	Total Operating Expenses	0	0	0	0	0	0
Net Revenues							
17	Transfer From/(To) Rate Stabilization Fund (b)	283	(295)	(278)	(179)	(75)	28
18	NET REVENUES AFTER OPERATIONS	0	0	0	0	0	0
Debt Service							
Senior Debt Service							
Revenue Bonds							
19	Outstanding Bonds	0	0	0	0	0	0
20	Pennvest Parity Bonds	0	0	0	0	0	0
21	Projected Future Bonds	0	0	0	0	0	0
22	Total Senior Debt Service	0	0	0	0	0	0
23	TOTAL SENIOR DEBT SERVICE COVERAGE (L18/L22)	NA	NA	NA	NA	NA	NA
27	Subordinate Debt Service	0	0	0	0	0	0
28	Transfer to Escrow	0	0	0	0	0	0
29	Total Debt Service on Bonds	0	0	0	0	0	0
30	CAPITAL ACCOUNT DEPOSIT	0	0	0	0	0	0
31	TOTAL COVERAGE (L18/(L22+L27+L30))	NA	NA	NA	NA	NA	NA
32	End of Year Revenue Fund Balance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

(a) Reflects projected contra revenue credits for Affordability Program Discounts (TAP Costs).

(b) Rate Stabilization Fund transfers necessary to meet over or under recovery of TAP costs until recovery is reconciled via TAP-R reconciliation.

Table 3-11 Projected Revenue and Revenue Requirements: Base Rates and TAP-R Rates [Schedule BV-1: Table C-1]

LINE	FISCAL YEAR ENDING JUNE 30,						
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
Operating Revenues							
1	Water Service - Existing Rates	\$ 280,747	\$ 277,861	\$ 275,363	\$ 272,903	\$ 270,460	\$ 268,028
2	Wastewater Service - Existing Rates	444,265	444,209	441,805	438,760	435,677	432,609
3	Total Service Revenue - Existing Rates	725,012	722,070	717,168	711,663	706,137	700,637
Additional Service Revenue Required							
	Year	Percent Increase	Months Effective				
4	FY 2021	6.11%	10	36,104	43,496	43,160	42,826
5	FY 2022	6.12%	10	38,079	46,193	45,836	45,481
6	FY 2023	6.71%	10		43,691	52,996	52,585
7	FY 2024	6.72%	10			46,280	56,135
8	FY 2025	6.73%	10				49,021
9	Total Additional Service Revenue Required	0	36,104	81,911	133,381	188,272	246,047
10	Total Water & Wastewater Service Revenue	725,012	758,174	799,079	845,043	894,410	946,684
Other Income (a)							
11	Other Operating Revenue	37,728	19,516	19,437	19,352	19,267	19,184
12	Debt Reserve Fund Interest Income	0	0	0	0	0	0
13	Operating Fund Interest Income	985	1,035	1,089	1,089	1,177	1,169
14	Rate Stabilization Interest Income	1,681	1,532	1,486	1,436	1,412	1,396
15	Total Revenues	765,405	780,257	821,091	866,919	916,266	968,433
Operating Expenses							
16	Total Operating Expenses	(518,271)	(534,165)	(552,364)	(571,485)	(590,284)	(608,717)
Net Revenues							
17	Transfer From/(To) Rate Stabilization Fund	21,883	7,905	622	9,021	(4,575)	7,728
18	NET REVENUES AFTER OPERATIONS	269,017	253,997	269,349	304,455	321,406	367,443
Debt Service							
Senior Debt Service							
Revenue Bonds							
19	Outstanding Bonds	(196,266)	(177,586)	(167,288)	(161,204)	(140,923)	(140,987)
20	Pennvest Parity Bonds	(10,631)	(10,765)	(11,080)	(13,611)	(13,611)	(13,611)
21	Projected Future Bonds	0	(7,000)	(28,788)	(59,345)	(92,657)	(128,031)
22	Total Senior Debt Service	(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
23	TOTAL SENIOR DEBT SERVICE COVERAGE (L18/L22)	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x	1.30 x
24	Subordinate Debt Service	0	0	0	0	0	0
25	Transfer to Escrow	0	0	0	0	0	0
26	Total Debt Service on Bonds	(206,897)	(195,351)	(207,155)	(234,161)	(247,191)	(282,629)
27	CAPITAL ACCOUNT DEPOSIT	(27,065)	(29,230)	(31,569)	(34,094)	(36,822)	(39,767)
28	TOTAL COVERAGE (L18/(L22+L24+L27))	1.14 x	1.13 x	1.12 x	1.13 x	1.13 x	1.13 x

Table 3-11 Projected Revenue and Revenue Requirements: Base Rates and TAP-R Rates (continued)

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Combined System (\$000s)							
Residual Fund							
29	Beginning of Year Balance	\$ 15,666	\$ 15,073	\$ 15,039	\$ 15,014	\$ 15,063	\$ 15,007
30	Interest Income	153	150	150	150	150	149
	Plus:						
31	End of Year Revenue Fund Balance	35,055	29,416	30,625	36,200	37,394	45,047
32	Deposit for Transfer to City General Fund (b)	1,922	1,920	2,107	2,330	2,616	2,977
	Less:						
33	Transfer to Construction Fund	(35,800)	(29,600)	(30,800)	(36,300)	(37,600)	(45,200)
34	Transfer to City General Fund	(1,922)	(1,920)	(2,107)	(2,330)	(2,616)	(2,977)
35	Transfer to Debt Service Reserve Fund	0	0	0	0	0	0
36	End of Year Balance	15,073	15,039	15,014	15,063	15,007	15,003
Rate Stabilization Fund							
37	Beginning of Year Balance	177,971	156,089	148,184	147,561	138,541	143,116
38	Deposit From/(To) Revenue Fund	(21,883)	(7,905)	(622)	(9,021)	4,575	(7,728)
39	End of Year Balance	\$ 156,089	\$ 148,184	\$ 147,561	\$ 138,541	\$ 143,116	\$ 135,388

(a) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund and reflects projected contra revenue credits for Affordability Program Discounts (TAP Costs). Includes Debt Service Reserve Fund Release in FY 2020.

(b) Transfer of interest earnings from the Bond Reserve Account to the Residual Fund as shown in Line 32 to satisfy the requirements for the transfer to the City General Fund shown on Line 34.

(c) FY 2020 beginning balance is estimated based on preliminary FY 2019 results.

For this analysis, an effective increase date of September 1 for each fiscal year is assumed. As indicated in Lines 23 and 28 on Table 3-11, the debt service coverage requirements discussed previously would be met with these overall levels of increase in revenues. Annual cash requirements for the Combined System would also be met with the proposed levels of increase, as shown on Line 29 of Table 3-9 and Line 31 of Table 3-11.

3.6. COMPLIANCE WITH GENERAL BOND ORDINANCE AND RATE ORDINANCE REQUIREMENTS

As stated in the assumptions utilized for these analyses, the Water Department must establish rates and charges to meet the financial management requirements of the General Bond Ordinance with respect to, among other things, (1) maintaining the Rate Stabilization Fund at minimum levels; (2) financing a portion of major annual capital improvement requirements directly from annual system revenues; (3) fulfilling rate covenant requirements; and (4) making required deposits into the Residual Fund of any monies remaining after payment of all current cash obligations to further support the Water Department's goal towards 20 percent capital funding from system revenues.

For the Study Period, the proposed rates and charges are derived to meet the targets identified during the 2018 Rate Determination, namely, a target Rate Stabilization Fund balance of approximately \$135 Million, a 1.30 senior debt service coverage ratio, 20 percent cash financing of capital improvements, and maintaining a target Residual Fund balance of \$15 Million.

In addition to the General Bond Ordinance, under Section 13-101(4)(a) of the Philadelphia Code, the Water Rate Board Ordinance ("Rate Ordinance") sets forth the floor for the amounts that rates and

charges must generate to support the Combined System. The rates and charges must yield to the City at least an amount equal to the sum of:

1. Operating expenses of the City in respect of the Water and Wastewater Systems;
2. Debt service on all obligations of the City in respect of the Water and Wastewater Systems;
3. With respect to the water, sewer and stormwater revenue obligations of the City, such additional amounts as will be required to comply with any rate covenant and sinking fund reserve requirements approved by ordinance of the City Council in connection with the authorization or issuance of water, sewer and stormwater revenue bonds; and
4. Proportionate charges for all services performed for the Water Department by all officers, departments, boards or commissions of the City.

Moreover, Section 13-101(4)(b) of the Philadelphia Code states that the rates and charges must not exceed (“ceiling”) the total appropriations from the Water Fund and provides considerations of the elements that are to be included in the calculation of the ceiling. The rates and charges projected for FY 2021 and FY 2022 do not exceed the Water Fund’s projected appropriations for the above years.

Lines 4 through 6 on Table 3-12 show the calculation for compliance with the General Bond Ordinance Rate Covenant. Line 11 in Table 3-12 reflects the compliance with the Rate Ordinance requirement over the Study Period.

Table 3-12 Projected Rate Stabilization Fund and Covenants Metrics Performance: Base Rates and TAP-R Rates [Schedule BV-1: Table C-2]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Rate Stabilization Fund (\$000s)							
1	Beginning Balance: Rate Stabilization Fund (a)	\$ 177,971	\$ 156,089	\$ 148,184	\$ 147,561	\$ 138,541	\$ 143,116
2	Transfers From (To) Revenue Fund (b)	(21,883)	(7,905)	(622)	(9,021)	4,575	(7,728)
3	Year-End Rate Stabilization Fund Balance (Line 1 + Line 2)	156,089	148,184	147,561	138,541	143,116	135,388
General Bond Ordinance Covenants							
4	Senior Debt Coverage (c)	1.30	1.30	1.30	1.30	1.30	1.30
5	Total Debt Coverage (d)	1.14	1.13	1.12	1.13	1.13	1.13
6	90% Test - Senior Debt Coverage from Current Revenues (e)	1.19	1.25	1.29	1.26	1.30	1.27
O&M Actual-to-Budget Ratio							
7	Projected O&M Budget (\$000s) (f)	590,441	612,192	632,887	654,632	676,189	697,481
8	O&M Actual to Budget Ratio	0.88	0.87	0.87	0.87	0.87	0.87
Rate Ordinance Requirements (\$000s)							
9	Projected Total Revenues	765,405	780,257	821,091	866,919	916,266	968,433
10	Projected Total Appropriations (g)	859,458	866,189	902,236	959,087	1,002,095	1,064,924
11	Ordinance Requirement Compliance (h)	Yes	Yes	Yes	Yes	Yes	Yes
Cash Funding (\$000s)							
12	Cash Funded Capital (i)	62,865	58,830	62,369	70,394	74,422	84,967
13	Capital Improvement Program Annual Expenses	\$ 355,787	\$ 435,911	\$ 508,928	\$ 513,328	\$ 568,514	\$ 555,538
14	Cash Funded Capital Ratio (j)	17.7%	13.5%	12.3%	13.7%	13.1%	15.3%

(a) FY 2020 beginning balance is estimated based on FY 2019 preliminary financial results.

(b) See Line 17 in Table 3-11.

(c) Senior Debt Coverage = (Total Revenues - Operating Expenses + Transfer From (to) Rate Stabilization) divided by Senior Debt. The General Bond Ordinance requires the minimum Senior Debt Service Coverage of 1.20.

(d) Total Debt Coverage = (Total Revenues - Operating Expenses + Rate Stabilization Transfer) divided by (Senior Debt + Subordinate Debt + Capital Account Deposit). The General Bond Ordinance requires the minimum Total Debt Service Coverage of 1.00.

(e) Senior Debt Coverage from Current Revenues = (Total Revenues - Operating Expenses - Transfer to Rate Stabilization Fund) divided by Senior Debt. Transfers from Rate Stabilization are excluded from the Total Revenues. The General Bond Ordinance requires a minimum Senior Debt Service Coverage of 0.90 from current revenues.

(f) FY 2020 budget reflects the PWD adopted budget; FY 2021 through FY 2025 budget reflects annual cost escalation factors.

(g) Total Appropriation = Total O&M Budget + Senior Debt + Subordinate Debt + Transfer to Escrow + Capital Account Deposit + Transfer to Rate Stabilization Fund + Transfer to Residual Fund. Costs to service the City included as required by the General Bond Ordinance rate covenants.

(h) Rate Ordinance requires that Total Revenues not exceed Total Appropriations.

(i) Cash Funded Capital = Capital Account Deposit + Residual Transfer to Construction Fund

(j) Cash Funded Capital Ratio = Cash Funded Capital divided by Capital Improvement Program annual expenses.

3.7. PROPOSED RATES

The proposed charges for water and wastewater service derived in this Report are applicable to General Service retail customers and recognize that certain retail customer types, including qualifying senior citizens, charities and schools, and the Philadelphia Housing Authority “(PHA)”, receive services at a discounted rate. The Water Department anticipates that the existing discounts (25 percent for senior citizens, charities and schools and 5 percent for PHA) will continue to be applicable for the entire Study Period.

In designing the proposed rates, water, sanitary sewer, and stormwater costs of service are adjusted to reflect the fact that the above customer types are served at a discount and do not pay the full cost of service. Accordingly, the proposed retail water, sewer, and stormwater rates are adjusted to recover this cost of service revenue reduction due to discounts.

In addition, in the case of the non-residential stormwater group, we adjust their stormwater rates to address the discounts as well as to recover the reduction in revenue due to the existing stormwater customer assistance program (“CAP”). Additional information regarding the anticipated revenue reductions due to the stormwater CAP are discussed later in this Report.

As previously noted, revenue loss due to providing TAP discounts and TAP-R revenues were excluded from the analysis of Base Rates. Consequently, Table 3-13 only summarizes the proposed Base Rates for the Rate Period (FY 2021 and FY 2022). Current effective rates for FY 2020 are presented for informational purposes.

Table 3-13 Proposed FY 2021 and FY 2022 Rates

Water			
Description	Existing	Proposed	
	FY 2020	FY 2021	FY 2022
Monthly Water Service Charge (\$/bill)			
Meter Size (Inches)			
5/8	\$5.21	\$5.08	\$5.19
3/4	\$5.55	\$5.40	\$5.52
1	\$6.70	\$6.47	\$6.63
1-1/2	\$8.88	\$8.51	\$8.73
2	\$12.32	\$11.73	\$12.06
3	\$19.44	\$18.37	\$18.94
4	\$35.39	\$33.60	\$34.58
6	\$66.29	\$62.74	\$64.64
8	\$100.66	\$95.03	\$98.00
10	\$147.50	\$139.39	\$143.70
12	\$239.52	\$224.76	\$232.22
Base Rate - Water Quantity Charges (\$/Mcf)			
Monthly Water Usage			
First 2 Mcf	\$44.80	\$48.57	\$51.02
Next 98 Mcf	\$38.56	\$42.67	\$46.05
Next 1,900 Mcf	\$29.88	\$33.07	\$35.47
Over 2,000 Mcf	\$29.06	\$32.17	\$34.49

Wastewater			
Description	Existing	Proposed	
	FY 2020	FY 2021	FY 2022
Monthly Sanitary Sewer Service Charge (\$/bill)			
Meter Size (Inches)			
5/8	\$7.01	\$7.61	\$8.15
3/4	\$8.93	\$9.75	\$10.44
1	\$13.07	\$14.36	\$15.39
1-1/2	\$22.97	\$25.40	\$27.23
2	\$35.42	\$39.23	\$42.08
3	\$63.82	\$70.85	\$76.01
4	\$108.49	\$120.31	\$129.06
6	\$213.81	\$237.29	\$254.58
8	\$338.27	\$375.66	\$403.06
10	\$488.25	\$542.09	\$581.62
12	\$887.22	\$986.67	\$1,058.80
Base Rate - Sanitary Sewer Quantity Charges (\$/Mcf)			
Monthly Usage			
All Billable Water Usage	\$31.25	\$33.88	\$36.50
Groundwater Charge	\$13.86	\$13.08	\$13.96

Sanitary - Surcharge Rates (\$/lb)			
BOD (\$/lb in excess of 250 mg/	\$0.397	\$0.448	\$0.478
SS (\$/lb in excess of 350 mg/l)	\$0.388	\$0.468	\$0.501

Residential Stormwater Charges			
Monthly Stormwater Management Service Charge			
Charge Per Parcel	\$14.03	\$15.81	\$17.03
Monthly Billing & Collection Charge			
Charge Per Bill	\$1.77	\$1.99	\$2.12
Non-Residential Stormwater Charges			
Monthly Stormwater Management Service Charge			
Gross Area (\$/500 sf)	\$0.717	\$0.765	\$0.825
Impervious Area (\$/500 sf)	\$5.410	\$5.383	\$5.790
Monthly Billing & Collection Charge			
Charge Per Bill	\$2.30	\$2.58	\$2.76

Notes:

All charges (existing and proposed) are effective September 1st of the respective Fiscal Year.

Non-Residential Stormwater Charges includes Condominiums.

3.7.1. Residential and Senior Citizen Typical Bills

Table 3-14 presents a series of typical or representative combined residential water, sanitary sewer, and stormwater monthly bills under existing and proposed rates for FY 2021 and FY 2022 for the 5/8-inch meter size. A typical PWD residential customer has a 5/8-inch meter and uses about 0.5 Mcf, or approximately 500 cubic feet, monthly. Under the proposed schedules of water, sanitary sewer, and stormwater rates for FY 2021, this customer's monthly bill would increase from \$66.99 to \$72.65, an increase of \$5.66 or about 8.4 percent. In FY 2022, the bill increases to \$77.19, an increase of \$4.54 over FY 2021 rates, or about 6.2 percent.

Table 3-14 Comparison of Typical Bill for Residential Customers Under Existing and Proposed Rates [Schedule BV-1: Table C-4]

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Meter Size	Monthly Use	FY 2020 Existing Rates	FY 2021 Proposed Rates	% Proposed of Existing	FY 2022 Proposed Rates	% Proposed of FY 2021
Inches	Mcf	\$	\$	%	\$	%
5/8	0.0	\$28.02	\$30.49	8.8	\$32.49	6.6
5/8	0.2	43.60	47.36	8.6	50.37	6.4
5/8	0.3	51.39	55.78	8.5	59.31	6.3
5/8	0.4	59.18	64.22	8.5	68.24	6.3
5/8	0.5	66.99	72.65	8.4	77.19	6.2
5/8	0.6	74.78	81.08	8.4	86.13	6.2
5/8	0.7	82.57	89.52	8.4	95.06	6.2
5/8	0.8	90.36	97.94	8.4	104.00	6.2
5/8	1.7	160.49	173.84	8.3	184.45	6.1
5/8	2.7	234.04	254.03	8.5	270.36	6.4
5/8	3.3	\$277.04	\$301.07	8.7	\$321.02	6.6

Notes:

FY 2021 and FY 2022 figures reflect the current TAP Rate Rider Surcharge rates, of \$0.71 MCF for water and \$1.16/MCF for sewer.

The TAP Rate Rider Surcharge is subject to annual reconciliation.

A typical PWD senior residential customer has a 5/8-inch meter and uses about 0.3 Mcf or approximately 300 cubic feet, monthly. Under the proposed schedules of water, sanitary sewer, and stormwater rates for FY 2021, this customer's monthly bill would increase from \$51.39 to \$55.78, an increase of \$4.39 or about 8.5 percent. In FY 2022, the bill increases to \$59.31, an increase of \$3.53 over FY 2021 rates, or about 6.3 percent. As previously noted, qualifying senior citizens may receive a 25 percent discount on their entire bill. The total monthly bills presented in Table 3-14 do not reflect this discount. Accounting for the discount for qualifying senior citizens, the typical senior residential customer's monthly bill (based upon the previously stated billing parameters) would increase from \$38.54 to \$41.83, an increase of \$3.29 or about 8.5 percent. In FY 2022, the bill increases to \$44.48, an increase of \$2.65 over FY 2021 rates, or about 6.3 percent.

3.7.2. Non-Residential Typical Bills

Table 3-15 presents a series of typical or representative combined non-residential water, sanitary sewer, and stormwater monthly bills under existing and proposed rates for FY 2021 and FY 2022 for multiple meter sizes and various parcel characteristics (i.e., GA and IA). A PWD small commercial business customer has a 5/8-inch meter and uses about 0.6 Mcf or approximately 600 cubic feet, monthly. A parcel with gross area of 5,500 square feet and impervious area of 4,000 square feet was assumed for development of the typical bill comparison.

Under the proposed schedules of water, sanitary sewer, and stormwater rates for FY 2021, this customer's monthly bill would increase from \$112.45 to \$117.34, an increase of \$4.89 or about 4.4 percent. In FY 2022, the bill increases to \$125.14, an increase of \$7.80 over FY 2021 rates, or about 6.6 percent.

Table 3-15 Comparison of Typical Bill for Non-Residential Customers Under Existing and Proposed Rates
 [Schedule BV-1: Table C-5]

(1) Meter Size Inches	(2) Monthly Use Mcf	(3) Impervious Area sf	(4) Gross Area sf	(5)	(6)	(7)	(8)	(9)
				FY 2020 Existing Rates \$	FY 2021 Proposed Rates \$	% Proposed of Existing %	FY 2022 Proposed Rates \$	% Proposed of FY 2021 %
5/8	0.0	1,794	2,110	\$39.75	\$40.63	2.2	\$43.39	6.8
5/8	0.2	1,794	2,110	55.33	57.50	3.9	61.27	6.6
5/8	0.3	1,794	2,110	63.12	65.92	4.4	70.21	6.5
5/8	0.4	1,794	2,110	70.91	74.36	4.9	79.14	6.4
5/8	0.5	1,794	2,110	78.72	82.79	5.2	88.09	6.4
5/8	0.6	4,000	5,500	112.45	117.34	4.4	125.14	6.6
5/8	0.7	4,000	5,500	120.24	125.78	4.6	134.07	6.6
5/8	0.8	26,000	38,000	412.67	420.78	2.0	451.39	7.3
5/8	1.7	26,000	38,000	482.80	496.68	2.9	531.84	7.1
5/8	2.7	4,000	5,500	271.71	290.29	6.8	309.37	6.6
5/8	3.3	4,000	5,500	314.71	337.33	7.2	360.03	6.7
5/8	11.0	7,000	11,000	906.99	981.88	8.3	1,053.87	7.3
1	1.7	7,700	7,900	252.57	265.13	5.0	282.58	6.6
1	5.0	22,500	24,000	670.82	706.27	5.3	756.97	7.2
1	8.0	7,700	7,900	706.02	760.94	7.8	815.92	7.2
1	17.0	22,500	24,000	1,530.98	1,647.31	7.6	1,770.01	7.4
2	7.6	1,063	1,250	625.67	679.77	8.6	728.29	7.1
2	16.0	22,500	24,000	1,487.27	1,599.02	7.5	1,717.71	7.4
2	33.0	66,500	80,000	3,262.21	3,491.54	7.0	3,754.77	7.5
2	100.0	7,700	7,900	7,328.55	8,005.71	9.2	8,614.68	7.6
4	30.0	7,700	7,900	2,407.09	2,619.26	8.8	2,814.78	7.5
4	170.0	10,500	12,000	11,867.48	12,959.09	9.2	13,928.53	7.5
4	330.0	26,000	38,000	22,152.47	24,176.95	9.1	25,965.32	7.4
4	500.0	140,000	160,000	34,270.90	37,290.33	8.8	40,039.54	7.4
6	150.0	10,500	12,000	10,743.70	11,728.81	9.2	12,607.31	7.5
6	500.0	41,750	45,500	33,182.57	36,206.20	9.1	38,871.36	7.4
6	1,000.0	26,000	38,000	64,498.69	70,432.47	9.2	75,593.70	7.3
6	1,500.0	140,000	160,000	97,407.12	106,256.45	9.1	114,035.12	7.3
8	750.0	10,500	12,000	48,702.53	53,191.47	9.2	57,093.15	7.3
8	1,500.0	66,500	80,000	96,655.96	105,513.41	9.2	113,233.83	7.3
8	2,000.0	26,000	38,000	127,657.52	139,423.13	9.2	149,615.54	7.3
8	3,000.0	140,000	160,000	191,245.95	208,757.11	9.2	223,996.96	7.3
10	600.0	22,500	24,000	39,596.40	43,226.82	9.2	46,400.17	7.3
10	1,700.0	41,750	45,500	109,138.22	119,171.65	9.2	127,885.46	7.3
10	3,300.0	26,000	38,000	208,688.34	227,929.92	9.2	244,557.80	7.3
10	6,000.0	140,000	160,000	\$377,982.77	\$412,727.90	9.2	\$442,801.22	7.3

(a) Examples with gross area less than 5,000 square feet reflect an impervious area of 85% of the gross area consistent with PWD Regulations section 304.3.

(b) FY 2021 and FY 2022 figures reflect the current TAP Rate Rider Surcharge rates, of \$0.71 MCF for water and \$1.16/MCF for sewer.
 The TAP Rate Rider Surcharge is subject to annual reconciliation.

4. WATER SYSTEM REVENUE AND REVENUE REQUIREMENTS

The major elements of the water system include three river supply intakes, three treatment plants, storage facilities and a conveyance network. Based on the 2020 U.S. Census Bureau estimate, the Water System served 1,584,138 individuals.

This section of the report focuses on the Revenue and Revenue Requirements component of the Cost of Service study for the Water System. These requirements establish how much money the Water System needs to meet its fiscal year operating and capital obligations. In the following discussion, we review O&M expenses, debt service payments, funding for specific deposits and reserves, and the cost of capital improvement projects that the Water Department does not fund via debt or contributions from third parties.

4.1. WATER REVENUE

The City's Water System derives revenue primarily from charges for water service. During the Study Period, future levels of revenue are projected based on an analysis of historical and future system growth in terms of the number of accounts and water consumption.

4.1.1. Customers and Growth

Table 4-1 summarizes the Water Department's customer account classifications. Customer types are based on a combination of service type, customer type, and installation type designations in Basis2.

Table 4-1 Water System Customer Types

CUSTOMER TYPES		
General Service	Other	Fire Service
- Residential	- PHA	- Public (Hydrants)
- Senior Citizens	- Charities & Schools	- Private
- Commercial	- Hospitals & Universities	Wholesale
- Industrial	- Hand Billed	
- Public Utilities	- Scheduled (Flat Rate)	

From 2010 to 2018, the US Census Bureau reports that metropolitan areas with populations of 1 million or more residents have generally seen declining populations. In terms of net growth, the metropolitan area of Philadelphia, which includes Camden and Wilmington, ranked 43rd out of 53 metropolitan areas over this period. The Philadelphia Inquirer reports that from 2017 to 2018, the Philadelphia metropolitan area saw a net population increase of only about 18,000.

Based on a review of historical growth patterns, the total number of customer accounts for the Water System is projected to remain stable during the Study Period, as shown on Table 4-2.

Table 4-2 Number of Customer Accounts

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Water System							
1	Residential	422,367	422,367	422,367	422,367	422,367	422,367
2	Senior Citizens	23,469	23,469	23,469	23,469	23,469	23,469
3	Commercial	36,747	36,747	36,747	36,747	36,747	36,747
4	Industrial	1,064	1,064	1,064	1,064	1,064	1,064
5	Public Utilities	173	173	173	173	173	173
6	Subtotal General Service	483,820	483,820	483,820	483,820	483,820	483,820
7	PHA	5,877	5,877	5,877	5,877	5,877	5,877
8	Charities and Schools	2,163	2,163	2,163	2,163	2,163	2,163
9	Hospitals and Universities	406	406	406	406	406	406
10	Hand Billed	241	241	241	241	241	241
11	Scheduled (Flat Rate)	3	3	3	3	3	3
12	Private Fire Protection	5,538	5,538	5,538	5,538	5,538	5,538
13	Subtotal Retail Customers	498,048	498,048	498,048	498,048	498,048	498,048
14	Aqua Pennsylvania	1	1	1	1	1	1
15	Total Water System	498,049	498,049	498,049	498,049	498,049	498,049

4.1.2. Billed Volume

Table 4-3 shows the historical usage per account for General Service customers (5/8-inch meters) and Table 4-4 presents the projected billed volume in thousands of cubic feet ("Mcf") for the Study Period. The projected water usage reflects the current number of accounts and the average usage per account based on historical demands, as presented in Schedule BV-6: WP-1, Appendix A.

Table 4-3 Historical Usage per Account for General Service Customers with 5/8-inch meters [Schedule BV-6: WP-1, Table 1]

DESCRIPTION	FISCAL YEAR ENDING JUNE 30,				
	2015	2016	2017	2018	2019
Annual Billed Volume per Account (Mcf/Account)	7.32	7.02	6.93	6.75	6.64
Annual Change		0.69%	-4.10%	-1.28%	-1.63%
2-Year Average Change		-1.73%	-2.70%	-1.94%	-2.11%

For General Service customers that have a 5/8-inch meter, the analysis of the historical 2-year average change in billed volume indicates a decrease in annual usage (i.e., billed volume) per account of approximately 2.00 percent. For all other General Service customers, the usage per account is based upon the 2-year average billed volume per account and projected to remain flat, based upon a review of long-term historical figures.

Table 4-4 Projected Billed Volumes

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Water System (Mcf)							
1	Residential	3,012,019	2,958,267	2,908,649	2,859,031	2,809,413	2,759,795
2	Senior Citizens	125,570	122,989	120,643	118,297	115,951	113,605
3	Commercial	1,580,366	1,574,457	1,568,547	1,562,918	1,557,290	1,551,943
4	Industrial	125,601	125,472	125,349	125,226	125,107	124,989
5	Public Utilities	9,305	9,291	9,277	9,264	9,251	9,237
6	Subtotal General Service	4,852,862	4,790,476	4,732,465	4,674,736	4,617,012	4,559,570
7	PHA	157,269	157,269	157,269	157,269	157,269	157,269
8	Charities and Schools	157,164	157,164	157,164	157,164	157,164	157,164
9	Hospitals and Universities	289,770	289,770	289,770	289,770	289,770	289,770
10	Hand Billed	449,426	449,426	449,426	449,426	449,426	449,426
11	Scheduled (Flat Rate)	11	11	11	11	11	11
12	Private Fire Protection	13,900	13,900	13,900	13,900	13,900	13,900
13	Public Fire Protection	0	0	0	0	0	0
14	Subtotal Retail Customers	5,920,402	5,858,016	5,800,005	5,742,276	5,684,553	5,627,110
15	Aqua Pennsylvania	63,991	100,000	100,000	100,000	100,000	100,000
16	Total Water System	5,984,393	5,958,016	5,900,005	5,842,276	5,784,553	5,727,110

4.1.3. Bill Tabulation

In addition to analyzing the historical usage per account trends, the bill-frequency distribution (more commonly known as a bill tabulation) was also examined. Specifically, the bill tabulation presents the number of customer bills issued at different meter sizes and water usage levels for each customer type served by the utility. The bill tabulation of customer bills provides information on customer type meter distributions and usage patterns. For the analysis conducted herein, the bill tabulation results provide data on the number of accounts by meter size and how much volume passes through each block of the Water Department's quantity charge structure.

4.1.4. Water Revenue

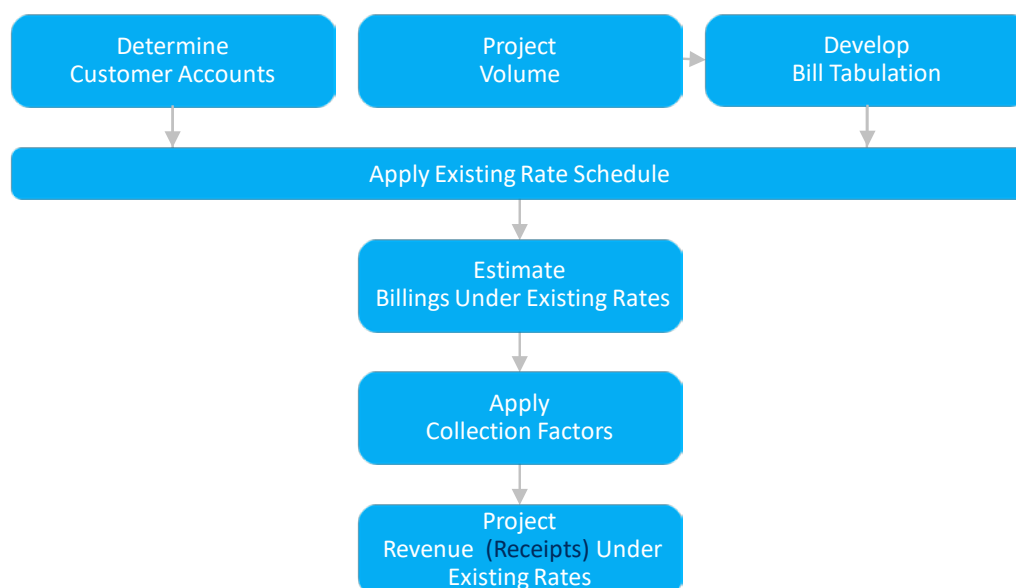
The total operating revenues for the Water Department include the following:

- Retail (i.e., all customers excluding wholesale) Water Service and Quantity charges;
- Private Fire Protection – A monthly charge based on meter size to recover a portion of the Water System costs related to serving certain customers with private fire systems; and
- Wholesale customer water charges.

4.1.4.1. Retail Operating Revenues

Retail operating revenues were developed following the process described below and illustrated in Figure 4-1.

Figure 4-1 Projecting Revenues Under Existing Rates



4.1.4.2. Projection of Gross Billings

To project the FY 2020 water gross billings, the FY 2019 (effective September 1, 2018) and FY 2020 (effective September 1, 2019) schedules of water rates were applied to proportionate shares of the projected FY 2020 annual water sales and number of customer accounts, to reflect the September 1, 2019 implementation of the FY 2020 rate schedule.

To project FY 2021 to FY 2025 water gross billings, the FY 2020 schedule of water rates shown on Table 4-5 were applied to the projections of annual water sales and number of customer accounts.

Table 4-5 Existing FY 2020 Water Rates

DESCRIPTION	WATER	PRIVATE FIRE	DESCRIPTION	WATER
Monthly Service Charge (\$/bill)			Quantity Charges (\$/Mcf)	
Meter Size (inches)			0 - 2 Mcf	\$44.80
5/8	\$5.21	\$27.63	2 - 100 Mcf	\$38.56
3/4	\$5.55	\$27.63	100 - 2,000 Mcf	\$29.88
1	\$6.70	\$27.63	>2,000 Mcf	\$29.06
1 1/4	\$8.05	\$27.63		
1 1/2	\$8.88	\$27.63		
2	\$12.32	\$27.63		
3	\$19.44	\$27.63		
4	\$35.39	\$27.63		
6	\$66.29	\$50.74		
8	\$100.66	\$75.77		
10	\$147.50	\$111.74		
12	\$239.52	\$172.64		

Where applicable, discounts were applied for eligible customer types. Table 4-6 summarizes the current discounts available.

Table 4-6 Current Customer Discounts

	SENIOR CITIZENS	PHA	CHARITIES/HOSPITALS/EDUCATION
Discount Rate	25%	5%	25%

Applying the appropriate rates and discounts to the number of accounts and billed volumes by customer type, billings for water services under existing rates were calculated, as shown in Table 4-7.

As shown on Line 14, the Water System revenues generated reflect a compounded annual decline of approximately 0.93 percent, which is primarily due the annual reduction in the usage per account associated with the 5/8-inch meter General Service customers. The decrease in the use per customer for smaller accounts seen on Table 4-3 continues a consistent downward trend observed over the past decade, both nationally as well as locally.

Table 4-7 Billings Under Existing Rates

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Water System (\$000s)							
Water Non-Discount							
1	Residential	\$ 159,112	\$ 156,389	\$ 154,217	\$ 152,044	\$ 149,872	\$ 147,699
2	Commercial	63,824	63,386	63,161	62,947	62,733	62,529
3	Industrial	4,376	4,354	4,350	4,346	4,342	4,338
4	Public Utilities	391	389	388	388	387	387
5	Private Fire Protection	4,388	4,394	4,394	4,394	4,394	4,394
6	Public Fire Protection	9,235	9,235	9,235	9,235	9,235	9,235
7	Wholesale	3,821	3,940	3,940	3,940	3,940	3,940
8	Other (Hand-Billed and Scheduled)	14,787	14,726	14,726	14,726	14,726	14,726
9	Subtotal Water Non-Discount Billings	259,934	256,813	254,411	252,020	249,629	247,248
Water Discount							
10	Residential (Senior Citizens)	5,280	5,183	5,105	5,027	4,950	4,872
11	PHA	6,203	6,183	6,183	6,183	6,183	6,183
12	Charity/Schools/Hospital/University	12,455	12,409	12,409	12,409	12,409	12,409
13	Subtotal Water Discount Billings	23,937	23,775	23,697	23,619	23,542	23,464
14	Total Water Service Billings	\$ 283,871	\$ 280,588	\$ 278,108	\$ 275,639	\$ 273,170	\$ 270,712

4.1.4.3. Application of Collection Factors


The second step in the process of calculating revenues involves applying receipt factors (i.e., collection factors) to the corresponding gross billings to determine the operating retail cash receipts. The historical collection factors are based on eight fiscal years (FY 2012 through FY 2019) of billing and associated collections.

The collection factors represent the multi-year payment pattern, as described below. Table 2-1 in Section 2.3.1 presents the collection factors¹⁴ used in the Study. Schedule BV-6: WP-1, Appendix C provides the data used to determine the projected collection factors used in this analysis. The collection factors represent the multi-year payment pattern, as described below.

- **Billing Year** – All payments associated with a given fiscal year’s billing and received within the 12 months following the beginning of the fiscal year.
- **Billing Year Plus 1** - All payments associated with a given fiscal year’s billing and received within 13-24 months following the beginning of the fiscal year.
- **Billing Year Plus 2 and Beyond** - All payments associated with a given fiscal year’s billing and received after 24 months following the beginning of the fiscal year.

Figure 4-2 presents an illustration of how the billing year collection factors were applied to determine the projected revenues (receipts).

Figure 4-2 Sample Calculation for Application of Collection Factors to Billings for Derivation of Receipts



1. To determine the FY 2022 projected receipts for Residential customers, we use the following information:
 - a. Identify the Billing Years and Collection Factors (Table 2-1) for each Collection Period relative to the FY 2022 receipts:
 - i. **Billing Year** is FY 2022 with a collection factor of 86.68%
 - ii. **Billing Year Plus 1** is FY 2021 with a collection factor of 8.74%
 - iii. **Billing Year Plus 2 and Beyond** is FY 2020 with a collection factor of 1.90%
 - b. Identify Projected Billings (in \$000s) for each Collection Period from Table 4-8 (Line 1)
 - i. **Billing Year:** FY 2022 = \$154,217
 - ii. **Billing Year Plus 1:** FY 2021 = \$156,389
 - iii. **Billing Year Plus 2 and Beyond:** FY 2020 = \$ 159,112
2. Calculate the projected FY 2022 receipts (in \$000s) for each Collection Period:
 - a. **Billing Year receipts** = \$154,217 x 86.68% = \$133,675
 - b. **Billing Year Plus 1 receipts** = \$156,389 x 8.74% = \$13,668
 - c. **Billing Year Plus 2 and Beyond receipts** = \$159,112 x 1.90% = \$3,023
3. Sum the projected FY 2022 receipts by Collection Period to arrive at the total FY 2022 receipts:
 $\$133,675 + \$13,669 + \$3,023 = \$150,367$ (Matches Line 1 of Table 4-9 for FY 2022)

4.1.4.4. Wholesale Operating Revenues

Currently, Aqua Pennsylvania is the Water Department’s only wholesale water customer. The Water Department’s service to Aqua Pennsylvania commenced in Fiscal Year 2002. Water charges for this service include a commodity charge designed to recover power and chemical costs and a fixed charge

¹⁴ As previously discussed in Section 2.3.1, collection factors used in the financial plan analysis reflect the average collection factors for FY 2012 through FY 2019. Collection factors do not represent all historical billings and receipts, as they are limited by available data and derived from historical collection data (i.e., FY 2012 - FY 2019).

designed to recover allocated capital costs and all other allocated operation and maintenance expenses, excluding power and chemical costs.

4.1.4.5. Projected Operating Revenues

Table 4-8 summarizes the projected revenues (receipts) for the Study Period.

Table 4-8 Projected Water Receipts Under Existing Rates [Schedule BV-6: Table W-1]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Water System (\$000s)							
1	Residential	\$ 155,079	\$ 152,513	\$ 150,367	\$ 148,242	\$ 146,128	\$ 144,014
2	Senior Citizens	5,155	5,058	4,979	4,902	4,827	4,751
3	Commercial	62,082	61,729	61,500	61,287	61,078	60,879
4	Industrial	4,331	4,260	4,234	4,230	4,226	4,222
5	Public Utilities	380	379	378	378	377	377
6	Subtotal General Customers	227,027	223,938	221,458	219,039	216,636	214,243
7	PHA	6,041	6,021	6,018	6,017	6,017	6,017
8	Charities and Schools	4,759	4,736	4,734	4,733	4,733	4,733
9	Hospitals and Universities	7,350	7,346	7,343	7,343	7,343	7,343
10	Hand Billed	14,348	14,326	14,332	14,330	14,330	14,330
11	Scheduled (Flat Rate)	1	1	1	1	1	1
12	Private Fire Protection	4,388	4,394	4,394	4,394	4,394	4,394
13	Public Fire Protection	9,235	9,235	9,235	9,235	9,235	9,235
14	Subtotal Retail Customers	273,150	269,996	267,514	265,092	262,689	260,296
15	Aqua Pennsylvania	3,821	3,940	3,940	3,940	3,940	3,940
16	Total Water System Sales	\$ 276,970	\$ 273,936	\$ 271,454	\$ 269,033	\$ 266,630	\$ 264,236

4.1.5. Tiered Assistance Program Rate Rider Surcharge

As, previously noted, revenue figures for the Study Period exclude the current TAP-R rate of \$0.71 Mcf for water. The TAP-R currently recovers the cost of providing discounts to TAP customers from Non-TAP customers and is subject to an annual reconciliation.

4.1.6. Other Operating Revenues

The Water Department has several sources of other revenues including miscellaneous fees, City and UESF grants, L&I permits, penalties, and releases from the Debt Service Reserve Fund. As noted above, no revenue losses associated with TAP discounts are included under Other Operating Revenues for the development of the Base Rates. Table 4-9 summarizes the other operating revenues for the Water System.

Table 4-9 Other Projected Receipts [Schedule BV-1: Table W-1A]

LINE		FISCAL YEAR ENDING JUNE 30,						
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025	
Water System (\$000s)								
1	Penalties	\$ 3,996	\$ 3,945	\$ 3,908	\$ 3,871	\$ 3,834	\$ 3,797	
2	Miscellaneous City Revenue	1,720	1,720	1,720	1,720	1,720	1,720	
3	Other	5,450	5,650	5,650	5,650	5,650	5,650	
4	State & Federal Grants	1,000	1,000	1,000	1,000	1,000	1,000	
5	Permits Issued by L&I	2,320	2,320	2,320	2,320	2,320	2,320	
6	Miscellaneous (Procurement)	210	210	210	210	210	210	
7	City & UESF Grants	132	132	132	132	132	132	
8	Affordability Program Discount Cost (a)	0	0	0	0	0	0	
9	Release from Debt Service Reserve (b)	6,107	0	0	0	0	0	
10	Total Water Other Income	20,935	14,977	14,940	14,903	14,866	14,829	
Interest Income								
11	Debt Reserve Fund (c)	0	0	0	0	0	0	
12	Operating Fund	413	415	398	413	466	504	
13	Rate Stabilization Fund	810	814	797	741	709	718	
14	Total Water System	\$ 22,158	\$ 16,206	\$ 16,135	\$ 16,057	\$ 16,042	\$ 16,051	

(a) Beginning in FY 2019, TAP Revenue Loss is recovered via the TAP Rate Rider Surcharge.

(b) Projected Release from Debt Reserve Fund based on outstanding and proposed debt service payments.

(c) Excludes deposit into Residual Fund for Transfer to City General Fund.

4.2. WATER REVENUE REQUIREMENTS

4.2.1. O&M Expenses

Operating expenses consist of all costs of the Water Department necessary and appropriate for the operation, maintenance, and administration of the Water System during each year. Projections of operating expenses include expenses such as personal services, purchased services including power, materials and supplies, equipment, pensions and benefits, as well as indemnities and liquidated encumbrances. Capital and reserve fund transfers required by the General Bond Ordinance are also revenue requirements, but are handled separately from O&M.

Table 4-10 summarizes the results of applying the assumptions described in Section 2.3, as well as after making budget adjustments, applying actual-to-budget factors, escalation factors, and incorporating known future O&M expenses described in Section 2.3.3.

Table 4-10 Projected O&M Expense [Schedule BV-1: Table W-2]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Water System (\$000s)							
1	Personal Services	\$ 60,302	\$ 62,659	\$ 65,186	\$ 67,762	\$ 70,433	\$ 73,203
2	Pension and Benefits	57,373	59,191	60,744	62,683	64,234	65,401
3	Subtotal	117,675	121,850	125,930	130,445	134,667	138,604
	Purchase of Services						
4	Power	7,305	7,524	7,524	7,562	7,637	7,714
5	Gas	612	630	630	634	640	646
6	Other	46,125	46,306	48,194	50,160	52,206	54,337
7	Subtotal	54,042	54,461	56,349	58,355	60,483	62,697
	Materials and Supplies						
8	Chemicals	18,996	19,946	20,943	21,990	23,090	24,244
9	Other	10,432	10,735	11,046	11,367	11,696	12,035
10	Subtotal	29,428	30,681	31,989	33,357	34,786	36,280
11	Equipment	2,456	2,505	2,556	2,607	2,659	2,712
12	Indemnities and Transfers	4,571	4,596	4,621	4,647	4,672	4,698
13	Subtotal Expenses	208,174	214,093	221,445	229,410	237,268	244,991
14	Liquidated Encumbrances	(10,673)	(11,100)	(11,513)	(11,949)	(12,408)	(12,885)
15	Total Water System	\$ 197,501	\$ 202,992	\$ 209,932	\$ 217,462	\$ 224,860	\$ 232,106

4.2.2. Fire Protection

The Water Department maintains fire hydrants and capacity in its Water System to support fire-fighting and fire suppression for the public. In September 2019, the City's Fire Department signed a Memorandum of Understanding ("MOU") with the Water Department regarding the maintenance of the City's fire hydrants. Under the terms of the MOU, the Fire Department will invoice the Water Department on a monthly basis for activities associated with maintaining the hydrants, including:

- Fire Flow Tests
- Low Pressure Investigations
- Hydrant Investigations
- Hydrant Repairs
- Hydrant Flushing
- Hydrant Maintenance

After the submittal of the FY 2020 budget, the Fire Department identified costs for additional functional fire hydrant testing. These additional costs are ongoing and occur throughout the Study Period.

4.2.3. Debt Service

As discussed earlier in this Report, the General Bond Ordinance views the Water and Wastewater Systems as one combined system for the purposes of the Rate Covenant. As a result, bond issuances are allocated between water and wastewater based on system needs.

The existing and proposed debt service were previously discussed in Sections 2.3.4 and 3.3.4 of this Report. Table 4-11 summarizes the Water System's share of the total existing and proposed debt financing for the Water System CIP.

Table 4-11 Summary of Existing and Proposed Water System Debt Service [Schedule BV-1: Table W-5]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Water System (\$000s)							
Revenue Bonds							
1	Existing (a)	\$ 63,775	\$ 56,792	\$ 54,430	\$ 52,627	\$ 49,006	\$ 49,087
	Proposed						
2	Fiscal Year 2021 (b)		3,150	9,450	12,412	12,412	12,412
3	Fiscal Year 2022 (b)			4,008	12,023	15,791	15,791
4	Fiscal Year 2023 (b)				4,060	12,180	15,998
5	Fiscal Year 2024 (b)					5,163	15,488
6	Fiscal Year 2025 (b)						5,670
7	Total Proposed	0	3,150	13,458	28,495	45,546	65,359
8	Total Revenue Bonds	63,775	59,942	67,888	81,122	94,552	114,446
PennVest Loans							
9	PennVest Loans - Parity PennVest (c)	4,353	4,487	4,802	7,333	7,333	7,333
10	Total Debt Service	\$ 68,129	\$ 64,429	\$ 72,690	\$ 88,455	\$ 101,885	\$ 121,779

(a) Projected debt service amounts for the Variable Rate Series 1997B and 2005B Bonds are based upon assumed interest rates of 3.0% and 4.53%, respectively. Projected amounts also include (i) debt service for the Series 2019B Bonds which issued in FY 2020; and (ii) savings from the Series 2019A Refunding Bonds and the Forward Refunding for the Series 2011A Bonds.

(b) Projected debt service amounts assume interest only payment for the first year of the bond authorization based on 5.25% interest rate; and assume issuance during the first quarter of the fiscal year.

(c) Includes projected Pennvest Loan for the Torresdale Pump Station Rehabilitation.

4.2.4. Capital Improvements

The Water Department's CIP reflects planned improvements to the Water System required to meet regulatory requirements and maintain existing levels of service. The CIP includes projects developed in the Water Department's Drinking Water Master Plan and major R&R projects at Baxter, Queen Lane, and Belmont water facilities. The Water Master Plan includes schedules for the replacement of water main, targeting a rate of 42 miles per year. Finally, the CIP has costs for the implementation of AMI and equipment vehicle purchases.

As discussed in Sections 2.3.6 and 3.3.3, adjustments to the Water Department's appropriations-based CIP budget were made to develop the projected anticipated annual cash expenditures. Following the steps outlined in Section 2.3.6 produces the CIP shown in Table 4-12.

Table 4-12 Projected Water System CIP [Schedule BV-1: Table W-3]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Water System (\$000s)							
1	Engineering and Administration (a)	\$ 7,382	\$ 6,378	\$ 5,585	\$ 4,775	\$ 3,966	\$ 3,156
2	Water Treatment Plant Improvements	50,000	128,000	149,200	196,500	80,200	241,200
3	Distribution System Rehabilitation	78,060	93,060	101,060	172,160	117,460	108,060
4	Large Meter Replacement	35,000	5,000	5,000	5,000	5,000	5,000
5	Vehicles	6,000	6,000	6,000	6,000	6,000	6,000
6	Total Improvements	176,442	238,438	266,845	384,435	212,626	363,416
7	Inflation Adjustment (b)	0	0	8,005	23,412	19,716	45,612
8	Inflated Total	176,442	238,438	274,850	407,847	232,342	409,028
9	Cash Flow Adjustment (c)	(19,858)	(68,434)	(25,328)	(130,254)	15,293	(65,664)
10	Net Cash Financing Required	\$ 156,584	\$ 170,003	\$ 249,522	\$ 277,593	\$ 247,635	\$ 343,364

(a) Beginning in FY 2017, Engineering and Administration Costs no longer include pension and benefits costs per City policy.

(b) Allowance for inflation of 3.0 percent per year after fiscal year 2021.

(c) Reflects adjustment to annual capital budget appropriations for project duration and contingency to reflect anticipated annual expenditures.

4.2.5. Capital Flow of Funds

The Water Department meets its projected capital needs by using several sources for funding, including internally generated funds (cash) and debt. As defined by the General Bond Ordinance, the Construction Fund is where the Water Department draws funds to pay for the CIP. The Water Department may deposit bond proceeds and cash transfers from the Revenue Fund and the Residual Fund into the Construction Fund to pay for capital projects.

Table 4-13 presents the proposed sources and uses for the Water System CIP. As shown on Line 6, the Construction Fund has an estimated beginning balance of \$120.6 Million on July 1, 2019. Over the course of the Study Period, the Water Department anticipates issuing debt and the bond proceeds for these transactions are shown on Line 1. The level of debt financing increases during the Study Period as the Water Department's CIP starts to ramp up. The Water System's share of bond proceeds totals \$1.26 billion during the Study Period.

Line 9 shows that the Water Department anticipates receiving a PennVest loan for the Torresdale Pump Station Rehabilitation project. Line 13 shows the estimated level of total annual capital expenditures the Water Department will fund. Lines 8 and 10 show the estimated level of annual pay-go (i.e., cash-funded) the Water Department will fund.

Table 4-13 Projected Flow of Funds – Water: Construction Fund & Debt Reserve Account [Schedule BV-1: Table W-4]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Water System (\$000s)							
Disposition of Bond Proceeds							
1	Proceeds From Sale of Bonds	\$ 126,000	\$ 180,000	\$ 229,000	\$ 232,000	\$ 295,000	\$ 324,000
	Transfers:						
2	Debt Reserve Fund (a)	1,680	6,322	12,023	10,216	20,342	22,320
3	Cost of Bond Issuance (b)	722	1,062	1,351	1,369	1,741	1,912
4	Construction Fund (c)	123,598	172,616	215,626	220,415	272,917	299,768
5	Total Issue	126,000	180,000	229,000	232,000	295,000	324,000
Construction Fund							
6	Beginning Balance	119,286	108,145	151,326	167,378	144,978	202,608
7	Transfer From Bond Proceeds	123,598	172,616	215,626	220,415	272,917	299,768
8	Capital Account Deposit	11,113	12,002	12,962	13,999	15,119	16,329
9	Penn Vest Loan	0	19,875	26,500	6,625	0	0
10	Transfer from Residual Fund	9,600	7,400	8,900	12,600	15,500	20,300
11	Interest Income on Construction Fund	1,131	1,291	1,586	1,554	1,729	1,991
12	Total Available	264,729	321,329	416,900	422,571	450,243	540,997
13	Net Cash Financing Required	156,584	170,003	249,522	277,593	247,635	343,364
14	Ending Balance	108,145	151,326	167,378	144,978	202,608	197,632
Debt Reserve Account							
15	Beginning Balance	65,709	61,282	67,603	79,626	89,842	110,184
16	Transfer From Bond Proceeds	1,680	6,322	12,023	10,216	20,342	22,320
17	Debt Service Reserve Release	(6,107)	0	0	0	0	0
18	Ending Balance	61,282	67,603	79,626	89,842	110,184	132,504
19	Interest Income on Debt Reserve Fund	\$ 635	\$ 644	\$ 736	\$ 847	\$ 1,000	\$ 1,213

(a) Amount of Debt Reserve Fund estimated based on outstanding and proposed debt service payments.

(b) Cost of bonds issuance assumed at 0.59 percent of issue amount.

(c) Deposits equal proceeds from sale of bonds less transfers to Debt Reserve Fund and Costs of Issuance.

4.3. WATER SYSTEM SUMMARY OF REVENUE AND REVENUE REQUIREMENTS

The Water System's financial performance during the Study Period is presented in Table 4-14. As seen in Table 4-14, the Water System will need a series of revenue increases, two years at 5.5 percent followed by three years of 10.90 percent. These revenue adjustments are necessary to meet O&M, debt service, Capital Account deposit requirements, and provide additional coverage per the Rate Covenant.

Table 4-14 presents the Water System operating results for Base Rates. The proposed revenue increases in the table do not reflect any rate compression as discussed in Section 1.5.

As previously mentioned, the Water Department is addressing the reconciliation of TAP discounts and TAP-R revenues in a separate proceeding.

4.4. PROJECTED WATER SYSTEM OPERATING RESULTS

Line 1 is the consolidated total for water retail and wholesale receipts from Table 4-8. These represent receipts under existing rates. Lines 2 through 7 present the revenues from proposed revenue

increases. Line 9 presents other operating receipts as detailed on Table 4-9. Interest income from the Debt Reserve, Operating Fund, and Rate Stabilization Funds is shown on Lines 10 through 12. Line 13 summarizes the projected Total Revenues for the Water System.

Table 4-14 Projected Water System Revenue and Revenue Requirements: Base Rates [Schedule BV-1: Table W-6]

LINE NO.	DESCRIPTION	FISCAL YEAR ENDING JUNE 30,					
		2020	2021	2022	2023	2024	2025
Water System (\$000s)							
Operating Revenues							
1	Water Service - Existing Rates (a)	\$ 276,970	\$ 273,936	\$ 271,454	\$ 269,033	\$ 266,630	\$ 264,236
	Additional Service Revenue Required						
</							

(a) Revenue from rates effective September 1, 2019.

(b) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund. Includes Debt Service Reserve Fund Release in FY 2020.

(c) Cost to process the Water Treatment Sludge at the wastewater treatment plants based on wastewater cost of service analysis.

(d) Transfer of interest earnings from the Bond Reserve Account to the Residual Fund as shown in Line 33 to satisfy the requirements for the transfer to the City General Fund shown on Line 35.

(e) FY 2020 beginning balance is estimated based on preliminary FY 2019 results.

Operating expenses are summarized on Lines 14 and 15. Line 15 represents the Water System's share of costs to process water treatment sludge at the wastewater treatment plants. Refer to Section 5.6.1 of this Report for further explanation of these costs.

During the Study Period, it is assumed that the Water Department will make a series of deposits to and transfers from the Rate Stabilization Fund as shown on Line 17. Line 18 presents the Net Revenues after Operations. Existing and proposed senior debt service obligations are shown on Lines 19 through 22. Debt service coverage on senior debt is calculated on Line 23 and indicates that coverage requirements meet the 1.30x target. The Capital Account deposit is on Line 27. Line 28 then shows results of the total debt service coverage requirement and indicates that total coverage requirements meet the 1.00 minimum coverage required by the General Bond Ordinance.

As established in the General Bond Ordinance and Rate Covenant, debt service coverage requirements are for the Combined System. The calculations shown in Table 4-14 are presented to demonstrate that the Water System's proposed financial plan provides sufficient resources for the Water System to be financially stable on its own.

5. WATER SYSTEM COST OF SERVICE ALLOCATIONS

The cost of service analysis is the middle step of three depicted in Figure 3-1 that form the basis for how a utility sets its rates and charges. At the cost of service stage, we identify how different customer types are using the Water System. As such, each customer type potentially places a different level of demands on the system – requirements that the Water Department must meet. The types of demand are cost drivers and the cost of service step is where we develop the nexus between how the system is designed and operated and how customers are using the system (cost-benefit nexus).

5.1. GENERAL

The cost of service process involves a multi-level allocation, where the net revenue requirements for the Combined System are first allocated between water and wastewater, then between customer category (Retail versus Wholesale), and then finally among customer types to determine each type's cost responsibility. This process is illustrated in Figure 5-1.

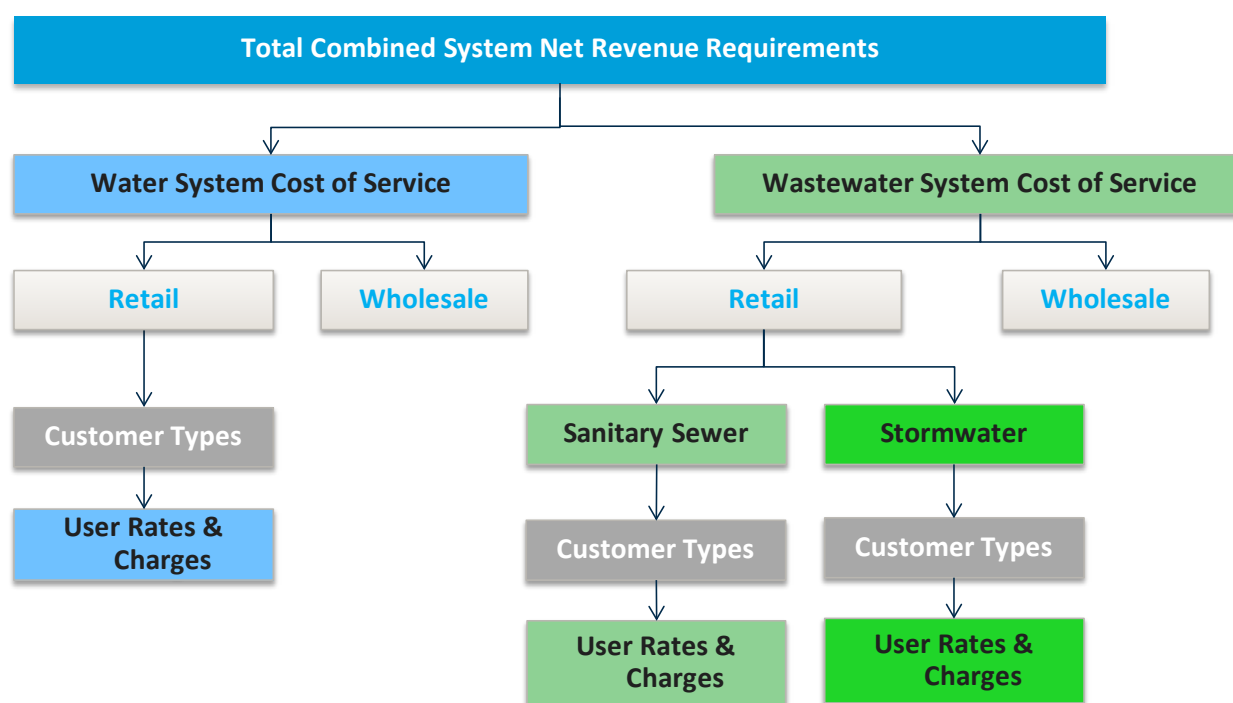


Figure 5-1 Multi-Layer Allocation of Costs

Cost of service is the process by which total net revenue requirements (O&M and capital costs) are allocated to the customer types of the system in proportion to the services received by the customer types. The process typically follows the following steps:

- Identification of net revenue requirements by cost category;
- Allocation of functional cost to appropriate cost centers;
- Allocate functional cost center costs to cost components or drivers;

- Determination of units of service by customer and by cost component;
- Development of unit cost for each cost component;
- Determine the cost of service by each customer type; and
- Apply any appropriate discounts and / or adjustments and derive the Adjusted Cost of Service by customer type.

Figure 5-2 shows the typical analytical steps performed as part of a Cost of Service study.

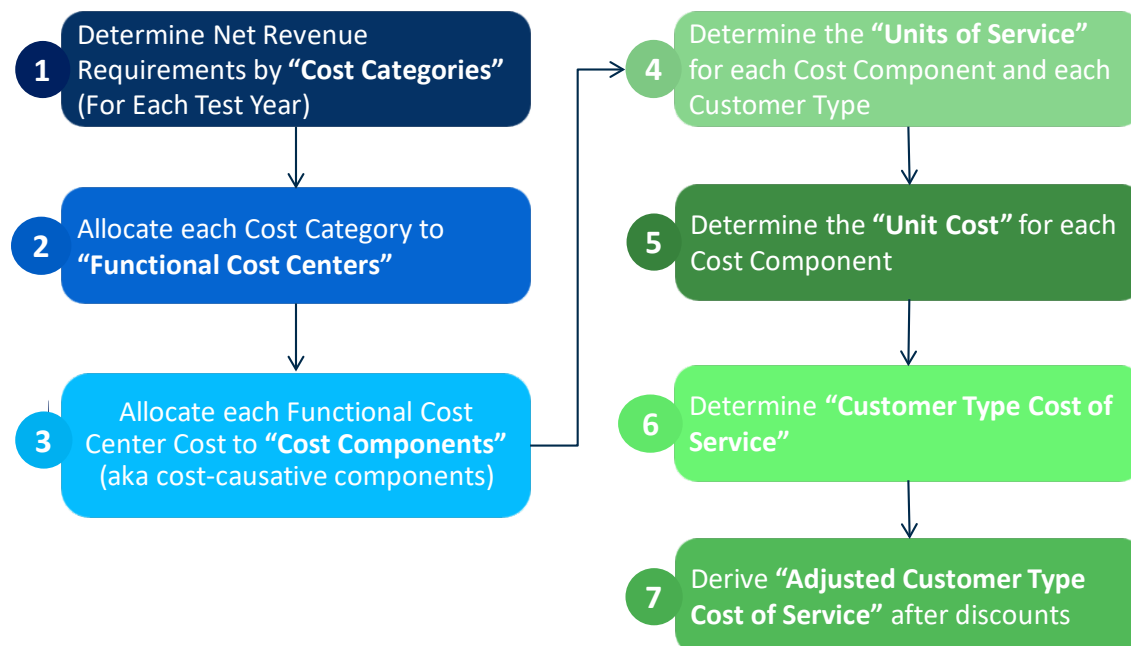


Figure 5-2 Seven Analytical Steps for Determining the Cost of Service

5.2. IDENTIFICATION OF NET REVENUE REQUIREMENTS BY COST CATEGORY

The cash-needs revenue requirements for a utility consist mainly of O&M, debt service, and capital expenditures. These revenue requirements should be identified by cost category or center (function) as best as possible. A function represents the type of operational activity that the costs are used for such as source of supply, pumping, treatment, etc. for water systems. The operational costs can be attributable directly or indirectly to a function. Costs such as engineering, administration, finance, etc. are indirectly allocated based on other costs. The debt service and capital expenditure costs can be attributable to functions based on existing fixed asset records. Figure 5-3 illustrates the Water System cost centers examined in this Report.

O&M, debt service and capital are cost categories used under the cash-needs approach to cost of service. Because the Water Department also provides water services to a wholesale customer, these cost categories



Figure 5-3 Functional Cost Centers

are translated into categories used under the utility-basis approach. Under the utility-basis, the relevant cost categories are O&M, depreciation, and return on rate base. Return on rate base recognizes the recovery of return on the Water Department's capital investment. Because the Water Department provides water service to wholesale customers (non-system owners), the Water Department is entitled to a higher rate of return from these customers. Figure 5-4 illustrates how the cash-needs basis cost categories relate to utility-basis cost categories.

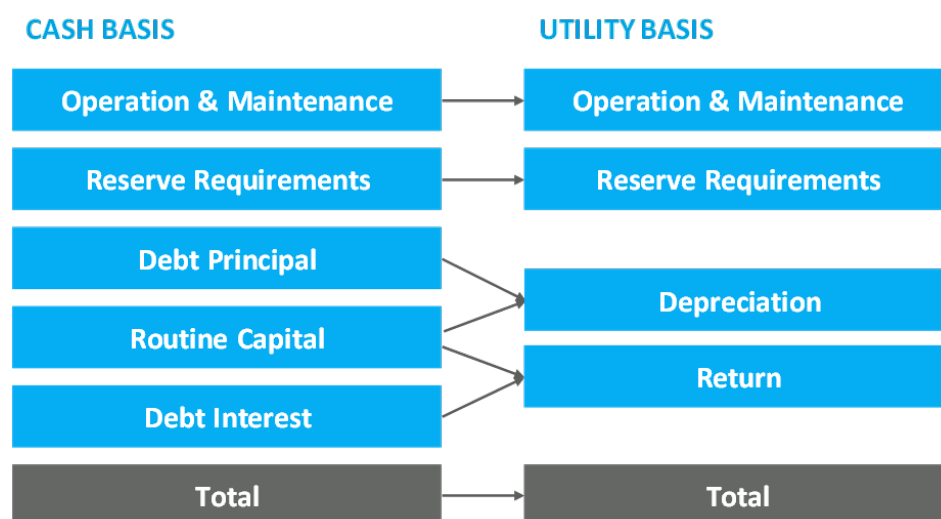


Figure 5-4 Relationship Between Cash-Needs Basis and Utility-Basis

The process of allocating the net revenue requirements to the system's users allows recognition of issues such as:

- Differences between service levels
- Differences in user characteristics
- Regulations and covenants that affect user rates and charges
- Nexus between charges and service demands

In the analysis described herein, the cost of the service provided serves as the allocation basis for the Test Year ("TY") revenue requirements to the various customer classifications. Since the Water Department's Rate Proposal is for two fully projected fiscal years, we are using the naming convention of "Test Year 1" to refer to FY 2021 and "Test Year 2" to refer to FY 2022. Allocations of revenue requirements to customer types account for the quantity of water used relative to peak capacity requirements placed on the system, the number and size of services to customers, proprietary interest in the system investment, and other relevant factors.

5.3. COST OF SERVICE TO BE ALLOCATED

5.3.1. Overall Water System

The projected annual revenue requirements for FY 2021 serve as the Test Year 1 requirements for the analyses conducted herein. The net cost of service recovered from water service charges is the total revenue requirements less revenues received from other sources. The TY net cost of service of \$289.0 Million (Column 3, Line 12), represents the total revenue requirements of \$305.2 Million (Column 3, Line 9) minus other revenues and transfers received of \$16.2 Million (Column 3, Lines 10 and 11). Table 5-1 presents the cost of service to be recovered from rates for Test Year 1. The cost of service to be recovered from rates consists of \$210.0 Million of net operating expenses (Column 1, Line 12) and \$79.0 Million of net capital-related costs (Column 2, Line 12).

Table 5-1 Water Estimated Test Year 1 Cost of Service [Schedule BV-1: Table W-7]

LINE NO.	DESCRIPTION	(1) OPERATING EXPENSE	(2) CAPITAL COSTS	(3) TOTAL
Water System (\$000s)				
Revenue Requirements				
1	Operations & Maintenance Expense	\$ 117,843	\$ -	\$ 117,843
2	Direct Interdepartmental Charges	85,149	0	85,149
3	Water Treatment Plant Sludge	14,732	0	14,732
	Existing Bond Debt Service			
4	Revenue Bonds	0	61,279	61,279
5	Proposed Bond Debt Service	0	3,150	3,150
6	Capital Account Deposit	0	12,002	12,002
7	Residual Fund Deposit	5,461	1,917	7,378
8	Deposit (From)/To Rate Stabilization Fund	2,739	961	3,700
9	Total	225,924	79,309	305,233
Deductions of Funds from Other Sources				
10	Other Operating Revenue	(14,977)	0	(14,977)
11	Interest Income	(929)	(326)	(1,255)
12	COST OF SERVICE TO BE DERIVED FROM RATES	\$ 210,018	\$ 78,983	\$ 289,001

5.3.2. Wholesale Water

The cost of service allocable to Aqua Pennsylvania and the rates developed to recover the allocated costs, reflect consideration of the contract demands for service as set forth in the contract between Aqua Pennsylvania and the City, as well as the projected annual water consumption, and the maximum day and hour demands for Aqua Pennsylvania. The Water Department allocates O&M expenses to Aqua Pennsylvania in the same manner as for its retail customers. The annual capital costs allocable to Aqua Pennsylvania recognize annual depreciation expense and return on investment, with the allocable investment based upon the contract maximum day demands versus the design capacity of the various facilities used in the provision of service to Aqua Pennsylvania. The Water Department uses original cost to allocate plant investment for determining the applicable rate base. This approach is consistent with the methodology applied in previous rate filings and is consistent with the derivation of Aqua Pennsylvania's existing rates. The rate of return for service to the City's wholesale water and wastewater customers used

in this Cost of Service Study is 7.5 percent, which is consistent with the rate of return used in the development of Aqua Pennsylvania's existing rates. The specific maximum day contract demands for Aqua Pennsylvania used in the cost of service analysis amount to 9.5 million gallons per day (MGD) for the period of July 1, 2019 through June 30, 2022.

As established under the contract, the rates applicable to Aqua Pennsylvania include a commodity or usage charge, a fixed charge, and a management fee. The commodity charge includes only the costs associated with power and chemicals and applies to the metered consumption of Aqua Pennsylvania. As agreed, to by both the City and Aqua Pennsylvania, the cost of service analysis limits water loss percentage applied to Aqua Pennsylvania to 20 percent. The fixed charge includes the allocated return on investment and depreciation expense, as described above, and the balance of O&M expenses allocated to Aqua Pennsylvania, excluding power and chemical costs. The O&M expenses allocable to Aqua Pennsylvania reflect the relationship of the projected annual consumption, the maximum day demands, and the maximum hour demands from Aqua Pennsylvania relative to the projected annual usage or production and total maximum day and hour demands of the facilities used by Aqua Pennsylvania. The management fee amounts to 10 percent and is applied to the sum of the usage charge and fixed charge.

5.4. FUNCTIONAL COST COMPONENTS

The costs derived in revenue requirements are incurred as a result of cost drivers placed on the system by its customers. Many utilities are designed and sized to meet the cost drivers; therefore, the operational and capital costs (depreciation and return on rate base) are linked to these cost drivers. The principal cost drivers for water are volume of water consumed, peak water demands, number of customers, and the number of fire services.

The various cost elements of water service are assigned to functional cost components as the first step in the subsequent distribution of the cost of service to the customer types. For the analyses conducted herein, the Base-Extra Capacity Method¹⁵ as outlined in the AWWA M1 Manual is used. This cost of service allocation methodology uses base, extra-capacity, customer and fire protection functional cost centers as listed in Figure 5-5.

■ **Base costs** are those which vary directly with the quantity of water used, as well as those costs associated with serving customers under average load conditions without the elements necessary to meet peak demands. Base costs include purchased treatment chemicals, and other operating and capital costs of the water system associated with serving customers to the extent required for a constant, or average annual rate of use.

3 Allocate each Retail Functional Cost Center Cost to "Cost Components"

COST COMPONENTS

- **Wholesale (Aqua PA)**
- Base
- Maximum Day
- Maximum Hour
- Meters
- Billing & Collection
- Fire Protection

Figure 5-5 Functional Cost Components

¹⁵ Per the AWWA M1 Manual, the Base-Extra Capacity Method is one of the "two most widely used methods" of allocating annual cost of service to cost components. Black & Veatch employees this methodology as appropriate in other cost of service studies and it has been used for allocating the Water Department's retail cost to the various cost components for years.

- **Extra capacity costs** represent those operating costs incurred due to demands in excess of average, and capital-related costs for additional plant and system capacity beyond that required for the average rate of use. Total extra capacity costs are subdivided into costs associated with maximum day and maximum hour demands.
- **Customer costs** are defined as costs that tend to vary in proportion to the number of customers connected to the system. These include meter reading, billing, collection and accounting costs, and maintenance and capital charges associated with meters and services.
- **Fire Protection costs** assigned to fire protection include operating expenses and capital costs associated with public and private fire protection.

The separation of costs of service into these principal categories provides the means of further allocating such costs to the various customer types based on the respective base, extra capacity, customer, and fire service requirements of each customer type.

5.5. ALLOCATION TO COST COMPONENTS

Under Step 4 of the process, we determine units of service for each cost component and each customer type.

The Water System is comprised of various facilities, each designed and operated to fulfill a given function. To provide adequate service to its customers, the Water System must be capable of providing not only the total amount of water used but also supplying water at the maximum rates of demand.

5.5.1. Base, Maximum Day, and Maximum Hour

Since all customers do not exert their maximum demand for water at the same time, capacities of the various water system components are designed to meet the peak coincidental demands that all types of customers place on the system. For every water service facility on the system, there is an underlying average demand, or uniform rate of usage exerted by the customers for which the base cost component is applicable. For those facilities designed solely to meet average day demand, costs are allocated 100 percent to the base cost component. Extra capacity requirements associated with coincidental demands in excess of average use are further related to maximum daily (“max day”) and maximum hourly (“max hour”) demands.

For volume-related cost allocations, the first step in determining the allocation percentages is to assign system peaking factors. The base element is equal to the average daily demand (“ADD”) and assigned a value of 1.0. For the Water System, max day and max hour ratios by Water System Facilities were reviewed.

As an example of how to interpret peaking factors and their relationship with base-extra capacity, we will use for illustrative purposes, the Water System’s raw water pumping max day demand factor of 1.40 times the ADD for max day allocations. The costs associated with facilities required to meet maximum day demand are allocable to base and maximum day extra capacity as follows:

$$\text{Base} = (1.0/1.4) \times 100 = 71 \text{ percent}$$

$$\text{Max Day} = (1.4 - 1.0)/1.4 \times 100 = 29 \text{ percent}$$

These calculations indicate that the average or base use requires 71 percent of the capacity of facilities designed and generated to meet average day demand and the remaining 21 percent meets maximum day extra capacity requirements.

The Water System's treated water delivered max hour demand factor of 1.90 times the ADD and max day demand factor of 1.30 times the ADD for max hour allocations. The costs associated with facilities required to meet maximum hour demand are allocable to base, maximum day extra capacity and maximum hour extra capacity as follows:

$$\text{Base} = (1.0/1.9) \times 100 = 52 \text{ percent}$$

$$\text{Max Day} = (1.3 - 1.0)/1.9 \times 100 = 16 \text{ percent}$$

$$\text{Max Hour} = (1.9 - 1.3)/1.9 \times 100 = 32 \text{ percent}$$

5.5.2. Units of Service

The estimated Test Year 1 value of Water System facilities is allocated to appropriate cost functions as the basis for further distribution to the various customer types.

Base costs vary with the volume of water used and distributed to customer types on that basis. Extra Capacity costs are those associated with meeting peak rates of water use and distributed to customer types based on the respective customer type capacity requirements in excess of average rates of use. The number of bills for each customer type serves as the basis for distributing customer billing requirements. Customer meter and fire protection requirements are allocated on the basis of the number of equivalent meters. The estimated number of equivalent meters for each customer type is based on the total number of various sizes of meters serving respective types and the capacity ratio of the meters for the various sizes to the cost of 5/8-inch meters. Table 5-2 summarizes the equivalent meter ratios and billing ratios used in this Report.

Table 5-2 Equivalent Meter and Bill Ratios [Schedule BV-1: Table W-12]

LINE NO.	METER SIZE (INCHES)	(1) EQUIVALENT FACTORS	
		METERS CAPACITY BASIS	BILLS
1	5/8	1.0	1.0
2	3/4	1.5	1.0
3	1	2.5	1.1
4	1-1/4	3.8	1.2
5	1-1/2	5.0	1.2
6	2	8.0	1.5
7	3	15.0	2.0
8	4	25.0	4.0
9	6	50.0	7.0
10	8	80.0	10.0
11	10	115.0	15.0
12	12	215.0	20.0

With respect to Fire Protection, Fire Protection Extra Capacity requirements are based on peak fire flow requirements reflected in previous cost of service studies and rate proceedings. The system wide fire protection demands reflect two simultaneous fires, one requiring 10,000 gallons per minute (“gpm”) fire flow demand for 10 hours and the second requiring 5,000 gpm for 8 hours. Fire protection capacity requirements are allocated between Public Fire Protection and Private Fire Protection in proportion to the relative total number of equivalent fire connections in each type.

Table 5-3 summarizes the estimated Test Year 1 units of service for the Water System’s retail customers. Estimates of test year annual water requirements, shown in Column 1, are based on the projections of total water sales developed in this Report. Column 2 presents the average daily use of all water sales. Columns 3 through 8 show the estimated maximum day and maximum hour capacity factors for each customer type, the resulting demands, and extra capacity requirements, respectively. We derived the customer type extra capacity factors based on previous cost of service studies and rate proceedings.

Based on our experience, we believe that the capacity factors determined in this analysis are reasonable. Generally, the peak water usage characteristics vary among the different customer types as follows:

- Residential customers place a higher peak demand on the water system than the non-residential customers. For example, the Residential customers typically would have high water usage in the morning due to shower and other morning chores and similarly may reflect a high usage in the evening when residents are usually back home from work/school, etc.
- The Senior Citizen and PHA types are projected to have usage patterns closely related to the Residential customers.
- Within the non-residential group, typically Commercial customer types and others including Charities and Schools are likely to have higher demand during business hours and very low demand during non-business hours.

- Industrial customer type usually has low peaking factors, as industrial enterprises often have very stable pattern of water usage. Industrial use is generally spread more uniformly throughout the day and hence their maximum rates of use vary less from their average day use.

The capacity factors determined reflects these characteristics and are reasonable based on the capacity factor analysis. In addition, to verify the reasonableness of the capacity factors, the system peak demand diversity factors were verified based on the capacity factors are within the AWWA industry acceptable range of 1.1 to 1.4.

Table 5-3 Test Year 1 Retail Units of Service [Schedule BV-1: Table W-11]

LINE NO.	CUSTOMER TYPE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)						
		TOTAL TEST YEAR WATER USE	AVERAGE	CAPACITY FACTOR	TOTAL CAPACITY	EXTRA CAPACITY (a)	CAPACITY FACTOR	TOTAL CAPACITY	EXTRA CAPACITY (b)	METERS	BILLS						
			DAILY									MAXIMUM DAY EXTRA CAPACITY		MAXIMUM HOUR EXTR CAPACITY		CUSTOMER COSTS	
			WATER USE (BASE)														
		Mcf	Mcf/day	%	Mcf/day	Mcf/day	%	Mcf/day	Mcf/day	Equiv. Meters	Equiv. Bills						
			(1) / 365		(2) x (3) / 100	(4) - (2)		(2) x (6) / 100	(7) - (4)								
1	Residential	2,958,300	8,100	200	16,200	8,100	360	29,160	12,960	457,953	5,103,438						
2	Senior Citizens	123,000	340	200	680	340	360	1,220	540	23,496	281,649						
3	Commercial	1,574,500	4,310	180	7,760	3,450	265	11,420	3,660	125,374	546,434						
4	Industrial	125,500	340	160	540	200	200	680	140	5,942	18,371						
5	Public Utilities	9,300	30	160	50	20	200	60	10	1,335	3,450						
6	Total General Service	4,790,600	13,120		25,230	12,110		42,540	17,310	614,100	5,953,342						
7	Housing Authority	157,300	430	190	820	390	313	1,340	520	10,199	75,555						
8	Charities & Schools	157,200	430	180	770	340	270	1,160	390	19,084	47,449						
9	Hospital/University	289,800	790	180	1,420	630	233	1,840	420	9,970	17,848						
10	Hand Billed	449,400	1,230	180	2,210	980	270	3,320	1,110	6,071	10						
11	Scheduled (Flat Rate)	0	0	200	0	0	360	0	0	3	36						
	Fire Protection (c)																
12	Public		0		980	980		2,550	1,570								
13	Private	13,900	40		170	130		380	210	3,817	340,436						
14	Total Retail Customers	5,858,200	16,040		31,600	15,560		53,130	21,530	663,244	6,434,676						

(a) Capacity in excess of average daily use.

(b) Capacity in excess of maximum day.

(c) System wide fire protection demands reflect two simultaneous fires, one requiring 10,000 gallons per minute (gpm) fire flow demand for 10 hours and the second requiring 5,000 gpm for 8 hours. These allocated between standard pressure public fire service and private fire service based upon equivalent 6-inch connections for each of the two fire service classes.

In the following sections, we discuss the results of conducting Steps 5 through 7 of the cost of service process. The purpose of each of these remaining steps is outlined in Figure 5-6.

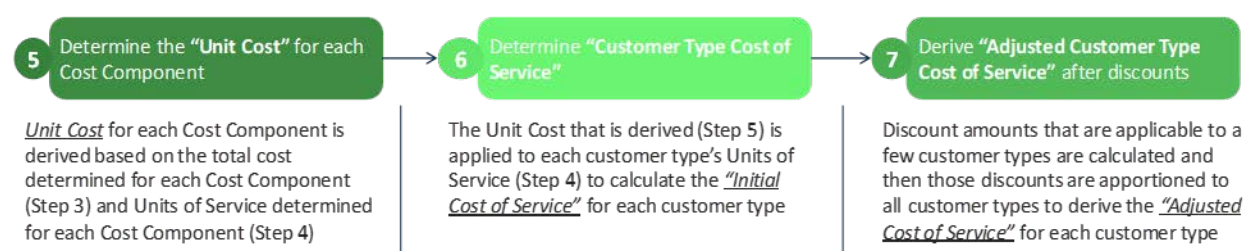


Figure 5-6 Cost of Service Steps 5 through 7

5.6. ALLOCATION OF O&M EXPENSES

5.6.1. Retail

Table 5-4 shows the allocation of Test Year 1 O&M expenses for the Water System to the identified functional cost components by cost center. The four key components of the Water System's portion of the Operating expenses are: (i) the O&M expense, (ii) the deposit to the Rate Stabilization Fund, (iii) the year-end Revenue Fund balance which is deposited into the Residual Fund and (iv) the cost of treating and disposing water treatment plant sludge that is discharged into the City's Wastewater System. The water treatment plant sludge expense of \$14.7 Million is shown in Line 3 of Table 5-1. A corresponding credit for this amount is shown in the wastewater cost of service in Table 7-20 .

The projected O&M expense for Test Year 1 is \$210 Million. Operation and Maintenance expense is allocated to water cost components generally in the same proportion as the plant investment and depreciation expense allocations.

The Test Year 1 O&M costs are allocated to the cost components using a two-step process.

- First, a portion of O&M costs are allocated to wholesale water contract customers.
- Then the retail portion of the total O&M (which is the total O&M expense less the proportionate share allocated to wholesale contract customers), is allocated to the cost components.

The O&M expenses that are directly allocable to Aqua Pennsylvania are deducted from the total expenses shown in Column 1 of Table 5-4. The remaining expenses are allocated to the retail customer types as follows:

- **Source of Supply:** Raw water pumping expense, other than purchased power, is allocated 71 percent to Base and 29 percent to Maximum Day cost components. The power costs associated with raw water pumping is allocated 95 percent to Base and 5 percent to Maximum Day cost components in recognition of the operating characteristics of pumps and the demand structure of electric rates.

Table 5-4 Allocation of Test Year 1 O&M Expense [Schedule BV-1: Table W-10]

LINE NO.	CUSTOMER TYPE	(1)	(3)		(4)	(5)	(6)	(7)	(8)
		TEST YEAR O&M EXPENSE	EXTRA CAPACITY		MAX HOUR IN EXCESS OF MAX DAY	CUSTOMER COSTS		PUBLIC FIRE PROTECTION - DIRECT	WHOLESALE
			IN EXCESS OF BASE		IN EXCESS OF MAX DAY	METERS	BILLING	STANDARD PRESSURE	DIRECT
WATER SYSTEM (\$)									
Raw Water Pumping									
1	Purchased Power	\$ 2,364,000	\$ 117,000						\$ 20,000
2	Purchased Gas	-	-						-
3	Other	3,230,000	925,000						42,000
4	Total Raw Water Pumping	5,594,000	1,042,000	-	-	-	-	-	62,000
Purification and Treatment									
Power and Pumping (a)									
5	Purchased Power	3,917,000	194,000	194,000					34,000
6	Purchased Gas	425,000	67,000	135,000					4,000
7	Other	11,760,000	1,857,000	3,713,000					155,000
Treatment									
8	Purchased Power	-	-	-					-
9	Purchased Gas	26,000	8,000	-					-
10	Chemicals	16,752,000							145,000
Other									
11	Other	44,914,000	12,854,000						591,000
12	Water Treatment Plant Sludge	14,732,000							159,000
13	Subtotal Other (b)	59,646,000	12,854,000	-	-	-	-	-	750,000
14	Total Purification and Treatment	92,526,000	14,980,000	4,042,000	-	-	-	-	1,088,000
Transmission and Distribution									
15	Mains	65,062,000	10,348,000	20,696,000					386,000
16	Meters	1,794,000				1,794,000			-
17	Hydrants	683,000						683,000	-
18	Filtered Water Storage	1,289,000	202,000	403,000					29,000
	High Pressure Fire System	-							-
19	Total Transmission and Distribution	\$ 68,828,000	\$ 10,550,000	\$ 21,099,000	\$ 1,794,000	\$ -	\$ 683,000	\$ 415,000	

Table 5-4 Allocation of Test Year 1 O&M Expense (continued)

LINE NO.	CUSTOMER TYPE	(1)	(3) (4)		(5)	(6)	(7)	(8)
		TEST YEAR O&M EXPENSE	EXTRA CAPACITY		CUSTOMER COSTS METERS BILLING	PUBLIC FIRE PROTECTION - DIRECT STANDARD PRESSURE	WHOLESALE DIRECT	
			MAX DAY IN EXCESS OF BASE	MAX HOUR IN EXCESS OF MAX DAY				
WATER SYSTEM (\$)								
20	Customer Accounting and Collection	\$ 23,990,000				\$ 23,990,000		\$ -
21	Subtotal	190,938,000	26,572,000	25,141,000	1,794,000	23,990,000	683,000	1,565,000
22	Administrative and General	26,786,000	4,593,000	4,352,000	315,000	4,208,000	120,000	211,000
23	Subtotal Water Operating Expense	217,724,000	31,165,000	29,493,000	2,109,000	28,198,000	803,000	1,776,000
24	Residual Fund Deposit	5,461,000	782,000	740,000	53,000	707,000	20,000	45,000
25	Deposit (from) to RSF	2,739,000	392,000	371,000	27,000	355,000	10,000	22,000
26	Total Water Operating Expense	225,924,000	32,339,000	30,604,000	2,189,000	29,260,000	833,000	1,843,000
27	Other Operating Revenue	14,977,000	2,158,000	2,042,000	146,000	1,952,000	55,000	23,000
28	Non-Operating Income	929,000	133,000	126,000	9,000	120,000	3,000	8,000
29	Total Operating Expense Less Other	\$ 210,018,000	\$ 30,048,000	\$ 28,436,000	\$ 2,034,000	\$ 27,188,000	\$ 775,000	\$ 1,812,000

(a) Includes booster pumping.

(b) Includes Wastewater System cost of treating water treatment plant sludge of \$14,732,000.

- **Water Treatment Costs:** Different expense items within the water treatment costs are allocated differently to the cost components.
 - Projected test year operating expense, exclusive of power, chemical costs, and sludge treatment and disposal costs, for the Baxter, Queen Lane, and Belmont treatment plants is allocated 71 percent to Base and 29 percent to Maximum Day.
 - Chemical costs and sludge treatment and disposal costs, which generally vary directly with the quantity of water treated, are assigned 100 percent to the Base cost component.
 - Test year treated water pumping operating expenses, exclusive of power costs, are allocated 52 percent to Base, 16 percent to Maximum Day, and 32 percent to Maximum Hour cost components.
 - Treatment plant power costs are allocated 90 percent to Base, 5 percent to Maximum Day Extra Capacity and 5 percent to Maximum Hour Extra Capacity in recognition of the effect of the demand structure of electric rates.
- **Water Treatment Sludge Costs:** As shown in Line 12 in Table 5-4, the water treatment sludge O&M cost for FY 2021 is determined to be \$14.7 Million. This cost represents the cost of treating the water treatment plant sludge. The water treatment sludge, which is discharged into the Wastewater System, is ultimately treated in the wastewater treatment facility and thereby becomes a wastewater treatment cost. This wastewater treatment cost is appropriately charged back to the Water System.
- **Transmission and Distribution:** Transmission and distribution test year operating expenses associated with mains and reservoirs are allocated to Base, Maximum Day, and Maximum Hour cost components, with factors identical to that of the Treated Water Pumping operation and maintenance expense allocation, discussed above.
- **Customer Meters and Public Fire Protection:** Meter maintenance expense is allocated 100 percent to the Meter component of Customer costs. Projected fire hydrant maintenance expense is allocated 100 percent to Direct Public Fire Protection cost component. Test year customer accounting and collection is allocated 100 percent to the Billing component of Customer costs.
- **Administrative and General:** Administrative and general expense is allocated to cost components in proportion to the total allocation of all other expenses to the cost components, excluding expenses for power, chemicals, and water treatment sludge.
- **Residual Fund and Rate Stabilization Fund Transfers:** The deposit into the Residual Fund (Line 24) and the deposit from the Rate Stabilization Fund (Line 25), each of which is allocable to O&M expense, are allocated to the various cost components in proportion to the allocation of the Administrative and General expense (Line 22).
- **Net Operating Expense:** The net operating expense to be recovered from all customers through charges for water service is derived by deducting the “Other Operating Revenue” and the non-operating “Interest Income” from the total operating expense.
 - Other operating revenue (Line 27) is allocated to the various O&M cost components, in proportion to the allocation of the Administrative and General costs (Line 22).

- The non-operating interest income (Line 28) is allocated to the various O&M cost components, in proportion to the allocation of the Administrative and General costs (Line 24).
- The total net operation and maintenance expense of \$210 Million to be recovered from water rates is shown on Line 29.

5.6.2. Wholesale

Currently, Aqua Pennsylvania is the only wholesale water customer. O&M expenses are allocated to Aqua Pennsylvania taking into considerations their projected annual usage and maximum day demands for service relative to the annual production and maximum day demand of the overall Water System, excluding costs associated with mains less than 24 inches in diameter. As shown in Column 8 of Table 5-4, a total of \$1.81 Million of Test Year 1 O&M expense has been allocated to Aqua Pennsylvania.

5.7. ALLOCATION OF NET PLANT INVESTMENT

Table 5-5 summarizes the test year investment in the Water System used in the allocation of test year capital related costs of service. The total Test Year 1 investment of \$1.45 Billion is the total original cost investment in facilities as of June 30, 2019.

5.7.1. Retail

The Test Year 1 plant investment is allocated to the cost components using a two-step process.

- First, a portion of the Water System plant investment costs are allocated to wholesale water customers.
- Then the retail portion of the total plant investment costs (which is the total plant investment less the proportionate share allocated to wholesale customers), are allocated to the other five cost components (Base, Extra Capacity (Max Day and Max Hour), Customer, and Public Fire Protection).

After deducting the investment directly allocable to Aqua Pennsylvania, the balance of the plant investment is allocated to retail customers as follows:

- **Source of Supply (Raw Water):** The investment in the source of supply facilities shown in Lines 1 and 2 includes the Fairmont Dam and associated structures and equipment. These facilities are designed to meet average annual water supply requirements and are allocated 100 percent to the Base cost component.
- **Raw Water Pumping:** Lines 3 and 4 reflect investment in the Baxter, Queen Lane, and Belmont raw water intakes, buildings, structures, and raw water pumping equipment. These facilities not only supply the average annual volume needs but are also designed to meet the capacity needs of maximum day requirements. Hence, investment in these facilities is allocated 71 percent to Base cost component and 29 percent to Maximum Day Extra Capacity cost component.

Table 5-5 Allocation of Test Year 1 Net Plant Investment to Functional Cost Components [Schedule BV-1: Table W-8]

LINE NO.	CUSTOMER TYPE	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		ESTIMATED PLANT INVESTMENT	BASE	EXTRA CAPACITY		CUSTOMER METERS	PUBLIC FIRE	WHOLESALE DIRECT
				MAX DAY IN EXCESS OF BASE	MAX HOUR IN EXCESS OF MAX DAY		PROTECTION - DIRECT	
WATER SYSTEM (\$)								
Raw Water Supply and Pumping								
Source of Supply								
1	Land	\$ 200,000	\$ 200,000					
2	Buildings and Equipment	5,291,000	5,291,000					
Power and Pumping								
3	Land	31,000	22,000	9,000				-
4	Buildings and Equipment	21,339,000	14,977,000	6,117,000				245,000
5	Total Raw Water Supply and Pumping	26,861,000	20,490,000	6,126,000	-	-	-	245,000
Purification and Treatment								
Power and Pumping (a)								
6	Land	71,000	36,000	11,000	23,000			1,000
7	Buildings and Equipment	77,766,000	39,757,000	12,233,000	24,466,000			1,310,000
Treatment								
8	Land	1,325,000	924,000	378,000				23,000
9	Buildings and Equipment	350,000,000	244,176,000	99,734,000				6,090,000
10	Total Purification and Treatment	429,162,000	284,893,000	112,356,000	24,489,000	-	-	7,424,000
Transmission and Distribution								
11	Mains	875,954,000	453,372,000	139,499,000	278,998,000			4,085,000
12	Meters	25,888,000				25,888,000		-
13	Hydrants	9,200,000					9,200,000	-
Filtered Water Storage								
14	Land	182,000	93,000	29,000	57,000			3,000
15	Buildings and Equipment	17,168,000	8,772,000	2,699,000	5,398,000			299,000
16	Total Transmission and Distribution	928,392,000	462,237,000	142,227,000	284,453,000	25,888,000	9,200,000	4,387,000
17	Subtotal	1,384,415,000	767,620,000	260,709,000	308,942,000	25,888,000	9,200,000	12,056,000
Administrative and General (b)								
18	Land	205,000	113,000	39,000	46,000	4,000	1,000	2,000
19	Buildings and Equipment	68,390,000	37,919,000	12,879,000	15,261,000	1,279,000	454,000	598,000
20	Total Administrative and General	68,595,000	38,032,000	12,918,000	15,307,000	1,283,000	455,000	600,000
21	Total Water Plant Investment	\$ 1,453,010,000	\$ 805,652,000	\$ 273,627,000	\$ 324,249,000	\$ 27,171,000	\$ 9,655,000	\$ 12,656,000

(a) Includes booster pumping

(b) Administrative and General allocated based on allocation of system investment.

- **Treated Water Pumping:** The investment in treated water pumping facilities at all three treatment plants, as well as the booster pumping stations in the distribution system, is included in Lines 6 and 7. These facilities are designed to fulfill maximum hour capacity needs in addition to meeting the Base and Maximum Day requirements. Hence, the retail portion of the plant investment costs of these facilities are allocated 52 percent to Base, 16 percent to Maximum Day Extra Capacity, and 32 percent to Maximum Hour Extra Capacity cost components.
- **Water Treatment:** The water purification and treatment facilities at the Baxter, Queen Lane, and Belmont treatment plants are designed to provide maximum day capacity needs. Hence, 71 percent of these costs are allocated to the Base cost component and 29 percent to the Maximum Day Extra Capacity cost component. The investment for Treatment is shown in Lines 8 and 9.
- **Transmission and Distribution:** Transmission and distribution investment, including transmission and distribution mains, and filtered water storage facilities are designed to meet maximum hour requirements of the system. Investment in these facilities is therefore allocated to Base, Maximum Day, and Maximum Hour cost components, with factors identical to that of the Treated Water Pumping allocation, discussed above.
- **Customer Meters and Public Fire Protection:** Investments in customer meters are entirely allocable to the Customer Meters cost component. Public fire protection service is comprised of the standard pressure fire system. Investment in public fire protection facilities is allocated 100 percent to the Public Fire Protection component.
- **General Plant and Equipment:** Other general plant and equipment investments are allocated to all the cost components based on the proportion of the total non-general plant and equipment component cost to the total plant investment cost.

5.7.2. Wholesale

Aqua Pennsylvania is allocated a share of total Water System investment in large transmission mains, defined as 24 inch and larger mains, as well as raw water and treated water storage and pumping facilities, and a share of the investment in the Baxter, Queen Lane and Belmont treatment facilities.

The plant investment costs are allocated to Aqua Pennsylvania based on the proportionate share of their contract capacity in the various facilities relative to the total design capacity of the various facilities. Aqua Pennsylvania's contract capacity in the various classes of facilities is in the range of 1.15 percent to 1.74 percent of the total design capacity of the facilities.

As shown in Column 7 of Table 5-5, a total of \$12.66 Million of test year net plant investment has been allocated to Aqua Pennsylvania. The associated return on investment at 7.50 percent is \$949,000.

5.8. ALLOCATION OF DEPRECIATION EXPENSE

Table 5-6 shows the estimated annual depreciation expense of the Water System and it is estimated to be \$31.33 Million for the Test Year 1. As shown on Line 14, the total depreciation expense allocated to Aqua Pennsylvania is \$276,000 out of the total \$31.33 Million.

Table 5-6 Allocation of Test Year 1 Depreciation Expense [Schedule BV-1: Table W-9]

LINE NO.	CUSTOMER TYPE	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		ESTIMATED PLANT INVESTMENT	BASE	EXTRA CAPACITY		CUSTOMER METERS	PUBLIC FIRE	WHOLESALE DIRECT
				MAX DAY IN EXCESS OF BASE	MAX HOUR IN EXCESS OF MAX DAY		PROTECTION - DIRECT	
STANDARD PRESSURE								
WATER SYSTEM (\$)								
Raw Water Supply and Pumping								
1	Source of Supply	\$ 132,000	\$ 132,000	\$ -				
2	Power and Pumping	438,000	307,000	126,000				5,000
3	Total Supply and Pumping	570,000	439,000	126,000	-	-	-	5,000
Purification and Treatment								
4	Power and Pumping (a)	1,539,000	787,000	242,000	484,000			26,000
5	Treatment	8,076,000	5,634,000	2,301,000				141,000
6	Total Purification and Treatment	9,615,000	6,421,000	2,543,000	484,000	-	-	167,000
Transmission and Distribution								
7	Mains	16,390,000	8,483,000	2,610,000	5,221,000			76,000
8	Meters	1,812,000				1,812,000		-
9	Hydrants	230,000					230,000	-
10	Filtered Water Storage	597,000	305,000	94,000	188,000			10,000
11	Total Transmission and Distribution	19,029,000	8,788,000	2,704,000	5,409,000	1,812,000	230,000	86,000
12	Subtotal	29,214,000	15,648,000	5,373,000	5,893,000	1,812,000	230,000	258,000
13	Administrative and General	2,116,000	1,174,000	398,000	472,000	40,000	14,000	18,000
14	Total Water Plant Depreciation Expense	\$ 31,330,000	\$ 16,822,000	\$ 5,771,000	\$ 6,365,000	\$ 1,852,000	\$ 244,000	\$ 276,000

(a) Includes booster pumping

The annual depreciation expense to be distributed to Water System cost components is based on the application of appropriate depreciation expense rates to the various categories of Water System facilities. The various items of depreciation expense are allocated to cost components on the same basis as the proportion of plant investment costs allocated to each of those cost components.

5.9. WHOLESALE COST OF SERVICE ALLOCATIONS

Table 5-7 summarizes the cost of service allocations for Aqua Pennsylvania based on the discussions presented above.

Table 5-7 Summary of Test Year 1 Cost of Service Allocated to Aqua Pennsylvania [Schedule BV-1: Table W-13A]

LINE NO.	DESCRIPTION	(1) ALLOCATED INVESTMENT	(2) COST OF SERVICE
1	Operating Expense		\$ 1,808,000
2	Depreciation Expense		276,000
3	Return on Investment		
4	Allocated Investment	12,656,000	
5	Return @ 7.50%		949,000
6	Total Allocated Cost of Service		\$ 3,033,000

5.10. DISTRIBUTION OF COSTS TO CUSTOMER TYPES

The cost of service is distributed to customer types by applying the unit costs to the individual customer types' units of service. Applying the unit costs of service to the number of units for which the customer type is responsible produces the customer type responsibility. The costs attributable to each customer type are based on the functional cost components described in earlier in this Report. Each customer type places a burden on the system in different ways and thus the allocation of the units is representative of this burden.

Table 5-8 presents the derivation of the unit costs of service for the Retail customers. Table 5-9 summarizes the distribution of the costs to the different customer types utilizing these unit costs. The total cost of service for each customer type is the sum of each type's units of service multiplied by the unit costs for the functional cost component.

As discussed earlier, the Water Department provides discounts to select customers. The cost of these discounts is not directly charged to customers. Instead, these costs are reallocated to the other retail customers in proportion to their allocated cost of service, as shown in Columns 2 to 4 of Table 5-10. The test year adjusted cost of service, reflecting the reallocation of these costs, is shown in Column 5. The indicated increase or decrease in the cost of service required to meet the adjusted cost of service is shown in Column 6.

Table 5-11 compares the total adjusted cost of service for each customer type to their respective revenues under existing rates. The indicated increase or decrease in the revenue required to meet the adjusted cost of service is shown in Column 4.

Table 5-8 Test Year 1 Retail Unit Costs of Service [Schedule BV-1: Table W-14]

LNE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		TOTAL TEST YEAR RETAIL COSTS	BASE	EXTRA CAPACITY		CUSTOMER COSTS	BILLING	DIRECT PUBLIC FIRE PROTECTION
				MAX DAY	MAX HOUR			
				IN EXCESS OF BASE	IN EXCESS OF MAX DAY			
METERS								
RETAIL WATER SYSTEM								
Total Retail Customer Units of Service								
1	Number		5,858,200	15,560	21,530	663,244	6,434,676	
2	Units		Mcf	Mcf/day	Mcf/day	Equiv. Meters	Equiv. Bills	Total
Operating Expense								
3	Total Expense - \$	\$208,206,000	\$119,725,000	\$30,048,000	\$28,436,000	\$2,034,000	\$27,188,000	\$775,000
4	Unit Expense - \$/Unit		\$20.4372	\$1,931.1054	\$1,320.7617	\$3.0667	\$4.2252	
Depreciation Expense								
5	Total Expense - \$	\$31,054,000	\$16,822,000	\$5,771,000	\$6,365,000	\$1,852,000		\$244,000
6	Unit Expense - \$/Unit		\$2.8715	\$370.8869	\$295.6340	\$2.7923		
Plant Investment								
7	Total Investment - \$	\$1,440,354,000	\$805,652,000	\$273,627,000	\$324,249,000	\$27,171,000		\$9,655,000
8	Unit Investment - \$/Unit		\$137.5255	\$17,585.2828	\$15,060.3344	\$40.9668		
Unit Return on Investment								
9	Total Return - \$	\$46,401,000	\$25,954,000	\$8,815,000	\$10,446,000	\$875,000		\$311,000
10	Inside City - \$/Unit (a)		\$4.4304	\$566.5099	\$485.1687	\$1.3197		
Total Unit Costs of Service								
11	Inside City - \$/Unit		\$27.7391	\$2,868.5022	\$2,101.5644	\$7.1787	\$4.2252	

(a) Retail rate of return = Retail allocation of Return on Investment / Retail Allocation of System Plant Investment = \$46,401,000 / \$1,440,354,000 = 3.2215%

Mcf - thousand cubic feet

Table 5-9 Test Year 1 Distribution of Costs of Service by Functional Cost Component to Customer Types [Schedule BV-1: Table W-15]

LINE NO.	CUSTOMER TYPE	(1)	(2)	(3) EXTRA CAPACITY		(4)	(5)	(6)
		TOTAL ALLOCATED COST OF SERVICE	BASE	MAX DAY	MAX HOUR IN EXCESS OF MAX DAY	CUSTOMER COSTS		
						METERS	BILLING	
Water System (\$)								
Retail								
General Service								
1	Senior Citizens	\$ 6,881,000	\$ 3,412,000	\$ 975,000	\$ 1,135,000	\$ 169,000	\$	1,190,000
2	Residential	157,382,000	82,060,000	23,235,000	27,236,000	3,288,000		21,563,000
3	Commercial	64,472,000	43,675,000	9,896,000	7,692,000	900,000		2,309,000
4	Industrial	4,470,000	3,481,000	574,000	294,000	43,000		78,000
5	Public Utilities	361,000	258,000	57,000	21,000	10,000		15,000
6	Subtotal General Service	233,566,000	132,886,000	34,737,000	36,378,000	4,410,000		25,155,000
7	PHA	6,967,000	4,363,000	1,119,000	1,093,000	73,000		319,000
8	Charities & Schools	6,493,000	4,361,000	975,000	820,000	137,000		200,000
9	Hospitals & University	10,876,000	8,039,000	1,807,000	883,000	72,000		75,000
10	Hand Billed	17,654,000	12,466,000	2,811,000	2,333,000	44,000		-
11	Scheduled (Flat Rate)	-	-	-	-	-		-
Fire Protection								
12	Private	2,665,000	386,000	373,000	441,000	27,000		1,438,000
	Public							
13	Standard Pressure	7,440,000	-	2,811,000	3,299,000	-		-
14	Subtotal Public Fire Protection	7,440,000	-	2,811,000	3,299,000	-		-
15	Total Retail Service	\$ 285,661,000	\$ 162,501,000	\$ 44,633,000	\$ 45,247,000	\$ 4,763,000	\$	27,187,000

Table 5-10 Test Year 1 Adjusted Cost of Service [Schedule BV-1: Table W-16]

LINE NO.	CUSTOMER CLASS	(1) ALLOCATED COST OF SERVICE	(2) DISCOUNT	(3) COST OF SERVICE WITH DISCOUNT	(4) RECOVERY OF DISCOUNT	(5) ADJUSTED COST OF SERVICE
Water System (\$000s)						
1	Residential	\$ 157,382,000	\$ -	\$ 157,382,000	\$ 3,613,000	\$ 160,995,000
2	Senior Citizens	6,881,000	1,720,000	5,161,000	118,000	5,279,000
3	Commercial	64,472,000	-	64,472,000	1,480,000	65,952,000
4	Industrial	4,470,000	-	4,470,000	103,000	4,573,000
5	Public Utilities	361,000	-	361,000	8,000	369,000
6	PHA	6,967,000	348,000	6,619,000	152,000	6,771,000
Charities, Schools, & Universities						
7	Charities & Schools	6,493,000	1,623,000	4,870,000	112,000	4,982,000
8	Hospital/University	10,876,000	2,719,000	8,157,000	187,000	8,344,000
9	Subtotal	17,369,000	4,342,000	13,027,000	299,000	13,326,000
10	Hand Billed	17,654,000	-	17,654,000	405,000	18,059,000
11	Scheduled (Flat Rate)	-	-	-	-	-
Fire Protection						
12	Private	2,665,000	-	2,665,000	61,000	2,726,000
13	Public Standard Pressure	7,440,000	-	7,440,000	171,000	7,611,000
14	Subtotal Public Fire Protection	7,440,000	-	7,440,000	171,000	7,611,000
15	Subtotal Retail Service	285,661,000	6,410,000	279,251,000	6,410,000	285,661,000
16	Wholesale	3,336,000	-	3,336,000	-	3,336,000
17	Total System	\$ 288,997,000	\$ 6,410,000	\$ 282,587,000	\$ 6,410,000	\$ 288,997,000

Table 5-11 Comparison of Test Year 1 Cost of Service and Adjusted Cost of Service with Revenues Under Existing Rates [Schedule BV-1: Table W-17]

LINE NO.	CUSTOMER TYPE	(1) REVENUE UNDER EXISTING RATES	(2) ADJUSTED COST OF SERVICE	(3) INDICATED INCREASE (DECREASE) REQUIRED
		\$	\$	%
Retail				
General Service				
1	Senior Citizens	\$ 5,058,165	\$ 5,279,000	4.40%
2	Residential	152,512,645	160,995,000	5.60%
3	Commercial	61,728,805	65,952,000	6.80%
4	Industrial	4,259,578	4,573,000	7.40%
5	Public Utilities	378,582	369,000	-2.50%
6	Subtotal General Service	223,937,776	237,168,000	5.90%
7	PHA	6,020,520	6,771,000	12.50%
8	Charities & Schools	4,736,465	4,982,000	5.20%
9	Hospitals & University	7,345,739	8,344,000	13.60%
10	Hand Billed	14,326,243	18,059,000	26.10%
11	Scheduled (Flat Rate)	672	-	-100.00%
Fire Protection				
12	Private	4,279,533	2,726,000	-36.30%
	Public			
13	Standard Pressure	9,235,000	7,611,000	-17.60%
14	Subtotal	13,514,533	10,337,000	-23.50%
15	Total Retail Service	269,881,948	285,661,000	5.80%
16	Total Wholesale	3,819,124	3,033,000	-20.60%
17	Total System	\$ 273,701,072	\$ 288,694,000	5.50%

6. WATER SYSTEM RATE DESIGN

The revenue requirement and cost of service analyses described in the preceding sections of this Report provide a basis for the review and update of a schedule of water rates that recover allocated cost of service. These studies are the results of engineering estimates, consideration of historical data and, to some extent, judgment and experience. Judgment must enter the final choice of rates, and factors such as public reaction to the extent of changes and adjustments, previous rate levels, contractual agreements, and past local practice are recognized in making rate adjustments.

Rates should be reasonably simple in application and subject to as few misinterpretations as possible. Considerations regarding the proposed rate adjustments reflect discussions with the Water Department staff and include the above considerations and the desire of the Water Department to maintain the existing structure for the Rate Period. This Report proposes water user rates in accordance with these considerations.

6.1. PROPOSED RETAIL WATER RATES

The cost of service analysis described in the preceding section of this Report provides the basis for the design of water rate schedules to cover the allocated cost for service for the Water System.

6.1.1. General Service

The proposed charges for water service derived in this Report are applicable to General Service retail customers and recognize that certain retail customer types, including senior citizens, charities and schools, and the PHA, receive services at a discounted rate. The Water Department anticipates that the existing discounts (25 percent for senior citizens, charities and schools and 5 percent for PHA) will continue to be applicable for the entire Study Period.

In designing the proposed rates, we adjust the retail water costs of service determined for each customer type to reflect the fact that these customer types will not pay full cost of service. Accordingly, we increase the proposed retail water, sewer, and stormwater rates to recover this cost of service revenue reduction due to discounts.

Additionally, the cost of service water rates that are designed for each Test Year require the application of a “lag factor.” The lag factor reflects a final adjustment to the cost of service rates to recognize the fact that there will be a proration of quantity charge billings between the existing and proposed rates during the first month following the effective date of the rate increase, as well as the fact that the fiscal year billings will not be fully collected within that fiscal year. The lag factor is calculated to recover only the anticipated receipts of the prorated revenue increase projected for the test year, recognizing the normally expected historical payment patterns. A lag factor of 1.031 is applied to the FY 2021 water cost of service rates.

Table 6-1 presents the proposed water rates for General Service customers applicable for Test Year 1 and Test Year 2. The proposed rates reflect a continuation of the existing rate structure, including a service charge which varies by meter size and a declining block quantity charge. The proposed rates designed for each fiscal year, are designed to recover the water revenue increase indicated in Table 4-14,

taking in to consideration the collection factor patterns as applied to billings from current and prior fiscal years.

Table 6-1 Proposed FY 2021 and FY 2022 General Service Water Rates [Schedule BV-1: Table W-18]

		(1)	(2)
LINE NO.	Meter Size (inches)	FY 2021	FY 2022
Monthly Service Charge (\$/bill)			
1	5/8	\$5.08	\$5.19
2	3/4	\$5.40	\$5.52
3	1	\$6.47	\$6.63
4	1-1/2	\$8.51	\$8.73
5	2	\$11.73	\$12.06
6	3	\$18.37	\$18.94
7	4	\$33.60	\$34.58
8	6	\$62.74	\$64.64
9	8	\$95.03	\$98.00
10	10	\$139.39	\$143.70
11	12	\$224.76	\$232.22
Quantity Charge (\$/Mcf)			
LINE NO.	MONTHLY WATER USAGE (Mcf)	FY 2021	FY 2022
12	First 2 Mcf	\$48.57	\$51.02
13	Next 98 Mcf	\$42.67	\$46.05
14	Next 1,900 Mcf	\$33.07	\$35.47
15	Over 2,000 Mcf	\$32.17	\$34.49

6.1.2. Fire Protection

Table 6-2 presents the proposed rates for private fire connections for Test Year 1 and Test Year 2.

Table 6-2 Proposed Rates for Fire Protection [Schedule BV-1: Table W-19 and W-19A]

Size of Meter			
Line	Or	(1)	(2)
No.	Connection	FY 2021	FY 2022
Private Fire Protection Monthly Service Charge (\$/bill)			
1	4" or less	\$27.52	\$28.43
2	6	\$50.57	\$52.33
3	8	\$75.56	\$78.29
4	10	\$111.41	\$115.38
5	12	\$172.45	\$179.27
Line		(1)	(2)
No.	Description	FY 2021	FY 2022
Public Fire Protection Annual Charge (\$)			
6	Standard Pressure	\$7,611,000	\$8,088,000

Size of Meter			
Line	Or	(1)	(2)
No.	or Connection (inches)	FY 2021	FY 2022
Monthly Residential Private Fire Protection			
Water Service Charge Including Fire Protection (\$/Bill)			
1	3/4	\$8.40	\$8.71
2	1	\$9.47	\$9.82
3	1-1/2	\$11.51	\$11.92
4	2	\$14.73	\$15.25
Monthly Sewer Service Charge (\$/Bill)			
5	3/4	\$7.61	\$8.15
6	1	\$7.61	\$8.15
7	1-1/2	\$7.61	\$8.15
8	2	\$7.61	\$8.15

7. WASTEWATER SYSTEM REVENUE AND REVENUE REQUIREMENTS

The Wastewater System currently serves the City of Philadelphia, and parts of Bucks, Montgomery, and Delaware Counties, a service area that is over 364 square miles, with 230 square miles in suburban communities and 134 square miles in the City.

The wastewater collection system consists of approximately 3,714 miles of total collector system piping, 19 pumping stations (16 Water Department owned and 3 owned by others but operated by the Water Department), 94,293 manholes, 25 storm relief structures, and 71,926 stormwater inlets. There are approximately 763 miles, 750 miles, and 1,852 miles of sanitary, stormwater, and combined sanitary/stormwater mains, respectively. Approximately 55 percent of the collection system consists of combined sanitary/stormwater mains. Sewers range in size from 8-inch diameter to 21 feet by 24 feet arch-shaped conduits primarily constructed of brick, vitrified clay, or reinforced concrete.

This section focuses on the Revenue and Revenue Requirements part of the Cost of Service study for the Wastewater System. In the following discussion, we review O&M expenses, debt service payments, funding for specific deposits and reserves, and the cost of capital improvement projects that the Water Department does not fund via debt or contributions from third parties.

7.1. WASTEWATER REVENUE

The Wastewater System derives revenue primarily from charges for sanitary sewer and stormwater services. During the Study Period, future levels of sanitary sewer revenues were projected based on an analysis of historical and future system growth in terms of the number of accounts and water consumption for sewer customers. For stormwater, trends for billable parcels and estimates of billable gross area (“GA”) and impervious area (“IA”) were examined.

7.1.1. Stormwater Services Background

The Water Department has been responsible for providing stormwater services to the City of Philadelphia since its creation. Historically, stormwater costs were recovered from customers through the Water Department’s rates and charges.

The Water Department fully transitioned the Stormwater Management Service Charge (“SWMS Charge”) to a parcel area-based SWMS Charge, as of July 1, 2013. Prior to the transition to the parcel area-based SWMS Charge, stormwater costs were recovered from customers via a meter-based stormwater charge with the customers sanitary service fees. Under this approach, equivalent meter sizes were used as a proxy for the demand a customer places on stormwater services. While customers were charged on the same basis, water meter size (or water use) does not directly correlate to the generation of stormwater or the demand placed on the Water Department’s system and/or services. In addition, the use of equivalent meter as the basis for the stormwater charged did not capture properties without water meters, such as parking lots, which generate stormwater runoff and may place a demand on the system and/or services.

Based upon prior rate proceedings as well as discussions with City stakeholders, the Water Department undertook a process in the 1990s to develop and implement a more acceptable and technically appropriate methodology for stormwater cost recovery. The underlying change in cost recovery recognizes that stormwater costs of service are not related to sanitary service requirements, which are generally related to customers' water use, and that a more appropriate basis would be a measure of (or surrogate for) the generation of stormwater runoff. As a result of this process, the Water Department chose a methodology that considered (1) the overall area of customer properties (i.e., gross area), and (2) stormwater runoff potential, including the impervious area of the property was identified as a more appropriate basis for recovery of stormwater costs. These two elements are recognized in the two primary components which make up the SWMS charge, namely the GA and IA charges. The parcel area-based fee is far more equitable, compared to an equivalent meter basis, as it better recognizes the generation of stormwater runoff from both pervious and impervious surfaces, associated demands placed on systems or services, and includes customers without a water meter, who previously did not contribute to cost recovery.

While this change in cost recovery approach was initially identified in the 1990s, billing data development and billing system updates to enable the use of a parcel area-based fee took several years. The Water Department began to transition customers to the current SWMS rate structure in July of 2010.

In the past, it was not unusual for stormwater costs to be recovered from customers via charges based upon water or sewer system attributes (such as water meter size). However, with improved data availability and technology, recovering stormwater costs via area-based fees has become far more widely used and publicly accepted nationwide. Further, WEF's "Use Fee Funded Stormwater Program" manual provides guidance on the development and implementation of such stormwater fees, and recognizes the methodology employed by the Water Department as one of the five named "Property Characteristics-Based Stormwater User Fee Methods,"¹⁶ which provide an equitable and defensible basis for establishing a stormwater rate structure and estimating units of service by customer class.

7.1.2. Customers and Growth

Table 7-1 summarizes the Water Department's wastewater customer account classifications.

Table 7-1 Wastewater System Customer Types

CUSTOMER TYPES			
Sanitary Sewer			Stormwater
General Service	Other	Fire Service	Residential
- Residential	- PHA	Wholesale	Condominiums
- Senior Citizens	- Charities & Schools		Non-Residential
- Commercial	- Hospitals & Universities		
- Industrial	- Hand Bill		Note: Stormwater also
- Public Utilities	- Scheduled (Flat Rate)		recognizes discounts as
- Sewer Only	- Surcharge		applicable to elderly, PHA and
- Groundwater			charities and schools.

¹⁶ See Section 5.4 of WEF's "User-Fee-Funded Stormwater Programs" Manual.

For the most part, the sanitary sewer customer types are similar to those for water customers, with the exception of sewer-only accounts, groundwater accounts, and hand-billed accounts. Hand-billed accounts are “H”-coded customers in the Basis2 billing system that receive surcharge and/or sewer credits. The adjustments to these accounts are made manually.

Based on a review of historical growth patterns, it is projected that the total number of sanitary sewer accounts will remain stable during the Study Period. Table 7-2 and Table 7-3 present the projection for number of accounts and billable parcels during the Study Period.

Table 7-2 Number of Customer Accounts

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Sanitary Sewer							
1	Residential	420,034	420,034	420,034	420,034	420,034	420,034
2	Senior Citizens	23,447	23,447	23,447	23,447	23,447	23,447
3	Commercial	35,804	35,804	35,804	35,804	35,804	35,804
4	Industrial	1,020	1,020	1,020	1,020	1,020	1,020
5	Public Utilities	170	170	170	170	170	170
6	Subtotal General Service	480,475	480,475	480,475	480,475	480,475	480,475
7	PHA	5,737	5,737	5,737	5,737	5,737	5,737
8	Charities and Schools	2,051	2,051	2,051	2,051	2,051	2,051
9	Hospitals and University	353	353	353	353	353	353
10	Hand Bill	217	217	217	217	217	217
11	Scheduled	3	3	3	3	3	3
12	Fire Service	112	112	112	112	112	112
13	Sewer Only	59	59	59	59	59	59
14	Groundwater	5	5	5	5	5	5
15	Subtotal Retail Customers	489,012	489,012	489,012	489,012	489,012	489,012
16	Wholesale	10	10	10	10	10	10
17	Total Sanitary Sewer	489,022	489,022	489,022	489,022	489,022	489,022
Stormwater							
18	Residential	464,172	464,171	464,171	464,171	464,170	464,170
19	Non-Residential	80,529	80,491	80,452	80,413	80,375	80,336
20	Condominium	4,969	4,969	4,969	4,969	4,969	4,969
21	Subtotal Stormwater	549,670	549,631	549,592	549,553	549,514	549,475

Table 7-3 Number of Billable Parcels [Schedule BV-3: Table SW-2]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Stormwater							
Residential							
1	Initial Parcel Count	462,380	462,380	462,380	462,380	462,380	462,380
2	Less Residential Zero Rate (1)	0	1	1	1	2	2
3	Subtotal Residential	462,380	462,379	462,379	462,379	462,378	462,378
Non-Residential							
4	Initial Parcel Count	73,559	73,559	73,559	73,559	73,559	73,559
5	Less Non-Residential Zero Rate (2)	39	77	116	155	193	232
6	Subtotal Non Residential	73,520	73,482	73,443	73,404	73,366	73,327
Condominium							
7	Initial Parcel Count	2,123	2,123	2,123	2,123	2,123	2,123
8	Less Appeals Adjustments	0	0	0	0	0	0
9	Subtotal Condominium	2,123	2,123	2,123	2,123	2,123	2,123
10	Total Billable Parcels	538,023	537,984	537,945	537,906	537,867	537,828

(1) Comprises Community Gardens under Residential Category

(2) Comprises Community Gardens under Non-Residential Category

7.1.3. Sanitary Sewer Retail Billed Volume

Table 7-4 presents the projected billed volume for retail sanitary sewer customers.

Table 7-4 Retail Billed Volumes

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System (Mcf)							
1	Residential	3,000,530	2,946,777	2,897,160	2,847,542	2,797,924	2,748,306
2	Senior Citizens	125,467	122,887	120,541	118,195	115,849	113,503
3	Commercial	1,520,202	1,514,292	1,508,383	1,502,754	1,497,126	1,491,779
4	Industrial	67,806	67,677	67,554	67,431	67,312	67,194
5	Public Utilities	9,304	9,290	9,276	9,263	9,249	9,236
6	Subtotal General Service	4,723,309	4,660,924	4,602,913	4,545,184	4,487,460	4,430,018
7	PHA	157,202	157,202	157,202	157,202	157,202	157,202
8	Charities and Schools	156,251	156,251	156,251	156,251	156,251	156,251
9	Hospitals and University	289,736	289,736	289,736	289,736	289,736	289,736
10	Hand Bill	439,660	439,660	439,660	439,660	439,660	439,660
11	Scheduled	11	11	11	11	11	11
12	Fire Service	8,000	8,000	8,000	8,000	8,000	8,000
13	Sewer Only	71,000	71,000	71,000	71,000	71,000	71,000
14	Groundwater	220,000	220,000	220,000	220,000	220,000	220,000
15	Subtotal Retail Customers	6,065,170	6,002,784	5,944,773	5,887,044	5,829,320	5,771,878
16	Wholesale	4,264,000	4,264,000	4,264,000	4,264,000	4,264,000	4,264,000
17	Total Sanitary Sewer System	10,329,170	10,266,784	10,208,773	10,151,044	10,093,320	10,035,878

7.1.4. Wholesale Volume, Capacity, and Strength Loadings

Table 7-5 summarizes projections of billed volume, capacity, and biological oxygen demand (“BOD”) and suspended solids (“SS”) loadings for the wholesale customers.

Table 7-5 Projections for Wholesale Customer Volumes, Capacities, and Strength Loadings

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System							
Abington							
1	Volume (Mcf)	96,000	96,000	96,000	96,000	96,000	96,000
2	Capacity (Mcf/day)	6,167	6,167	6,167	6,167	6,167	6,167
3	SS (1,000 lbs)	1,000	1,000	1,000	1,000	1,000	1,000
4	BOD (1,000 lbs)	1,400	1,400	1,400	1,400	1,400	1,400
Bucks County (Bensalem)							
5	Volume (Mcf)	175,000	175,000	175,000	175,000	175,000	175,000
6	Capacity (Mcf/day)	7,588	7,588	7,588	7,588	7,588	7,588
7	SS (1,000 lbs)	2,000	2,000	2,000	2,000	2,000	2,000
8	BOD (1,000 lbs)	2,200	2,200	2,200	2,200	2,200	2,200
Bucks County							
9	Volume (Mcf)	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
10	Capacity (Mcf/day)	47,996	47,996	47,996	47,996	47,996	47,996
11	SS (1,000 lbs)	10,300	10,300	10,300	10,300	10,300	10,300
12	BOD (1,000 lbs)	9,800	9,800	9,800	9,800	9,800	9,800
Cheltenham							
13	Volume (Mcf)	428,000	428,000	428,000	428,000	428,000	428,000
14	Capacity (Mcf/day)	20,521	20,521	20,521	20,521	20,521	20,521
15	SS (1,000 lbs)	3,400	3,400	3,400	3,400	3,400	3,400
16	BOD (1,000 lbs)	3,000	3,000	3,000	3,000	3,000	3,000
Lower Moreland							
17	Volume (Mcf)	65,000	65,000	65,000	65,000	65,000	65,000
18	Capacity (Mcf/day)	3,800	3,800	3,800	3,800	3,800	3,800
19	SS (1,000 lbs)	660	660	660	660	660	660
20	BOD (1,000 lbs)	500	500	500	500	500	500
Lower Southampton							
21	Volume (Mcf)	300,000	300,000	300,000	300,000	300,000	300,000
22	Capacity (Mcf/day)	10,205	10,205	10,205	10,205	10,205	10,205
23	SS (1,000 lbs)	2,440	2,440	2,440	2,440	2,440	2,440
24	BOD (1,000 lbs)	1,820	1,820	1,820	1,820	1,820	1,820
DELCORA							
25	Volume (Mcf)	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
26	Capacity (Mcf/day)	100,179	100,179	100,179	100,179	100,179	100,179
27	SS (1,000 lbs)	13,400	13,400	13,400	13,400	13,400	13,400
28	BOD (1,000 lbs)	11,000	11,000	11,000	11,000	11,000	11,000
Lower Merion							
29	Volume (Mcf)	360,000	360,000	360,000	360,000	360,000	360,000
30	Capacity (Mcf/day)	20,404	20,404	20,404	20,404	20,404	20,404
31	SS (1,000 lbs)	3,700	3,700	3,700	3,700	3,700	3,700
32	BOD (1,000 lbs)	3,200	3,200	3,200	3,200	3,200	3,200

Table 7-5 Projections for Wholesale Customer Volumes, Capacities, and Strength Loadings (continued)

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System							
Springfield (less Wyndmoor)							
33	Volume (Mcf)	128,000	128,000	128,000	128,000	128,000	128,000
34	Capacity (Mcf/day)	2,973	2,973	2,973	2,973	2,973	2,973
35	SS (1,000 lbs)	2,200	2,200	2,200	2,200	2,200	2,200
36	BOD (1,000 lbs)	2,250	2,250	2,250	2,250	2,250	2,250
Upper Darby							
37	Volume (Mcf)	490,000	490,000	490,000	490,000	490,000	490,000
38	Capacity (Mcf/day)	22,621	22,621	22,621	22,621	22,621	22,621
39	SS (1,000 lbs)	4,800	4,800	4,800	4,800	4,800	4,800
40	BOD (1,000 lbs)	4,000	4,000	4,000	4,000	4,000	4,000
Springfield (Wyndmoor)							
41	Volume (Mcf)	22,000	22,000	22,000	22,000	22,000	22,000
42	Capacity (Mcf/day)	1,247	1,247	1,247	1,247	1,247	1,247
43	SS (1,000 lbs)	240	240	240	240	240	240
44	BOD (1,000 lbs)	180	180	180	180	180	180

7.1.5. Stormwater Impervious and Gross Area

A stormwater units of service analysis was performed to develop estimates of the billable GA and IA units of service for the Study Period and is provided as Schedule BV-6: WP-2. The billable units of service are utilized in projecting the stormwater revenues under existing rates, as well as in developing the proposed GA and IA rates discussed later in this Report.

The Water Department obtained updated stormwater billing data based upon 2015 aerial and infrared imagery. The updated data set provides new impervious area and gross area data for billing purposes for properties City-wide. Based upon the updated Stormwater Billing Data, the overall impervious area has increased 86 million square feet compared to the prior data set. Most of this increase in IA is attributable to residential parcels, which reflect a total increase in IA of 72 million square feet. Overall non-residential impervious area increased 14 million square feet. Based on the updated Billing Data, the overall gross area increased 1.3 million square feet compared to the prior data set. The Residential GA has increased 1.5 million square feet, while Non-residential GA decreased 0.2 million square feet. The Water Department has been in the process of transitioning to the updated data set¹⁷.

Based upon the updated data set, there is no impact to the mean residential GA square footage, which remains unchanged from the prior rate proceeding at 2,110 square feet. The mean residential IA has increased to 1,200 square feet as compared to the mean residential IA of 1,050 square feet from the prior rate proceeding.

¹⁷ The Water Department has not fully transitioned new billing data for roughly 7,300 Non-residential parcels. These parcels were identified as being potentially highly impacted and are proposed to be transitioned pending the adoption of rates based upon the updated data set. Residential customers are billed a uniform charge per parcel and would not be impacted until rates are adopted based upon the updated stormwater billing data.

Table 7-6 summarizes the mean GA and IA square footage for each customer class. These values were used to project the initial GA and IA for each customer class based upon the associated number of parcels for each customer class beginning in FY 2021. Further discussion is provided in Schedule BV-6: WP-2.

Table 7-6 FY 2021 Mean GA and Mean IA [Schedule BV-3: Table SW-1]

LINE NO.	DESCRIPTION	FY 2021 MEAN GA (*)	FY 2021 MEAN IA (*)
Stormwater (square feet)			
All Residential Parcels		2,110	1,200
Non-Residential Sub-Classes			
Non-Discount			
1	Water & Sewer	28,596	16,031
2	SW Only	8,562	2,529
Discount: Senior, Education & Charities			
3	Water & Sewer	95,329	51,985
4	SW Only	23,021	13,472
Discount: PHA			
5	Water & Sewer	56,353	30,970
6	SW Only	2,015	721
Condominiums Sub-Classes			
Non-Discount			
7	Water & Sewer	15,996	11,499
8	SW Only	23,637	15,389
Discount: Senior, Education & Charities			
9	Water & Sewer	40,951	19,489
10	SW Only	24,704	20,649
Discount: PHA			
11	Water & Sewer	9,358	6,158
12	SW Only	0	0

FY 2021 Mean GA and Mean IA is based on fully transitioned stormwater parcel data.

This dataset is based on 2015 aerial and infrared imagery obtained by the City.

With this cost of service study, projected billable units of service reflect:

■ Updated stormwater billing data as follows:

- For FY 2020 - Initial IA and GA square footage as reflected in the Water Department's stormwater billing data as of June 2019.
- For FY 2021 and beyond – full transition of initial IA and GA square footage based upon the updated data set.
- Reduction in billable IA and GA square footage as a result of credits, based upon:
 - Projected increase in Impervious Area Reduction ("IAR") credits based upon the average 5-year growth and average IAR loss per parcel;
 - Projected increase in Non-surface and Surface Discharge Credits based upon the average 5-year growth in the number of parcels receiving credit and the associated average credit per parcel; and
 - Credits resulting from SMIP/GARP grants:

- Based upon the overall annual program budget of \$25 million;
- Average grant award per greened acre, anticipated cost escalation and average project completion time.

■ Reduction in billable IA and GA square footage due to appeals and other adjustments:

- Adjustment appeals, include reductions in GA and IA billable square footage resulting from customers who seek clarification for and take exception to GA and IA billing data;
- Other adjustments include reductions in GA and IA billable square footage resulting from a property's designation as a "Community Garden", which provides customers with a 100 percent discount on their stormwater bill and as referred to as a "Zero Rate Adjustment" in the tables below. This discount also applies to billing and collection charges associated with the subject parcel(s).

Additional information regarding the derivation of the billable GA and IA units of service, including the basis for above mentioned projections, are provided in Schedule BV-6: WP-2.

Table 7-7 summarizes the development of the billable GA for the Study Period, while Table 7-8 summarizes the development of the billable IA for the Study Period.

Table 7-7 Determination of Billable Gross Area [Schedule BV-3: Table SW-3]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Stormwater (thousand square feet)							
Residential							
1	Initial GA	974,653	975,622	975,622	975,622	975,622	975,622
2	Less Residential Zero Rate (1)	2	5	7	10	12	15
3	Subtotal Residential ☐	974,650	975,617	975,615	975,612	975,610	975,607
Non-Residential							
4	Initial GA	1,433,456	1,433,456	1,433,456	1,433,456	1,433,456	1,433,456
5	Less Credits Adjustments	338,727	360,128	375,828	394,413	412,888	431,257
6	Less Stormwater Appeals	1,213	2,117	2,710	2,993	2,993	2,993
7	Less Non-Residential Zero Rate (2)	486	972	1,458	1,944	2,430	2,916
8	Subtotal Non Residential ☐	1,093,029	1,070,239	1,053,460	1,034,106	1,015,144	996,289
Condominium							
9	Initial GA	35,297	35,297	35,297	35,297	35,297	35,297
10	Less Credits Adjustments	7,115	7,564	7,894	8,284	8,672	9,058
11	Subtotal Condominium ☐	28,183	27,733	27,404	27,013	26,625	26,239
12	Total Billable GA	2,095,862	2,073,590	2,056,478	2,036,731	2,017,379	1,998,136

(1) Comprises Community Gardens under Residential Category

(2) Comprises Community Gardens in the Non-Residential Category.

Table 7-8 Determination of Billable Impervious Area [Schedule BV-3: Table SW-4]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Stormwater (thousand square feet)							
Residential							
1	Initial IA	553,534	554,856	554,856	554,856	554,856	554,856
2	Less Residential Zero Rate (1)	1	1	2	2	3	3
3	Subtotal Residential ☐	553,534	554,855	554,854	554,854	554,853	554,853
Non-Residential							
4	Initial IA	704,894	717,806	717,806	717,806	717,806	717,806
5	Less Credits Adjustments	102,388	113,058	118,147	126,061	133,868	141,570
6	Less Stormwater Appeals	909	1,586	2,031	2,243	2,243	2,243
7	Less Non-Residential Zero Rate (2)	19	38	57	76	95	114
8	Subtotal Non Residential ☐	601,578	603,125	597,572	589,427	581,601	573,880
Condominium							
9	Initial IA	24,452	24,903	24,903	24,903	24,903	24,903
10	Less Credits Adjustments	4,404	4,863	5,082	5,423	5,758	6,090
11	Subtotal Condominium ☐	20,048	20,040	19,821	19,481	19,145	18,814
12	Total Billable IA	1,175,160	1,178,020	1,172,247	1,163,761	1,155,599	1,147,546

(1) Comprises Community Gardens under Residential Category

(2) Comprises Community Gardens in the Non-Residential Category.

Revenue Under Existing Rates projections utilize the number of billable residential parcels, since residential properties are billed a uniform charge per parcel. The impact of the updated billing data is more evident in the allocation of stormwater cost of service (see Section 8.10). The distribution of projected credits, appeals and community garden adjustments are based on current distributions within the stormwater billing data.

7.1.6. Bill Tabulation

Similar to our process for calculating water revenues, we used the bill tabulation results generated in Section 4.1.3 for the sewer revenue calculations as well. However, it is only necessary to utilize the distribution of accounts by meter size. The billed volume distribution is not required for sanitary sewer billings since the sanitary sewer quantity charge is a uniform volume charge for all billed volume.

7.1.7. Wastewater Revenue

The total operating revenues for the Water Department include the following:

- Retail (i.e., all customers excluding wholesale) Sanitary Sewer Service and Quantity charges and Stormwater charges
- Additional charges for high-strength customers (surcharges)
- Wholesale wastewater charges

7.1.7.1. Retail Operating Revenues

In developing projections for retail operating revenues, the process described in the following paragraphs and illustrated in Figure 4-1 was followed.

7.1.7.2. Projection of Gross Billings

To project the FY 2020 sewer gross billings, the FY 2019 (effective September 1, 2018) and FY 2020 (effective September 1, 2019) schedules of sanitary sewer rates were applied to proportionate shares of the projected FY 2020 annual billed water volume and number of customer accounts, to reflect the September 1, 2019 implementation of the FY 2020 rate schedule. For stormwater, the method is similar to the sanitary sewer billing projections, the FY 2019 (effective September 1, 2018) and FY 2020 (effective September 1, 2019) schedules of stormwater are applied to proportionate shares of the projected FY 2020 billable residential parcels and accounts, and non-residential billable GA and IA, as well as accounts.

To project the FY 2021 to FY 2025 sewer gross billings, the FY 2020 schedule of sewer rates shown Table 7-9 were applied to the projections of annual billed water volume, bill tabulation, and number of customer accounts. For stormwater, we apply the FY 2020 GA and IA rates to the projected billable residential parcels and accounts, and non-residential billable GA and IA, and the projected number of billable accounts.

Table 7-9 Existing Sanitary Sewer and Stormwater Rates

Sanitary Sewer	
Monthly Sanitary Sewer Service Charge (\$/bill)	
<u>Meter Size (Inches)</u>	
5/8	\$7.01
3/4	\$8.93
1	\$13.07
1-1/2	\$22.97
2	\$35.42
3	\$63.82
4	\$108.49
6	\$213.81
8	\$338.27
10	\$488.25
12	\$887.22
Base Rate - Sanitary Sewer Quantity Charges (\$/Mcf)	
<u>Monthly Usage</u>	
All Billable Water Usage	\$31.25
Groundwater Charge	\$13.86
Sanitary - Surcharge Rates (\$/lb)	
BOD (\$/lb in excess of 250 mg/l)	\$0.473
SS (\$/lb in excess of 350 mg/l)	\$0.481

Stormwater		
Residential Stormwater Charges		
<u>Monthly Stormwater Management Service Charge</u>		
Charge Per Parcel		\$14.03
<u>Monthly Billing & Collection Charge</u>		
Charge Per Bill		\$1.77
Non-Residential Stormwater Charges		
<u>Monthly Stormwater Management Service Charge</u>		
Gross Area	(\$/500 sf)	\$0.717
Impervious Area	(\$/500 sf)	\$5.410
<u>Monthly Billing & Collection Charge</u>		
Charge Per Bill		\$2.30

Notes:

Non-Residential Stormwater Charges includes Condominiums.

Non-Residential Stormwater Customers are

subject to a minimum Stormwater Management Service Charge

equal to the residential charge per parcel.

Where applicable, for all customer types that are eligible for discounts, the appropriate discounts previously shown on Table 4-6 were applied. Moreover, similar to our analysis for the Water System, TAP discounts and TAP-R surcharge billings are excluded from this analysis. Thus, the proposed revenue adjustments and rates developed will reflect the Base Rates for sanitary sewer and stormwater.

7.1.7.3. Projection of Projected Billings

Table 7-10 presents the projected billings under existing rates for the Wastewater System.

Table 7-10 Billings Under Existing Rates

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System (\$000s)							
Sewer Non-Discount							
1	Residential	\$ 129,867	\$ 128,432	\$ 126,881	\$ 125,331	\$ 123,780	\$ 122,230
2	Commercial	53,183	53,136	52,951	52,775	52,599	52,432
3	Industrial	2,346	2,349	2,345	2,341	2,337	2,333
4	Public Utilities	356	356	356	355	355	355
5	Fire Protection	249	250	250	250	250	250
6	Wholesale	39,006	38,982	38,982	38,982	38,982	38,982
7	Surcharge	4,859	4,862	4,862	4,862	4,862	4,862
8	Other (Hand-Billed and Groundwater)	16,988	17,033	17,033	17,033	17,033	17,033
9	Sewer Only	2,238	2,245	2,245	2,245	2,245	2,245
10	Subtotal Sewer Non-Discount Billings	249,093	247,643	245,903	244,173	242,442	240,720
Sewer Discount							
11	Residential (Senior Citizens)	4,413	4,360	4,305	4,250	4,195	4,140
12	PHA	5,240	5,253	5,253	5,253	5,253	5,253
13	Charity/Schools/Hospital/University	11,310	11,340	11,340	11,340	11,340	11,340
14	Subtotal Sewer Discount Billings	20,963	20,954	20,899	20,844	20,789	20,734
15	Subtotal Sewer Service Billings	270,056	268,596	266,802	265,016	263,231	261,454
Stormwater							
Stormwater General Service							
16	Residential	82,136	82,437	82,437	82,437	82,437	82,437
17	Non Residential	88,026	88,056	87,084	85,744	84,451	83,173
18	Subtotal Stormwater Non-Discount	170,162	170,493	169,521	168,181	166,888	165,610
Stormwater Discount							
19	Residential (Senior Citizens)	3,342	3,354	3,354	3,354	3,354	3,354
20	PHA	2,108	2,173	2,173	2,172	2,172	2,172
21	Charity/Schools/Hospital/University	9,371	9,456	9,401	9,325	9,250	9,175
22	Subtotal Stormwater Discount	14,820	14,983	14,928	14,851	14,776	14,701
23	Subtotal Stormwater Service Billings	184,983	185,476	184,449	183,032	181,664	180,311
24	Subtotal Wastewater Billings	\$ 455,038	\$ 454,072	\$ 451,251	\$ 448,048	\$ 444,894	\$ 441,765

7.1.7.4. Application of Collection Factors

As shown in Figure 4-1, the second step in the process of calculating revenues involves applying receipt factors (i.e., collection factors) to the corresponding gross billings to determine the operating retail cash receipts. Table 2-1 in Section 2.3.1 presents the collection factors used in determining the revenues for sanitary sewer and stormwater in the Study.

Table 7-11 and Table 7-12 summarizes the projected revenues (receipts) during the Study Period for the Retail customers of the Wastewater System.

Table 7-11 Projected Receipts Under Existing Sanitary Sewer Rates [Schedule BV-1: Table WW-1A]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Sanitary Sewer (\$000s)							
1	Residential	\$ 126,592	\$ 125,152	\$ 123,673	\$ 122,166	\$ 120,657	\$ 119,148
2	Senior Citizens	4,308	4,251	4,196	4,143	4,089	4,036
3	Commercial	51,739	51,703	51,552	51,383	51,211	51,048
4	Industrial	2,371	2,303	2,282	2,279	2,275	2,271
5	Public Utilities	345	346	346	346	345	345
6	Subtotal General Customers	185,355	183,755	182,050	180,316	178,579	176,849
7	Housing Authority	5,104	5,111	5,112	5,112	5,112	5,112
8	Charities and Schools	4,148	4,152	4,153	4,153	4,153	4,153
9	Hospitals and University	6,843	6,879	6,883	6,883	6,883	6,883
10	Hand Bill	13,495	13,591	13,607	13,608	13,608	13,608
11	Scheduled	1	1	1	1	1	1
12	Fire Service	249	250	250	250	250	250
13	Sewer Only	2,170	2,181	2,184	2,184	2,184	2,184
14	Groundwater	2,957	2,968	2,967	2,967	2,967	2,967
15	Wholesale	39,006	38,982	38,982	38,982	38,982	38,982
16	Surcharge	4,859	4,862	4,862	4,862	4,862	4,862
17	Subtotal Sanitary Sewer Receipts	\$ 264,188	\$ 262,733	\$ 261,052	\$ 259,320	\$ 257,582	\$ 255,852

Table 7-12 Projected Receipts Under Existing Stormwater Rates [Schedule BV-1: Table WW-1B]

LINE		FISCAL YEAR ENDING JUNE 30,						
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025	
Stormwater (\$000s)								
Residential								
1	Non Discount	\$ 79,406	\$ 79,913	\$ 79,980	\$ 79,986	\$ 79,986	\$ 79,986	
2	Discount: Senior, Education & Charities	3,240	3,261	3,263	3,263	3,263	3,263	
3	Discount PHA	728	732	733	733	733	733	
Non Residential								
4	Non Discount	77,582	77,844	77,106	75,958	74,796	73,640	
5	Discount: Senior, Education & Charities	8,931	9,036	9,002	8,936	8,866	8,796	
6	Discount PHA	1,253	1,309	1,315	1,317	1,316	1,316	
Condominium								
7	Non Discount	2,991	3,007	2,981	2,937	2,891	2,846	
8	Discount: Elderly, Education & Charities	76	75	73	71	69	67	
9	Discount PHA	1	1	1	1	1	1	
10	Total Stormwater Receipts	\$ 174,207	\$ 175,178	\$ 174,455	\$ 173,202	\$ 171,922	\$ 170,648	

7.1.7.5. Wholesale Operating Revenues

The Water Department provides wholesale wastewater service to ten (10) suburban customers on a contractual basis. Three wholesale customers (Bensalem, Lower Merion, and Upper Darby) make capital contributions to the Water Department for their allocated share of investment in treatment and collection system facilities used in providing wastewater service to the particular customer. Contract rates for wastewater service apply on a monthly basis and generally consist of charges for O&M expense,

applicable capital costs associated with the collection and treatment facilities used in providing the service, customer related costs, and a management fee. Cheltenham, Lower Southampton, Springfield, Abington, and Lower Moreland Townships, and the Delaware County Regional Water Authority (“DELCORA”) contract rates consist of charges for O&M expense and capital costs associated with the Long-Term Control Plan (“LTCP”) and Consent Order Agreement (“COA”) in accordance with their contract terms. The Water Department actively manages the wholesale service agreements to recover the costs associated with the wholesale service.

Table 7-13 presents the projected revenues under existing rates from the wholesale customers based on their respective contract terms.

Table 7-13 Projected Receipts for Wholesale Contract Customers

LINE		FISCAL YEAR ENDING JUNE 30,						
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025	
Wastewater System (\$000s)								
1	Abington	\$ 1,618	\$ 1,617	\$ 1,617	\$ 1,617	\$ 1,617	\$ 1,617	
2	Bucks County (Bensalem)	1,688	1,686	1,686	1,686	1,686	1,686	
3	Bucks County	8,569	8,559	8,559	8,559	8,559	8,559	
4	Cheltenham	4,373	4,369	4,369	4,369	4,369	4,369	
5	Lower Moreland	888	887	887	887	887	887	
6	Lower Southampton	4,145	4,161	4,161	4,161	4,161	4,161	
7	DELCORA	9,812	9,799	9,799	9,799	9,799	9,799	
8	Lower Merion	2,480	2,475	2,475	2,475	2,475	2,475	
9	Springfield (less Wyndmoor)	2,041	2,040	2,040	2,040	2,040	2,040	
10	Upper Darby	3,047	3,041	3,041	3,041	3,041	3,041	
11	Springfield (Wyndmoor)	347	346	346	346	346	346	
12	Total Wastewater Wholesale	\$ 39,006	\$ 38,982	\$ 38,982	\$ 38,982	\$ 38,982	\$ 38,982	

7.1.7.6. Projected Wastewater System Operating Revenues

Table 7-14 summarizes the projected receipts for the Wastewater System during the Study Period.

Table 7-14 Projected Receipts under Existing Rates [Schedule BV-1: Table WW-1]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System (\$000s)							
1	Sanitary Sewer Receipts	\$ 264,188	\$ 262,733	\$ 261,052	\$ 259,320	\$ 257,582	\$ 255,852
2	Stormwater Receipts	174,207	175,178	174,455	173,202	171,922	170,648
3	Total Wastewater Service Receipts	\$ 438,395	\$ 437,910	\$ 435,507	\$ 432,522	\$ 429,503	\$ 426,500

7.1.8. Tiered Assistance Program Rate Rider Surcharge

The FY 2021 and FY 2022 projected revenues do not include the current TAP-R rate of \$1.16/Mcf for sanitary sewer. Similar to our methodology for the Water System, the revenues developed in for the Wastewater Cost of Service analysis are referred to as the “Base Rates” (corresponding with Table 3-9) because they do not include the impact of providing discounts to TAP customers nor do they reflect the impact of TAP-R revenues.

7.1.9. Other Revenue and Adjustments

The Water Department has several sources of other revenues including miscellaneous fees, UESF grants, L&I permits, penalties, and releases from the Debt Service Reserve Fund. As noted above, no revenue losses associated with TAP discounts are included under Other Operating Revenues for the development of the Base Rates. Table 7-15 summarizes the other operating revenues for the Wastewater System.

Table 7-15 Other Revenue Projected Receipts [Schedule BV-1: Table WW-1C]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System (\$000s)							
1	Penalties	\$ 6,134	\$ 6,120	\$ 6,077	\$ 6,029	\$ 5,982	\$ 5,935
2	Miscellaneous City Revenues	0	0	0	0	0	0
3	Other	5,450	5,650	5,650	5,650	5,650	5,650
4	State & Federal Grants	0	0	0	0	0	0
5	Permits Issued by L&I	2,320	2,320	2,320	2,320	2,320	2,320
6	Miscellaneous (Procurement)	210	210	210	210	210	210
7	City & UESF Grants	168	168	168	168	168	168
8	Affordability Program Discount Cost (a)	0	0	0	0	0	0
9	Release from Debt Service Reserve (b)	12,439	0	0	0	0	0
10	Total Wastewater Other Income	26,721	14,468	14,425	14,377	14,330	14,283
Interest Income							
11	Debt Reserve Fund (c)	0	0	0	0	0	0
12	Operating Fund	571	620	691	676	711	665
13	Rate Stabilization Fund	871	717	689	694	703	678
14	Total Wastewater System	\$ 28,163	\$ 15,805	\$ 15,806	\$ 15,748	\$ 15,743	\$ 15,626

(a) Beginning in FY 2019, TAP Revenue Loss is recovered via the TAP Rate Rider Surcharge.

(b) Projected Release from Debt Reserve Fund based on outstanding and proposed debt service payments.

(c) Excludes deposit into Residual Fund for Transfer to City General Fund.

7.2. WASTEWATER REVENUE REQUIREMENTS

7.2.1. O&M Expenses

Operating expenses consist of all costs of the Water Department necessary and appropriate for the operation, maintenance, and administration of the Wastewater System during each year. Projections of operating expenses include expenses such as personal services, purchased services including power, materials and supplies, equipment, pensions and benefits, as well as indemnities and liquidated encumbrances.

Table 7-16 summarizes the projected O&M expenses reflecting of the assumptions and adjustments described in Sections 2.3.3 and 4.2.1.

Table 7-16 Projected O&M Expenses [Schedule BV-1: Table WW-2]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System (\$000s)							
1	Personal Services	\$ 87,061	\$ 91,202	\$ 95,338	\$ 99,280	\$ 103,371	\$ 107,615
2	Pension and Benefits	82,832	86,155	88,842	91,839	94,272	96,147
3	Subtotal	169,893	177,357	184,180	191,118	197,642	203,762
	Purchase of Services						
4	Power	6,609	6,808	6,808	6,842	6,910	6,979
5	Gas	3,375	3,477	3,477	3,494	3,529	3,564
6	SMIP/GARP	25,000	25,000	25,000	25,000	25,000	25,000
7	Other	107,332	110,095	114,604	119,299	124,188	129,278
8	Subtotal	142,317	145,379	149,888	154,635	159,627	164,821
	Materials and Supplies						
9	Chemicals	3,270	3,433	3,605	3,785	3,975	4,173
10	Other	15,527	15,978	16,441	16,918	17,408	17,913
11	Subtotal	18,797	19,411	20,046	20,703	21,383	22,087
12	Equipment	2,937	2,995	3,055	3,116	3,179	3,242
13	Indemnities and Transfers	7,824	7,868	7,913	7,958	8,003	8,049
14	Subtotal Expenses	341,768	353,011	365,083	377,531	389,834	401,962
15	Liquidated Encumbrances	(20,998)	(21,838)	(22,651)	(23,507)	(24,410)	(25,350)
16	Total Wastewater System	\$ 320,770	\$ 331,173	\$ 342,433	\$ 354,023	\$ 365,424	\$ 376,612

7.2.2. Debt Service

As discussed earlier in this Report, the General Bond Ordinance views the Water and Wastewater Systems as one combined system for the purposes of the Rate Covenant. Accordingly, bond issuances are allocated between water and wastewater based on System needs.

The existing and proposed debt service were previously discussed in Sections 2.3.4 and 3.2.4 of this Report.

Table 7-17 summarizes the Wastewater System's share of the total existing and proposed debt financing for the Wastewater System CIP.

Table 7-17 Summary of Existing and Proposed Debt Service [Schedule BV-1: Table WW-5]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System (\$000s)							
Revenue Bonds							
1	Existing (a)	\$ 132,491	\$ 120,794	\$ 112,858	\$ 108,577	\$ 91,917	\$ 91,900
	Proposed						
2	Fiscal Year 2021 (b)		3,850	11,550	15,171	15,171	15,171
3	Fiscal Year 2022 (b)			3,780	11,340	14,895	14,895
4	Fiscal Year 2023 (b)				4,340	13,020	17,101
5	Fiscal Year 2024 (b)					4,025	12,075
6	Fiscal Year 2025 (b)						3,430
7	Total Proposed	0	3,850	15,330	30,851	47,110	62,672
8	Total Revenue Bonds	132,491	124,644	128,188	139,428	139,028	154,572
PennVest Loans							
9	Parity PennVest	6,278	6,278	6,278	6,278	6,278	6,278
10	Total Debt Service	\$ 138,768	\$ 130,922	\$ 134,465	\$ 145,705	\$ 145,305	\$ 160,850

(a) Projected debt service amounts for the Variable Rate Series 1997B and 2005B Bonds are based upon assumed interest rates of 3.0% and 4.53%, respectively. Projected amounts also include (i) debt service for the Series 2019B Bonds which issued in FY 2020; and (ii) savings from the Series 2019A Refunding Bonds and the Forward Refunding for the Series 2011A Bonds.

(b) Projected debt service amounts assume interest only payment for the first year of the bond authorization based on 5.25% interest rate; and assume issuance during the first quarter of the fiscal year.

7.2.3. Capital Improvements

The Water Department's CIP reflects planned improvements to the Wastewater System required to meet regulatory requirements and maintain existing levels of service. The Wastewater System CIP includes major capital projects required for implementing the LTCP and complying with the COA. The Water Department currently estimates that executing the 25-year LTCP program will cost about \$4.5 Billion, of which \$3.5 Billion is related to anticipated capital expenditures. The Wastewater System CIP reflects a ramp-up of COA-related projects associated with increasing compliance criteria over the life of the LTCP.

As discussed in Sections 2.3.6 and 3.2.3, several adjustments were made to the Water Department's appropriations-based CIP budget to develop the projected anticipated annual cash expenditures. Following the steps outlined in Section 2.3.6 produces the CIP shown in Table 7-18.

Table 7-18 Projected Wastewater System CIP [Schedule BV-1: Table WW-3]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System (\$000s)							
1	Engineering and Administration (a)	\$ 8,665	\$ 7,487	\$ 6,556	\$ 5,606	\$ 4,655	\$ 3,705
2	Water Pollution Control Plant	70,000	200,000	110,000	160,000	110,000	60,000
3	Storm Flood Relief	10,000	15,000	15,000	15,000	15,000	15,000
4	Reconstruction of Sewers	67,800	72,460	67,860	67,860	67,860	67,860
5	Green Infrastructure	62,000	72,000	72,000	72,000	72,000	72,000
6	Vehicles	6,000	6,000	6,000	6,000	6,000	6,000
7	Total Improvements	224,465	372,947	277,416	326,466	275,515	224,565
8	Inflation Adjustment (b)	0	0	8,322	19,882	25,548	28,185
9	Inflated Total	224,465	372,947	285,739	346,348	301,063	252,750
10	Cash Flow Adjustment (c)	(25,262)	(107,040)	(26,332)	(110,613)	19,816	(40,575)
11	Net Cash Financing Required	\$ 199,203	\$ 265,907	\$ 259,407	\$ 235,735	\$ 320,879	\$ 212,174

(a) Beginning in FY 2017, Engineering and Administration Costs no longer include pension and benefits costs per City policy.

(b) Allowance for inflation of 3.0 percent per year after fiscal year 2021.

(c) Reflects adjustment to annual capital budget appropriations for project duration and contingency to reflect anticipated annual expenditures.

7.2.4. Capital Flow of Funds

The Water Department meets its projected capital needs by using several sources for funding, including internally generated funds (cash) and debt. As defined by the General Bond Ordinance, the Construction Fund is where the Water Department draws funds to pay for the CIP. The Water Department may deposit bond proceeds and cash transfers from the Revenue Fund and the Residual Fund into the Construction Fund to pay for capital projects.

Table 7-19 presents the proposed sources and uses for the Wastewater System CIP. As shown on Line 6, the Construction Fund has an estimated beginning balance of \$150.9 Million on July 1, 2019. Over the course of the Study Period, the Water Department anticipates issuing debt and the bond proceeds for these transactions are shown on Line 1. The level of debt financing increases during the Study Period as the Water Department's CIP starts to ramp up. The Wastewater System's share of bond proceeds totals \$1.29 Billion during the Study Period. Line 13 shows the estimated level of total annual capital expenditures the Water Department will fund. Lines 8 and 10 show the estimated level of annual pay-go (i.e., cash-funded) the Water Department will fund.

Table 7-19 Projected Flow of Funds – Wastewater: Construction Fund & Debt Reserve Account [Schedule BV-1: Table WW-4]

LINE		FISCAL YEAR ENDING JUNE 30,					
NO.	DESCRIPTION	2020	2021	2022	2023	2024	2025
Wastewater System (\$000s)							
Disposition of Bond Proceeds							
1	Proceeds From Sale of Bonds	\$ 179,834	\$ 220,000	\$ 216,000	\$ 248,000	\$ 230,000	\$ 196,000
	Transfers:	0	0	0	0	0	0
2	Debt Reserve Fund (a)	2,398	7,726	11,340	10,920	15,860	13,502
3	Cost of Bond Issuance (b)	1,030	1,298	1,274	1,463	1,357	1,156
4	Construction Fund (c)	176,406	210,976	203,386	235,616	212,783	181,341
5	Total Issue	179,834	220,000	216,000	248,000	230,000	196,000
Construction Fund							
6	Beginning Balance	150,949	171,910	158,049	144,037	189,373	126,651
7	Transfer From Bond Proceeds	176,406	210,976	203,386	235,616	212,783	181,341
8	Capital Account Deposit	15,952	17,228	18,607	20,095	21,703	23,439
9	Penn Vest Loan	0	0	0	0	0	0
10	Transfer from Residual Fund	26,200	22,200	21,900	23,700	22,100	24,900
11	Interest Income on Construction Fund	1,606	1,642	1,503	1,659	1,572	1,354
12	Total Available	371,113	423,956	403,444	425,107	447,530	357,685
13	Net Cash Financing Required	199,203	265,907	259,407	235,735	320,879	212,174
14	Ending Balance	0	0	0	0	0	0
Debt Reserve Account							
15	Beginning Balance	133,751	123,710	131,437	142,777	153,697	169,557
16	Transfer From Bond Proceeds	2,398	7,726	11,340	10,920	15,860	13,502
17	Debt Service Reserve Release	(12,439)	0	0	0	0	0
18	Ending Balance	123,710	131,437	142,777	153,697	169,557	183,059
19	Interest Income on Debt Reserve Fund	\$ 1,287	\$ 1,276	\$ 1,371	\$ 1,482	\$ 1,616	\$ 1,763

(a) Amount of Debt Reserve Fund estimated based on outstanding and proposed debt service payments.

(b) Cost of bonds issuance assumed at 0.59 percent of issue amount.

(c) Deposits equal proceeds from sale of bonds less transfers to Debt Reserve Fund and Costs of Issuance.

7.3. WASTEWATER SYSTEM SUMMARY OF REVENUE AND REVENUE REQUIREMENTS

The Wastewater System's estimated financial performance during the Study Period is presented in Table 7-20. As shown in the table below, the Wastewater System will need a series of revenue increases, starting at 6.64 percent in FY 2021, followed by increases of 6.65 percent, 4.23 percent, 4.07 percent, and then 3.90 percent for each subsequent year. These revenue adjustments are necessary to meet O&M, debt service, Capital Account deposit requirements, and provide additional coverage per the Rate Covenant.

Table 7-20 presents the Wastewater System operating results for Base Rates. The proposed revenue increases in the table do not reflect any rate compression as discussed in Section 1.5.

As previously mentioned, the Water Department is addressing the reconciliation of TAP discounts and TAP-R revenues in a separate proceeding.

Table 7-20 Projected Revenue and Revenue Requirements: Base Rates [Schedule BV-1: Table WW-6]

LINE NO.	DESCRIPTION	FISCAL YEAR ENDING JUNE 30,					
		2020	2021	2022	2023	2024	2025
Wastewater System (\$000s)							
Operating Revenues							
1	Wastewater Service - Existing Rates (a)	\$ 438,395	\$ 437,910	\$ 435,507	\$ 432,522	\$ 429,503	\$ 426,500
	Additional Service Revenue Required						

(a) Revenue from rates effective September 1, 2019.

(b) Includes other operating and nonoperating income, including interest income on funds and accounts transferable to the Revenue Fund. Includes Debt Service Reserve Fund Release in FY 2020.

(c) Cost to process the Water Treatment Sludge at the wastewater treatment plants based on wastewater cost of service analysis.

7.4. PROJECTED WASTEWATER SYSTEM OPERATING RESULTS

Line 1 of Table 7-20 is the consolidated total for wastewater retail and wholesale receipts from Table 7-11, Table 7-12, and Table 7-13. These represent receipts under existing rates. Lines 2 through 6 present the revenues from proposed revenue increases. Line 9 presents other operating receipts as detailed on Lines 1 to 10 of Table 7-15. Interest income from the Debt Reserve, Operating Fund, and Rate

Stabilization Funds is shown on Lines 10 through 12. Line 13 summarizes the projected Total Revenues for the Wastewater System.

Operating expenses are summarized on Lines 14 and 15. Line 15 represents the Wastewater System's share of costs to process water treatment sludge at the wastewater treatment plants. As noted in Section 4, a portion of the cost to process this sludge is allocated back to the Water System as well. During the Study Period, it is estimated that the Water Department will make a series of deposits to and transfers from the Rate Stabilization Fund as shown on Line 17. Line 18 presents the Net Revenues after Operations. Existing and proposed senior debt service obligations are shown on Lines 19 through 22. Debt service coverage on senior debt is calculated on Line 23 and indicates that coverage requirements meet the 1.30x target. The Capital Account deposit is on Line 27. Line 28 then shows results of the total debt service coverage requirement and indicates that total coverage requirements meet the 1.00 minimum coverage required by the General Bond Ordinance.

Line 29 presents the end of year balance to be transferred to the Residual Fund. As shown on Line 29 each fiscal year of the Study Period results in positive balances.

As established in the General Bond Ordinance and Rate Covenant, debt service coverage requirements are for the Combined System. The calculations shown in Table 7-20 are presented to demonstrate that the Wastewater System's proposed financial plan provides sufficient resources for the Wastewater System to be financially stable on its own.

8. WASTEWATER SYSTEM COST OF SERVICE ALLOCATIONS

The cost of service analysis is the middle step of three depicted in Figure 3-1 that forms the basis for how a utility sets its rates and charges. At the cost of service stage, we identify how different customer types are using the sanitary sewer and stormwater systems. As such, each customer type potentially places a different level of demands on the system – requirements that the Water Department must meet. The types of demand are cost drivers and the cost of service step is where we develop the nexus between how the systems are designed and operated and how customers are using the systems (cost-benefit nexus).

8.1. GENERAL

As indicated previously for the Water System, in allocating the test year cost of service, we apportion revenue requirements between wholesale customers and retail customer types on a utility basis, per the industry accepted guidelines provided in the WEF MoP 27. The tasks illustrated in Figure 8-1 to conduct the wastewater cost of service analysis presented herein.

Wastewater Cost of Service Analytical Tasks	1. Categorize	2. Functionalize	3. Allocate	4. Distribute
	Determine net revenue requirements by <i>cost categories</i>	Assign revenue requirements to <i>functional cost centers</i>	Allocate functional costs to <i>cost components</i>	Distribute costs to <i>customer types</i>
Subcomponent Costs	<ul style="list-style-type: none"> • O&M Costs • Capital Costs 	<ul style="list-style-type: none"> • Collection & Pumping • Water Pollution Control Plants • Customer Costs • Administrative & General 	<ul style="list-style-type: none"> • Volume • Capacity • Strength (Suspended Solids & BOD) • Direct Stormwater 	<ul style="list-style-type: none"> • Residential • Senior Citizens • Commercial • Industrial • Public Utilities • Housing Authority • Charities / Schools • Retail • Infiltration/Inflow • Contract Services

Figure 8-1 Wastewater Cost of Service Steps

8.2. COST OF SERVICE TO BE ALLOCATED

8.2.1. Overall Wastewater System

The projected annual revenue requirements for FY 2021 serve as the Test Year 1 requirements for the analyses conducted herein. The net cost of service recovered from wastewater service charges is the total revenue requirements less revenues received from other sources. The TY net cost of service of \$467.0 Million (Column 3, Line 12), represents the total revenue requirements of \$482.8 Million (Column 3, Line 9) minus other revenues and transfers received of \$15.9 Million (Column 3, Lines 10 and 11). Table 8-1 presents the cost of service to be recovered from sanitary sewer and stormwater rates for

Test Year 1. The cost of service to be recovered from rates consists of \$317.2 Million of net operating expenses (Column 1, Line 12) and \$149.8 Million of net capital-related costs (Column 2, Line 12).

Table 8-1 Estimated Wastewater System Test Year 1 Cost of Service [Schedule BV-1: Table WW-7]

LINE NO.	DESCRIPTION	(1) OPERATING EXPENSE	(2) CAPITAL COSTS	(3) TOTAL
Wastewater System (\$000s)				
Revenue Requirements				
1	Operations & Maintenance Expense	\$ 209,052	\$ -	\$ 209,052
2	Direct Interdepartmental Charges	122,121	-	122,121
3	Water Treatment Plant Sludge	(11,098)	(3,634)	(14,732)
4	Revenue Bonds	-	127,072	127,072
5	Proposed Bond Debt Service	-	3,850	3,850
6	Capital Account Deposit	-	17,228	17,228
7	Residual Fund Deposit	15,191	6,858	22,049
8	Deposit (From)/To Rate Stabilization Fund	(2,618)	(1,182)	(3,800)
9	Total	332,648	150,192	482,840
Deductions of Funds from Other Sources				
10	Other Operating Revenue	(14,468)	-	(14,468)
11	Interest Income	(971)	(422)	(1,393)
12	COST OF SERVICE TO BE DERIVED FROM RATES	\$ 317,209	\$ 149,770	\$ 466,979

8.2.2. Wholesale Wastewater

The cost of service allocable to the 10 wholesale wastewater customers and the rates developed to recover these allocated costs, reflect consideration of the contract demands for service as set forth in each customer's contract with the City. Contract rates for wastewater service apply on a monthly basis and generally consist of charges for O&M expense, applicable capital costs associated with the collection and treatment facilities used in providing the service, customer related costs, and a management fee ranging from 10 to 12 percent applied to the sum of the unit and fixed charges.

For Test Year 1, the O&M expense of \$317.2 Million from Table 8-1 is allocated between wholesale and retail customers based on service demand characteristics. With respect to capital costs, to allocate the \$149.9 Million (Column 2, Line 12 of Table 8-1) of Capital Costs using the utility-basis approach, typically we delineate the annual Capital Costs into two components, namely, the Depreciation Expense and the Return on Investment. Under the utility-basis approach, the restatement of Capital Costs into these two components is necessary as the Water Department provides service to wholesale customers outside the City, and hence is entitled to obtaining a return on investment from those wholesale customers.

To restate the Capital Costs in terms of depreciation and return, we determine the depreciation expense for the Wastewater System and subtract this amount from the Total Capital Costs. The resulting figure corresponds to the return on investment for the Wastewater System, which is recovered from both the inside City retail and outside City wholesale customers. As noted earlier, the rate of return for service

to the City's wholesale wastewater customers used in the Cost of Service Study is 7.5 percent, which is consistent with the rate of return used in the development of the wastewater wholesale existing rates.

8.3. FUNCTIONAL COST COMPONENTS

The costs derived in revenue requirements are incurred as a result of cost drivers placed on the system by its customers. Many systems are designed and sized to meet the cost drivers; therefore, the operational and capital costs (depreciation and return on rate base) are linked to these cost drivers.

The various cost elements of wastewater service are assigned to functional cost components as the first step in the subsequent distribution of the cost of service to the customer types. For a wastewater system, the functional cost centers include collection system, pumping, treatment, pollutant loadings (strength), customer costs, and general administration. For the analyses conducted herein, the Design Basis cost of service methodology proposed in WEF MoP 27 was followed.

8.3.1. Wastewater System Facilities

A wastewater system includes different facilities each designed and operated to fulfill a given function. The sewage collection system in the City of Philadelphia consists of both separate sanitary and storm sewers as well as combined sanitary and storm sewers designed to convey sanitary and stormwater flows. In addition, these conveyance systems transport a large part of these flows to one of the three wastewater treatment plants for treatment prior to discharge into the rivers.

The wastewater treatment plants consist of different facilities as well. The sizing of certain facilities, such as the sedimentation basins, is on the basis of the average annual volume of wastewater received at the plant. The sizing of other facilities, such as the aeration basins, is on the basis of the measurable pollutant, BOD, since these facilities are required to reduce this pollutant prior to discharge into the river. Further, the sizing of other facilities is on the basis of SS loading, another readily measurable pollutant, contained in the influent wastewater. Finally, certain other facilities, such as sludge disposal facilities, are designed to manage both BOD and SS loadings.

8.3.2. Wastewater System Design Basis

The Design Basis method uses volume, capacity, strengths, and customer. Volume represents costs incurred for the quantity of sewerage volume treated. Capacity represents costs incurred with meeting peak flows. Strengths represents costs incurred with treating and handling specific constituents in the sewer flow such as BOD, SS, nitrogen, ammonia, etc. Customer represents the costs associated with meter reading, billing, collecting, and accounting costs related to the provision of wastewater service.

8.3.3. Units of Service

Table 8-2 summarizes the Test Year 1 units of service for the sanitary sewer customers. Table 8-3 presents the Test Year 1 units of service for the wholesale customers and Table 8-4 summarizes the estimated average wastewater strengths applied for the wholesale customer contracts.

Table 8-2 Test Year 1 Sanitary Sewer Units of Service [Schedule BV-1: Table WW-8]

LINE NO.	CUSTOMER TYPE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		TY 2021 VOLUME (Mcf)	CAPACITY FLOW RATE		SUSPENDED SOLIDS	BOD	CUSTOMER COSTS		
			(Mcf/day)				EQUIV. METERS	EQUIV. BILLS	BILLS
Sanitary Sewer									
1	Residential	2,799,394	30,679	11,506	45,417	48,911	440,825	5,058,102	5,040,408
2	Commercial	1,438,578	15,765	5,912	23,339	25,135	92,550	490,505	429,648
3	Industrial	64,293	705	264	1,043	1,123	4,031	15,198	12,240
4	Public Utilities	8,826	97	36	143	154	1,209	3,239	2,040
5	Senior Citizens	116,742	1,279	480	1,894	2,040	23,460	281,374	281,364
6	Sewer Only	67,450	739	277	1,094	1,178	504	1,259	708
7	Groundwater	220,000	4,822	1,507	961	137	0	0	0
8	Surcharge	0	0	0	1,633	10,650	0	0	0
9	Water Treatment Plant Sludge	292,800	3,209	1,203	27,500	0	0	0	0
10	Housing Authority	149,342	1,637	614	2,423	2,609	8,462	72,030	68,844
11	Charities & Schools	148,439	1,627	610	2,408	2,594	14,813	40,212	24,612
12	Hospital/University	275,249	3,016	1,131	4,466	4,809	7,192	13,269	4,236
13	Hand Bill	417,677	4,577	1,716	6,776	7,298	4,718	8,486	2,604
14	Fire Meters	7,600	83	31	123	133	498	1,824	1,344
15	Scheduled (Flat Rate)	11	0	0	0	0	3	36	36
16	Subtotal Retail Service	6,006,400	68,235	25,287	119,220	106,771	598,265	5,985,534	5,868,084
17	Infiltration/Inflow	10,850,500	237,818	74,318	47,382	6,769	0	0	0
18	Total Retail Service	16,856,900	306,053	99,605	166,602	113,540	598,265	5,985,534	5,868,084
Contract Service									
19	Sanitary	4,264,000	32,577	32,577	44,128	39,345			
20	Infiltration/Inflow	105,100	420	420	459	66			
21	Total Contract Service	4,369,100	32,997	32,997	44,587	39,411			
22	Total System	21,226,000	339,050	132,602	211,189	152,951	598,265	5,985,534	5,868,084

Table 8-3 Test Year 1 Wholesale Customer Units of Service [Schedule BV-2: Table WH-3]

LINE NO.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		NORTHEAST WPC PLANT							
		UNITS	ABINGTON	BENSALEM	BUCKS COUNTY	CHELTENHAM	MORELAND	SOUTHAMPTON	TOTAL NORTHEAST
Wholesale Customers									
Volume									
1	Sanitary Wastewater	(Mcf)	96,000	175,000	1,000,000	428,000	65,000	300,000	2,064,000
2	Infiltration	(Mcf)	4,500	5,600	35,100	15,000	2,800	7,500	70,500
3	Total	(Mcf)	100,500	180,600	1,035,100	443,000	67,800	307,500	2,134,500
Suspended Solids									
4	Sanitary Wastewater	(1,000 lbs)	1,000	1,998	10,296	3,392	661	2,434	19,781
5	Infiltration	(1,000 lbs)	20	24	153	66	12	33	308
6	Total	(1,000 lbs)	1,020	2,022	10,449	3,458	673	2,467	20,089
BOD									
7	Sanitary Wastewater	(1,000 lbs)	1,402	2,206	9,797	2,991	499	1,816	18,711
8	Infiltration	(1,000 lbs)	3	3	22	9	2	5	44
9	Total	(1,000 lbs)	1,405	2,209	9,819	3,000	501	1,821	18,755
Contract Maximum Units									
Capacity									
10	Sanitary Wastewater	(Mcf/day)	824	1,014	6,416	2,743	508	1,364	12,869
11	Infiltration	(Mcf/day)	20	20	140	60	10	30	280
12	Total	(Mcf/day)	844	1,034	6,556	2,803	518	1,394	13,149
Volume									
13	Sanitary Wastewater	(Mcf)	217,292	299,271	1,171,123	654,370	92,714	348,409	2,783,179
14	Infiltration	(Mcf)	4,500	5,600	35,100	15,000	2,800	7,500	70,500
15	Total	(Mcf)	221,792	304,871	1,206,223	669,370	95,514	355,909	2,853,679
Suspended Solids									
16	Sanitary Wastewater	(1,000 lbs)	2,481	3,734	13,400	5,186	966	6,000	31,767
17	Infiltration	(1,000 lbs)	20	24	153	66	12	33	308
18	Total	(1,000 lbs)	2,501	3,758	13,553	5,252	978	6,033	32,075
BOD									
19	Sanitary Wastewater	(1,000 lbs)	2,102	5,340	13,400	4,573	729	5,500	31,644
20	Infiltration	(1,000 lbs)	3	3	22	9	2	5	44
21	Total	(1,000 lbs)	2,105	5,343	13,422	4,582	731	5,505	31,688

Table 8-3 Test Year 1 Wholesale Customer Units of Service (continued)

LINE NO.		(1)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		SOUTHWEST WPC PLANT						SOUTHEAST WPC PLANT	
		SPRINGFIELD							
		UNITS	DELCORA	MERION	(EXCLUDING WYNDMOOR)	UPPER DARBY	TOTAL SOUTHWEST	SPRINGFIELD (WYNDMOOR)	TOTAL
Wholesale Customers									
Volume									
1	Sanitary Wastewater	(Mcf)	1,200,000	360,000	128,000	490,000	2,178,000	22,000	4,264,000
2	Infiltration	(Mcf)	0	14,900	2,200	16,600	33,700	900	105,100
3	Total	(Mcf)	1,200,000	374,900	130,200	506,600	2,211,700	22,900	4,369,100
Suspended Solids									
4	Sanitary Wastewater	(1,000 lbs)	13,404	3,707	2,196	4,800	24,107	240	44,128
5	Infiltration	(1,000 lbs)	0	65	10	73	148	4	460
6	Total	(1,000 lbs)	13,404	3,772	2,206	4,873	24,255	244	44,588
BOD									
7	Sanitary Wastewater	(1,000 lbs)	11,007	3,190	2,252	4,005	20,454	180	39,345
8	Infiltration	(1,000 lbs)	0	9	1	10	20	1	65
9	Total	(1,000 lbs)	11,007	3,199	2,253	4,015	20,474	181	39,410
Contract Maximum Units									
Capacity									
10	Sanitary Wastewater	(Mcf/day)	13,392	2,728	397	3,024	19,541	167	32,577
11	Infiltration	(Mcf/day)	0	60	10	70	140	0	420
12	Total	(Mcf/day)	13,392	2,788	407	3,094	19,681	167	32,997
Volume									
13	Sanitary Wastewater	(Mcf)	2,439,840	707,553	156,150	829,545	4,133,088	48,797	6,965,064
14	Infiltration	(Mcf)	0	14,900	2,200	16,600	33,700	900	105,100
15	Total	(Mcf)	2,439,840	722,453	158,350	846,145	4,166,788	49,697	7,070,164
Suspended Solids									
16	Sanitary Wastewater	(1,000 lbs)	19,487	7,250	3,300	7,349	37,386	200	69,353
17	Infiltration	(1,000 lbs)	0	65	10	73	148	4	460
18	Total	(1,000 lbs)	19,487	7,315	3,310	7,422	37,534	204	69,813
BOD									
19	Sanitary Wastewater	(1,000 lbs)	21,771	6,871	3,100	6,831	38,573	155	70,372
20	Infiltration	(1,000 lbs)	0	9	1	10	20	1	65
21	Total	(1,000 lbs)	21,771	6,880	3,101	6,841	38,593	156	70,437

Table 8-4 Estimated Average Wastewater Strengths for Wholesale Customers [Schedule BV-2: Table WH-4]

CUSTOMER	(1) AVERAGE WASTEWATER STRENGTHS (mg/l)	(2)
	SUSPENDED SOLIDS	BOD
Abington	167	234
Bensalem	183	202
Bucks County	165	157
Cheltenham	127	112
DELCORA	179	147
Lower Merion	165	142
Lower Moreland	163	123
Lower Southhampton	130	97
Springfield (excluding Wyndoor)	275	282
Springfield (Wyndoor)	175	131
Upper Darby	157	131

mg/l - milligram per liter

8.3.3.1. Retail Service

The units of service for the retail customer types of the Wastewater System are determined as follows:

- **Volume:** For the retail customer types, we estimate the sanitary wastewater quantities by applying a 95 percent return factor to the projected test year water sales from each customer type. The return factor reflects an allowance for water consumption which is not discharged into the Wastewater System. In addition, we also apportion the test year infiltration/inflow ("I/I") in the Wastewater System to the retail customer types based upon the total projected test year flow at all three treatment plants, less the estimated annual sanitary sewage contribution from the retail customers and the total annual flow projected for the wholesale customers.
- **Collection System – Capacity:** The sanitary wastewater peak (capacity) flow rate, exclusive of I/I, for each retail customer type is estimated to be approximately four times (4 times) the average daily flow rate, computed from the annual volumes shown in Column 1 of Table 8-2. These estimated capacity requirements reflect the system-wide ratio of maximum to average sanitary wastewater flow rates. The capacity flow rate of I/I in the collection system is estimated to be eight times (8 times) the average daily flow rate. Retail customers' I/I is largely due to leakage in to sewers and direct extraneous inflows.
- **Treatment – Capacity:** The peak sanitary wastewater capacity flow rate, exclusive of I/I is estimated to be 1.5 times the average daily flow rate. The capacity flow rate of I/I at the water pollution control plants is estimated to be 2.5 times the average daily flow rate.
- **Strengths (BOD and Suspended Solids):** The estimated strength units for each customer type are shown in Columns 4 and 5 of Table 8-2. Based upon an analysis of historical data, the wastewater reaching the water pollution control plants is estimated to have a weighted average suspended solids concentration of approximately 159 milligrams per liter (mg/l), and a weighted average BOD concentration of approximately 116 mg/l. These weighted averages are based on estimated influent concentrations at the

three treatment plants. Infiltration/ inflow is assumed to have a suspended solids and BOD concentration of 70 mg/l and 10 mg/l, respectively. The estimates of strength units for customers with excess strength wastewater are based upon an analysis of surcharge bills.

- Additional wastewater strength loadings at the treatment plants are attributable to water plant sludge from the Belmont and Queen Lane treatment plants. An estimate of the volume and pounds of sludge from the water treatment plants has been included in the units of service shown in Table 8-2 in Line 9.
 - The retail loadings for suspended solids and BOD are determined as the difference between the total influent wastewater loadings at the plant less the sum of I&I and water plant sludge loadings for those two components respectively. The resulting retail suspended solids and BOD concentrations are 260 mg/l and 280 mg/l, respectively.
- **Customer:** Units of service applicable for the allocation of customer costs are summarized in Columns 6 to 8 of Table 8-2. The number of accounts and bills for each customer type and meter size are derived from billing information prepared by the Water Department. Equivalent meters are based upon capacity factors determined for various size meters relative to the capacity associated with a 5/8-inch meter.

8.3.3.2. Wholesale Customers

Table 8-3 and Table 8-4 present a summary of the test year units of service for volume, capacity, strength, and customer units of service for each of the wholesale customers. The strength units from wholesale customers are estimated for each customer based on projected Study Period flows and historical measured wastewater strength concentrations, as measured at the point of their discharge to the City's sewers.

8.4. ALLOCATION TO COST COMPONENTS

We allocate the Test Year 1 cost to the functional cost components using a two-step process.

1. First, a portion of the Wastewater System costs (O&M, depreciation, and net plant investment) are allocated to wholesale wastewater customers.
2. Then the retail portion of the remaining costs are allocated to the various wastewater cost components, including direct charges to stormwater.

8.5. ALLOCATION OF O&M EXPENSES

8.5.1. Retail

Table 8-5 shows the allocation of Test Year 1 O&M expenses for the Wastewater System to the identified functional cost components by cost center. O&M expense is allocated to wastewater cost components generally in the same proportion as the plant investment and depreciation expense allocations.

Table 8-5 Test Year 1 Allocation of O&M to Functional Cost Components [Schedule BV-1: Table WW-10]

LINE NO.	COST COMPONENT	(1) NET O&M	(2) LESS O&M ALLOCATED TO CONTRACT SERVICE	(3) O&M ALLOCATED TO RETAIL SERVICE	(4) LESS RETAIL O&M DEDUCTIONS: OTHER OPERATING REVENUE	(5) NET O&M TO BE ALLOCATED TO RETAIL SERVICE
Wastewater Systems (\$000s)						
COLLECTION SYSTEM						
	Sewer Maintenance					
1	All Customers - Capacity	\$ 88,291	\$ 1,437	\$ 86,854	\$ 3,360	\$ 83,494
	Inlet Cleaning					
2	Retail - Storm Capacity	18,867	-	18,867	730	18,137
	Neill Drive Pumping Station					
	Retail and Lower Merion					
3	Total Volume	7	1	6	-	6
4	Total Capacity	162	50	112	4	108
	Central Schuylkill Pumping Station					
	Retail and Springfield (excl. Wyndmoor)					
5	Total Volume	43	2	41	2	39
6	Total Capacity	440	8	432	17	415
	All Other Pumping Stations					
	Retail					
7	Total Volume	2,786	-	2,786	108	2,678
8	Total Capacity	19,528	-	19,528	756	18,772
9	Total Collection Systems	157,597	2,173	155,424	6,014	149,410
WATER POLLUTION CONTROL PLANTS						
	Northeast Plant:					
	Retail and Cheltenham					
10	Volume	-	-	-	-	-
11	Capacity	-	-	-	-	-
	Retail, Abington, Bensalem, Bucks County, Lower Moreland, and Lower Southampton					
12	Volume	601	152	449	17	432
13	Capacity	2,568	637	1,931	75	1,856
	Retail, Abington, Bensalem, Bucks County, Cheltenham, Lower Moreland, and Lower Southampton					
14	Volume	12,872	3,044	9,828	380	9,448
15	Capacity	4,180	975	3,205	124	3,081
16	Suspended Solids	22,723	4,419	18,304	707	17,597
17	BOD	\$ 18,399	\$ 4,776	\$ 13,623	\$ 527	\$ 13,096

Table 8-5 Test Year 1 Allocation of O&M to Functional Cost Components (continued)

LINE NO.	COST COMPONENT	(1) NET O&M	(2) LESS O&M ALLOCATED TO CONTRACT SERVICE	(3) O&M ALLOCATED TO RETAIL SERVICE	(4) LESS RETAIL O&M DEDUCTIONS: OTHER OPERATING REVENUE	(5) NET O&M TO BE ALLOCATED TO RETAIL SERVICE
Wastewater Systems (\$000s)						
Southwest Plant:						
Retail						
18	Volume	\$ 56	\$ -	\$ 56	\$ 2	\$ 54
19	Capacity	502	-	502	19	483
Retail, DELCORA, Lower Merion, Springfield (Excluding Wyndmoor), and Upper Darby						
20	Volume	12,819	3,418	9,401	364	9,037
21	Capacity	4,570	1,736	2,834	110	2,724
22	Suspended Solids	17,494	5,587	11,907	461	11,446
23	BOD	11,268	4,265	7,003	271	6,732
Southeast Plant:						
Retail and Springfield (Wyndmoor)						
24	Volume	9,004	53	8,951	346	8,605
25	Capacity	5,084	35	5,049	195	4,854
26	Suspended Solids	11,017	84	10,933	423	10,510
27	BOD	3,664	25	3,639	141	3,498
28	Total Water Pollution Control Plants	136,821	29,206	107,615	4,162	103,453
CUSTOMER COSTS						
All Customers						
29	Equivalent Bills	33,279	228	33,051	1,279	31,772
Equivalent Meters						
30	Industrial Waste Unit	4,350	68	4,282	166	4,116
31	Other	5,558	-	5,558	215	5,343
32	Stormwater - Direct	499	-	499	19	480
33	Excess Strength Wastewater - Direct	2,142	-	2,142	83	2,059
34	Total Customer Costs	45,828	296	45,532	1,762	43,770
35	Total O&M	\$ 340,245	\$ 31,675	\$ 308,570	\$ 11,938	\$ 296,632

NOTE: The total net O&M from Table 8-1 of \$317.2 Million (Column 1, Line 12) = Total net Retail O&M of \$296.6 Million (Table 8-5, Column 5, Line 35) + Total net Wholesale O&M of \$31.7 Million (Table 8-5, Column 5, Line 35) - Water Treatment Plant sludge costs of \$11.1 Million (Table 8-1, Column 1, Line 3)

The net O&M expenses are allocated to the retail customer types as follows:

- **Collection System:** The various functional cost centers of the wastewater collection system are designed based on different wastewater parameters. Therefore, those functional O&M expenses are allocated to respective wastewater parameter (cost component). The allocation of the operation and maintenance expense for each collection system component is presented in Table 8-6 and is summarized in Lines 1 to 9 on Table 8-5.
 - **Wastewater Collection System - Sewers:** The operation and maintenance costs of the wastewater collection system sewers are shown in Line 1 of Table 8-6. These facilities are designed to carry maximum rates of wastewater flows and are allocated 100 percent to the capacity cost component.

We further delineate the test year collection system O&M between sanitary sewer related costs and stormwater costs. Based on an analysis of system-wide ratio of peak wet weather flows to peak dry weather flows, 60 percent of the sewer maintenance cost is allocated to stormwater and 40 percent to sanitary sewer. The rationale for using the peak flow ratio as the basis for apportioning sewer maintenance costs is that those costs would normally be incurred in proportional to the quantity of flow.
 - **Wastewater Collection System – Inlet Cleaning:** The inlet cleaning related operation and maintenance expenses are shown on Line 2 of Table 8-6. These expenses are allocated 100 percent to the stormwater related capacity cost component.
 - **Wastewater Collection System – Pumping:** The power costs of the pumping stations located in the collection system, shown on Lines 3, 6, and 9 of Table 8-6, are allocated 85 percent to the volume cost component and 15 percent to the capacity cost component. The other operation and maintenance expense of the pumping stations located in the collection system, shown on Lines 5, 8, and 11 of Table 8-6 is allocated 100 percent to the capacity cost component.
- **Wastewater Treatment:** The various functional facilities of the water pollution control plants are designed to process different wastewater parameters. Therefore, those functional O&M expenses are allocated to respective wastewater parameter (cost component). The allocation of the operation and maintenance expense for each of the water pollution control plants is presented in Table 8-7, Table 8-8, and Table 8-9 and is summarized in Lines 10 to 28 on Table 8-5.
 - **Volume:** Wastewater treatment related power costs are allocated 85 percent to the volume cost component. Water pollution control plant facilities such as primary and secondary sedimentation basins, recirculation pumping and chlorination, are designed largely on the basis of total average flow projected for the plant. Therefore, most of the operation and maintenance expense excluding power costs, associated with these functions, is allocated largely to the volume cost component.
 - **Capacity:** Wastewater treatment related power costs are allocated 15 percent to the capacity cost component. Most of the operation and maintenance expenses, excluding power, which is associated with facilities such as raw wastewater pumps, preliminary treatment, and effluent pumping vary according to peak wastewater flow rates. Therefore, the O&M costs of those functions are largely allocated to the capacity functional cost component.

Table 8-6 Test Year 1 Allocation of O&M for the Collection System [Schedule BV-1: Table WW-10A]

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) (9)		
		TOTAL	ALL CUSTOMERS CAPACITY	RETAIL		STORM CAPACITY	RETAIL AND LOWER MERION		RETAIL AND SPRINGFIELD (EXCLUDING WYNDMOOR)		
				VOLUME	CAPACITY		VOLUME	CAPACITY	Volume	Capacity	
Wastewater System (\$000s)											
1	Sewer Maintenance	\$ 31,051	\$ 31,051	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
2	Inlet Cleaning	12,781	-	-	-	12,781	-	-	-	-	-
Pump Stations											
Neill Drive											
3	Power	8	-	-	-	-	7	1	-	-	-
4	Gas	-	-	-	-	-	-	-	-	-	-
5	Other	109	-	-	-	-	-	109	-	-	-
Central Schuylkill											
6	Power	50	-	-	-	-	-	-	43	7	-
7	Gas	-	-	-	-	-	-	-	-	-	-
8	Other	277	-	-	-	-	-	-	-	-	277
All Other Pumping Stations											
9	Power	3,287	-	2,794	493	-	-	-	-	-	-
10	Gas	-	-	-	-	-	-	-	-	-	-
11	Other	13,482	-	-	13,482	-	-	-	-	-	-
12	GSI Maintenance	8,934	8,934	-	-	-	-	-	-	-	-
13	Total Collection System	\$ 69,979	\$ 39,985	\$ 2,794	\$ 13,975	\$ 12,781	\$ 7	\$ 110	\$ 43	\$ 284	

Table 8-7 Test Year 1 Allocation of O&M for the Northeast WPC Plant [Schedule BV-1: Table WW-10B]

LINE NO.	DESCRIPTION	(1)	(2)		(3)	(4)		(5)	(6)	(7)
		TOTAL	RETAIL, ABINGTON BENSALEM, BUCKS COUNTY, LOWER MORELAND, & LOWER SOUTHAMPTON		CAPACITY	RETAIL, CHELTENHAM, ABINGTON BENSALEM, BUCKS COUNTY, LOWER MORELAND & LOWER SOUTHAMPTON		SUSPENDED		BOD
		O&M	VOLUME			VOLUME	CAPACITY	SOLIDS		
Wastewater System (\$000s)										
Personal Services:										
1	Raw Wastewater Pumping	\$ 796,985	\$ -	\$ 796,985		\$ -	\$ -	\$ -	\$ -	
2	Preliminary Treatment	1,549,693	-	-		1,100,282	449,411	-	-	
3	Primary Sedimentation	625,412	-	-		625,412	-	-	-	
4	Aeration	2,584,667	-	-		-	-	-	-	2,584,667
5	Secondary Sedimentation	630,947	-	-		630,947	-	-	-	
6	Recirculating Pumping	464,908	-	-		464,908	-	-	-	
7	Chlorination	437,235	-	-		266,713	170,522	-	-	
8	Primary Sludge Pumping	127,296	-	-		-	-	127,296	-	
9	Secondary Sludge Thickening	309,939	-	-		-	-	154,970	154,969	
10	Sludge Digestion	2,435,232	-	-		-	-	1,826,424	608,808	
11	Sludge Holding Tanks	177,108	-	-		-	-	132,831	44,277	
12	Sludge Dewatering	448,304	-	-		-	-	336,228	112,076	
13	Grit and Screening Incineration	996,231	-	-		667,475	328,756	-	-	
14	Scum and Grease Incineration	237,989	-	-		-	-	237,989	-	
15	Laboratory	824,658	-	-		-	-	412,329	412,329	
16	Subtotal Personal Services	12,646,604	-	796,985		3,755,737	948,689	3,228,067	3,917,126	
Purchase of Services, Materials, Supplies, and Equipment:										
17	Raw Wastewater Pumping	646,571	-	646,571		-	-	-	-	
18	Preliminary Treatment	1,021,742	-	-		-	1,021,742	-	-	
19	Primary Sedimentation	478,941	-	-		478,941	-	-	-	
20	Aeration	718,412	-	-		-	-	-	-	718,412
21	Secondary Sedimentation	550,783	-	-		550,783	-	-	-	
22	Recirculating Pumping	207,541	-	-		207,541	-	-	-	
23	Chlorination	\$ 2,417,068	\$ -	\$ -		\$ 2,417,068	\$ -	\$ -	\$ -	

Table 8-7 Test Year 1 Allocation of O&M for the Northeast WPC Plant (continued)

		(1)	(2)		(3)	(4)		(5)	(6)	(7)
			RETAIL, ABINGTON BENSALEM, BUCKS COUNTY, LOWER MORELAND, & LOWER SOUTHAMPTON			RETAIL, CHELTENHAM, ABINGTON BENSALEM, BUCKS COUNTY, LOWER MORELAND & LOWER SOUTHAMPTON				
LINE		TOTAL	LOWER SOUTHAMPTON		SUSPENDED					
NO.	DESCRIPTION	O&M	VOLUME	CAPACITY	VOLUME	CAPACITY	SOLIDS	BOD		
Wastewater System (\$000s)										
24	Primary Sludge Pumping	\$ 87,806	\$ -	\$ -	\$ -	\$ -	\$ 87,806	\$ -		
25	Secondary Sludge Thickening	103,771	-	-	-	-	51,886	51,885		
26	Sludge Digestion	1,349,018	-	-	-	-	1,011,764	337,254		
27	Sludge Holding Tanks	191,577	-	-	-	-	143,683	47,894		
28	Sludge Dewatering	151,665	-	-	-	-	113,749	37,916		
29	Grit and Screening Incineration	431,047	-	-	-	431,047	-	-		
30	Scum and Grease Incineration	119,735	-	-	-	-	119,735	-		
31	Laboratory	925,953	-	-	-	-	462,977	462,976		
32	Subtotal Purchase of Services, Materials, Supplies & Equipment	9,401,630	-	646,571	3,654,333	1,452,789	1,991,600	1,656,337		
33	Subtotal All Above	22,048,234	-	1,443,556	7,410,070	2,401,478	5,219,667	5,573,463		
Administrative and General:										
34	Personal Services	3,254,357	-	205,089	966,466	244,127	830,680	1,007,995		
35	Other	1,229,444	-	84,552	477,874	189,980	260,440	216,598		
36	Subtotal Administration & General	4,483,801	-	289,641	1,444,340	434,107	1,091,120	1,224,593		
Power Requirements:										
37	Raw Wastewater Pumping	722,035	613,730	108,305	-	-	-	-		
38	Preliminary Treatment	5,967	-	-	5,072	895	-	-		
39	Primary Sedimentation	47,738	-	-	40,577	7,161	-	-		
40	Aeration	3,956,272	-	-	-	-	-	3,956,272		
41	Secondary Sedimentation	47,738	-	-	40,577	7,161	-	-		
42	Recirculating Pumping	167,082	-	-	142,020	25,062	-	-		
43	Chlorination	11,934	-	-	10,144	1,790	-	-		
44	Primary Sludge Pumping	5,967	-	-	-	-	5,967	-		
45	Secondary Sludge Thickening	\$ 447,542	\$ -	\$ -	\$ -	\$ -	\$ 223,771	\$ 223,771		

Table 8-7 Test Year 1 Allocation of O&M for the Northeast WPC Plant (continued)

		(1)	(2)		(3)	(4)		(5)	(6)	(7)
			RETAIL, ABINGTON BENSALEM, BUCKS COUNTY, LOWER MORELAND, & LOWER SOUTHAMPTON			RETAIL, CHELTENHAM, ABINGTON BENSALEM, BUCKS COUNTY, BOD				
LINE		TOTAL				SUSPENDED				
NO.	DESCRIPTION	O&M	VOLUME	CAPACITY		VOLUME	CAPACITY	SOLIDS	BOD	
Wastewater System (\$000s)										
46	Sludge Digestion	\$ 101,443	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 76,082	\$ 25,361	
47	Sludge Dewatering	107,410	-	-	-	-	-	80,558	26,852	
48	Grit and Screening Incineration	95,476	-	-	81,155	14,321	-	-	-	
49	Scum and Grease Incineration	5,967	-	-	-	-	-	5,967	-	
50	Subtotal Power Requirements	5,722,571	613,730	108,305	319,545	56,390	392,345	4,232,256		
Gas Requirements:										
51	Raw Wastewater Pumping	53,148	-	53,148	-	-	-	-	-	
52	Preliminary Treatment	83,986	-	-	-	83,986	-	-	-	
53	Primary Sedimentation	39,369	-	-	39,369	-	-	-	-	
54	Aeration	59,053	-	-	-	-	-	-	59,053	
55	Secondary Sedimentation	45,274	-	-	45,274	-	-	-	-	
56	Recirculating Pumping	17,060	-	-	17,060	-	-	-	-	
57	Chlorination	7,218	-	-	7,218	-	-	-	-	
58	Primary Sludge Pumping	7,218	-	-	-	-	7,218	-	-	
59	Secondary Sludge Thickening	8,530	-	-	-	-	4,265	4,265	-	
60	Sludge Digestion	110,888	-	-	-	-	83,166	27,722	-	
61	Sludge Dewatering	12,467	-	-	-	-	9,350	3,117	-	
62	Grit and Screening Incineration	35,432	-	-	-	35,432	-	-	-	
63	Scum and Grease Incineration	9,842	-	-	-	-	9,842	-	-	
64	Subtotal Gas Requirements	581,345	-	53,148	108,921	119,418	163,708	136,150		
65	Sludge Disposal	12,668,362	-	-	-	-	9,501,271	3,167,091		
66	Total Northeast WPC Plant Expense	\$ 45,504,312	\$ 613,730	\$ 1,894,650	\$ 9,282,876	\$ 3,011,393	\$ 16,368,111	\$ 14,333,553		

Table 8-8 Test Year 1 Allocation of O&M for the Southeast WPC Plant [Schedule BV-1: Table WW-10C]

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		TOTAL O&M	RETAIL		RETAIL, DELCORA, LOWER MERION, SPRINGFIELD (EXCLUDING WYNDMOOR) AND UPPER DARBY			
			VOLUME	CAPACITY	VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD
Wastewater System (\$000s)								
Personal Services								
1	Raw Wastewater Pumping	\$ 159,823	\$ -	\$ 159,823	\$ -	\$ -	\$ -	\$ -
2	Preliminary Treatment	2,109,661	-	-	1,540,053	569,608	-	-
3	Flocculation	383,575	-	-	383,575	-	-	-
4	Primary Sedimentation	556,183	-	-	556,183	-	-	-
5	Aeration	1,131,546	-	-	-	-	-	1,131,546
6	Secondary Sedimentation	958,937	-	-	958,937	-	-	-
7	Recirculating Pumping	358,003	-	-	358,003	-	-	-
8	Chlorination	543,398	-	-	320,605	222,793	-	-
9	Effluent Pumping	447,504	-	-	-	447,504	-	-
10	Primary Sludge Pumping	409,146	-	-	-	-	409,146	-
11	Secondary Sludge Thickening	338,824	-	-	-	-	166,024	172,800
12	Sludge Digestion	1,294,564	-	-	-	-	970,923	323,641
13	Sludge Holding Tanks	220,555	-	-	-	-	165,416	55,139
14	Sludge Dewatering	1,006,884	-	-	-	-	755,163	251,721
15	Sludge Lagoon	9,589	-	-	-	-	7,192	2,397
16	Grit and Screening Incineration	887,017	-	-	603,172	283,845	-	-
17	Scum and Grease Incineration	225,350	-	-	-	-	225,350	-
18	Laboratory	818,293	-	-	-	-	409,147	409,146
19	Subtotal Personal Services	\$ 11,858,852	\$ -	\$ 159,823	\$ 4,720,528	\$ 1,523,750	\$ 3,108,361	\$ 2,346,390

Table 8-8 Test Year 1 Allocation of O&M for the Southeast WPC Plant (continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
					RETAIL, DELCORA, LOWER MERION, SPRINGFIELD (EXCLUDING WYNDMOOR) AND UPPER DARBY			
LINE		TOTAL	RETAIL		SUSPENDED			
NO.	DESCRIPTION	O&M	VOLUME	CAPACITY	VOLUME	CAPACITY	SOLIDS	BOD
Wastewater System (\$000s)								
Purchase of Services, Materials, Supplies, and Equipment:								
20	Raw Wastewater Pumping	\$ 66,643	\$ -	\$ 66,643	\$ -	\$ -	\$ -	\$ -
21	Preliminary Treatment	762,899	-	-	-	762,899	-	-
22	Flocculation	395,413	-	-	395,413	-	-	-
23	Primary Sedimentation	222,777	-	-	222,777	-	-	-
24	Aeration	434,129	-	-	-	-	-	434,129
25	Secondary Sedimentation	467,768	-	-	467,768	-	-	-
26	Recirculating Pumping	194,850	-	-	194,850	-	-	-
27	Chlorination	1,096,054	-	-	1,096,054	-	-	-
28	Effluent Pumping	22,214	-	-	-	22,214	-	-
29	Primary Sludge Pumping	250,703	-	-	-	-	250,703	-
30	Secondary Sludge Thickening	44,428	-	-	-	-	21,770	22,658
31	Sludge Digestion	438,413	-	-	-	-	328,810	109,603
32	Sludge Holding Tanks	154,706	-	-	-	-	116,030	38,676
33	Sludge Dewatering	926,809	-	-	-	-	695,107	231,702
34	Sludge Lagoon	8,568	-	-	-	-	6,426	2,142
35	Grit and Screening Incineration	196,120	-	-	-	196,120	-	-
36	Scum and Grease Incineration	62,834	-	-	-	-	62,834	-
37	Laboratory	500,772	-	-	-	-	250,386	250,386
38	Subtotal Purchase of Services, Materials, Supplies & Equipment	6,246,100	-	66,643	2,376,862	981,233	1,732,066	1,089,296
39	Subtotal All Above	\$ 18,104,952	\$ -	\$ 226,466	\$ 7,097,390	\$ 2,504,983	\$ 4,840,427	\$ 3,435,686

Table 8-8 Test Year 1 Allocation of O&M for the Southeast WPC Plant (continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
		RETAIL, DELCORA, LOWER MERION, SPRINGFIELD (EXCLUDING WYNDMOOR) AND UPPER DARBY						
LINE		TOTAL	RETAIL		SUSPENDED			
NO.	DESCRIPTION	O&M	VOLUME	CAPACITY	VOLUME	CAPACITY	SOLIDS	BOD
Wastewater System (\$000s)								
Administrative & General								
40	Personal Services	\$ 2,865,200	\$ -	\$ 38,615	\$ 1,140,519	\$ 368,151	\$ 751,007	\$ 566,908
41	Other	748,500	-	7,986	284,831	117,586	207,561	130,536
42	Subtotal Administration & General	3,613,700	-	46,601	1,425,350	485,737	958,568	697,444
Power Requirements								
43	Raw Wastewater Pumping	67,069	57,009	10,060	-	-	-	-
44	Preliminary Treatment	4,471	-	-	3,800	671	-	-
45	Flocculation	214,940	-	-	182,699	32,241	-	-
46	Primary Sedimentation	16,927	-	-	14,388	2,539	-	-
47	Aeration	2,094,148	-	-	-	-	-	2,094,148
48	Secondary Sedimentation	43,116	-	-	36,649	6,467	-	-
49	Recirculating Pumping	114,337	-	-	97,186	17,151	-	-
50	Chlorination	9,262	-	-	7,873	1,389	-	-
51	Effluent Pumping	28,105	-	-	23,889	4,216	-	-
52	Primary Sludge Pumping	2,555	-	-	-	-	2,555	-
53	Secondary Sludge Thickening	279,773	-	-	-	-	137,089	142,684
54	Sludge Digestion	65,392	-	-	-	-	49,044	16,348
55	Sludge Dewatering	47,906	-	-	-	-	35,930	11,976
56	Grit and Screening Incineration	29,702	-	-	25,247	4,455	-	-
57	Scum and Grease Incineration	4,551	-	-	-	-	4,551	-
58	Subtotal Power Requirements	\$ 3,022,254	\$ 57,009	\$ 10,060	\$ 391,731	\$ 69,129	\$ 229,169	\$ 2,265,156

Table 8-8 Test Year 1 Allocation of O&M for the Southeast WPC Plant (continued)

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		TOTAL O&M	RETAIL		RETAIL, DELCORA, LOWER MERION, SPRINGFIELD (EXCLUDING WYNDMOOR) AND UPPER DARBY			
			VOLUME	CAPACITY	VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD
Wastewater System (\$000s)								
Gas Requirements								
59	Raw Wastewater Pumping	\$ 20,775	\$ -	\$ 20,775	\$ -	\$ -	\$ -	\$ -
60	Preliminary Treatment	237,819	-	-	-	237,819	-	-
61	Flocculation	123,262	-	-	123,262	-	-	-
62	Primary Sedimentation	69,446	-	-	69,446	-	-	-
63	Aeration	135,331	-	-	-	-	-	135,331
64	Secondary Sedimentation	145,817	-	-	145,817	-	-	-
65	Recirculating Pumping	60,741	-	-	60,741	-	-	-
66	Chlorination	20,775	-	-	20,775	-	-	-
67	Effluent Pumping	6,925	-	-	-	6,925	-	-
68	Primary Sludge Pumping	78,152	-	-	-	-	78,152	-
69	Secondary Sludge Thickening	13,850	-	-	-	-	6,787	7,063
70	Sludge Digestion	136,666	-	-	-	-	102,500	34,166
71	Sludge Dewatering	288,914	-	-	-	-	216,686	72,228
72	Grit and Screening Incineration	61,136	-	-	-	61,136	-	-
73	Scum and Grease Incineration	19,588	-	-	-	-	19,588	-
74	Subtotal Gas Requirements	1,626,200	-	20,775	420,041	305,880	539,939	339,565
75	Sludge Disposal	8,159,704	-	-	-	-	6,119,778	2,039,926
76	Total Southwest WPC Plant Expense	\$ 34,526,810	\$ 57,009	\$ 303,902	\$ 9,334,512	\$ 3,365,729	\$ 12,687,881	\$ 8,777,777

Table 8-9 Test Year 1 Allocation of O&M for the Southeast WPC Plant [Schedule BV-1: Table WW-10D]

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)
		TOTAL O&M	RETAIL AND SPRINGFIELD (WYNDMOOR)			
			VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD
Wastewater System (\$000s)						
Personal Services						
1	Raw Wastewater Pumping	\$ 941,142	\$ -	\$ 941,142	\$ -	\$ -
2	Preliminary Treatment	1,336,694	962,420	374,274	-	-
3	Flocculation	409,192	409,192	-	-	-
4	Primary Sedimentation	477,391	477,391	-	-	-
5	Aeration	477,391	-	-	-	477,391
6	Secondary Sedimentation	593,329	593,329	-	-	-
7	Recirculating Pumping	286,435	286,435	-	-	-
8	Chlorination	456,931	287,867	169,064	-	-
9	Effluent Pumping	361,453	-	361,453	-	-
10	Primary Sludge Pumping	381,913	-	-	381,913	-
11	Waste Sludge Pumping	279,615	-	-	237,673	41,942
12	Sludge Digestion	431,522	-	-	366,794	64,728
13	Sludge Holding Tanks	271,295	-	-	230,601	40,694
14	Sludge Dewatering	335,628	-	-	285,284	50,344
15	Sludge Lagoon	3,197	-	-	2,717	480
16	Grit and Screening Incineration	295,672	201,057	94,615	-	-
17	Scum and Grease Incineration	75,117	-	-	75,117	-
18	Scum Pumping	381,913	-	-	381,913	-
19	Primary Sludge Transfer Pumping	197,776	-	-	197,776	-
20	Waste Activated Sludge Xfer Pumping	184,136	-	-	156,516	27,620
21	Laboratory	654,707	-	-	327,354	327,353
22	Subtotal Personal Services	\$ 8,832,449	\$ 3,217,691	\$ 1,940,548	\$ 2,643,658	\$ 1,030,552

Table 8-9 Test Year 1 Allocation of O&M for the Southeast WPC Plant (continued)

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)
		TOTAL O&M	RETAIL AND SPRINGFIELD (WYNDMOOR)			
			VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD
Wastewater System (\$000s)						
Purchase of Services, Materials, Supplies, and Equipment:						
23	Raw Wastewater Pumping	\$ 178,350	\$ -	\$ 178,350	\$ -	\$ -
24	Preliminary Treatment	520,667	-	520,667	-	-
25	Flocculation	218,623	218,623	-	-	-
26	Primary Sedimentation	140,954	140,954	-	-	-
27	Aeration	218,623	-	-	-	218,623
28	Secondary Sedimentation	178,350	178,350	-	-	-
29	Recirculating Pumping	106,435	106,435	-	-	-
30	Chlorination	1,059,476	1,059,476	-	-	-
31	Effluent Pumping	92,052	-	92,052	-	-
32	Primary Sludge Pumping	166,844	-	-	166,844	-
33	Waste Sludge Pumping	106,435	-	-	90,470	15,965
34	Sludge Digestion	146,138	-	-	124,217	21,921
35	Sludge Holding Tanks	134,991	-	-	114,742	20,249
36	Sludge Dewatering	308,936	-	-	262,596	46,340
37	Sludge Lagoon	2,856	-	-	2,428	428
38	Grit and Screening Incineration	65,373	-	65,373	-	-
39	Scum and Grease Incineration	20,945	-	-	20,945	-
40	Scum Pumping	166,844	-	-	166,844	-
41	Primary Sludge Transfer Pumping	60,409	-	-	60,409	-
42	Waste Activated Sludge Xfer Pumping	57,532	-	-	48,902	8,630
43	Laboratory	233,006	-	-	116,503	116,503
44	Subtotal Purchase of Services, Materials, Supplies & Equipment	4,183,839	1,703,838	856,442	1,174,900	448,659
45	Subtotal All Above	\$ 13,016,288	\$ 4,921,529	\$ 2,796,990	\$ 3,818,558	\$ 1,479,211

Table 8-9 Test Year 1 Allocation of O&M for the Southeast WPC Plant (continued)

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)
		TOTAL O&M	RETAIL AND SPRINGFIELD (WYNDMOOR)			
			VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD
Wastewater System (\$000s)						
Administrative & General						
46	Personal Services	2,482,504	904,385	545,423	743,043	289,653
47	Other	379,737	154,645	77,733	106,637	40,722
48	Gas	13,913	2,272	4,090	4,595	2,956
49	Subtotal Administration & General	2,876,154	1,061,302	627,246	854,275	333,331
Power Requirements						
50	Raw Wastewater Pumping	216,847	184,320	32,527	0	0
51	Flocculation	333,830	283,756	50,074	0	0
52	Primary Sedimentation	13,315	11,318	1,997	0	0
53	Aeration	289,129	0	0	0	289,129
54	Secondary Sedimentation	9,511	8,084	1,427	0	0
55	Recirculating Pumping	22,826	19,402	3,424	0	0
56	Chlorination	2,853	2,425	428	0	0
57	Effluent Pumping	25,679	21,827	3,852	0	0
58	Primary Sludge Pumping	951	0	0	951	0
59	Waste Sludge Pumping	2,853	0	0	2,425	428
60	Sludge Digestion	21,798	0	0	18,528	3,270
61	Sludge Dewatering	15,969	0	0	13,574	2,395
62	Grit and Screening Incineration	9,901	8,416	1,485	0	0
63	Scum and Grease Incineration	1,517	0	0	1,517	0
64	Scum Pumping	2,853	0	0	2,853	0
65	Primary Sludge Transfer Pumping	19,973	0	0	19,973	0
66	Waste Activated Sludge Xfer Pumping	10,462	0	0	8,893	1,569
67	Subtotal Power Requirements	1,000,267	539,548	95,214	68,714	296,791

Table 8-9 Test Year 1 Allocation of O&M for the Southeast WPC Plant (continued)

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)
		TOTAL O&M	RETAIL AND SPRINGFIELD (WYNDMOOR)			
			VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD
Wastewater System (\$000s)						
Gas Requirements						
68	Raw Wastewater Pumping	\$ 8,136	\$ -	\$ 8,136	\$ -	\$ -
69	Flocculation	9,973	9,973	-	-	-
70	Primary Sedimentation	6,430	6,430	-	-	-
71	Aeration	9,973	-	-	-	9,973
72	Secondary Sedimentation	8,136	8,136	-	-	-
73	Recirculating Pumping	4,855	4,855	-	-	-
74	Chlorination	1,968	1,968	-	-	-
75	Effluent Pumping	4,199	-	4,199	-	-
76	Primary Sludge Pumping	7,611	-	-	7,611	-
77	Waste Sludge Pumping	4,855	-	-	4,127	728
78	Sludge Digestion	45,556	-	-	38,723	6,833
79	Sludge Dewatering	96,305	-	-	81,859	14,446
80	Grit and Screening Incineration	20,379	-	20,379	-	-
81	Scum and Grease Incineration	6,529	-	-	6,529	-
82	Scum Pumping	7,611	-	-	7,611	-
83	Primary Sludge Transfer Pumping	2,756	-	-	2,756	-
84	Waste Activated Sludge Xfer Pumping	2,625	-	-	2,231	394
85	Subtotal Gas Requirements	303,051	31,362	56,466	174,419	40,804
86	Sludge Disposal	3,540,482	-	-	3,009,410	531,072
87	Total Southeast WPC Plant Expense	\$ 20,736,242	\$ 6,553,741	\$ 3,575,916	\$ 7,925,376	\$ 2,681,209

The raw wastewater pumping facilities at the Southwest plant are not used by the wholesale contract customers whose flow is tributary to the plant. Consequently, the operation and maintenance expense of raw wastewater pumping facilities at the Southwest plant is allocated entirely to the Retail customer group.

- **Strength (BOD and Suspended Solids):** Aeration basins and oxygen, or air supply, facilities are designed principally on the basis of BOD, and the related O&M expense is assigned to the BOD functional cost component.
 - The operation and maintenance expense of sludge conditioning and disposal facilities pertains to both the suspended solids and BOD parameters and is allocated to those two cost components. The design of facilities handling only sludge from the primary sedimentation basins, such as the primary sludge pumps and scum disposal facilities, reflects the suspended solids content of the raw wastewater, and the related operating expense is therefore allocated to that cost component.
 - The O&M expense of certain other facilities handling both primary and waste activated sludge, such as digesters and sludge dewatering and composting facilities, is allocated to the suspended solids functional cost component and to the BOD functional cost component. The percentage allocation to these cost components is derived from an analysis of the relative quantities of sludge from the two sources and reflects the relative difficulty of treating waste activated sludge as compared with primary sludge. The resulting allocation percentages are 75 percent to the suspended solids functional cost component and 25 percent to the BOD functional cost component. The O&M expense of the sludge force main at the Southeast plant is allocated 85 percent to suspended solids and 15 percent to BOD functional cost components, based on design flows.
 - Some of the treatment and sludge related facilities in the Wastewater System service multiple treatment facilities. The digesters and the sludge processing and distribution facilities provide treatment and disposal of sludge from both the Southwest treatment plant and the Southeast treatment plant and provide disposal of sludge from the Northeast treatment plant. To properly recognize cost responsibility for these joint use facilities, a portion of the operations and maintenance expense associated with these facilities is allocated to the Southeast and Northeast plants.
- **Customer:** The allocation of customer related O&M costs is summarized on Lines 29 to 34 of Table 8-5. Test year customer accounting and collection is allocated 100 percent to the equivalent bills component of Customer costs. Meter maintenance expense is allocated 100 percent to the meter component of Customer costs. \$0.51 Million in retail stormwater-related customer costs are allocated 100 percent to Direct Stormwater costs and recovered by retail stormwater charges. The operation and maintenance costs of the Industrial Waste Unit are allocated 33 percent to the excess strength component and 67 percent to the meter component of Customer costs.

- **Administrative and General:** Administrative and general expense is allocated to cost components in proportion to the total allocation of all other expenses to the cost components, excluding expenses for power.
- **Residual Fund and Rate Stabilization Fund Transfers:** The deposit into the Residual Fund (Line 7 of Table 8-1) and the deposit from the Rate Stabilization Fund (Line 8 of Table 8-1), each of which is allocable O&M expense, are allocated to the various cost components in proportion to the direct O&M expense.
- **Net Operating Expense:** The net operating expense to be recovered from all customers through charges for wastewater service is derived by deducting the “Other Operating Revenue” and the non-operating “Interest Income” from the total operating expense.
 - Other revenue is allocated to the various cost components applicable to retail customers, as shown on Column 4 of Table 8-5. Since virtually all of these revenues are generated from retail customers, no credit is applicable to wholesale service.
 - The non-operating interest income which is assigned to operation and maintenance expense (Line 11 of Table 8-1) is allocated in proportion to the distribution of the O&M expenses allocable to retail service (Column 3 of Table 8-5).

The total net operation and maintenance expense to be recovered from retail wastewater rates, for TY 2021, is estimated at \$296.6 Million, and is shown on Line 35 in Column 5 of Table 8-5. As the footnote to Table 8-5 indicates, adding back the net O&M costs allocated to the wholesale customers (Column 2, Line 35) less the Water Treatment Plant sludge costs from Line 3 of Table 8-1 gives a total Wastewater System net O&M expense presented on Table 8-1 (Column 1, Line 12).

8.5.2. Wholesale

The process of allocating O&M expenses to the Wholesale customers follows the analytical steps outlined below. The tables for these steps are provided in Schedule BV-2.

The following four categories of O&M costs are allocated to wholesale contract service customers, as applicable:

- Pumping and Treatment;
- Collection System;
- Long Term Control Plan (LTCP); and
- Customer.

The following analytical steps are used to allocate the applicable O&M costs to each wholesale contract service customer:

1. Determine O&M Unit cost by cost component for each “Pumping Station” and each “Water Pollution Control (Treatment) Plant” (Schedule BV-2: Table WH-17).
2. Allocate Pumping & Treatment O&M Cost to each wholesale contract service customer based on contract customer’s units of service and applicable O&M unit cost (Schedule BV-2: Table WH-18)

through Table WH-28). Only costs associated with facilities used directly by a customer are allocated to that customer.

3. Allocate Collection System O&M Cost to each wholesale contract service customer based on the allocation of applicable capital investments in sewer collection system which serves that specific contract service customer and the ratio of the total O&M expense associated with collection system maintenance to the total plant investment of the collection system (Schedule BV-2: Table WH-18 through Table WH-28).
 - a. Sewer Maintenance O&M costs are not applicable to DELCORA contract service customer since they pump their wastewater directly to the Southwest WPCP and do not utilize the Water Department's collection system.
4. Allocate LTCP O&M Cost to applicable wholesale contract service customers in accordance with their contractual agreements (Schedule BV-2: Table WH-18 through Table WH-28). Test year Green infrastructure maintenance expense is estimated based on 3.5 percent of the total estimated test year LTCP investment. Wholesale customers are allocated a portion of the sewer maintenance expense on the basis of 3.5 percent of their respective allocated share of LTCP investment. In lieu of recovering the annual SMIP and GARP O&M costs in the year the expenses are incurred, the Water Department allocates SMIP/GARP costs based on amortized costs determined recognizing expected project completion.
5. Allocate customer costs to the wholesale customers based on estimates of costs of billing for wastewater service, including allowances for flow and strength monitoring, bill preparation, and calibration of the flow meters.

8.6. ALLOCATION OF NET PLANT INVESTMENT

Table 8-10 summarizes the Test Year 1 (FY 2021) investment in the Wastewater System used in the allocation of test year capital related costs of service. The total test year investment of \$2.43 Billion is the total original cost investment in facilities as of June 30, 2019. Contributed plant investments from Federal grants on the three wastewater treatment plants are deducted in arriving at the plant investment for cost allocation and rate design purposes.

Table 8-10 Summary of Test Year 1 Plant Investment Allocations to Functional Cost Components [Schedule BV-1: Table WW-9]

LINE NO.	COST COMPONENT	(1) TOTAL DIRECT INVESTMENT	(2) INVESTMENT ALLOCATED TO CONTRACT SERVICE	(3) INVESTMENT ALLOCATED TO RETAIL SERVICE
Wholesale Customers (\$)				
COLLECTION SYSTEM				
1	Sewers-Capacity	\$ 1,649,393,000	\$ 17,991,000	\$ 1,631,402,000
2	Pumping Stations Capacity	28,659,000	252,000	28,407,000
3	LTCP Investment	132,401,000	19,288,000	113,113,000
4	Total Collection System	1,810,453,000	37,531,000	1,772,922,000
WATER POLLUTION CONTROL PLANTS				
Northeast Plant				
Retail, Abington, Bensalem, Bucks County				
Cheltenham, Lower Moreland, & Lower Southampton				
5	Volume	64,809,000	18,049,000	46,760,000
6	Capacity	32,141,000	7,386,000	24,755,000
7	Suspended Solids	70,293,000	13,015,000	57,278,000
8	BOD	90,360,000	22,283,000	68,077,000
9	Total Northeast Plant	257,603,000	60,733,000	196,870,000
Southwest Plant				
Retail, DELCORA, Lower Merion, Springfield (excluding Wyndmoor), & Upper Darby				
10	Volume	69,783,000	29,794,000	39,989,000
11	Capacity	43,445,000	7,689,000	35,756,000
12	Suspended Solids	56,363,000	15,905,000	40,458,000
13	BOD	49,947,000	24,488,000	25,459,000
14	Total Southwest Plant	219,538,000	77,876,000	141,662,000
Southeast Plant				
Retail & Springfield (Wyndmoor)				
15	Volume	44,436,000	404,000	44,032,000
16	Capacity	49,635,000	277,000	49,358,000
17	Suspended Solids	23,729,000	73,000	23,656,000
18	BOD	23,584,000	65,000	23,519,000
19	Total Southeast Plant	141,384,000	819,000	140,565,000
20	Total Allocated Treatment Plants	618,525,000	139,428,000	479,097,000
21	Total Allocated System Investment	\$ 2,428,978,000	\$ 176,959,000	\$ 2,252,019,000

(a) Plant Investment as of 6/30/2019. Includes Administration & General Costs

8.6.1. Retail

Similar to our treatment of O&M expenses, the net plant investment allocable to Retail customers is the difference between the net plant investment on Line 21, Column 1 on Table 8-10 and the amount allocated to Wholesale customers on Line 21, Column 2. After deducting the investment directly allocable to Wholesale customers, the balance of the plant investment is allocated to Retail customers as follows:

- **Collection System:** The various functional cost centers of the wastewater collection system are designed based on different wastewater parameters. Therefore, the net plant investment allocable to Retail customers is allocated to the respective wastewater parameter (cost component). The allocation of net plant investment allocable to retail customers for each collection system component is summarized in Lines 1 to 4 of Table 8-10.

- **Wastewater Collection System - Sewers:** The collection system is designed to carry maximum rates of wastewater flow and as such, 100 percent of the collection system costs are allocated to the capacity cost component.

As the combined sewer system also conveys stormwater, the test year retail customer plant investment associated with the collection system is apportioned between sanitary sewer-related costs and stormwater-related costs. Consistent with the allocation factor presented in prior rate proceedings, sixty four percent of the collection system retail plant investment costs were allocated to stormwater. This factor was determined based on an “inch-foot” analysis (the inch (diameter) of pipes times the number of feet of the sewer system), and then further adjusted to reflect the trenching cost savings typically associated with the construction of separate sanitary and storm sewers. As explained in prior rate proceedings, during construction, the sanitary sewer is buried deeper and a storm sewer is placed in the same trench above the sanitary sewer. Our analysis indicates that it is reasonable to allocate 36 percent of the capacity of the system for conveyance of sanitary flows and 64 percent for stormwater drainage.

- **Wastewater Collection System - Pumping:** These facilities are designed to meet the maximum rates of wastewater flows and are allocated 100 percent to the capacity cost component.
- **Wastewater Collection System - Long-Term Control Plan:** The LTCP investments reduce the maximum rates of wastewater flows and are allocated 100 percent to the capacity cost component.

- **Wastewater Treatment:** The various functional facilities of the water pollution control plants are designed to manage different wastewater parameters including average and peak flows, BOD, and TSS. Hence, the treatment plant investments in each functional facility are allocated across the key wastewater parameters, as shown in Table 8-11, Table 8-12, and Table 8-13 for each of the three water pollution control plants and summarized in Lines 5 to 20 of Table 8-10.

- **Volume:** The water pollution control plant facilities such as flocculation, sedimentation basins, and recirculation pumping, are designed primarily to handle the total average flow projected for the plant. Therefore, investments in such facilities are allocated to the volume cost component.
- **Capacity:** The investment in facilities such as raw wastewater pumps, preliminary treatment, chlorine contact basins, wastewater conduits, and outfall lines varies according to peak wastewater flow rates, and therefore is allocated to the capacity functional cost component.

Wholesale customers whose flow is tributary to the plant do not use the raw wastewater pumping facilities at the Southwest plant. Consequently, the investment in raw wastewater pumping facilities at the Southwest plant is allocated entirely to the Retail customer group.

Table 8-11 Test Year 1 Allocation of Plant Investment for the Northeast WPC Plant [Schedule BV-1: Table WW-9A]

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)	(6)	
		TOTAL INVESTMENT (a)	RETAIL, ABINGTON	VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD	
			BENSALEM,					RETAIL, ABINGTON, BENSALAM,
			BUCKS COUNTY, & LOWER SOUTHAMPTON					BUCKS COUNTY, CHELTENHAM, LOWER MORELAND & LOWER SOUTHAMPTON
Wastewater System (\$000s)								
NON-WATER POLLUTION ABATEMENT PROGRAM FACILITIES								
1	Primary Sedimentation Basins	\$ 5,523	\$ -	\$ 5,523	\$ -	\$ -	\$ -	
2	Pumping Station	1,367	-	-	1,367	-	-	
3	Aeration Facilities	18,250	-	-	-	-	18,250	
4	Primary Sludge Pumps	1,225	-	-	-	1,225	-	
5	Scum Ejectors	192	-	-	-	192	-	
6	Effluent Conduit	-	-	-	-	-	-	
7	Final Sedimentation Basins	9,605	-	9,605	-	-	-	
8	Recirculation Pumps	1,729	-	1,729	-	-	-	
9	Digesters	18,801	-	-	-	14,101	4,700	
10	Sludge Dewatering	4,088	-	-	-	3,066	1,022	
11	Frankford Grit Chamber	-	-	-	-	-	-	
12	Chlorination Facilities	5,148	-	-	5,148	-	-	
13	Aeration Tank No. 1	3,139	-	-	-	-	3,139	
14	Sludge Thickener Building	4,415	-	-	-	2,208	2,207	
15	Sludge Transfer Station	285	-	-	-	214	71	
16	Subtotal All Above	73,767	-	16,857	6,515	21,006	29,389	
Administrative and General Facilities								
17	Administrative and General Plant	67,198	-	-	-	-	-	
18	Land	943	-	-	-	-	-	
19	Subtotal	68,141	1,897	17,621	7,323	18,303	22,997	
20	Total	141,908	1,897	34,478	13,838	39,309	52,386	
WATER POLLUTION ABATEMENT PROGRAM FACILITIES								
21	New Preliminary Treatment Building	40,926	10,232	-	30,694	-	-	
22	Primary Sedimentation Tanks	52,657	-	52,657	-	-	-	
23	Blower Building	16,513	-	-	-	-	16,513	
24	Aeration Tank No. 1	38,501	-	-	-	-	38,501	
25	Chlorination Facilities	-	-	-	-	-	-	
26	New Sludge Thickener Building	41,152	-	-	-	20,576	20,576	
27	Effluent Conduits	2,286	-	-	2,286	-	-	
28	New Final Sedimentation Tanks	25,514	-	25,514	-	-	-	
29	Sludge Digestion System	34,358	-	-	-	25,769	8,589	
30	Composting Facilities	-	-	-	-	-	-	
31	Sludge Dewatering	11,947	-	-	-	8,960	2,987	
32	Sludge Transfer Station	24,400	-	-	-	18,300	6,100	
33	Loading Terminal/Barges	5,461	-	-	-	4,096	1,365	
34	Subtotal	293,715	10,232	78,171	32,980	77,701	94,631	
35	Admin. and General Facilities	47,434	1,321	12,266	5,098	12,741	16,008	
36	Adjustment for Joint Use Facilities	1,761	-	-	-	1,321	440	
37	Total	342,910	11,553	90,437	38,078	91,763	111,079	
38	Total Northeast WPC Plant Book Cost	484,818	13,450	124,915	51,916	131,072	163,465	
39	Less Federal Grants	227,215	7,867	60,106	25,358	60,779	73,105	
40	Adjusted Total Northeast WPC Plant	\$ 257,603	\$ 5,583	\$ 64,809	\$ 26,558	\$ 70,293	\$ 90,360	

(a) Plant Investment as of 6/30/2019.

Table 8-12 Test Year 1 Allocation of Plant Investment for the Southwest WPC Plant [Schedule BV-1: Table WW-9B]

		(1)	(2)	(3)	(4)	(5)	(6)
		RETAIL, DELCORA, LOWER MERION, SPRINGFIELD (EXCLUDING WYNDMOOR), & UPPER DARBY					
LINE NO.	DESCRIPTION	TOTAL INVESTMENT (a)	RETAIL CAPACITY	VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD
Wastewater System (\$000s)							
NON-WATER POLLUTION ABATEMENT PROGRAM FACILITIES							
1	Raw Wastewater Pumping Station	\$ 12,786	\$ 12,786	\$ -	\$ -	\$ -	\$ -
2	Sludge Digestion Facilities	5,076	-	-	-	3,704	1,372
3	Scum Incineration	1,942	-	-	-	1,942	-
4	Settling Tanks	30,505	-	30,505	-	-	-
5	Sludge Handling	7,847	-	-	-	5,885	1,962
6	Chlorination Facilities	1,214	-	-	1,214	-	-
7	Aeration Tanks	699	-	-	-	-	699
8	Oxygen Supply	3,628	-	-	-	-	3,628
9	Effluent Pump Station	203	-	-	203	-	-
10	Sludge Thickener Building	1,611	-	-	-	806	805
11	Composting Facilities	1,164	-	-	-	873	291
12	Sludge Gas Facilities	9,544	-	-	-	7,158	2,386
13	Subtotal	76,219	12,786	30,505	1,417	20,368	11,143
Administrative and General Facilities							
14	Administrative and General Plant	81,261	-	-	-	-	-
15	Land	686	-	-	-	-	-
16	Subtotal	81,947	6,109	22,676	10,098	21,857	21,207
17	Adjustment for Joint Use Facilities	(2,553)	-	-	-	(2,022)	(531)
18	Total	155,613	18,895	53,181	11,515	40,203	31,819
WATER POLLUTION ABATEMENT PROGRAM FACILITIES							
19	Influent Pumping Station	6,313	6,313	-	-	-	-
20	Preliminary Treatment Building	24,235	-	-	24,235	-	-
21	Primary Sedimentation Tanks	11,120	-	11,120	-	-	-
22	Aeration Tanks	16,378	-	-	-	-	16,378
23	Oxygen Supply System	14,085	-	-	-	-	14,085
24	Compressor Building	3,728	-	-	-	-	3,728
25	Final Tanks	29,275	-	29,275	-	-	-
26	Scum Concentration Building	1,371	-	-	-	1,371	-
27	Sludge Thickener Building	12,538	-	-	-	6,269	6,269
28	Sludge Digestion Facilities	31,084	-	-	-	22,680	8,404
29	Effluent Pumping Station	5,920	-	-	5,920	-	-
30	New Centrifuges	8,102	-	-	-	5,912	2,190
31	Composting Facilities	-	-	-	-	-	-
32	Sludge Dewatering	8,607	-	-	-	6,455	2,152
33	Sludge Gas Facilities	7,241	-	-	-	5,284	1,957
34	Subtotal	179,997	6,313	40,395	30,155	47,971	55,163
35	Admin. and Gen'l. Facilities	33,959	2,531	9,397	4,185	9,058	8,788
36	Adjust. for Joint Use Facilities	(6,979)	-	-	(608)	(4,746)	(1,625)
37	Total	206,977	8,844	49,792	33,732	52,283	62,326
38	Total Southwest WPC Plant	362,590	27,739	102,973	45,247	92,486	94,145
39	Less Federal Grants	143,052	5,187	33,190	24,354	36,123	44,198
40	Adjusted Total Southwest WPC Plant	\$ 219,538	\$ 22,552	\$ 69,783	\$ 20,893	\$ 56,363	\$ 49,947

(a) Plant Investment as of 6/30/2019.

Table 8-13 Test Year 1 Allocation of Plant Investment for Southeast WPC Plant [Schedule BV-1: Table WW-9C]

LINE NO.	DESCRIPTION	(1)	(2)	(3)	(4)	(5)
		RETAIL AND SPRINGFIELD (WYNDMOOR)				
		TOTAL INVESTMENT (a)	VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD
Wastewater System (\$000s)						
NON-WATER POLLUTION ABATEMENT PROGRAM FACILITIES						
1	Main Pumping Station	\$ 2,149	\$ -	\$ 2,149	\$ -	\$ -
2	Grit Chambers	13,143	-	13,143	-	-
3	Outfall Line	1,999	-	1,999	-	-
4	Sludge Digestion Facilities	2,450	-	-	1,941	509
5	Settling Tanks & Floc. Channel	15,816	15,816	-	-	-
6	Sludge Force Main	5,010	-	-	3,758	1,252
7	Subtotal	40,567	15,816	17,291	5,699	1,761
8	Administrative and General Plant	27,692	-	-	-	-
9	Land	156	-	-	-	-
10	Subtotal	27,848	8,339	9,375	4,395	5,739
11	Adjustment for Joint Use Facilities	2,553	-	-	2,022	531
12	Total	70,968	24,155	26,666	12,116	8,031
WATER POLLUTION ABATEMENT PROGRAM FACILITIES						
13	Influent Pump. Stat. and Screen & Grit	24,936	-	24,936	-	-
14	Primary Sedimentation Tanks	21,134	21,134	-	-	-
15	Compressor Building	9,916	-	-	-	9,916
16	Air Supply Facilities	23,162	-	-	-	23,162
17	Final Sedimentation	26,056	26,056	-	-	-
18	Effluent Pumping Station	12,894	-	12,894	-	-
19	Effluent Conduit	11,593	-	11,593	-	-
20	Scum Concentration Facilities	2,816	-	-	2,816	-
21	Sludge Force Main	1,943	-	-	1,457	486
22	Preliminary Treatment Bldg.	4,123	-	4,123	-	-
23	Sludge Thickeners	4,656	-	-	2,328	2,328
24	Sludge Digesters	15,007	-	-	11,888	3,119
25	Sludge Disposal Facilities	3,912	-	-	3,099	813
26	Composting Facilities	-	-	-	-	-
27	Sludge Dewatering	4,197	-	-	3,148	1,049
28	Sludge Gas Facilities	3,497	-	-	2,770	727
29	Subtotal	169,842	47,190	53,546	27,506	41,600
30	Admin. and Gen'l. Facilities	43,265	12,956	14,566	6,828	8,915
31	Adjustment for Joint Use Facilities	5,218	-	608	3,425	1,185
32	Total	218,325	60,146	68,720	37,759	51,700
33	Total Southeast WPC Plant	289,293	84,301	95,386	49,875	59,731
34	Less Federal Grants	147,909	39,865	45,751	26,146	36,147
35	Adjusted Total Southeast WPC Plant	\$ 141,384	\$ 44,436	\$ 49,635	\$ 23,729	\$ 23,584

(a) Plant Investment as of 6/30/2019.

- **Strength (BOD and Suspended Solids):** The aeration basins and oxygen, or air blower facilities are designed to handle BOD, and investments in these facilities are allocated to the BOD functional cost component.
 - The investment in sludge conditioning and disposal facilities depends upon both the suspended solids and BOD parameters and is allocated to those two components of cost. The design of facilities handling only sludge from the primary sedimentation basins, such as the primary sludge pumps and scum disposal facilities, reflects the suspended solids content of the raw wastewater, and the related investment is therefore allocated to that cost component. The investment in facilities handling waste activated sludge, such as waste activated sludge thickeners, is allocated 50 percent to the suspended solids and 50 percent to the BOD functional cost components based upon the design loadings and degree of treatment provided.
 - Likewise, the investment in other facilities such as digesters and sludge dewatering and composting facilities, that handle both primary and waste activated sludge, is allocated to the suspended solids functional cost component and to the BOD functional cost component. We determined the allocation of cost between SS and BOD based on the relative quantities of sludge generated from BOD and SS components, and the relative difficulty of treating waste activated sludge as compared with primary sludge. The resulting allocation percentages are 75 percent to the suspended solids functional cost component and 25 percent to the BOD functional cost component. The investment in the sludge force main at the Southeast plant is allocated 75 percent to suspended solids and 25 percent to BOD functional cost components, based on design flows.
 - Some of the treatment and sludge related facilities in the Wastewater System service multiple treatment facilities. The digesters and the sludge processing and distribution facilities provide treatment and disposal of sludge from both the Southwest treatment plant and the Southeast treatment plant and provide disposal of sludge from the Northeast treatment plant. To properly recognize cost responsibility for these joint use facilities, a portion of the investment in both existing and expanded plant joint use facilities is allocated to the Southeast and Northeast plants.
- **General Plant and Equipment:** Other general plant and equipment includes investment allocable to all of the above and is allocated to cost components in proportion to the total of the preceding items of the direct plant investment allocation to those cost components.

8.6.2. Wholesale

For the Wholesale customers, the various contracts typically provide for maximum short-term flow rates expressed in cubic feet per second (“cfs”), maximum average daily flow rates expressed in MGD, and maximum annual suspended solids and BOD loadings expressed in pounds (“lbs”). The Cost of Service analysis recognizes the City’s obligation to provide service to its wholesale customers through the allocation of plant investment and operating expenses. Since installed capacity is the primary concern of the contracts, the basis for wholesale customer allocations uses the relationship of the contract service requirements to the total installed capacity of the respective facilities. Only plant investment associated with facilities used directly by a customer are allocated to that customer.

As presented earlier, Table 8-3 and Table 8-4 summarize the units of service applicable to wholesale customers used in the cost of service analysis. In Table 8-3, the section titled "Contract Maximum Units," is based upon the contractual rate of flow for each customer, including an allowance for I/I that can occur downstream from the wholesale customer's discharge point into the City's Wastewater System. To determine the contract maximum units for suspended solids and BOD, contractual strength loadings for those customers which have such provisions in their contracts were used. For those customers which do not have specific loadings in their contracts, the estimated measured strength for each customer as applied to their contract maximum daily flow rate, expressed in MGD was used. The contract maximum units serve as the basis for allocation of capital investment related costs to the wholesale customers.

Each wholesale customer is allocated a share of the Wastewater System investment in the wastewater collection system (mains, pumping, and LTCP) and treatment facilities serving them. The plant investment costs are allocated to the wholesale customers based on the proportionate share of their contract capacity in the various facilities relative to the total design capacity of the various facilities. In the interest of avoiding duplication, the reader is referred to Schedule BV-2: Tables WH-6 through WH-16 for details regarding the allocation of plant investment for each wholesale customer.

8.7. ALLOCATION OF DEPRECIATION EXPENSE

The allocation of depreciation expenses for Retail and Wholesale customers follows the steps used for the allocation of plant investment described above. The annual depreciation expense to be distributed to Wastewater System cost components is based on the application of appropriate depreciation expense rates to the various categories of Wastewater System facilities. The various items of depreciation expense are allocated to cost components on the same basis as the proportion of plant investment costs allocated to each of those cost components.

8.8. WHOLESALE COST OF SERVICE ALLOCATIONS

Table 8-14 summarizes the Test Year 1 cost of service allocated to the wholesale customers. Specifically, the table presents the total allocated plant investment, depreciable investment, depreciation expense, return on rate base, and operation and maintenance expense for the wholesale customers. The total cost of service allocable to wholesale customers, for Test Year 1 is estimated at \$38.3 Million. This amount includes a return on investment requirement of \$5.1 Million, which reflects a 7.50 percent rate of return on allocated investment.

It should be noted, that six of the wholesale customers have made front-end capital contributions related to the investment in plant which provides them service. These customers include Bucks County (Bensalem), Bucks County, DELCORA, Lower Merion, Lower Southampton, and Upper Darby.

Table 8-14 Summary of Test Year 1 Allocated Cost of Service for Wholesale Customers [Schedule BV-2: Table WH-29]

LINE NO.	CUSTOMER	(1) INVESTMENT (a)		(3)	(4)	(5)	(6) ALLOCATED
		ALLOCATED	DEPRECIABLE	O&M	DEPR'N	RETURN	COST OF SERVICE
Wholesale Customers (\$000S)							
1	Abington	\$ 5,653	\$ 5,637	\$ 938	\$ 135	\$ 424	\$ 1,497
2	Bucks County (Bensalem)	8,926	8,897	1,513	(a)	(a)	1,513
3	Bucks County (b)	27,974	27,877	7,333	96	288	7,718
4	Cheltenham	14,650	14,611	2,654	347	1,099	4,099
5	DELCORA	57,251	57,111	9,380	340	1,207	10,928
6	Lower Merion	15,528	15,485	2,535	(a)	(a)	2,535
7	Lower Moreland	2,998	2,991	531	69	225	825
8	Lower Southampton (d)	20,881	20,847	2,160	386	1,305	3,851
9	Springfield (less Wyndmoor)	6,480	6,466	1,358	153	486	1,997
10	Springfield (Wyndmoor)	1,150	1,149	217	27	86	330
11	Upper Darby	15,468	15,422	3,056	(a)	(a)	3,056
12	Total	\$ 176,959	\$ 176,493	\$ 31,675	\$ 1,553	\$ 5,121	\$ 38,349

(a) It is assumed that Bucks County (Bensalem), Lower Merion and Upper Darby contribute their entire allocated plant investment, and therefore, are not allocated any depreciation expense or return on investment.

(b) Bucks County allocated Return on Investment and Depreciation Expense based on assets in service after 6/30/2007.

(c) DELCORA allocated Return and Depreciation Expense based on assets in service after 7/1/2011.

(d) Lower Southampton phased into Return on Investment and Depreciation Expense on total rate base uniformly over 18 years starting in FY 2007.

The Water Department does not anticipate any contractual changes; as such Bucks County (Bensalem), Lower Merion and Upper Darby will continue to provide upfront annual capital contributions associated with applicable plant improvements. Therefore, there is no cost of service allocation of depreciation or return on rate base for these three wholesale customers.

Bucks County, DELCORA, and Lower Southampton were initially capital contribution-based customers. However, their current contracts reflect the utility basis for the recovery of allocated capital investment.

The allocation of return and depreciation, presented in Table 8-14, reflects the terms of the current contracts for these customers. The depreciation expense presented in Column 4 reflects 2 percent of the depreciable investment in the collection system and 2.5 percent of the depreciable investment in treatment and pumping facilities. The corresponding table for Test Year 2 (FY 2022) is provided as Schedule BV-2: Table WH-30.

8.9. DISTRIBUTION OF COSTS TO CUSTOMER TYPES

As a basis for estimating the cost of providing wastewater service to each customer type, we distribute each functional component cost among the customer types in proportion to their respective service requirements for each of those cost components.

We perform the following key steps to allocate the Sanitary Sewer Retail Capital and O&M Costs to the various customer types:

■ Retail: Determination of Sanitary Sewer Unit Costs of Cost Components

- The retail test year unit cost, for each of the cost components, is summarized on Table 8-15 and derived as follows:
 - Divide the operational and capital costs allocated to each cost component by the respective retail units of service.
 - Derive the total Retail unit cost for each cost component as follows:
 - Total Retail Unit Cost = Operation Expense unit cost + Depreciation Expense unit cost + Inside City Return on Plant Investment unit cost.

■ Retail: Distribution of Sanitary Sewer Costs to Customer Types

- The Wastewater test year cost of service is distributed to each customer type as follows:
 - Applying the total unit cost of each cost component to the corresponding units of service of each customer type as presented on Table 8-16; and
 - Reapportioning the Pumping & Treatment related I&I Costs between Sanitary Sewer and Stormwater as shown on Table 8-17.

8.9.1. Infiltration/Inflow Adjustments

The cost of service allocable to I/I must be distributed among the retail service customer types. As in the case of the allocation of stormwater costs, the relative customer type responsibility for I/I cost can neither be precisely measured, nor can it be directly associated with the parameters of sanitary wastewater service.

In general, I/I due to leakage in lateral sewers of individual residences would be expected to be less than in the services of individual large commercial or industrial establishments. The greater length, due to larger lot frontage, and greater size of main sewer required for the larger customers would also contribute to potential increased I/I with the size of customer. The number of equivalent meters of each customer type, discussed previously in this report, provides a reasonable means of recognizing both numbers and relative sizes of customers and provides a measure of customer type responsibility for I/I cost.

Table 8-15 Test Year 1 Retail Unit Costs of Service [Schedule BV-1: Table WW-11 and Table WW-12]

LINE NO.	DESCRIPTION	(1) TOTAL	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
			COLLECTION SYSTEM				WATER POLLUTION CONTROL PLANTS				
			PUMPING STATION		SANITARY SEWERS	STORMWATER	VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD	
VOLUME	CAPACITY	CAPACITY									
Retail Sanitary Sewer											
Total Units of Service											
1	Units	\$000s	Mcf	Mcf/day	Mcf/day		Mcf	Mcf/day	1,000 lbs.	1,000 lbs.	
2	Quantity		16,856,900	99,605	306,053		16,856,900	99,605	166,602	113,540	
Operation and Maintenance Expense											
3	Total Expense - \$000s	\$ 252,862	\$ 2,723	\$ 19,295	\$ 43,702	\$ 83,690	\$ 27,576	\$ 12,998	\$ 39,553	\$ 23,326	
4	Unit Expense - \$/unit		0.1615	193.7102	142.7923		1.6359	130.4955	237.4086	205.4430	
Capital Costs											
5	Total Plant Investment - \$000s	2,252,019		28,407	628,025	1,116,490	130,781	109,869	121,392	117,055	
6	Unit Plant Investment - \$/unit			285.1965	2,052.0152		7.7583	1,103.0470	728.6347	1,030.9583	
7	Depreciable Plant Investment - \$000s	2,248,857		28,407	627,372	1,115,327	130,425	109,611	121,028	116,687	
8	Unit Depreciable Plant Investment - \$/unit			285.1965	2,049.8789		7.7372	1,100.4568	726.4499	1,027.7142	
9	Depreciation Expense - \$000s	47,508		710	12,547	22,307	3,261	2,740	3,026	2,917	
10	Unit Depreciation Expense - \$/unit			7.1299	40.9976		0.1934	27.5114	18.1612	25.6929	
Unit Return on Investment											
11	Total Return - \$000s (a)	94,875		1,197	26,458	47,037	5,510	4,629	5,114	4,931	
12	Inside City - \$/Unit (a)			12.0150	86.4493		0.3268	46.4702	30.6966	43.4332	
Total Unit Capital Costs											
13	(Line 10 + Line 12) - \$/unit			19.1449	127.4469		0.5202	73.9816	48.8578	69.1261	
Total Unit Costs of Service											
14	Inside City (Line 4 + Line 13) - \$/unit	\$	0.1615	\$ 212.8551	\$ 270.2392		\$ 2.1561	\$ 204.4771	\$ 286.2664	\$ 274.5691	

(a) Retail rate of return = Retail allocation of Return on Investment / Retail Allocation of System Plant Investment = \$94,875,400 / \$2,252,019,000 = 4.2129 %.

Table 8-16 Test Year 1 Retail Unit Costs of Service (continued)

LINE NO.	DESCRIPTION	(10)	(11)	(12)	(13)	(14)	(15)	
		CUSTOMER COSTS					DIRECT STORMWATER	
		METER COSTS	BILLING		RETAIL CUSTOMERS	INDUSTRIAL WASTE UNIT		
			SANITARY	STORMWATER		DIRECT EXTRA WASTEWATER		STRENGTH
Retail Sanitary Sewer								
Total Units of Service								
1	Units	Eq. Meters	Eq. Bills		Eq. Meters			
2	Quantity	598,265	5,985,534		598,265			
Operation and Maintenance Expense								
3	Total Expense - \$000s	\$ 5,343	\$ 18,655	\$ 13,117	\$ 4,116	\$ 2,059	\$ 480	
4	Unit Expense - \$/unit	8.9308	3.1167		6.8799			
Capital Costs								
5	Total Plant Investment - \$000s							
6	Unit Plant Investment - \$/unit							
7	Depreciable Plant Investment - \$							
8	Unit Depreciable Plant Investment - \$/unit							
9	Depreciation Expense - \$000s							
10	Unit Depreciation Expense - \$/unit							
Unit Return on Investment								
11	Total Return - \$000s							
12	Inside City - \$/Unit (a)							
Total Unit Capital Costs								
13	(Line 10 + Line 12) - \$/unit							
Total Unit Costs of Service								
14	Inside City (Line 4 + Line 13) - \$/unit	\$ 8.9308	\$ 3.1167		\$ 6.8799	\$ -		

(a) Retail rate of return = Retail allocation of Return on Investment / Retail Allocation of System Plant Investment = \$94,875 / \$2,252,019 = 4.2129 %.

Table 8-16 Wastewater Retail Costs of Service [Schedule BV-1: Table WW-13]

LINE NO.	CUSTOMER TYPE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		ALLOCATED COST OF SERVICE	COLLECTION SYSTEM			TREATMENT				CUSTOMER		INDUSTRIAL WASTE	
			PUMPING VOLUME	PUMPING CAPACITY	SEWER CAPACITY	VOLUME	CAPACITY	SUSPENDED SOLIDS	BOD	METER	BILLING & COLLECTION	SURCHARGE	METER
Retail Service (\$000s)													
1	Residential	\$ 68,745	\$ 452	\$ 2,449	\$ 8,291	\$ 6,036	\$ 2,353	\$ 13,001	\$ 13,429	\$ 3,937	\$ 15,764	\$ -	\$ 3,033
2	Commercial	26,636	232	1,258	4,260	3,102	1,209	6,681	6,901	827	1,529	-	637
3	Industrial	1,168	10	56	191	139	54	299	308	36	47	-	28
4	Public Utilities	174	1	8	26	19	7	41	42	11	10	-	8
5	Senior Citizens	3,167	19	102	346	252	98	542	560	210	877	-	161
6	Wastewater Only	1,120	11	59	200	145	57	313	323	5	4	-	3
7	Groundwater	2,755	36	321	1,303	474	308	275	38	-	-	-	-
8	Surcharge	5,440	-	-	-	-	-	467	2,924	-	-	2,048	-
9	Housing Authority	2,813	24	131	442	322	126	694	716	76	224	-	58
10	Charities & Schools	2,799	24	130	440	320	125	689	712	132	125	-	102
11	Hospital/University	4,679	44	241	815	593	231	1,278	1,320	64	41	-	49
12	Hand Bill	6,966	67	365	1,237	901	351	1,940	2,004	42	26	-	32
13	Water Treatment Plant Sludge	9,920	47	256	867	631	246	7,872	-	-	-	-	-
14	Private Fire	138	1	7	22	16	6	35	37	4	6	-	3
15	Scheduled (Flat Rate)	0	0	-	-	0	-	-	-	0	0	-	0
16	Conveyance	64,268	-	-	64,268	-	-	-	-	-	-	-	-
17	Pumping & Treatment	71,587	1,753	15,819	-	23,396	15,196	13,564	1,859	-	-	-	-
18	Total	\$ 272,376	\$ 2,723	\$ 21,202	\$ 82,708	\$ 36,346	\$ 20,367	\$ 47,693	\$ 31,175	\$ 5,343	\$ 18,655	\$ 2,048	\$ 4,116

Table 8-17 Adjusted Costs of Service After Allocation of I/I and Discounts [Schedule BV-1: Table WW-14]

LINE NO.	CUSTOMER TYPE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		ALLOCATED COST OF SERVICE	RE-ALLOCATION OF I/I (a)		ADJUSTED COST OF SERVICE	DISCOUNTS	ADJUSTED COST OF SERVICE W/ DISCOUNTS	RECOVERY OF DISCOUNTS (b)	ADJUSTED COST OF SERVICE
			SANITARY SEWER	STORMWATER					
Retail Service (\$000s)									
1	Residential	\$ 68,745	\$ 60,214	\$ -	\$ 128,960	\$ -	\$ 128,960	\$ 3,089	\$ 132,049
2	Commercial	26,636	26,625		53,262		53,262	1,276	54,537
3	Industrial	1,168	1,187		2,354		2,354	56	2,411
4	Public Utilities	174	184		358		358	9	367
5	Senior Citizens	3,167	2,675		5,841	(1,460)	4,381	105	4,486
6	Wastewater Only	1,120	1,125		2,245		2,245	54	2,299
7	Groundwater	2,755	-		2,755		2,755	66	2,821
8	Surcharge	5,440	-		5,440		5,440	130	5,570
9	Housing Authority	2,813	2,727		5,540	(277)	5,263	126	5,389
10	Charities & Schools	2,799	2,917		5,716	(1,429)	4,287	103	4,390
11	Hospital/University	4,679	4,755		9,434	(2,359)	7,076	169	7,245
12	Hand Bill	6,966	7,017		13,982		13,982	335	14,317
13	Water Treatment Plant Sludge	9,920	4,812		14,732		14,732		14,732
14	Private Fire	138	141		279		279	7	286
15	Scheduled	0	0		0		0	0	0
16	Conveyance	64,268	(64,268)						
17	Pumping & Treatment	71,587	(50,111)	(21,476)	-	-	-	-	-
18	Total	272,376	-	(21,476)	250,900	(5,525)	245,375	5,525	250,900
Allocation of I/I									
19	Sanitary Sewer	272,376		(21,476)	250,900				
20	Stormwater	-	-	21,476	21,476	-	-	-	-
21	Total	\$ 272,376	\$ -	\$ -	\$ 272,376	\$ -	\$ -	\$ -	\$ -

(a) 70% of allocated I/I costs are recovered by sanitary sewer rates and charges. 30% of allocated I/I costs are recovered by stormwater rates and charges.

(b) Reflects current policy of recovering discounts from all customer types.

Columns 3 and 4 of Table 8-17 reflect the redistribution of the cost of I/I to the other customer types based upon equivalent meters and volume. In accordance with the prior rate proceeding decisions, the cost of service and rate design for the current study reflects a 30 percent recovery of pumping and treatment related I/I costs through the service charge and 70 percent through the volume charge.

8.9.2. Fee Discounts

The proposed cost of service reflects the continuation of the current practice of providing fee discounts to the following customer types:

- Senior Citizens, and Charities and Schools customer types are billed at 75 percent of the general customer rate levels.
- The PHA is billed at 95 percent of general customer rate levels.

The revenue reduction resulting from the discounts is recovered from all inside City retail customer types in order to recover the total test year cost of service for retail customers.

Column 8 of Table 8-17 presents the adjusted cost of service of the inside City customer types. This adjusted cost of service recognizes the fee reduction due to discounts and the recovery of those discounts from all customer types.

8.10. STORMWATER COST OF SERVICE ALLOCATIONS

Stormwater management and related costs are an integral component of the Water Department's Wastewater System costs. We have already discussed in detail the Wastewater System cost of service allocations between sanitary sewer and stormwater, and the associated rationale for each allocation.

8.10.1. Test Year Revenue Requirements

The following is a summary of the key allocation factors used in determining the stormwater revenue requirements.

- **Conveyance O&M Cost Allocation:** As discussed earlier in Section 8.5.1, 60 percent of the sewer collection system maintenance cost is allocated to stormwater and 40 percent to sanitary sewer.
- **Conveyance Capital Cost Allocation:** As discussed in Section 8.6.1, 64 percent of the sewer collection system capital cost is allocated to stormwater and 36 percent to sanitary sewer based on a cost weighted pipe capacity analysis.
- **Pumping & Treatment O&M and Capital Cost:** A portion of the retail pumping and treatment component cost is allocated to Infiltration and Inflow. Affirmed in prior rate proceedings, the Infiltration and Inflow cost is allocated 70 percent to sanitary sewage and 30 percent to stormwater services based on the ratio of average dry weather flow to average wet weather flow.
- **Customer Costs:** The allocation approach used in allocating customer costs to stormwater is consistent with the method used in the previous rate proceeding. The customer costs are first allocated one-third to water service and two-thirds to the wastewater service (as wastewater includes sanitary sewer and stormwater). The wastewater customer costs less the metering costs are further allocated 60 percent

to sanitary sewer and 40 percent to stormwater services based on the relative revenue requirement levels between the two services.

Table 8-18 presents the total FY 2021 stormwater revenue requirements. Based on the detailed technical cost allocations, the estimated FY 2021 stormwater revenue requirements are \$187.2 Million excluding stormwater Customer Assistance Program (CAP) costs.

Table 8-18 Summary of Test Year 1 Stormwater Costs [Schedule BV-3: Table SW-13]

LINE NO.	COST COMPONENT	(1) ALLOCATED COST OF SERVICE
Stormwater (\$000s)		
1	Billing & Collection Costs	\$ 12,859
2	Impervious Area and Gross Area Costs ² (Excluding CAP Costs)	174,349
3	Total	\$ 187,208

8.10.2. Allocation to Customer Types

To delineate the stormwater management costs from the balance of annual wastewater costs, a multi-step cost allocation approach was used to allocate the Test Year 1 stormwater costs to various customer types. The framework we used is outlined below:

- Allocate stormwater management service charge (SWMS) costs (i.e. impervious area and gross area costs) presented in Table 8-19, to their respective charge components.
 - As established in the 2008 Rate Proceeding, the SWMS charge costs are allocated 20 percent to GA and 80 percent to IA.
 - The resulting System Wide Unit Costs for GA and IA are summarized on Table 8-19;
 - System-Wide Unit Costs for GA and IA reflect overall reductions in billable GA and IA, resulting from credits and other adjustments; therefore, the recovery of these reductions is shared by all stormwater customers as reflected in the System-Wide Units Costs for GA and IA. Refer to Schedule BV-6: WP-3 Cost Recovery Approach of various customer assistance programs (including stormwater credits).
- Distribute GA and IA costs to Residential and Non-Residential Customer Types.
 - Residential GA and IA cost of service is calculated by applying the system-wide unit costs presented in Table 8-19 to the estimated residential billable GA and IA units of service (Table 7-7 and Table 7-8).
 - The initial Non-residential GA and IA cost of service are calculated as the total GA and IA cost of service less residential. The resulting Non-Residential costs are then adjusted to account for the Stormwater CAP costs.
 - Table 8-20 shows the results of this step.
- Determine the GA and IA cost of service rates prior to discount and lag factor adjustments.

- Residential Monthly GA and IA Unit rates are then calculated to reflect:
 - Residential customers are billed a uniform fee per parcel based upon the mean residential IA and GA.
 - As previously noted, based upon the updated Stormwater Billing Data the mean residential GA square footage is 2,110 square feet and the mean residential IA is 1,200 square feet.
 - The System-Wide GA and IA unit costs are applied to the mean residential GA and IA respectively and then summed to calculate the resulting stormwater management service charge per parcel.
- Non-residential customers GA and IA unit costs are calculated to account for the recovery of stormwater CAP costs (presented in Table 8-20) by dividing the Adjusted Non-Residential Cost of Service by the respective GA and IA billable units of service.
- Table 8-21 shows the results of the above steps.
- Allocate Billing & Collection costs to Residential and Non-Residential Customers.
 - Billing & Collection costs are allocated to Residential and Non-Residential customers based on the weighted number of billable accounts.
 - As with prior rate determinations, a cost weighting factor of 1.3 higher weighting factor is assigned to non-residential accounts due to the additional time and effort needed to address billing issues and parcel data issues for non-residential class, as the charges are individually calculated for each parcel. and the corresponding billing and collection unit costs.
 - The resulting monthly billing & collection unit cost by customer type are presented in Table 8-22.
- Determine “Adjusted Stormwater Cost of Service” by Customer Type after re-apportioning revenue reduction due to discounts to customer types. Table 8-23 illustrates the recovery of discounts.

The adjusted Stormwater cost of service determined for each retail customer type provides the basis for the design of the Stormwater Rates and Charges for the test year. Schedule BV-6: WP-2 provides additional information regarding the development of the stormwater units of service for the analysis conducted herein.

Table 8-19 Test Year 1 Estimate of GA and IA Unit Costs Adjusted for CAP [Schedule BV-3: Table SW-14]

LINE NO.	DESCRIPTION	(1)	(2)	(3)
		GA	IA	TOTAL
		20%	80%	
1	Annual Cost of Service (\$ 1000) from GA & IA (Excluding CAP)	\$ 34,870	\$ 139,479	\$ 174,349
2	Stormwater Units of Service (500 Square Feet)	4,147,179	2,356,039	
3	System Annual Unit Cost (\$/500 Square Feet)	8.41	59.20	
4	System Monthly Unit Cost (\$/500 Square Feet)	\$ 0.70	\$ 4.93	

Table 8-20 Test Year 2021 Estimate of Customer Type GA and IA Cost of Service Adjusted for CAP [Schedule BV-3: Table SW-15]

LINE NO.	DESCRIPTION	(1) GA	(2) IA	(3) TOTAL
Stormwater (\$000s)				
RESIDENTIAL				
1	Residential Cost of Service (a)	\$ 16,407	\$ 65,696	\$ 82,103
NON-RESIDENTIAL				
2	Initial Non-Residential Cost of Service (b)	18,463	73,783	92,246
3	Adjustment for CAP (c)	401	1,602	2,003
4	Adjusted Non-Residential Cost of Service	18,864	75,385	94,249
5	Total GA & IA Cost of Service	\$ 35,271	\$ 141,081	\$ 176,352

(a) Calculated as Residential GA and IA square footage times the GA and IA unit cost.

(b) Total GA and IA Cost of Service LESS Residential cost of service.

(c) To recover Non-residential CAP Loss from the Non-residential stormwater customer class.

Table 8-21 Test Year 1 Estimate of Customer Type GA and IA Cost of Service Rates Prior to Discount and Lag Factor Adjustments [Schedule BV-3: Table SW-16]

Line No.	DESCRIPTION	(1) GA	(2) IA	(3) Total
GA and IA Cost of Service Rates				
1	Residential Monthly GA & IA Charge (a)	\$ 2.96	\$ 11.84	\$ 14.80
2	Non-Residential Monthly GA & IA Unit Cost (Adjusted for CAP)	0.72	5.04	
3	Impact of CAP on Non-Residential GA & IA Rate	\$ 0.02	\$ 0.11	

(a) Calculated based on Residential Mean GA (2,110 sf) and Mean IA (1,200 sf).

Table 8-22 Test Year 1 Stormwater Billing and Collection Unit Costs [Schedule BV-3: Table SW-17]

LINE NO.	DESCRIPTION	(1) UNITS	TEST YEAR
1	Stormwater Billing & Collection Annual Revenue Requirements	\$	12,859,192
2	Monthly Billable Accounts: Residential	# Accounts	464,171
3	Non-Residential Cost Weighting Factor (a)		1.3
4	Weighted Monthly Billable Accounts: Non-Residential	# Accounts	111,098
5	Total Weighted Monthly Billable Accounts (Line 2 + Line 4)	# Accounts	575,269
6	Annual Billable Accounts: Residential (Line 2 x 12)	# Accounts	5,570,056
7	Weighted Annual Billable Accounts: Non-Residential (Line 4 x 12)	# Accounts	1,333,171
8	Total Weighted Annual Billable Accounts (Line 6 + Line 7)	# Accounts	6,903,227
9	Residential Billing & Collection Unit Cost per Billing Cycle	\$/Unit	1.86
10	Non-Residential Billing & Collection Unit Cost per Billing Cycle (Line 9 x Line 3)	\$/Unit	2.42

(a) A higher weighting factor is assigned to non-residential due to the additional time and effort needed to address billing issues and parcel data issues for non-residential class, as the charges are individually calculated for each parcel.

Table 8-23 Test Year 1 Stormwater Adjusted Costs of Service After Discounts [Schedule BV-3: Table SW-18]

		(1)	(2)	(3)	(4)	(5)
LINE NO.	CUSTOMER TYPE	ALLOCATED COST OF SERVICE (a)	DISCOUNTS	ADJUSTED COST OF SERVICE WITH DISCOUNTS	RECOVERY OF DISCOUNTS (b)	ADJUSTED COST OF SERVICE
Stormwater (\$)						
Residential						
1	Non-Discount	\$ 86,919,403	\$ -	\$ 86,919,403	\$ 2,005,699	\$ 88,925,102
2	Discount - Non-PHA	4,715,364	(1,178,841)	3,536,523	81,607	3,618,129
3	Discount - PHA	844,101	(42,205)	801,896	18,504	820,400
Non-Residential						
4	Non-Discount	80,461,929		80,461,929	1,856,690	82,318,619
5	Discount - Non-PHA	11,803,839	(2,950,960)	8,852,879	204,284	9,057,163
6	Discount - PHA	1,414,712	(70,736)	1,343,976	31,013	1,374,989
Condominiums						
7	Non-Discount	2,945,086		2,945,086	67,959	3,013,045
8	Discount - Non-PHA	98,786	(24,697)	74,090	1,710	75,799
9	Discount - PHA	935	(47)	888	20	908
10	Total	\$ 189,204,154	\$ (4,267,485)	\$184,936,670	\$ 4,267,485	\$ 189,204,154

(a) Non-Residential Customer cost of service includes the cost of CAP.

(b) Reflects current policy of recovering discounts from all customer classes.

Table 8-24 and Table 8-25 compare the total adjusted cost of service for each customer type to their respective revenues under existing rates for sanitary sewer and stormwater, respectively. The indicated increase or decrease in the revenue required to meet the adjusted cost of service is shown in Column 3 of each table.

Table 8-24 Test Year 1 Distribution of Sanitary Sewer Cost of Service to Customer Types

LINE NO.	CUSTOMER TYPE	(1) REVENUE UNDER EXISTING RATES	(2) ADJUSTED COST OF SERVICE	(3) INDICATED INCREASE (DECREASE) REQUIRED
Sanitary Sewer (\$000s)				
1	Residential	\$ 125,152	\$ 132,049	5.5%
2	Commercial	51,703	54,537	5.5%
3	Industrial	2,303	2,411	4.7%
4	Public Utilities	346	367	5.9%
5	Senior Citizens	4,251	4,486	5.5%
6	Sewer Only	2,181	2,299	5.4%
7	Groundwater	2,968	2,821	-5.0%
8	Surcharge	4,862	5,581	14.8%
9	PHA	5,111	5,389	5.4%
10	Charities & Schools	4,152	4,390	5.7%
11	Hospital/University	6,879	7,245	5.3%
12	Hand Bill	13,591	14,317	5.3%
13	Private Fire	243	286	17.4%
14	Scheduled (Flat Rate)	1	0	-20.2%
15	Total Retail Service	223,744	236,178	5.6%
16	Total Wholesale	38,982	42,655	9.4%
17	Total System	\$ 262,726	\$ 278,833	6.1%

Table 8-25 Test Year 1 Distribution of Stormwater Cost of Service to Customer Types

LINE NO.	CUSTOMER TYPE	(1) REVENUE UNDER EXISTING RATES	(2) ADJUSTED COST OF SERVICE	(3) INDICATED INCREASE (DECREASE) REQUIRED
Stormwater (\$000s)				
Residential				
1	Non-Discount	\$ 79,913	\$ 88,925	11.3%
2	Discount - Non-PHA	3,261	3,618	11.0%
3	Discount - PHA	732	820	12.1%
Non-Residential				
4	Non-Discount	77,844	82,319	5.7%
5	Discount - Non-PHA	9,036	9,057	0.2%
6	Discount - PHA	1,309	1,375	5.0%
Condominiums				
7	Non-Discount	3,007	3,013	0.2%
8	Discount - Non-PHA	75	76	1.4%
9	Discount - PHA	1	1	0.1%
10	Total	\$ 175,178	\$ 189,204	8.0%

9. WASTEWATER SYSTEM RATE DESIGN

The revenue requirement and cost of service analyses described in the preceding sections of this Report provide a basis for the review and update of a schedule of sanitary sewer and stormwater rates that recover allocated cost of service. These studies are the results of engineering estimates, consideration of historical data and, to some extent, judgment and experience. Judgment must enter the final choice of rates, and factors such as public reaction to the extent of changes and adjustments, previous rate levels, contractual agreements, and past local practice are recognized in making rate adjustments.

Rates should be reasonably simple in application and subject to as few misinterpretations as possible. Considerations regarding the proposed rate adjustments reflect discussions with the Water Department staff and include the above considerations and the desire of the Water Department to maintain the existing structure for the Rate Period. This Report proposes sanitary sewer and stormwater user rates in accordance with these considerations.

The cost of service analysis described in the preceding section of this Report provides the basis for the design of sanitary sewer and stormwater rate schedules to cover the allocated cost for service for the Wastewater System.

The proposed charges for sanitary sewer service derived in this Report are applicable to General Service retail customers and recognize that certain retail customer types, including senior citizens, charities and schools, and the PHA, receive services at a discounted rate. Similarly, the proposed charges for stormwater derived in this Report are applicable to Retail Residential, Non-residential and Condominium stormwater customers and recognize these same discounts. The Water Department anticipates that the existing discounts (25 percent for senior citizens, charities and schools and 5 percent for PHA) will continue to be applicable for the entire Study Period.

In designing the proposed rates, we adjust the wastewater costs of service determined for each customer type to reflect the fact that these customer types will not pay full cost of service. Accordingly, we increase the proposed retail sanitary sewer and stormwater rates to recover this cost of service revenue reduction due to discounts.

Similar to the situation for water rates, the cost of service wastewater rates that are designed for Test Year-1 requires the application of a lag factor. The lag factor is calculated to recover only the anticipated receipts of the prorated revenue increase projected for FY 2021, recognizing the normally expected historical payment patterns. A lag factor of 1.044 is applied to the FY 2021 sanitary sewer and stormwater cost of service rates.

9.1. PROPOSED SANITARY SEWER RATES

The proposed sanitary sewer rates are designed based on the unit costs of service developed for the cost of service analysis. Since the sanitary sewer quantity charges are based on the water consumption volume, the unit costs of service are adjusted to eliminate the return factor reflected in the cost of service analysis. Table 9-1 presents the Unit Costs of Service adjusted for the basis of rate design. Column 1 of Table 9-1 presents the Unit Costs of Service developed for the wastewater cost of service analysis (Line 14 of Table 8-16). Columns 3 to 5 present the adjustment factors to account for discounts and billed water consumption. Column 6 presents the adjusted unit costs of service for rate design.

Table 9-1 Inside City Retail Service Unit Costs of Service for Rate Design [Schedule BV-1: Table WW-15]

LINE NO.	COST COMPONENT	(1) UNITS	(2) UNADJUSTED UNIT COST	(3) COS DEFICIT RECOVERY FACTOR	(4) BILLING UNITS CONVERSION FACTOR	(5) TOTAL ADJUSTMENT FACTOR	(6) ADJUSTED UNIT COST
Inside City Retail Service			\$/Unit				\$/Unit
Collection System							
Pumping Station							
1	Volume	Mcf	0.1615	1.0240	0.95	0.9728	0.1571
2	Capacity	Mcf/day	212.8551	1.0240	0.95	0.9728	207.0654
3	Sanitary Sewers - Capacity	Mcf/day	270.2392	1.0240	0.95	0.9728	262.8887
WPC Plants							
4	Volume	Mcf	2.1561	1.0240	0.95	0.9728	2.0975
5	Capacity	Mcf/day	204.4771	1.0240	0.95	0.9728	198.9153
6	Suspended Solids	1,000 lbs	286.2664	1.0240	1.00	1.0240	293.1368
7	BOD	1,000 lbs	274.5691	1.0240	1.00	1.0240	281.1588
Customer Costs							
8	Meter Costs	Eq. Meters	8.9308	1.0240	1.00	1.0240	9.1451
Billing Costs							
9	Sanitary	Eq. Bills	3.1167	1.0240	1.00	1.0240	3.1915
10	Industrial Waste Unit - Retail	Eq. Meters	6.8799	1.0240	1.00	1.0240	7.0450
11	Infiltration/Inflow - Customer Related	Eq. Meters	32.2273	1.0240	1.00	1.0240	33.0008
12	Infiltration/Inflow - Volume Related	Volume	16.4349	1.0240	0.95	0.9728	15.9879

Table 9-2 and Table 9-3 illustrate the development of the cost of service monthly service charge for customers with a 5/8-inch meter and the quantity charge for normal strength sanitary wastewater. Table 9-4 presents the proposed sanitary sewer rates for General Service customers applicable for Test Year 1 and Test Year 2. The proposed rates reflect a continuation of the existing rate structure, including a service charge which varies by meter size and a uniform quantity charge.

Table 9-2 Development of Cost of Service Monthly Service Charge for 5/8-inch Meter Customers [Schedule BV-1: Table WW-16]

LINE NO.	COST COMPONENT	(1) UNITS	(2) ADJUSTED UNIT COST (\$/unit)	(3) NUMBER OF UNITS	(4) TOTAL COST (\$)
Sanitary Sewer					
Customer Costs					
1	Meter Costs	Eq. Meter	\$ 0.7621	1.0	\$ 0.7621
2	Billing Costs	Eq. Bills	3.1915	1.0	3.1915
3	Industrial Waste Unit	Eq. Meter	0.5871	1.0	0.5871
4	Infiltration/Inflow Costs - Sanitary	Eq. Meter	2.7501	1.0	2.7501
5	Total Service Charge (a)				7.2908
6	Total Service Charge - Rounded (a)				\$ 7.29

(a) Prior to lag factor.

Table 9-3 Development of Cost of Service Quantity Charge for Normal Strength Sanitary Wastewater [Schedule BV-1: Table WW-17]

LINE NO.	COST COMPONENT	(1) UNITS	(2) ADJUSTED UNIT COST (\$/unit)	(3) NUMBER OF UNITS	(4) TOTAL COST (\$)
Sanitary Sewer					
Collection System					
	Pumping Stations				
1	Volume	Mcf	\$ 0.1571	1.0000	\$ 0.1571
2	Capacity (a)	Mcf/day/mo.	17.2555	0.0493	0.8507
3	Sanitary Sewers: Capacity (b)	Mcf/day/mo.	21.9074	0.1316	2.8830
Water Pollution Control Plants					
4	Volume	Mcf	2.0975	1.0000	2.0975
5	Capacity (a)	Mcf/day/mo.	16.5763	0.0493	0.8172
6	Suspended Solids (c)	1,000 lbs	293.1368	0.0162	4.7488
7	BOD (d)	1,000 lbs	281.1588	0.0175	4.9203
8	Total Cost per Mcf				16.4746
9	Infiltration/Inflow Cost	Mcf	15.9879	1.0000	15.9879
10	Total Cost + Infiltration/Inflow per Mcf (e)				32.4625
11	Total Cost per Mcf - Rounded (e)				\$ 32.46

 (a) $(1.0 \text{ Mcf} \times 1 \text{ month}/30.4 \text{ days}) \times 1.5$

 (b) $(1.0 \text{ Mcf} \times 1 \text{ month}/30.4 \text{ days}) \times 4.0$

(c) 1.0 Mcf @ 260 mg/l

(d) 1.0 Mcf @ 280 mg/l

(e) Prior to lag factor.

Table 9-4 Proposed FY 2021 and FY 2022 General Service Sanitary Sewer Rates [Schedule BV-1: Table WW-18]

LINE NO.	METER SIZE (inches)	(1) FY 2021 Monthly Charge	(2) FY 2022 Monthly Charge
METER BASED SERVICE CHARGE (\$/month)			
1	5/8	7.61	8.15
2	3/4	9.75	10.44
3	1	14.36	15.39
4	1 1/2	25.40	27.23
5	2	39.23	42.08
6	3	70.85	76.01
7	4	120.31	129.06
8	6	237.29	254.58
9	8	375.66	403.06
10	10	542.09	581.62
11	12	986.67	1,058.80
LINE NO.		FY 2021 Charge	FY 2022 Charge
QUANTITY CHARGE (\$/Mcf)			
12	All billable water usage	33.88	36.50
13	Groundwater Charge	13.08	13.96
LINE NO.		FY 2021 Charge	FY 2022 Charge
SURCHARGE RATES (\$/lb)			
14	BOD (excess of 250 mg/l)	0.448	0.478
15	SS (excess of 350 mg/l)	0.468	0.501
LINE NO.		FY 2021 Charge	FY 2022 Charge
SEPTIC HAULER RATES (\$/1,000 gallons)			
16	Sanitary Wastewater Delivered to WPCP (a)	66.45	71.02

(a) Based on BOD and SS Loading of 9,000 mg/l.

9.2. PROPOSED STORMWATER RATES

Table 9-5 illustrates the development of the Test Year 1 proposed rates for stormwater service. The proposed rates include recovery of provided discounts and application of the lag factor based upon the adjusted cost of service presented in Table 8-23.

Table 9-5 Development of Test Year 1 Stormwater Cost of Service Rates [Schedule BV-3: Table SW-19]

LINE NO.	SERVICE TYPE	(1) COST OF SERVICE RATE	(2) DISCOUNT RECOVERY FACTOR	(3) COST OF SERVICE RATE	(4) LAG FACTOR ADJUSTMENT	(5) PROPOSED RATE
Stormwater (\$)						
Billing & Collection Charge						
1	Residential	\$ 1.86	\$ 1.02	\$ 1.90	\$ 1.04	\$ 1.99
2	Non-Residential	2.42	1.02	2.47	1.04	2.58
3	Condominiums	2.42	1.02	2.47	1.04	2.58
IA/GA Charge						
4	Residential	14.80	1.02	15.14	1.04	15.81
	Non-Residential					
5	IA Charge	5.04	1.02	5.16	1.04	5.38
6	GA Charge	0.72	1.02	0.73	1.04	0.76
	Condominiums					
7	IA Charge	5.04	1.02	5.16	1.04	5.38
8	GA Charge	\$ 0.72	\$ 1.02	\$ 0.73	\$ 1.04	\$ 0.76

Notes: Non-Residential and Condominium have the same Billing & Collection and GA/IA rate

Table 9-6 and Table 9-7 summarize the FY 2021 and FY 2022 proposed stormwater rates for residential and non-residential customers respectively.

Table 9-6 Proposed FY 2021 and FY 2022 Residential Stormwater Rates [Schedule BV-3: Table SW-19A]

LINE NO.	DESCRIPTION	(1) FY 2021 MONTHLY CHARGE Charge	(2) FY 2022 MONTHLY CHARGE Charge
Residential Stormwater Service			
Stormwater Management Service Charge (\$/month/parcel)			
1	Charge Per Parcel	\$ 15.81	\$ 17.03
Billing and Collection Charge (\$/bill)			
2	Charge Per Bill	\$ 1.99	\$ 2.12

Table 9-7 Proposed FY 2021 and FY 2022 Non-Residential Stormwater Rates [Schedule BV-3: Table SW-19B]

LINE NO.	DESCRIPTION	(1) FY 2021 MONTHLY CHARGE	(2) FY 2022 MONTHLY CHARGE
Non-Residential Stormwater Service			
Stormwater Management Service Charge			
1	Min Charge	\$ 15.81	\$ 17.03
2	GA (per 500 sf)	0.765	0.825
3	IA (per 500 sf)	5.383	5.790
Billing and Collection Charge (\$/bill)			
4	Charge Per Bill	\$ 2.58	\$ 2.76

**In the Matter of the Philadelphia Water
Department's Proposed Change in Water,
Wastewater and Stormwater Rates and Related
Charges**

Fiscal Years 2021-2022

Philadelphia Water Department

Black & Veatch Management Consulting, LLC

Schedule BV-6

Dated: February 11, 2020

Schedule REF #		Schedule Name
BV-6 Black & Veatch Schedules		
1	WP-1	FINANCIAL PLAN – REVENUE AND REVENUE REQUIREMENT ASSUMPTIONS
2	WP-2	STORMWATER UNITS OF SERVICE
3	WP-3	COST RECOVERY OF DISCOUNTS, CREDITS, GRANTS, AND TAP
4	WP-4	SENIOR CITIZEN DISCOUNT THRESHOLD ADJUSTMENT

FINANCIAL PLAN: REVENUE & REVENUE REQUIREMENTS ASSUMPTIONS

SCHEDULE BV-6: WP-1

This document summarizes the assumptions used in developing the revenue and revenue requirement projections for the Philadelphia Water Department's (PWD or the Water Department) Financial Plan for the Fiscal Year (FY) 2020 - FY 2025 projection period (the study period) in conjunction with the FY 2021 - FY 2022 Rate Proceeding before the Philadelphia Water, Sewer and Stormwater Rate Board (the Rate Board). The assumptions presented in this document apply only to the development of revenue and revenue requirements as they relate to PWD's base rates, from which Tiered Assistance Program (TAP) revenue loss and TAP Rate Rider Surcharge Rate (TAP-R) revenues are excluded.

1. Revenue Projections

- a. Projected FY 2020 to FY 2025 service revenues under existing rates reflect the adopted FY 2020 rates (effective September 1, 2019).
- b. Total system accounts are anticipated to remain stable over the projection period.
- c. Projected water usage reflects the current number of accounts and the average usage per account based on historical demands, as presented in Appendix A.
- d. The usage per account is projected as follows:
 - i. For 5/8-inch meter General Service Customers usage per account is projected to decrease 2.00 percent per year during the study period; this is based on Black & Veatch's review of the historical 2- Year Average change shown in Table 1.
 - ii. For all other General Service Customers, usage per account is based upon the 2-year average billed volume per account and projected to remain flat based upon a review of long-term historical figures.

Table 1 – Historical Usage Per Account for General Service Customers (5/8" Meters)

Description	Historical (Fiscal Year)				
	2015	2016	2017	2018	2019
Annual Billed Volume Per Account (Mcf/Account)	7.32	7.02	6.93	6.75	6.64
Annual Change	0.69%	(4.10%)	(1.28%)	(2.60%)	(1.63%)
2 Year Average Change		(1.73%)	(2.70%)	(1.94%)	(2.11%)

The projected decrease in usage results in a projected decrease (in water and sewer retail revenues) of approximately (- \$12 million) during the rate period and a total of (- \$61 million) over the entire study period.

- e. Impervious Area (IA) and Gross Area (GA) billable square footage:
 - i. FY 2020 reflects current initial billing data (prior to the application of credits and appeals) as of June 30, 2019.

- ii. FY 2021 and beyond reflects full implementation of the updated IA and GA initial stormwater billing data.
- iii. Billing units for FY 2020 to FY 2025 include stormwater credits which are presented as a reduction in billable IA and GA square footage. The credits reflect an average incremental reduction of:
 - 18.7 million square feet of gross area per year; and
 - 7.9 million square feet of impervious area per year.

This reduction in square footage is primarily due to:

- 1. Projected increase in Non-surface and Surface Discharge Credits based upon the average 5-year growth in the number of parcels receiving credit and the associated average credit per parcel; and
- 2. Credits resulting from Stormwater Management Incentive Program/Greened Acre Retrofit Program (SMIP/GARP) grants:
 - Based upon the overall annual program budget of \$25 million;
 - Average grant award per greened acre, anticipated cost escalation and average project completion time.

Historical stormwater credit program information is provided in Appendix B.

- iv. Reductions are also anticipated as a result of appeals and other adjustments, amounting to a reduction of 0.8 million square foot in gross area per year and 0.3 million square foot reduction in impervious area per year.

Reductions in billable IA and GA square footage due to stormwater credits, equates to an average of (- \$22.1 million) per year in contra revenue. Overall annual contra revenue impacts from credits are anticipated to increase to (- \$26.7 million) per year by the end of the study period (based on existing rates).

- f. Projected revenues under existing rates reflect the anticipated cumulative receipts for the water, sanitary sewer, and stormwater services (including retail and wholesale receipts) each fiscal year. The receipts for each fiscal year are estimated based on the projected system billings and the associated projected collection factors.

Raftelis provided the projected collection factors for retail *Non-Stormwater Only* and *Stormwater Only* Customers, as detailed in Raftelis Report 4 and included in Appendix C. The collection factors represent the multi-year payment pattern for the following periods:

- **Billing Year** – All payments associated with a given fiscal year’s billing and received within the 12 months following the beginning of the fiscal year.
- **Billing Year Plus 1** - All payments associated with a given fiscal year’s billing and received within 13-24 months following the beginning of the fiscal year.

- **Billing Year Plus 2 and Beyond** - All payments associated with a given fiscal year's billing and received after 24 months following the beginning of the fiscal year.

Collection factors used in the financial plan analysis reflect the average collection factors for fiscal years provided in Raftelis Report 4.

The projected collection factors utilized in the financial plan analysis for FY 2020 to FY 2025 are presented in Table 2.

Table 2 – Projected Collection Factors

	Billing Year	Billing Year Plus 1	Billing Year Plus 2 and Beyond
Non-Stormwater Only	86.68%	8.74%	1.90%
Stormwater Only	63.19%	7.88%	6.57%

- Operating Fund and Rate Stabilization Fund interest earnings are estimated based on projected fund balances and 1.0 percent annual interest earnings rate.
- Miscellaneous and contra revenues are projected based on historical and budgeted levels as presented in Table 3.

Table 3 –Projected Miscellaneous and Contra Revenues

Description	Fiscal Years	Projection
Penalties¹	2020 – 2025	\$10.1 Million / Year to \$9.7 Million / Year
Other Miscellaneous Revenue²	2020 2021 – 2025	\$13.0 Million / Year \$13.4 Million / Year
Debt Service Reserve Release	2020	\$18.5 Million
State and Federal Grants³	2020 – 2025	\$1.0 Million / year
License and Inspection Permits³	2020 – 2025	\$4.6 Million / year
UESF Grants⁴	2020 – 2025	\$0.3 Million / year
Stormwater CAP⁵	2020 – 2025	(\$2.0) Million / Year

Notes:

1. Reflects 1.5 percent of billings under existing rates based on the two-year historical average from FY 2018 to FY 2019.
2. FY 2020 reflects budgeted amount. FY 2021 to FY 2025 are anticipated to remain essentially flat.
3. Reflects FY 2020 Budget amount.
4. FY 2020 to FY 2025 projection reflects anticipates Utility Emergency Services Fund (UESF) grant.
5. Stormwater CAP revenue loss is anticipated to remain constant due to the implementation of the updated stormwater billing data.

2. Operating Expenses

- a. Annual operating expenses are projected as follows:
 - i. For FY 2020, projected operating expenses are:
 1. Based upon the Water Fund's approved FY 2020 budget (as of December 2019). Note - the approved FY 2020 budget includes \$7 million additional budget to cover ongoing major maintenance of PWD infrastructure;
 2. Anticipated budget shift of \$5 million from electric costs to services (Operations Division Class 200) to cover ongoing major maintenance of PWD infrastructure; and
 3. Reflect the application of actual to budget factors to estimate anticipated expenses (discussed further below).
 - b. For FY 2021 through FY 2025, projected operating expenses are:
 - i. Based upon escalation of the FY 2020 projected operating expenses and reflect the escalation factors [discussed further in Section 2(d)]; and
 - ii. Include additional adjustments for planned increases in operating expenses.
- c. Actual to Budget Factors
 The Water Fund actual to budget spending levels of approximately 91.3 percent, reflect the 2-year historical average actual to budget factors from FY 2018 and FY 2019 (See Appendix D). Actual to Budget factors by cost classification for each Water Department Division and City Department (which budget costs to be funded by the Water Fund) reflect the two-year historical average of the actual to budget ratio, with the following exceptions:

Table 4 – Actual to Budget Factor Exceptions

Department	Class(es)	Description	Actual to Budget Factor
Water, Sewer and Stormwater Rate Board	100 and 200	Personnel and Services Costs	100%
Finance	200	SMIP/GARP	100%
Finance	800	Transfers	85.4% ¹
City Finance	100	Pension and Pension Obligations	100%
City Finance	100	Other Benefits	89.01% ²

Notes:

1. Reflects the 2-year historical average actual to budget factors from FY 2018 and FY 2019 adjusted to reflect the \$2.0 million decrease in the FY 2020 budget for Class 800 Expenses.
2. Reflects actual to budget factor adjustment to reflect estimated FY 2020 expense as provided by the Water Department.

d. Escalation Factors

Operating Expenses for FY 2021 through 2025 are projected by applying the annual escalation factors to the projected FY 2020 operating expenses by category as presented in Table 5.

Table 5 – Annual Escalation Factors

Class	Description	Fiscal Year – Annual Escalation Factor				
		FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
100	Labor Costs	2.90%	2.90%	2.90%	2.90%	2.90%
191	Pension	2.53%	1.45%	2.86%	1.39%	0.00%
190	Pension Obligations	0.00%	0.00%	0.00%	0.00%	0.00%
1xx	Benefits	5.27%	4.66%	4.51%	4.39%	4.29%
220	Power	3.00%	0.00%	0.50%	1.00%	1.00%
221	Gas	3.00%	0.00%	0.50%	1.00%	1.00%
200	Services	4.15%	4.15%	4.15%	4.15%	4.15%
200	Public Property - Leases	2.00%	2.00%	2.00%	2.00%	2.00%
307	Chemical Costs	5.00%	5.00%	5.00%	5.00%	5.00%
300	Materials and Supplies	2.90%	2.90%	2.90%	2.90%	2.90%
400	Equipment	2.00%	2.00%	2.00%	2.00%	2.00%
500	Indemnities	0.00%	0.00%	0.00%	0.00%	0.00%
800	Transfers	0.90%	0.90%	0.90%	0.90%	0.90%

- The escalation factors for Labor costs are based on the prior average annual salary increases under the current labor agreement.
- The pension and benefit cost escalation factors are based on the cost increases reflected in the City's current projections.
- The escalation factors for Power and Gas are based on City Energy Office estimates (see Appendix I).
- The escalation factors for Chemicals are based a review of the 2-year and 3-year average annual increase per PWD's recent experience and the 2-year and 3-year average increase per Producer Price Index (PPI) for Industrial Chemicals.
- The escalation factors for Public Property – Leases are based a comparison of the 2-year and 3-year average annual increase per PWD's recent experience.
- The escalation factor for equipment is based upon the 2-year and 3-year average increase per PPI for Construction Equipment and Machinery.
- The escalation factor for Materials and Supplies is based upon the 5-year average annual increase per PWD's experience.
- No escalation factor is applied for Indemnities for FY 2021 through FY 2025.

- The escalation factor for Transfers is based upon the 5-year average annual increase per PWD's experience.

PWD's long-term historical O&M costs are presented in Appendix E. Relevant O&M cost industry indices are provided in Appendix F.

e. Adjustments

Projected Operating Expenses also include adjustments as presented in Table 6.

Table 6 – Additional Adjustments for Projected Operating Expenses

Department	Class	Fiscal Year(s)	Adjustment Amount	Purpose
Operations	100	2021 to 2025	\$0.5 to \$0.9 Million	Additional Water Department staff costs related to regulatory compliance.
Construction & Engineering	100	2021 to 2025	\$1.1 Million to \$7.8 Million	Transition of staff salaries from Capital Funded Positions to O&M Funded.
Planning & Environmental Services	100	2021 to 2025	\$0.7 Million to \$2.1 Million	Transition of staff salaries from Capital Funded Positions to O&M Funded.
Operations	100	2020 to 2025	\$3.0 Million to \$3.5 Million	Functional fire hydrant testing as provided by the Fire Department.
Division of Technology	200	2020	\$3.2 Million	Various AMI related matters.
City Finance	100	2021 to 2025	\$0.4 to \$0.8 Million	Additional pension and benefits costs associated with additional staff noted above. Costs are estimated as 83 percent of salaries based upon the City's FY 2019 estimate of fringe costs as a percentage of salaries (as provided).

f. Liquidated Encumbrances

Liquidated encumbrances for FY 2020 thru FY 2025 are projected to be 17.2 percent of projected Services (class 200) and Materials and Supplies (class 300) expenses excluding SMIP/GARP. The projection is based on the average of the actual ratio of liquidated encumbrances to expenses for Services (class 200) and Materials and Supplies (class 300) experienced in FY 2017 to FY 2019. SMIP/GARP is excluded from this ratio as the budget has been fully expended.

3. Debt Service

a. Existing debt service reflects the actual debt service schedules for the following issuances:

- All Water and Wastewater Revenue Bonds and Revenue Refunding Bonds issued prior to July 1, 2019.

- ii. Water and Wastewater Revenue Refunding Bonds Series 2019A (issued in FY 2020).
 - iii. Forward refunding of Water and Wastewater Revenue Bonds Series 2011A (to be issued in FY 2021).
- b. Projected debt service reflects the following anticipated bond issues and assumed interest rates:
 - i. FY 2021 - \$400 Million at 5.25 percent
 - ii. FY 2022 - \$445 Million at 5.25 percent
 - iii. FY 2023 - \$480 Million at 5.25 percent
 - iv. FY 2024 - \$525 Million at 5.25 percent
 - v. FY 2025 - \$520 Million at 5.25 percent
- c. Projected debt service for the anticipated bond issues in FY 2021 to 2025 reflect:
 - i. bond issuance in the first quarter of the fiscal year with November and May interest payments;
 - ii. interest only payments for the first year of the bond amortization; and
 - iii. bond issuance cost of 0.59 percent based upon the Water and Wastewater Revenue Bonds Series 2019A and 2019B issues.
- d. The existing and proposed debt service payments over the study period are presented in Appendix G.

4. Bond Covenants, Transfers, and Fund Balances

- a. Senior Debt Coverage:
 - i. The General Bond Ordinance rate covenant requires minimum senior debt service coverage of 1.20.
 - ii. The General Bond Ordinance rate covenant requires the City to establish rates and charges for use by the Water and Wastewater systems sufficient to yield Net Revenues (excluding amounts transferred from the Rate Stabilization Fund into the Revenue Fund during, or as of the end of, such fiscal year) at least equal to 90 percent of the Debt Service Requirements (excluding debt service due on any Subordinated Bonds) in such fiscal year.
 - iii. In accordance with the 2018 Rate Determination, the Water Department has targeted a debt service coverage of 1.30 for the study period.
 - iv. The General Bond Ordinance rate covenant requires minimum total debt coverage of 1.00.
- b. Capital Account Deposit.
 - i. Projected FY 2021 to FY 2025 Capital Account Deposit is based on the following assumptions:
 - a. Inflated net plant investment of 8.0 percent per year based on the average annual increase in net plant investment during FY 2018 and FY 2019.
 - b. Annual Capital Account Deposit is based on 1.0 percent of the prior year projected net plant investment (original cost less depreciation).
- c. Residual Transfer to Construction.
 - i. Projected transfers are made as available.
 - ii. The end-of-year Residual Fund balance is maintained at \$15.0 million for the study period.
- d. Rate Stabilization Fund Transfers.

- i. In accordance with the 2018 Rate Determination, the Water Department has a Rate Stabilization Fund balance target of approximately \$135 million.
- e. Beginning Fund Balances.
 - i. The FY 2020 beginning fund balances are based on the preliminary FY 2019 financial results.

5. Capital Program

Total capital program for the study period is estimated as shown in Table 7.

The projected capital program is based on the Department's adopted FY 2020 capital program and proposed FY 2021 to FY 2026 capital program (note - FY 2026 is outside of the study period for this analysis).

- The Department's CIP Budget is an appropriation-based budget and reflects the following:
 - The budget for each respective fiscal year represents the total cost of the capital improvements expected to be let in that fiscal year;
 - The Department's total CIP Budget does not represent expected project duration or anticipated cashflows;
 - The Department's CIP budget includes contingencies; and
 - The Department's CIP Budget does not include inflation.
- The CIP Budget includes improvements related to the Department's Drinking Water Master Plan for which detailed project plans and cashflows have been developed.

Taking the above factors into consideration, Black & Veatch adjusted the Department's CIP Budget to develop projected spending for each fiscal year to reflect the following:

- The shift in positions from the Capital Fund to the O&M Fund (as previously noted in Section 2 of this document);
- Annual inflation of 3.0 percent based on industry construction cost indices, for FY 2022 to FY 2025 capital program costs (relevant capital cost industry indices are provided in Appendix H);
- Estimated cashflows for Drinking Water Master Plan improvements as provided by the Water Department;
- Anticipated program level project durations, for improvements without detailed cashflow estimates, as follows:
 - Water Conveyance – 2 years;
 - Sewer Collection – 3 years;
 - Facilities Improvements – 5 years; and
- Removal of contingency, by applying an estimated 90 percent spend factor to the estimated annual cash need.

The overall resulting CIP spending estimate, reflecting the above noted adjustments is reflected in the table below.

Table 7 –Projected Capital Program Budget and Annual Expenditures

Line No.	Description	2020	2021	2022	2023	2024	2025
1	Engineering and Administration (a)	16,047	13,865	12,141	10,381	8,621	6,861
2	Plant Improvements	120,000	328,000	259,200	356,500	190,200	301,200
3	Distribution System Rehabilitation	78,060	93,060	101,060	172,160	117,460	108,060
4	Large Meter Replacement	35,000	5,000	5,000	5,000	5,000	5,000
5	Storm Flood Relief	10,000	15,000	15,000	15,000	15,000	15,000
6	Reconstruction of Sewers	67,800	72,460	67,860	67,860	67,860	67,860
7	Green Infrastructure	62,000	72,000	72,000	72,000	72,000	72,000
8	Vehicles	12,000	12,000	12,000	12,000	12,000	12,000
9	Total Improvements	400,907	611,385	544,261	710,901	488,141	587,981
10	Inflation Adjustment (b)	-	-	16,328	43,294	45,264	73,797
11	Inflated Total	400,907	611,385	560,589	754,195	533,405	661,778
12	Cash Flow Adjustment (c)	(45,120)	(175,475)	(51,660)	(240,867)	35,109	(106,239)
13	Net Cash Financing Required	355,787	435,911	508,928	513,328	568,514	555,538

(a) Beginning in FY 2017, Engineering and Administration Costs no longer include pension and benefits costs per City policy.

(b) Allowance for inflation of 3.0 percent per year after fiscal year 2021.

(c) Reflects adjustment to annual capital budget appropriations for project duration and contingency to reflect anticipated annual expenditures.

Appendix A

Billed Volume per Account

Annual Billed Volume Per Account (Mcf/Account)						
Customer Type	USE	Historical Averages		Historical Usage Per Account		
	FY 2020	2 Year	3 Year	FY 2017	FY 2018	FY 2019
Senior Citizens (Special Customer Group II)						
5/8" Meter	5.45	5.45	5.42	5.35	5.37	5.54
> 5/8" Meter	6.54	6.54	5.91	4.64	7.37	5.71
General Service (Residential)						
5/8" Meter	6.48	6.48	6.57	6.73	6.54	6.42
> 5/8" Meter	43.49	43.49	47.04	54.15	46.68	40.30
General Service (Commercial)						
5/8" Meter	10.71	10.71	10.81	11.03	10.87	10.55
> 5/8" Meter	149.35	149.35	151.75	156.57	152.07	146.62
General Service (Industrial)						
5/8" Meter	12.71	12.71	12.29	11.46	12.40	13.01
> 5/8" Meter	216.73	216.73	197.22	158.21	164.12	269.34
General Service (Public Utilities)						
5/8" Meter	9.77	9.77	9.90	10.15	11.15	8.39
> 5/8" Meter	86.84	86.84	102.40	133.54	89.75	83.92
General Service (Excluding Senior Citizens)						
5/8" Meter	NA	6.76	6.84	7.01	6.82	6.69
> 5/8" Meter	NA	100.65	104.23	111.39	103.38	97.92
General Service (Including Senior Citizens)						
5/8" Meter	NA	6.69	6.77	6.93	6.75	6.64
> 5/8" Meter	NA	100.61	104.18	111.34	103.34	97.88
PHA (Special Customer Group IV)						
Charities & Schools (Special Customer Group I)	72.66	72.66	72.75	72.95	72.42	72.89
Hospital/University (Special Customer Group III)	713.72	713.72	672.48	590.00	721.88	705.56
Hand Bill	1,864.84	1,864.84	1,955.45	2,136.67	1,951.17	1,778.52
Scheduled	3.73	3.73	3.62	3.40	3.30	4.17
Fire Service	2.51	2.51	2.73	3.18	3.48	1.53

Note: The volumes presented above represent the average annual billed volume per account for all accounts within the respective customer type. These figures differ from the typical customer consumption used to estimate the typical customer bills for residential, senior citizen and small commercial customers.

Appendix B

Stormwater Credit Historical Data

Annual Credit Summary															
FY 2013 - 2019															
NON SURFACE DISCHARGE CREDITS															
Line #	Fiscal Year Ending June 30,	Number of Parcels	Total Gross Credit	Total Impervious Credit	Open Space GA Credit	IA Managed Credit	GA Managed Credit	IA NPDES Credit	GA NPDES Credit	Parcel Growth/Change	Open Space GA Credit (Per Parcel)	IA Managed Credit (Avg Per parcel)	GA Managed Credit (Avg per parcel)	IA NPDES Credit (Avg per parcel)	GA NPDES Credit (Avg per parcel)
1	2013	525	84,747,750	16,965,996	69,085,002	11,130,986	9,872,244	-	-		131,549	21,195	18,798	-	-
2	2014	642	86,500,424	19,124,571	63,326,060	12,070,526	10,812,253	-	-	117	98,639	18,801	16,842	-	-
3	2015	663	94,398,657	22,691,859	53,896,318	12,685,643	10,164,813	-	-	21	81,292	19,134	15,332	-	-
4	2016	679	108,697,253	28,066,799	56,138,882	14,669,162	13,347,402	-	-	16	82,730	21,617	19,670	-	-
5	2017	710	118,238,063	32,929,915	60,956,631	15,820,906	14,421,521	-	-	31	85,895	22,293	20,322	-	-
6	2018	793	141,495,194	37,199,643	71,407,595	17,299,828	15,902,204	-	-	83	90,095	21,827	20,064	-	-
7	2019	784	146,753,255	39,908,576	63,714,784	17,050,405	15,847,492	-	-	(8)	81,226	21,736	20,203	-	-
8	5-Yr Average	726	121,916,484	32,159,359	61,222,842	15,505,189	13,936,686	-	-	28	84,247	21,322	19,118	-	-
SURFACE DISCHARGE CREDITS															
Line #	Fiscal Year Ending June 30,	Number of Parcels	Total Gross Credit	Total Impervious Credit	Open Space GA Credit	IA Managed Credit	GA Managed Credit	IA NPDES Credit	GA NPDES Credit	Parcel Growth/Change	Open Space GA Credit (Per Parcel)	IA Managed Credit (Avg Per parcel)	GA Managed Credit (Avg per parcel)	IA NPDES Credit (Avg per parcel)	GA NPDES Credit (Avg per parcel)
1	2013	133	118,501,030	46,892,242	65,392,938	42,960,119	42,972,144	1,500,033	2,547,115		65,392,805	42,959,986	42,972,010	11,264	19,127
2	2014	189	144,562,526	51,013,477	92,109,527	46,992,515	47,123,124	1,543,214	2,630,144	56	92,109,339	46,992,327	47,122,936	8,180	13,941
3	2015	229	167,879,689	57,904,570	115,367,033	53,569,632	45,235,716	1,539,184	2,610,514	40	115,366,805	53,569,403	45,235,487	6,734	11,420
4	2016	262	185,355,344	60,025,975	123,975,196	55,926,825	53,378,640	1,307,952	2,203,393	33	123,974,934	55,926,563	53,378,378	4,994	8,413
5	2017	284	191,033,886	61,869,788	122,589,452	58,946,451	58,969,427	256,680	439,202	22	122,589,169	58,946,168	58,969,143	904	1,547
6	2018	315	225,185,675	64,743,525	150,625,248	61,795,186	61,816,884	499,494	1,778,914	31	150,624,933	61,794,871	61,816,570	1,587	5,653
7	2019	313	240,774,037	65,802,749	164,843,954	62,766,109	62,803,953	675,769	3,018,058	(2)	164,843,641	62,765,797	62,803,641	2,162	9,658
8	5-Yr Average	280	202,045,726	62,069,321	135,480,177	58,600,841	56,440,924	855,816	2,010,016	25	135,479,896	58,600,560	56,440,644	3,276	7,338
SMIP /GARP CREDITS															
Line #	Fiscal Year Ending June 30,	Number of Parcels	Total Gross Credit	Total Impervious Credit	Open Space GA Credit	IA Managed Credit	GA Managed Credit	IA NPDES Credit	GA NPDES Credit	Parcel Growth/Change	Open Space GA Credit (Per Parcel)	IA Managed Credit (Avg Per parcel)	GA Managed Credit (Avg per parcel)		
1	2013	-	-	-	-	-	-	-	-	-					
2	2014	1	23,176	8,721	14,455	8,721	8,721	-	-	1	14,455	8,721	8,721		
3	2015	6	1,466,634	2,339,769	684,031	2,314,367	779,365	-	-	5	122,513	414,513	139,588		
4	2016	13	2,880,807	3,979,857	1,322,491	3,877,799	1,595,853	-	-	8	99,187	290,835	119,689		
5	2017	28	6,871,610	5,905,291	3,476,031	5,751,925	3,448,930	-	-	14	125,262	207,277	124,286		
6	2018	36	8,895,134	6,846,530	4,586,577	6,632,712	4,301,275	-	-	8	127,405	184,242	119,480		
7	2019	45	10,770,601	7,731,492	5,609,063	7,448,894	5,161,539	-	-	9	126,046	167,391	115,990		
8	5-Yr Average	17	6,176,957	5,360,588	3,135,639	5,205,139	3,057,392	-	-	9	120,083	252,852	123,806		

Note: Historical growth in the number of parcels receiving credit and average credit per parcel are not utilized in developing for SMIP/GARP projections. SMIP/GARP Projections are based upon program budget, average grant award amount per greened acre and estimated completion timeline.

Appendix C

Retail Non-Stormwater Only and Stormwater Only Collection Factor Calculations

Non-Stormwater Only Customers	Collection Factors		
	Billing Year (Payments within 12 months)	Billing Year Plus 1 (Payments w/in 13-24 months)	Billing Year Plus 2 and Beyond (Payment after 24 months)
<i>FY 2012</i>	84.15%	9.66%	2.63%
<i>FY 2013</i>	84.83%	9.81%	2.56%
<i>FY 2014</i>	86.19%	8.63%	2.23%
<i>FY 2015</i>	87.15%	8.26%	1.85%
<i>FY 2016</i>	87.68%	8.31%	1.35%
<i>FY 2017</i>	88.16%	8.17%	0.81%
<i>FY 2018</i>	87.89%	8.36%	
<i>FY 2019</i>	86.87%		
Average	86.68%	8.74%	1.90%

Stormwater Only Customers	Collection Factors		
	Billing Year (Payments within 12 months)	Billing Year Plus 1 (Payments w/in 13-24 months)	Billing Year Plus 2 and Beyond (Payment after 24 months)
<i>FY 2012</i>	59.22%	9.22%	8.69%
<i>FY 2013</i>	60.84%	7.49%	8.21%
<i>FY 2014</i>	59.07%	5.99%	8.35%
<i>FY 2015</i>	59.50%	8.17%	6.57%
<i>FY 2016</i>	64.65%	8.15%	4.91%
<i>FY 2017</i>	66.74%	7.86%	2.69%
<i>FY 2018</i>	67.26%	8.22%	
<i>FY 2019</i>	68.27%		
Average	63.19%	7.88%	6.57%

Source: Raftelis Report 4

Appendix D

Actual to Budget Factors

Actual to Budget Factors														
	Factor Used	Historical Average			Actual to Budget Factor			Actual O&M Expense			Budgeted O&M Expense			
		2 Year	3 Year	5 Year	2019	2018	2017	2019	2018	2017	2019	2018	2017	
Human Resources and Administration														
Salaries & Wages	100	91.75%	91.75%	94.16%	94.66%	95.25%	88.39%	100.00%	\$ 9,009,476	\$ 8,707,658	\$ 7,948,131	\$ 9,459,000	\$ 9,851,135	\$ 7,948,132
Services	200	62.11%	62.11%	64.77%	67.80%	53.05%	73.81%	69.78%	\$ 2,997,589	\$ 3,228,503	\$ 3,710,260	\$ 5,650,000	\$ 4,374,100	\$ 5,316,800
Materials and Supplies	300	77.13%	77.13%	70.59%	65.79%	79.73%	74.57%	57.67%	\$ 899,390	\$ 859,256	\$ 664,311	\$ 1,128,000	\$ 1,152,218	\$ 1,151,988
Equipment	400	53.50%	53.50%	71.09%	66.35%	29.24%	85.49%	100.00%	\$ 214,297	\$ 475,462	\$ 783,911	\$ 733,000	\$ 556,190	\$ 783,911
Indemnities	500	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	\$ -	\$ -	\$ -	\$ 100,000	\$ 100,000	\$ 100,000
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Human Resources and Administration			79.72%	81.60%	82.10%	76.86%	82.77%	85.66%	\$ 13,120,752	\$ 13,270,879	\$ 13,106,613	\$ 17,070,000	\$ 16,033,643	\$ 15,300,831
Finance														
Salaries & Wages	100	77.89%	77.89%	81.05%	83.38%	64.96%	98.72%	89.31%	\$ 3,193,307	\$ 3,012,527	\$ 2,725,589	\$ 4,916,034	\$ 3,051,659	\$ 3,051,659
Services	200	91.65%	91.65%	95.46%	77.20%	93.18%	90.27%	103.24%	\$ 7,328,266	\$ 7,882,538	\$ 8,384,056	\$ 7,865,000	\$ 8,731,808	\$ 8,120,759
SMIP/GARP	2xx	100.00%	100.00%	97.57%	103.58%	100.00%	100.00%	90.00%	\$ 25,000,000	\$ 26,900,000	\$ 15,000,000	\$ 25,000,000	\$ 26,900,000	\$ 16,666,841
Materials and Supplies	300	61.29%	61.29%	64.17%	25.73%	72.01%	54.06%	69.53%	\$ 46,807	\$ 52,064	\$ 60,298	\$ 65,000	\$ 96,305	\$ 86,725
Equipment	400	76.71%	76.71%	62.56%	37.37%	63.80%	108.98%	0.00%	\$ 26,798	\$ 18,309	\$ -	\$ 42,000	\$ 16,800	\$ 13,300
Indemnities	500	0.00%	0.00%	0.00%	0.00%	0.00%			\$ -	\$ -	\$ -	\$ 10,000	\$ -	\$ -
Transfers	800	85.40%	69.87%	88.61%	75.29%	73.21%	66.54%	134.41%	\$ 8,052,752	\$ 7,319,325	\$ 12,097,064	\$ 11,000,000	\$ 11,000,000	\$ 9,000,000
Subtotal Finance			90.01%	93.71%	88.72%	89.26%	90.74%	103.59%	\$ 43,647,930	\$ 45,184,763	\$ 38,267,007	\$ 48,898,034	\$ 49,796,572	\$ 36,939,284
Construction and Engineering														
Salaries & Wages	100	79.47%	79.47%	79.76%	83.41%	77.94%	81.84%	80.69%	\$ 2,225,368	\$ 1,513,130	\$ 1,187,885	\$ 2,855,352	\$ 1,848,821	\$ 1,472,207
Services	200	88.83%	88.83%	71.77%	67.55%	84.05%	96.68%	34.57%	\$ 1,141,400	\$ 799,991	\$ 346,543	\$ 1,358,000	\$ 827,500	\$ 1,002,500
Materials and Supplies	300	41.03%	41.03%	35.11%	37.45%	45.14%	38.04%	24.60%	\$ 63,643	\$ 73,576	\$ 46,356	\$ 141,000	\$ 193,420	\$ 188,440
Equipment	400	7.46%	7.46%	12.26%	13.11%	6.65%	10.57%	35.69%	\$ 15,632	\$ 6,486	\$ 21,649	\$ 235,000	\$ 61,350	\$ 60,650
Indemnities	500	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Construction and Engineering			77.64%	72.64%	73.45%	75.09%	81.65%	58.83%	\$ 3,446,043	\$ 2,393,183	\$ 1,602,433	\$ 4,589,352	\$ 2,931,091	\$ 2,723,797

Note: Spend factors using 2-year average highlighted yellow and exceptions are highlighted in blue.

Actual to Budget Factors (Continued)

	Factor Used	Historical Average			Actual to Budget Factor			Actual O&M Expense			Budgeted O&M Expense			
		2 Year	3 Year	5 Year	2019	2018	2017	2019	2018	2017	2019	2018	2017	
Operations														
Salaries & Wages	100	96.40%	96.40%	97.20%	97.54%	95.51%	97.33%	98.94%	\$ 80,747,114	\$ 79,570,651	\$ 74,937,545	\$ 84,546,676	\$ 81,757,426	\$ 75,736,594
Services	200	96.27%	96.27%	97.72%	94.56%	95.28%	97.41%	101.08%	\$ 76,327,780	\$ 67,977,576	\$ 65,234,449	\$ 80,109,026	\$ 69,784,843	\$ 64,537,200
Power	220	79.93%	79.93%	79.35%	77.58%	71.03%	90.39%	78.46%	\$ 13,854,363	\$ 15,002,114	\$ 18,252,847	\$ 19,505,474	\$ 16,596,570	\$ 23,265,000
Gas	221	85.11%	85.11%	75.21%	78.84%	85.06%	85.17%	57.35%	\$ 4,652,000	\$ 3,855,757	\$ 3,176,528	\$ 5,469,000	\$ 4,527,170	\$ 5,538,900
Materials and Supplies	300	82.68%	82.68%	84.63%	83.77%	81.40%	84.03%	88.58%	\$ 16,573,700	\$ 16,189,484	\$ 17,375,608	\$ 20,361,000	\$ 19,266,793	\$ 19,615,689
Chemicals	307	97.50%	97.50%	93.60%	93.70%	95.57%	99.53%	85.59%	\$ 22,115,310	\$ 21,771,176	\$ 18,728,508	\$ 23,141,000	\$ 21,872,905	\$ 21,880,928
Equipment	400	78.15%	78.15%	73.22%	75.03%	87.17%	63.25%	52.50%	\$ 4,195,679	\$ 1,845,043	\$ 964,973	\$ 4,813,000	\$ 2,916,897	\$ 1,838,140
Indemnities	500	0.00%		0.00%	0.00%			0.00%	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,000
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Operations			93.40%	93.44%	92.21%	91.81%	95.15%	93.53%	\$ 218,465,946	\$ 206,211,801	\$ 198,670,458	\$ 237,945,176	\$ 216,722,604	\$ 212,413,451
Planning & Environmental Services														
Salaries & Wages	100	96.46%	96.46%	95.89%	96.67%	100.74%	92.14%	94.70%	\$ 14,956,269	\$ 13,558,767	\$ 13,465,491	\$ 14,847,000	\$ 14,714,696	\$ 14,219,367
Services	200	96.22%	96.22%	97.08%	95.71%	96.29%	96.14%	98.45%	\$ 19,507,659	\$ 16,333,568	\$ 23,055,720	\$ 20,259,000	\$ 16,989,043	\$ 23,419,092
Materials and Supplies	300	86.24%	86.24%	85.08%	81.83%	87.91%	84.00%	82.87%	\$ 1,680,851	\$ 1,200,234	\$ 1,448,059	\$ 1,912,000	\$ 1,428,850	\$ 1,747,285
Equipment	400	64.45%	64.45%	61.00%	50.57%	41.09%	91.22%	51.96%	\$ 385,416	\$ 746,607	\$ 348,946	\$ 938,000	\$ 818,441	\$ 671,513
Indemnities	500	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Planning & Environmental Services			95.08%	95.29%	94.56%	96.24%	93.78%	95.66%	\$ 36,530,195	\$ 31,839,176	\$ 38,318,216	\$ 37,956,000	\$ 33,951,030	\$ 40,057,257
Public Affairs														
Salaries & Wages	100	91.87%	91.87%	90.27%	90.03%	100.64%	83.69%	84.62%	\$ 4,922,385	\$ 4,390,923	\$ 2,420,693	\$ 4,891,060	\$ 5,246,556	\$ 2,860,744
Services	200	99.18%	99.18%	96.72%	94.14%	98.81%	99.55%	91.33%	\$ 8,327,583	\$ 8,700,798	\$ 7,167,949	\$ 8,428,000	\$ 8,740,488	\$ 7,848,700
Materials and Supplies	300	75.98%	75.98%	69.44%	65.84%	77.49%	74.41%	54.60%	\$ 432,412	\$ 401,159	\$ 264,012	\$ 558,000	\$ 539,124	\$ 483,500
Equipment	400	14.37%	14.37%	11.08%	59.99%	9.76%	19.14%	4.39%	\$ 1,562	\$ 2,966	\$ 681	\$ 16,000	\$ 15,500	\$ 15,500
Indemnities	500	94.25%	94.25%	95.82%	95.82%	89.13%	100.00%	100.00%	\$ 500,000	\$ 500,000	\$ 400,000	\$ 561,000	\$ 500,000	\$ 400,000
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Public Affairs			95.54%	93.50%	91.95%	98.13%	93.05%	88.33%	\$ 14,183,942	\$ 13,995,846	\$ 10,253,335	\$ 14,454,060	\$ 15,041,668	\$ 11,608,444

Note: Spend factors using 2-year average highlighted yellow and exceptions are highlighted in blue.

Actual to Budget Factors (Continued)														
	Factor Used		Historical Average			Actual to Budget Factor			Actual O&M Expense			Budgeted O&M Expense		
			2 Year	3 Year	5 Year	2019	2018	2017	2019	2018	2017	2019	2018	2017
Division of Technology														
Salaries & Wages	100	83.48%	83.48%	86.30%	86.96%	81.24%	85.95%	93.10%	\$ 6,502,251	\$ 6,236,674	\$ 5,893,231	\$ 8,003,747	\$ 7,256,281	\$ 6,330,207
Services	200	72.69%	72.69%	74.36%	75.16%	72.86%	72.50%	78.53%	\$ 15,249,284	\$ 13,806,992	\$ 12,605,190	\$ 20,930,724	\$ 19,043,874	\$ 16,050,511
Materials and Supplies	300	69.65%	69.65%	72.35%	69.57%	64.90%	75.00%	79.91%	\$ 1,967,863	\$ 2,025,326	\$ 1,634,654	\$ 3,032,350	\$ 2,700,550	\$ 2,045,628
Equipment	400	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Division of Technology			75.10%	77.20%	77.77%	74.20%	76.10%	82.42%	\$ 23,719,398	\$ 22,068,992	\$ 20,133,075	\$ 31,966,821	\$ 29,000,705	\$ 24,426,346
Mayor's Office of Transportation & Utilities and Office of Sustainability														
Salaries & Wages	100	100.00%	100.00%	100.00%	99.67%	100.00%	100.00%	100.00%	\$ 202,424	\$ 202,424	\$ 202,424	\$ 202,424	\$ 202,424	\$ 202,424
Services	200	100.00%	100.00%	98.89%	99.17%	100.00%	100.00%	96.67%	\$ 30,000	\$ 30,000	\$ 29,000	\$ 30,000	\$ 30,000	\$ 30,000
Materials and Supplies	300	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Equipment	400	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Mayor's Office of Transportation & Utilities			100.00%	99.86%	99.62%	100.00%	100.00%	99.57%	\$ 232,424	\$ 232,424	\$ 231,424	\$ 232,424	\$ 232,424	\$ 232,424
Philadelphia Water, Sewer and Stormwater Rate Board														
Salaries & Wages	100	100.00%	14.00%	9.36%	9.36%	0.00%	18.67%	3.17%	\$ -	\$ 22,404	\$ 3,800	\$ 40,000	\$ 120,000	\$ 120,000
Services	200	100.00%	34.28%	25.39%	25.39%	0.00%	54.44%	11.28%	\$ -	\$ 462,749	\$ 95,851	\$ 500,000	\$ 850,000	\$ 850,000
Materials and Supplies	300	100.00%	0.00%	0.00%	0.00%	0.00%			\$ -	\$ -	\$ -	\$ 25,000	\$ -	\$ -
Equipment	400	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Philadelphia Water, Sewer and Stormwater Rate Board						0.00%	50.02%	10.27%	\$ -	\$ 485,153	\$ 99,651	\$ 565,000	\$ 970,000	\$ 970,000

Note: Spend factors using 2-year average highlighted yellow and exceptions are highlighted in blue.

Actual to Budget Factors (Continued)														
	Factor Used	Historical Average			Actual to Budget Factor			Actual O&M Expense			Budgeted O&M Expense			
		2 Year	3 Year	5 Year	2019	2018	2017	2019	2018	2017	2019	2018	2017	
Public Property														
Salaries & Wages	100	0.00%						\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Leases	200	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	\$ 4,265,847	\$ 4,256,817	\$ 4,042,633	\$ 4,265,847	\$ 4,256,817	\$ 4,042,633	
Materials and Supplies	300	0.00%						\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Equipment	400	0.00%						\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	0.00%						\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transfers	800	0.00%						\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Public Property			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	\$ 4,265,847	\$ 4,256,817	\$ 4,042,633	\$ 4,265,847	\$ 4,256,817	\$ 4,042,633
Fleet Management														
Salaries & Wages	100	94.40%	94.40%	94.78%	91.48%	94.35%	94.44%	95.55%	\$ 2,909,020	\$ 2,891,880	\$ 2,925,816	\$ 3,083,114	\$ 3,062,196	\$ 3,062,196
Services	200	84.55%	84.55%	88.10%	92.58%	99.48%	69.63%	95.20%	\$ 1,481,230	\$ 1,036,762	\$ 1,417,465	\$ 1,489,000	\$ 1,489,000	\$ 1,489,000
Materials and Supplies	300	76.81%	76.81%	77.82%	84.62%	72.08%	81.54%	79.83%	\$ 3,081,353	\$ 3,485,331	\$ 3,412,351	\$ 4,274,640	\$ 4,274,640	\$ 4,274,640
Equipment	400	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Fleet Management			84.23%	85.44%	88.34%				\$ 7,471,603	\$ 7,413,973	\$ 7,755,632	\$ 8,846,754	\$ 8,825,836	\$ 8,825,836
City Finance														
Salaries & Wages	100	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Benefits	1xx	89.01%	95.42%	96.21%	93.82%	88.35%	103.42%	97.93%	\$ 54,912,153	\$ 56,886,859	\$ 52,651,923	\$ 62,155,000	\$ 55,005,283	\$ 53,765,209
Pension	191	100.00%	106.54%	106.39%	103.83%	99.70%	114.67%	106.05%	\$ 64,686,954	\$ 62,666,813	\$ 55,552,438	\$ 64,881,002	\$ 54,652,000	\$ 52,384,383
Pension Obligations	190	100.00%	106.90%	108.02%	105.10%	100.14%	114.55%	110.49%	\$ 14,170,375	\$ 14,290,585	\$ 13,362,362	\$ 14,150,000	\$ 12,475,000	\$ 12,093,775
Services	200	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Materials and Supplies	300	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Equipment	400	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	56.44%	56.44%	69.02%	69.85%	39.01%	73.87%	99.67%	\$ 3,316,246	\$ 6,279,219	\$ 6,952,193	\$ 8,500,000	\$ 8,500,000	\$ 6,975,000
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal City Finance			98.89%	100.05%	97.63%	91.58%	107.27%	102.64%	\$ 137,085,728	\$ 140,123,476	\$ 128,518,916	\$ 149,686,002	\$ 130,632,283	\$ 125,218,367

Note: Spend factors using 2-year average highlighted yellow and exceptions are highlighted in blue.

Actual to Budget Factors (Continued)														
	Factor Used	Historical Average			Actual to Budget Factor			Actual O&M Expense			Budgeted O&M Expense			
		2 Year	3 Year	5 Year	2019	2018	2017	2019	2018	2017	2019	2018	2017	
Revenue														
Salaries & Wages	100	97.07%	97.07%	93.73%	91.60%	94.53%	99.76%	88.26%	\$ 9,791,864	\$ 9,735,827	\$ 10,844,659	\$ 10,358,907	\$ 9,759,200	\$ 12,287,592
Services	200	95.90%	95.90%	96.52%	97.75%	96.05%	95.76%	97.76%	\$ 4,858,989	\$ 4,834,053	\$ 4,958,726	\$ 5,059,000	\$ 5,048,100	\$ 5,072,174
Materials and Supplies	300	72.20%	72.20%	67.43%	73.91%	81.48%	62.91%	57.94%	\$ 1,164,755	\$ 898,556	\$ 831,018	\$ 1,429,500	\$ 1,428,400	\$ 1,434,199
Equipment	400	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	0.00%	0.00%	0.80%	7.88%	0.00%	0.00%	2.40%	\$ -	\$ -	\$ 120	\$ 5,000	\$ 5,000	\$ 5,000
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Revenue			94.53%	92.34%	92.15%	93.85%	95.24%	88.49%	\$ 15,815,608	\$ 15,468,436	\$ 16,634,523	\$ 16,852,407	\$ 16,240,700	\$ 18,798,965
Procurement														
Salaries & Wages	100	95.74%	95.74%	97.10%	94.24%	96.87%	94.57%	100.00%	\$ 90,176	\$ 84,412	\$ 85,470	\$ 93,093	\$ 89,261	\$ 85,470
Services	200	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Materials and Supplies	300	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Equipment	400	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Procurement			95.74%	97.10%	94.24%	96.87%	94.57%	100.00%	\$ 90,176	\$ 84,412	\$ 85,470	\$ 93,093	\$ 89,261	\$ 85,470
Law														
Salaries & Wages	100	97.55%	97.55%	96.52%	91.63%	100.00%	95.04%	94.43%	\$ 2,569,445	\$ 2,381,984	\$ 2,369,450	\$ 2,569,445	\$ 2,506,206	\$ 2,509,294
Services	200	84.05%	84.05%	64.04%	52.69%	99.97%	68.12%	24.02%	\$ 691,440	\$ 471,162	\$ 166,099	\$ 691,614	\$ 691,614	\$ 691,614
Materials and Supplies	300	79.23%	79.23%	81.09%	60.92%	98.59%	59.88%	84.79%	\$ 42,404	\$ 25,753	\$ 36,469	\$ 43,010	\$ 43,010	\$ 43,010
Equipment	400	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Indemnities	500	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transfers	800	0.00%							\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Law			94.46%	89.43%	82.95%	99.98%	88.83%	79.29%	\$ 3,303,289	\$ 2,878,899	\$ 2,572,018	\$ 3,304,069	\$ 3,240,830	\$ 3,243,918
Total Water Fund			91.90%	92.90%	91.71%	90.40%	93.49%	95.13%	\$ 521,378,881	\$ 505,908,230	\$ 480,291,404	\$ 576,725,039	\$ 541,141,465	\$ 504,887,023

Note: Spend factors using 2-year average highlighted yellow and exceptions are highlighted in blue.

Appendix E

Water Fund Historical O&M Costs

Water Fund Historical O&M Costs									
Description		Historical							
		2014	2015	2016	2017	2018	2019		
PWD Operating and Maintenance Expenses Summary									
100	Salaries & Wages	\$ 108,902,414	\$ 118,718,437	\$ 118,414,751	\$ 125,010,184	\$ 132,309,261	\$ 137,119,099		
1xx	Benefits	\$ 41,044,344	\$ 48,293,131	\$ 47,276,002	\$ 52,651,923	\$ 56,886,859	\$ 54,912,153		
191	Pension	\$ 38,305,052	\$ 40,861,335	\$ 46,646,526	\$ 55,552,438	\$ 62,666,813	\$ 64,686,954		
190	Pension Obligations ¹	\$ 22,450,403	\$ 11,415,451	\$ 12,468,686	\$ 13,362,362	\$ 14,290,585	\$ 14,170,375		
200	Services	\$ 99,871,258	\$ 107,412,392	\$ 106,570,050	\$ 127,171,308	\$ 125,564,692	\$ 137,941,220		
220	Power	\$ 21,440,579	\$ 20,427,534	\$ 20,071,556	\$ 18,252,847	\$ 15,002,114	\$ 13,854,363		
221	Gas	\$ 3,561,029	\$ 4,190,988	\$ 4,013,404	\$ 3,176,528	\$ 3,855,757	\$ 5,452,000		
2xx	Public Property - Leases	\$ 3,786,428	\$ 3,959,919	\$ 4,042,633	\$ 4,042,633	\$ 4,256,817	\$ 4,265,847		
2xx	SMIP/GARP	\$ 5,020,143	\$ 11,598,134	\$ 15,000,000	\$ 15,000,000	\$ 26,900,000	\$ 25,000,000		
300	Materials and Supplies	\$ 22,546,905	\$ 23,180,707	\$ 22,505,723	\$ 25,773,136	\$ 25,210,739	\$ 25,953,178		
307	Chemicals	\$ 24,446,114	\$ 22,324,969	\$ 21,075,520	\$ 18,728,508	\$ 21,771,176	\$ 22,115,310		
400	Equipment	\$ 2,419,659	\$ 1,849,016	\$ 1,992,145	\$ 2,120,160	\$ 3,094,873	\$ 4,839,384		
500	Indemnities	\$ 6,036,579	\$ 3,842,040	\$ 5,440,820	\$ 7,352,313	\$ 6,779,219	\$ 3,816,246		
800	Transfers	\$ 7,714,419	\$ 6,244,621	\$ 8,100,186	\$ 12,097,064	\$ 7,319,325	\$ 8,052,752		
Total PWD Operating and Maintenance Expenses Summary		\$ 407,545,325	\$ 424,318,674	\$ 433,618,002	\$ 480,291,404	\$ 505,908,230	\$ 522,178,881		
PWD Operating and Maintenance Expenses Summary - 2 Year Average Increase				2014 - 2016	2015 - 2017	2016 - 2018	2017 - 2019		
100	Salaries & Wages			4.28%	2.62%	5.70%	4.73%		
1xx	Benefits			7.32%	4.42%	9.69%	2.12%		
191	Pension			10.35%	16.60%	15.91%	7.91%		
190	Pension Obligations ¹			-25.48%	8.19%	7.06%	2.98%		
200	Services			3.30%	8.81%	8.55%	4.15%		
220	Power			-3.25%	-5.47%	-13.55%	-12.88%		
221	Gas			6.16%	-12.94%	-1.98%	31.01%		
2xx	Public Property - Leases			3.33%	1.04%	2.61%	2.72%		
2xx	SMIP/GARP			72.86%	13.72%	33.92%	29.10%		
300	Materials and Supplies			-0.09%	5.44%	5.84%	0.35%		
307	Chemicals			-7.15%	-8.41%	1.64%	8.67%		
400	Equipment			-9.26%	7.08%	24.64%	51.08%		
500	Indemnities			-5.06%	38.33%	11.62%	-27.95%		
800	Transfers			2.47%	39.18%	-4.94%	-18.41%		
Total PWD Operating and Maintenance Expenses Summary - 2 Year Average Increase				3.15%	6.39%	8.01%	4.27%		
PWD Operating and Maintenance Expenses Summary - 3 Year Average Increase									
100	Salaries & Wages				4.71%	3.68%	5.01%		
1xx	Benefits				8.66%	5.61%	5.12%		
191	Pension				13.19%	15.32%	11.51%		
190	Pension Obligations ¹				-15.88%	7.78%	4.36%		
200	Services				8.39%	5.34%	8.98%		
220	Power				-5.22%	-9.78%	-11.62%		
221	Gas				-3.74%	-2.74%	10.75%		
2xx	Public Property - Leases				2.21%	2.44%	1.81%		
2xx	SMIP/GARP				44.03%	32.37%	18.56%		
300	Materials and Supplies				4.56%	2.84%	4.87%		
307	Chemicals				-8.50%	-0.83%	1.62%		
400	Equipment				-4.31%	18.73%	34.43%		
500	Indemnities				6.79%	20.84%	-11.15%		
800	Transfers				16.18%	5.44%	-0.20%		
Total PWD Operating and Maintenance Expenses Summary - 3 Year Average Increase					5.63%	6.04%	6.39%		
PWD Operating and Maintenance Expenses Summary - 5 Year Average Increase									
300	Materials and Supplies							2.9%	
800	Transfers							0.9%	

Note: 1. Decrease from FY 2014 to FY 2015 reflects decrease in debt service payments per City's Series 2012 Pension Bonds.

Appendix F

O&M Cost Industry Indices Data

O&M Cost Industry Indices Data												
Fiscal Year	CPI All Urban Consumers		PPI Materials for Construction		PPI Construction Machinery & Equipment		PPI Industrial Chemicals		CPI Electricity Philadelphia Area		CPI Gas Philadelphia Area	
	Raw Number	% Change	Raw Number	% Change	Raw Number	% Change	Raw Number	% Change	Raw Number	% Change	Raw Number	% Change
2011	230.6	1.90%	208.7	2.56%	193.7	1.52%	296.2	15.39%	203.1	0.45%	191.7	-5.15%
2012	236.2	2.43%	216.1	3.55%	201.7	4.13%	321.4	8.51%	205.4	1.13%	181.2	-5.48%
2013	240.0	1.61%	220.8	2.17%	208.5	3.37%	302.0	-6.04%	197.2	-3.99%	177.3	-2.15%
2014	242.7	1.13%	224.7	1.77%	212.6	1.97%	294.5	-2.48%	196.4	-0.41%	177.0	-0.17%
2015	244.2	0.62%	228.7	1.78%	215.7	1.46%	265.2	-9.95%	193.0	-1.73%	169.7	-4.12%
2016	244.2	0.00%	228.0	-0.31%	218.1	1.11%	231.3	-12.78%	192.9	-0.05%	148.1	-12.73%
2017	247.2	1.23%	231.7	1.62%	219.9	0.83%	241.6	4.45%	188.1	-2.49%	151.9	2.57%
2018	250.0	1.13%	240.5	3.80%	220.0	0.05%	264.0	9.27%	182.1	-3.19%	162.0	6.65%
2019	254.1	1.64%	250.4	4.12%	229.5	4.32%	267.7	1.40%	176.5	-3.08%	175.7	8.46%
2 Yr Avg												
2015	-	0.87%	-	1.77%	-	1.71%	-	-6.29%	-	-1.07%	-	-2.17%
2016	-	0.31%	-	0.73%	-	1.29%	-	-11.38%	-	-0.90%	-	-8.53%
2017	-	0.61%	-	0.65%	-	0.97%	-	-4.55%	-	-1.28%	-	-5.39%
2018	-	1.18%	-	2.70%	-	0.43%	-	6.84%	-	-2.84%	-	4.59%
2019	-	1.39%	-	3.96%	-	2.16%	-	5.26%	-	-3.13%	-	7.55%
3 Yr Avg												
2015	-	1.12%	-	1.91%	-	2.26%	-	-6.21%	-	-2.05%	-	-2.16%
2016	-	0.58%	-	1.08%	-	1.51%	-	-8.51%	-	-0.73%	-	-5.82%
2017	-	0.61%	-	1.03%	-	1.13%	-	-6.39%	-	-1.43%	-	-4.97%
2018	-	0.79%	-	1.69%	-	0.66%	-	-0.15%	-	-1.92%	-	-1.54%
2019	-	1.33%	-	3.17%	-	1.71%	-	4.99%	-	-2.92%	-	5.86%

Appendix G

Existing & Proposed Debt Service

Line No.	Description	2020	2021	2022	2023	2024	2025
Revenue Bonds							
1	Existing (a)	196,266	177,586	167,288	161,204	140,923	140,987
	Proposed						
2	Fiscal Year 2021 (b)		7,000	21,000	27,583	27,583	27,583
3	Fiscal Year 2022 (b)			7,788	23,363	30,686	30,686
4	Fiscal Year 2023 (b)				8,400	25,200	33,100
5	Fiscal Year 2024 (b)					9,188	27,563
6	Fiscal Year 2025 (b)						9,100
7	Total Proposed	-	7,000	28,788	59,345	92,657	128,031
8	Total Revenue Bonds	196,266	184,586	196,076	220,550	233,580	269,018
Pennvest Loans							
9	Pennvest Loans - Parity Pennvest (c)	10,631	10,765	11,080	13,611	13,611	13,611
10	Total Senior Debt Service	206,897	195,351	207,155	234,161	247,191	282,629

(a) Assumes the average interest rates of 3.0 % for the Variable Rate Series 1997B Bonds and 4.53% for the Variable Rate Series 2005B Bonds. Includes the debt service for the Series 2019B Bonds issued in FY 2020. Reflects savings from Series 2019A Refunding Bonds and the Forward Refunding of the Series 2011A Bonds.

(b) Assumes interest only payments for the first year of the bond amortization based on 5.25% interest. Also assumes bond issuance during the first quarter of the fiscal year.

(c) Includes projected Pennvest Loan for the Torresdale Pump Station Rehabilitation.

Appendix H

Capital Cost Industry Indices

Capital Cost Industry Indices Data												
Fiscal Year	H.W. Index Cost of Construction Pump Plant - Equipment		H.W. Index Cost of Construction Treatment Plant - Equipment		H.W. Index Cost of Construction Transmission Plant - Steel		H.W. Index Cost of Construction Distribution Plant - Mains		H.W. Index Cost of Construction Distribution Plant - Meters		McGraw-Hill (ENR) Construction Cost Index	
	Raw Number	% Change	Raw Number	% Change	Raw Number	% Change	Raw Number	% Change	Raw Number	% Change	Raw Number	% Change
2011	708	0.14%	642	1.74%	644	8.60%	633	2.59%	635	3.76%	8,950.3	3.48%
2012	780	10.17%	669	4.21%	711	10.40%	669	5.69%	646	1.73%	9,189.3	2.67%
2013	800	2.56%	689	2.99%	724	1.83%	698	4.33%	677	4.80%	9,424.2	2.56%
2014	856	7.00%	713	3.48%	694	-4.14%	720	3.15%	688	1.62%	9,672.1	2.63%
2015	928	8.41%	736	3.23%	712	2.59%	736	2.22%	702	2.03%	9,933.1	2.70%
2016	990	6.68%	755	2.58%	697	-2.11%	747	1.49%	709	1.00%	10,166.6	2.35%
2017	1,052	6.26%	774	2.52%	723	3.73%	774	3.61%	722	1.83%	10,534.5	3.62%
2018	1,146	8.94%	797	2.97%	733	1.38%	790	2.07%	750	3.88%	10,898.1	3.45%
2019	1,261	10.03%	832	4.39%	792	8.05%	819	3.67%	765	2.00%	11,194.7	2.72%
2 Yr Avg												
2015	-	4.76%	-	3.24%	-	-1.20%	-	3.74%	-	3.20%	-	2.59%
2016	-	7.70%	-	3.35%	-	-0.83%	-	2.69%	-	1.83%	-	2.66%
2017	-	7.54%	-	2.90%	-	0.22%	-	1.86%	-	1.51%	-	2.52%
2018	-	11.13%	-	4.06%	-	1.46%	-	3.60%	-	3.36%	-	4.74%
2019	-	12.86%	-	4.98%	-	6.60%	-	4.71%	-	3.87%	-	4.93%
3 Yr Avg												
2015	-	6.53%	-	3.56%	-	2.52%	-	4.39%	-	2.71%	-	2.62%
2016	-	5.96%	-	3.23%	-	0.05%	-	3.23%	-	2.81%	-	2.63%
2017	-	7.36%	-	3.10%	-	-1.26%	-	2.29%	-	1.55%	-	2.56%
2018	-	10.21%	-	3.78%	-	1.84%	-	3.14%	-	2.92%	-	4.06%
2019	-	10.76%	-	4.17%	-	3.61%	-	3.63%	-	2.91%	-	4.07%

Appendix I

**Memo from the City Energy Office
Re: Escalation Factors for the Philadelphia Water Department**

THE CITY OF PHILADELPHIA
OFFICE OF
SUSTAINABILITY

MEMO

TO: Melissa LaBuda, Philadelphia Water Department
CC: Jaclyn Rogers, Emily Hill, Paul Kohl, Mardi Ditzel
FROM: Adam Agalloco
DATE: September 13th, 2019
SUBJECT: Utility Escalation Factors for the Philadelphia Water Department

Background

At the request of the Philadelphia Water Department (PWD), this memo means to serve as a reference document for utility escalation prices for FY21-FY25 for PWD's use. The Energy Office, housed in the Office of Sustainability, purchases Electricity, Natural Gas and Vehicle Fuel on behalf of City government (including PWD) and has information relative to the how the hedge purchases impact future costs.

Electricity

The City has purchases of electricity for Fiscal Year FY20 and is currently finalizing a solar electricity power purchase agreement, which will serve as a long-term hedge in electricity markets. Electricity production from the solar project will start in late FY21 and continuing for the next 20 years serving as a hedge on future price increases. Following final signature of the solar power purchase agreement, the City is next scheduled to purchase electricity hedges in November. After accounting for the electricity purchases already made, the solar PPA and future markets, the Energy Office anticipates a 3% increase in rates into FY21 followed by a relatively flat escalation rate for electricity prices from FY21 to FY25 as outlined below.

Year Transition	Escalation Rate
FY20 to FY21	3.0%
FY21 to FY22	0.0%
FY22 to FY23	0.5%
FY23 to FY24	1.0%
FY24 to FY25	1.0%

The other significant portion of electricity costs come from distribution services provided by PECO. PECO does not presently have a rate case open and therefore no escalation costs are assumed from the distribution portion of the bill.

Natural Gas

The City has purchases of natural gas for Fiscal Year's FY20 and FY21. Projections for future escalation curves beyond hedges are primarily based on the forward NYMEX natural gas market and Winter Basis Strips from Transco Z6 (NNY) North. Winter Basis strip prices are used as a proxy for all months as they tend to have the most volatile cost changes. The PWDs use is not driven by weather patterns as much as the General Fund use and thus is more sheltered from the basis market (and price volatility). In

THE CITY OF PHILADELPHIA
— OFFICE OF —
SUSTAINABILITY

looking at the market, the Energy Office anticipated a 3% increase into FY21, followed by a relatively flat throughout the coming five years after an increase in FY21.

Year Transition	Escalation Rate
FY20 to FY21	3.0%
FY21 to FY22	0.0%
FY22 to FY23	0.5%
FY23 to FY24	1.0%
FY24 to FY25	1.0%

Beyond natural gas commodity, the other a significant portion of natural gas costs come from distribution services provided by PGW. PGW does not presently have a rate case open and therefore no escalation costs are assumed from the distribution portion of the bill.

Next Steps

The Energy Office will provide regular updates to PWD on the purchases and impacts to electricity and natural gas rates and escalation projections. Please feel free to reach out if there are any questions.

Adam Agalloco

Energy Manager

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215.686.4460

STORMWATER UNITS OF SERVICE

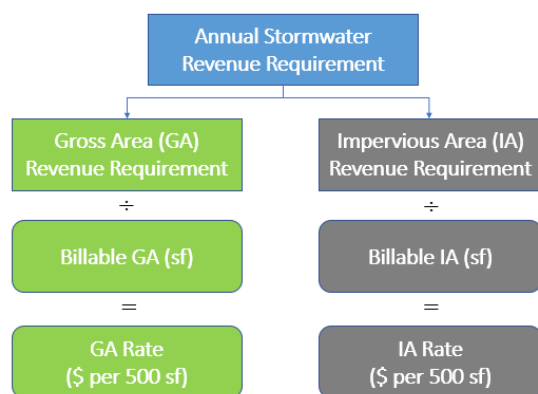
SCHEDULE BV-6: WP-2

This memorandum outlines the methodology used in developing the projections of the Billable Gross Area (GA) and Impervious Area (IA), collectively referred to as the “Stormwater Units of Service”, for the Water and Wastewater Cost of Service (COS) Study (Study) for the study period of FY 2020 through FY 2025 (Study Period).

Introduction

The Philadelphia Water Department (PWD or the Water Department) stormwater charge is comprised of a Billing and Collection charge and the Stormwater Management Services (SWMS) charge. The Billing and Collection charge is a fixed charge per account, whereas the SWMS charge is parcel area based. The SWMS Charge consists of two components: a Gross Area (GA) Charge and an Impervious Area (IA) Charge. These two charges are calculated based on the GA and IA square footage of a property and the associated GA and IA Rates. As illustrated in Figure 1, the system-wide GA and IA rates are determined based on the estimated GA and IA revenue requirements for a given fiscal year and the billable GA and IA square footage. *The Billable GA and IA Square Footage (sf) is also referred to as “Stormwater Units of Service”.*

Figure 1: Determination of GA and IA Rates



As part of the Study performed, the GA and IA units of service over the Study Period were estimated to support the development of the GA and IA rates for stormwater services provided under the Water Department’s wastewater utility. This memorandum explains the methods used in developing the projected billable GA and IA units of service and discusses the results of the units of service analysis.

Definitions

The following key terms are used throughout this memorandum.

1. **Gross Area (GA)** - Includes all of the property area within the legally described boundaries except streets, medians and sidewalks in the public right-of-way.
2. **Impervious Area (IA)** - Includes surfaces which are compacted or covered with material that restricts infiltration of water, including semi-pervious surfaces such as compacted clay, most conventionally hardscaped surfaces such as streets, driveways, roofs, sidewalks, parking lots, attached and detached structures, and other similar surfaces.

3. **Stormwater Management Incentives Program (SMIP)** – The Water Department’s stormwater grant program offered to non-residential property owners for stormwater retrofit projects.
4. **Green Acres Retrofit Program (GARP)** – The Water Department’s stormwater grant program offered to contractors, companies or project aggregators to build large-scale stormwater retrofit projects across multiple properties.
5. **Units of Service** – The system wide billable GA and IA square footage.
6. **Impervious Area Managed** - Impervious area that directs runoff to surface water bodies or to approved Stormwater Management Practices (SMPs). For the purposes of PWD’s credit program, IA managed is calculated in square footage.
7. **Impervious Area Reduction** - Impervious area that is directed to a pervious area on a property or, based on the type of land cover, has characteristics similar to a pervious area.
8. **Adjustment Appeals** – PWD’s appeal program which enables customers to seek adjustments for billing inaccuracies including inaccurate parcel classification, incorrect parcel identification, residential sideyard, or for errors in the calculation of a parcel’s gross and/or impervious area.

Purpose

The primary purpose of the stormwater units of services analysis is to develop reasonable estimates of the billable GA and IA units of service for the Study Period of FY 2020 through FY 2025. The billable units of service are utilized in projecting the stormwater revenues under existing rates, as well as in developing the proposed GA and IA rates.

Updated Stormwater Billing Data

The Water Department recently obtained updated Stormwater Billing Data based upon 2015 aerial and infrared imagery. The updated data set provides new impervious area and gross area data for billing purposes for properties City-wide. The City-wide total impervious area is 1,298 million square feet (sf) and the total gross area is 2,444 million sf. Table 1 below presents the impervious area under the prior dataset¹ and the updated data set.

Table 1 Impervious Area Change by Customer Class

Line No.	Description	Prior Dataset (Square Feet)	Updated Dataset (Square Feet)	Variance (Square Feet)
1	Initial Impervious Area-Residential	482,687,000	554,856,000	72,169,000
2	Initial Impervious Area-Non- Residential	706,470,000	717,806,000	11,336,000
3	Initial Impervious Area-Condominium	22,198,000	24,903,000	2,705,000
4	Initial Impervious Area-Total	1,211,355,000	1,297,565,000	86,210,000

¹ Prior dataset is data from the Stormwater Database as of June 30, 2018

Table 2 below presents the gross area under the prior dataset and updated dataset.

Table 2 Gross Area change by Customer Class

Line No.	Description	Prior Dataset (Square Feet)	Updated Dataset (Square Feet)	Variance (Square Feet)
1	Initial Gross Area-Residential	974,110,000	975,622,000	1,512,000
2	Initial Gross Area-Non- Residential	1,436,695,000	1,433,456,000	3,239,000
3	Initial Gross Area-Condominium	32,284,000	35,297,000	3,013,000
4	Initial Gross Area-Total	2,443,089,000	2,444,375,000	1,286,000

- Overall, the updated billing data indicates an increase of 86 million sf of impervious area and an increase of 1.3 million sf of gross area when compared to the prior billing data set.
- The residential IA has increased 72 million sf and the residential GA has increased 1.5 million sf.
 - Residential customers are currently billed a uniform charge (per parcel) based upon the mean IA and GA square footage;
 - During the prior rate study, the mean residential IA per parcel was 1,050 sf and the mean GA per parcel was 2,110 sf².
 - With updated data set, the mean residential IA per parcel has increased to 1,200 sf.
 - Residential customers have not yet been impacted because the average IA and GA are used to establish the residential IA and GA rates, and would not see a change until updated stormwater rates are determined by the Rate Board.
 - Based upon the above, Black & Veatch has utilized the updated average residential IA and GA for projecting billable units of service for Study Period and determining residential rates for FY 2021 and FY 2022.
- The combined non-residential and condominium IA has increased by 14 million sf and the GA has decreased by 0.2 million sf from the prior billing data set.
 - Based upon the new data set, the Water Department has been in the process of updating all stormwater billing information for all customers.
 - Of the approximately, 75,700 Non-Residential parcels, roughly 7,300 Non-Residential Parcels would be highly impacted³.
 - These properties have not been fully transitioned to their new billing data.
 - The Water Department would transition these properties to their new data, following the next rate determination and after such time that the Water Department can notify customer of the updated billing data and associated impacts to their respective bills.

² As reflected in the Rate Determination of the Water, Sewer and Storm Water Rate Board dated July 12, 2018.

³ Accounts seeing a change of more than \$6 and 8-percent from their current stormwater charge are defined as highly impacted.

- Based upon the above, Black & Veatch has utilized the billing data currently in place to estimate units of service for FY 2020 and utilized the fully transitioned billing data set for the Study Period and determining non-residential rates for FY 2021 and FY 2022.

The fully transitioned stormwater data set is referred to as the FY 2021 data set, herein.

Adjustment Factors

In addition to the updated stormwater billing data, the GA and IA units of service projections are impacted by the following three “Adjustment Factors”:

- a. ***Adjustments for Stormwater Credits⁴***: Stormwater credits which are offered in the form of a reduction in GA and/or IA square footage;
- b. ***Adjustments for Stormwater Appeals***: Reduction in GA and IA square footage due to customer appeals; and
- c. ***Other Adjustments***: Reduction in GA and IA due to exempt Community Gardens⁵, Residential Side Yards and City Owned Vacant.

The billable GA and IA units of service are projected taking in to consideration any potential reduction or gain in billable square footage due to the above three Adjustment Factors.

Units of Service Analysis

This section provides an overview of the methodology used in the determination of the billable GA and IA units of service for the three customer classes: *Residential, Non-Residential, and Condominium*.

Classification of Parcels

PWD’s Rates and Charges (Effective September 1, 2019), Section 4 defines three classes for the purposes of SWMS Charge:

- **Residential Property** - Real estate used exclusively for residential purposes with at least one and no more than four dwelling units.
- **Non-residential Property** - Real estate which cannot be classified as either residential or condominium.
- **Condominium Property** – Real estate, portions of which are designated for separate ownership, and the remainder of which is designated for common ownership by the owners of those portions.

In determining the billable unit of service, identical methodology is used for both the Non-Residential and Condominium customer classes. For presentation purposes, the discussion on the Non-Residential class also encompasses the Condominium class.

⁴ As per PWD Rates and Charges Section 4.5 SWMS Credits

⁵ As per 2016 Special Filing Rate Board Decision, PWD Rates and Charges Section 5.2 (f) and Philadelphia Code Section 19-1603

System-Wide Billable GA and IA Units of Service Framework

The following key steps are used in the determination of the billable GA and IA square footage, which are as follows:

- **Step 1** – Project Initial GA and IA square footage for each customer class;
- **Step 2** – Project GA and IA adjustments for each of the three adjustment factors; and
- **Step 3** –Derive the billable GA and IA square footage for each customer class by applying the adjustments to the initial GA and IA square footage.

Step 1 – Project Initial GA and IA

The initial GA and IA refer to the baseline GA and IA square footage prior to the application of any Adjustment Factors. The Initial GA and IA for the Residential and Non-residential classes⁶ are projected by applying the Mean GA and IA to the projected number of parcels in each of those classes.

Residential Initial GA and IA

- **Mean GA & IA:** Based on the Fiscal Year 2021 Residential GA and IA and the number of parcels, the Residential Mean GA is 2,110 sf and the Mean IA is 1,200 sf.
- **Projected Number of Parcels:** The annual number of parcels projected for the Study Period is set to equal the FY 2021 number of parcels.
- **Initial GA & IA:** The Initial GA and IA for each year of the Study Period is derived by applying the updated Mean GA of 2,110 sf and updated Mean IA of 1,200 sf to the annual number of parcels determined for each year of the Study Period.

Non-Residential Initial GA and IA

- **Mean GA & IA:** Due to the significant diversity in the types of parcels within the non-residential and Condominium customer classes, sub-groups were delineated as illustrated in Figure 3. The Mean GA and Mean IA for FY 2021 is derived for each of the sub-groups based on the FY 2021 Mean GA and Mean IA. **Table SW-1** in Schedule BV-3 illustrates the FY 2021 Mean GA and Mean IA determined for each of the Non-residential and Condominium sub-groups.
- **Projected Number of Parcels:** The annual number of parcels projected for the Study Period is set to equal the FY 2021 number of parcels.
- **Initial GA & IA:** The Initial GA and IA for each year of the Study Period is derived by applying the FY 2021 Mean GA and Mean IA square footage of the sub-groups to the annual number of parcels determined for each year of the Study Period for each of those sub-groups.

⁶ As noted earlier, the Water Department is currently integrating the 2015 impervious Area data into the stormwater billing database. The FY 2019 and FY 2020 initial GA and IA reflect the current IA and GA data currently in use. This data set integrates all new IA and GA data with the exception of parcels most impacted by the update data set change. The full integration of the updated dataset is anticipated to occur in FY 2021. Therefore, the baseline GA and IA for projection purposes is assumed to be the full implemented in FY 2021. This is referred to as the “FY 2021” data set, herein.

Table SW-2 in Schedule BV-3 presents the projection of the Initial Parcel Count, Initial GA, and Initial IA estimated for the Residential, Non-Residential, and Condominium customer classes.

Step 2 Project GA and IA Adjustments

The estimation of the potential reduction or gain in the billable GA and IA units involved an analysis of each of the three Adjustment Factors referenced in Section 3, namely:

- A. Adjustments for Stormwater Credits
- B. Adjustments for Appeals
- C. Other Adjustments

The approach used to estimate the impact on GA and IA units of service due to each of these three Adjustment Factors is discussed in the following sections.

A. Adjustments for Stormwater Credits

Stormwater fee credits, which are offered to Non-residential and Condominium properties for implementing and maintaining onsite stormwater management practices, cause a reduction in stormwater billing and ultimately stormwater revenues. To assure revenue adequacy, potential reduction in the billable GA and IA units of service due to credits need to be accounted for in designing the GA and IA rates.

Three primary types of stormwater management activities and/or programs are integral to private onsite stormwater management, each of which could result in the issuance of additional stormwater GA and IA credits during the Study Period. The three types of stormwater management activities/programs are:

- 1. Impervious Area Reduction (IAR) Practices
- 2. GA/IA Management Practices
- 3. SMIP/GARP Grants

The potential reduction in GA and IA credits, defined in terms of square footage, was estimated for each of these three types of activities/programs. The projections were developed based upon a review of the five-year historical data (FY 2015 through FY 2019) as provided by the Water Department, discussions with Department Stormwater Billing and Incentives Staff, and use the following approach(es):

IAR Practices –IAR practices refer to stormwater management practices that are typically deployed onsite by property owners to effectively reduce the impervious area square footage. IAR practices include tree canopy cover, impervious area disconnection, and down spout disconnections. The potential IA reduction during the Study Period due to these practices is estimated as follows:

Annual Estimated Additional IAR Credits (sf) = Number of additional IAR parcels projected for the fiscal year x

- Historical average IAR (sf) per parcel Average IAR (sf) per parcel – The average IAR per parcel, determined using that 5-year trend, was estimated at 11,758 sf.
- Projection of Additional IAR Parcels – The number of IAR parcels from FY 2019 was used as the baseline for projection purposes. A five-year average annual growth rate of 65

Average Impervious Area Reduction per Parcel = 11,758 sf

Average five-year annual growth in parcels with IAR practices = 65

Parcels with IAR Practices (FY 2019 Baseline) = 597

parcels per year was estimated based on the growth rate from FY 2015 to FY 2019 and used to project the number of additional IAR parcels anticipated annually over the Study Period.

The annual growth in parcels is multiplied by the average credit per parcel (sf) to estimate the IA credit over the Study Period.

Table A-1 in the Appendix presents the historical IAR credits along with the annual growth rate and average IAR credit per parcel.

Table SW-5 in Schedule BV-3 presents the estimated additional number of parcels projected to receive IAR credits, and the associated reduction in Impervious Area estimated for the Study Period.

GA/IA Management Practices – The GA/IA Management Practices refer to stormwater management practices that are typically deployed to comply with the Water Department’s stormwater management regulations. The potential GA and IA reduction during the Study Period due to these GA/IA Management practices were estimated as follows:

Annual Estimated Additional GA/IA Managed Credits (sf) = Number of additional GA/IA Managed parcels projected for the fiscal year x Historical Average GA/IA Managed (sf) per parcel

- Average GA/IA Managed (sf) per parcel – The FY 2019 data was used as the baseline for the projection of GA & IA credits.
 - Parcel level data on the GA and IA credits issued in FY 2015 to FY 2019 was obtained from the Department, to determine the average square footage for GA and IA credits issued.
 - A review of the FY 2015 to FY 2019 GA/IA managed credits data revealed differences in the average GA and IA credits issued per parcel, between the “Surface Discharge” and “Non-Surface Discharge” properties, and by the type of credits issued.
 - Therefore, the average GA and IA credits were determined for the two discharge types, and by the type of credits granted historically.
 - Table 3 presents the results of the five year (FY 2015 to FY 2019) average GA and average IA credits by type (IA Managed, GA Managed, National Pollutant Discharge Elimination System [NPDES] and Open Space Credits) for the two types of stormwater discharges.

Table 3 Projection Factors for GA/IA Managed Credits

NON-SURFACE DISCHARGE CREDITS			SURFACE DISCHARGE CREDITS		
Line No.	Description	Average Per Parcel- Year End (5 yr)	Line No.	Description	Average Per Parcel- Year End (5 yr)
1	Parcel Growth	26	1	Parcel Growth	19
2	IA Managed(sf)- Average Per Parcel	21,692	2	IA Managed(sf)- Average Per Parcel	207,035
3	IA NPDES(sf)-Average Per Parcel	0	3	IA NPDES(sf)-Average Per Parcel	2,439
4	GA Managed(sf)- Average Per Parcel	19,962	4	GA Managed(sf)- Average Per Parcel	200,228
5	GA Open Space(sf)- Average Per Parcel	86,253	5	GA Open Space(sf)- Average Per Parcel	491,536
6	GA NPDES(sf)-Average Per Parcel	0	6	GA NPDES(sf)-Average Per Parcel	6,550

- Projection of Additional GA/IA Managed Parcels – As indicated in Figure 4, the 5-year average for number of parcels that were issued GA/IA managed credits between FY 2015 and FY 2019 for the Non-Surface and Surface Discharge types were 26 and 19 parcels, respectively.
 - Discussions with the Water Department staff indicated that recent short-term drops in credit enrollment are not believed to be indicative of longer-term trends; therefore, a more reasonable assumption would be to utilize the longer-term growth in parcels receiving credit to project overall program growth, for each succeeding fiscal year of the Study Period.
 - Based on the above, the number of parcels with GA/IA managed credits at the end of FY 2019 (782 parcels for Non-Surface Discharge and 308 parcels for Surface Discharge types) was assumed to be the baseline.
 - The 5-year annual growth in parcels was used to incrementally increase the total number of parcels receiving credit each succeeding fiscal year for the Study Period.

For each stormwater discharge and credit type, the annual growth in parcels is multiplied by the average IA and GA credit per parcel (sf) to estimate the IA and GA managed credits respectively during the Study Period.

Table A-2 in the Appendix presents the historical non-surface and surface credits along with the annual growth rate and average credits awarded per parcel.

Table SW-5 in Schedule BV-3 presents the estimated additional number of parcels projected to receive credit for the GA/IA Management Practices, and the associated square footage of GA and IA managed credits, for the Study Period.

SMIP and GARP – As defined earlier, SMIP and GARP are the two grant programs offer by the Water Department to incentivize private stormwater management. Properties that receive SMIP/GARP grants ultimately receive stormwater credit⁷. Therefore, the reduction in billable GA and IA sf resulting from SMIP/GARP grants needs to be estimated for the Study Period.

The annual SMIP/GARP grant budget is expected to remain at \$25 million per year throughout the FY 2020 to FY 2025 Study Period. This annual budget includes program administration costs and services which amount to roughly \$600k, therefore the budget available for reward is reduced accordingly as summarized in **Table SW-6**.

Estimation of Potential GA and IA Credits

The potential GA and IA credits resulting from the SMIP/GARP awards are estimated through a two-step approach:

- **STEP 1:** Estimate the amount of “greened acres” that could result from the annual SMIP and GARP award amounts.
- **STEP 2:** Estimate the amount of GA and IA credits for the greened acres deployed.

STEP 1: Based on a review of the completed SMIP/GARP project data as provided by the Department provided as well as discussions with the SMIP/GARP technical review team, the following assumptions were used in projecting greened acres:

- The average grant amount awarded per greened acre for the SMIP/ GARP projects was estimated to be \$185,000 for FY 2020.
- The average grant amount awarded per greened acre is escalated 4-percent annually based upon anticipated increases in construction costs. The resulting average grant award amount in FY 2021 is \$192,400. The average grant awarded is escalated for each year of the Study Period.
- The runoff depth to be managed by each resulting project is 1.5 inches, as per PWD’s credits policies.

Using the average award per greened acre, the available grant award amount (which is calculated as the annual SMIP/GARP program budget less administration costs) is then translated to estimate the number of resulting greened acres.

Then the estimated number of resulting greened acres is translated into managed GA and IA square footage by converting acres to square feet and accounting for the depth of runoff managed.

STEP 2: The GA and IA managed credits are calculated for the estimated managed area determined in Step 1, for each fiscal year, taking into account the following factors:

⁷ Upon the completion and verification of the Stormwater Management Practice (SMP) installation.

- SMIP/GARP projects are currently estimated to take 24 months to complete construction and begin receiving credit (from the award date); and
- Projects are assumed to be awarded credit based upon the managed impervious area (per current stormwater credit policies) at 80% for IA and 80% GA for the corresponding GA.

The total GA and IA credits for each fiscal year are then calculated as the sum of the GA and IA credits estimated for the SMIP/ GARP projects.

Table SW-9 in Schedule BV-3 presents the estimated additional square footage of GA and IA managed credits, resulting from SMIP/GARP grant awards for the Study Period.

B. Adjustments for Stormwater Appeals

Stormwater adjustment appeals, which customers can seek for inaccurate property classification, and GA and IA data exceptions, have the potential to cause a reduction in the billable GA and IA units of service; these adjustments primarily occur for the Non-residential and customer class. The potential reduction in GA and IA due to stormwater appeals, was estimated for the Study Period.

- A review of the appeals data for FY 2015 through FY 2019 obtained from the Water Department indicates a year-to-year decrease in the number of appeals in all years except in FY 2016. The two-year average (FY 2018 & FY 2019) decrease in number of appeals was 58.
- The two-year average (FY 2018 & FY 2019) total number of parcels was used to establish a baseline estimate for the number of appeals in FY 2020; thereafter, it is estimated that during each year of the Study Period, the number of appeals will gradually decrease, as shown in the inset box, based upon the average decrease in number of appeals.
- The two year (FY 2018 & FY 2019) average reduction in GA and IA sf per appeal is 5,345 sf and 4,005 sf, respectively. These values are applied to the estimated number of appeals to determine the reduction in billable GA and IA units of service for each year of the Study Period.

<u>Number of Appeals</u>	
FY 2015: 335	FY 2020: 227
FY 2016: 393	FY 2021: 169
FY 2017: 332	FY 2022: 111
FY 2018: 237	FY 2023: 53
FY 2019: 216	

Table A-3 in the Appendix presents the historical appeals along with the annual change in growth rate and average appeals granted per parcel.

Table SW-3 in Schedule BV-3 shows the reduction in billable GA and IA for the non-residential class due to stormwater appeals.

C. Other Adjustments

Community Gardens – Approved community gardens (Community Gardens) receive a 100% discount on their stormwater bill. This is reflected as a reduction in billable GA and IA units of service.

Therefore, the potential reduction in GA and IA due to Community Gardens applications approved is estimated for the Study Period.

- A review of the community gardens tracking data for FY 2017 through FY 2019 provided by the Water Department indicates a year-to-year increase in the number of approved community garden. For projection purposes, it is assumed that the number of parcels receiving the community gardens discount will continue to grow by 39 parcels per year (based upon the most recent annual increase in number of community gardens). The number of community gardens parcels estimated for the Study Period is shown in the inset box.
- The FY 2019 average reduction in GA and IA square footage per community garden parcel is 12,525 and 501, respectively. These values are applied to the estimated number of community garden parcels to determine the reduction in billable GA and IA units of service for each year of the Study Period.

Number of Community Gardens

FY 2017: 14	FY 2020: 179
FY 2018: 101	FY 2021: 218
FY 2019: 140	FY 2022: 257
	FY 2023: 296
	FY 2024: 335
	FY 2025: 374

Table A-4 in the Appendix presents the historical community gardens information along with the annual change in growth rate and average discount granted per parcel, as expressed in terms of IA and GA square footage.

Residential Side Yards – As with the previous COS study, it is assumed that there will be no additional residential side yard parcels, consequently no impact on the billable units of service for the Study Period.

City Owned Vacant Lots – As with previous COS study, it is assumed that there will be no net additional City owned vacant lots, consequently no impact on the billable units of service for the Study Period.

Tables SW-2, SW-3 and SW-4 in the Schedule BV-3 present the projections of reduction in the number of parcels; the reduction in billable GA and the reduction in billable IA by customer class due to ‘Other Adjustment’ appeals.

Step 3 - Projection of Billable GA and IA Units of Service

The third and final step in the units of service analysis is to compute the final billable GA and IA units of service for each of the three customer classes. The final billable GA and IA units of service are derived by deducting the total units of service adjustments from the Initial GA and IA units of service

Table SW-10 presents a summary of the billable number of parcels, the billable GA, and the billable IA estimated for each customer class and for each year of the Study Period.

In summary while, the total billable IA and billable GA for Residential customer class are projected to remain nearly flat throughout the Study Period, the billable IA and GA for the non-residential and condominium classes are projected to decrease due to credits, appeals and other adjustments. In total:

- Billable IA is projected to decrease from 1,175 million square feet in FY 2020 to 1,148 million square feet by FY 2025.
- Billable GA is projected to decrease from 2,096 million square feet in FY 2020 to 1,998 million square feet in FY 2025.

APPENDIX A – HISTORICAL DATA

Table A-1 – Historical IAR Credits

Line No.	Fiscal Year Ending June 30	Total No. of Parcels	IA Loss (sf)	Parcel Growth/ Change	IA Loss Per Parcel
1	2013	255	5,097,161		19,989
2	2014	272	4,251,503	17	15,631
3	2015	324	4,559,863	52	14,074
4	2016	412	5,024,187	88	12,195
5	2017	378	4,415,022	(34)	11,680
6	2018	579	6,209,567	201	10,725
7	2019	597	6,041,082	18	10,119
8	2-Yr Average	588	6,125,325	110	10,422
9	3-Yr Average	518	5,555,224	62	10,841
10	5-Yr Average	458	5,249,944	65	11,758

Notes:

For credit projections, 5-Year average projection factors are being used.

Table A-2 – Historical Non- Surface and Surface Discharge Credits

NON SURFACE DISCHARGE CREDITS															
Line #	Fiscal Year Ending June 30,	Number of Parcels	Total Gross Credit	Total Impervious Credit	Open Space GA Credit	IA Managed Credit	GA Managed Credit	IA NPDES Credit	GA NPDES Credit	Parcel Growth/ Change	Open Space GA Credit (Per Parcel)	IA Managed Credit (Avg Per parcel)	GA Managed Credit (Avg per parcel)	IA NPDES Credit (Avg per parcel)	GA NPDES Credit (Avg per parcel)
1	2013	604	84,520,414	17,965,807	67,429,822	11,563,893	10,305,605	-	-		111,639	19,146	17,062	-	-
2	2014	653	94,009,369	20,633,398	55,499,304	12,668,858	11,410,570	-	-	49	84,991	19,401	17,474	-	-
3	2015	670	100,305,627	25,029,525	54,712,505	13,777,050	12,373,766	-	-	17	81,660	20,563	18,468	-	-
4	2016	695	119,638,164	33,170,833	60,658,419	16,434,037	15,025,143	-	-	25	87,278	23,646	21,619	-	-
5	2017	767	138,022,843	33,920,101	72,445,173	15,539,131	14,141,507	-	-	72	94,453	20,260	18,437	-	-
6	2018	823	144,822,988	39,742,752	72,337,150	19,141,871	17,744,247	-	-	56	87,894	23,259	21,560	-	-
7	2019	782	149,679,885	41,344,307	62,542,914	16,212,413	15,425,254	-	-	(41)	79,978	20,732	19,725	-	-
8	2-Yr Average	803	147,251,437	40,543,530	67,440,032	17,677,142	16,584,751	-	-	8	83,936	21,995	20,643	-	-
9	3-Yr Average	791	144,175,239	38,335,720	69,108,412	16,964,472	15,770,336	-	-	29	87,442	21,417	19,908	-	-
10	5-Yr Average	747	130,493,901	34,641,504	64,539,232	16,220,900	14,941,983	-	-	26	86,253	21,692	19,962	-	-

SURFACE DISCHARGE CREDITS															
Line #	Fiscal Year Ending June 30,	Number of Parcels	Total Gross Credit	Total Impervious Credit	Open Space GA Credit	IA Managed Credit	GA Managed Credit	IA NPDES Credit	GA NPDES Credit	Parcel Growth/ Change	Open Space GA Credit (Per Parcel)	IA Managed Credit (Avg Per parcel)	GA Managed Credit (Avg per parcel)	IA NPDES Credit (Avg Per parcel)	GA NPDES Credit (Avg per parcel)
11	2013	152	129,107,867	47,612,306	80,471,840	43,703,240	43,717,412	1,500,062	2,575,193		529,420	287,521	287,615	9,869	16,942
12	2014	212	170,699,769	53,693,207	114,259,551	49,493,761	49,668,409	1,580,879	2,681,653	60	538,960	233,461	234,285	7,457	12,649
13	2015	246	176,930,329	60,226,500	122,127,335	55,736,478	47,311,404	1,524,473	2,590,089	34	496,453	226,571	192,323	6,197	10,529
14	2016	273	192,946,835	61,024,331	127,568,199	58,166,690	58,101,140	250,387	428,721	27	467,283	213,065	212,825	917	1,570
15	2017	312	223,008,811	63,952,942	151,024,452	61,284,210	61,338,258	242,176	423,291	39	484,053	196,424	196,597	776	1,357
16	2018	318	227,585,196	66,195,369	149,779,130	62,881,606	62,901,801	726,596	3,097,451	6	471,004	197,741	197,804	2,285	9,740
17	2019	308	241,876,061	65,118,503	165,977,231	62,023,047	62,089,933	621,466	2,942,661	(10)	538,887	201,374	201,591	2,018	9,554
18	2-Yr Average	313	234,730,629	65,656,936	157,878,181	62,452,327	62,495,867	674,031	3,020,056	(2)	504,945	199,557	199,698	2,151	9,647
19	3-Yr Average	313	230,823,356	65,088,938	155,593,604	62,062,954	62,109,997	530,079	2,154,468	12	497,981	198,513	198,664	1,693	6,884
20	5-Yr Average	291	212,469,446	63,303,529	143,295,269	60,018,406	58,348,507	673,020	1,896,443	19	491,536	207,035	200,228	2,439	6,550

Notes: For credit projections, 5-year average projection factors are being used.

Table A-3 – Historical Appeals, IA and GA Loss

Line No.	Fiscal Year Ending June 30	Total No. of Parcels	IA Loss (sf)	GA Loss (sf)	Parcel Reduction/ Change	IA Loss Per Parcel (sf)	GA Loss Per Parcel (sf)
1	2012	793	4,617,485	5,257,906		5,820	6,630
2	2013	531	4,314,593	570,367	262	8,130	1,070
3	2014	423	1,497,566	385,468	108	3,540	910
4	2015	335	989,841	2,168,335	88	2,950	6,470
5	2016	393	1,560,294	14,863	(58)	3,970	40
6	2017	332	655,318	(151,566)	61	1,970	(460)
7	2018	237	896,103	1,292,493	95	3,780	5,450
8	2019	216	913,347	1,132,098	21	4,230	5,240
9	2-Yr Average	227	904,725	1,212,296	58	4,005	5,345
10	3-Yr Average	262	821,589	757,675	59	3,327	3,410
11	5-Yr Average	303	1,002,981	891,245	41	3,380	3,348

Notes:

For appeals projections, 2-Year average projection factors are being used.

Table A-4 – Historical Community Gardens Parcels, IA and GA

Line No.	Fiscal Year Ending June 30	Total No. of Parcels	IA (sf)	GA (sf)	Parcel Growth/ Change	IA Per Parcel (sf)	GA Per Parcel (sf)
1	2017	14	687	62,131		49	4,438
2	2018	101	65,346	1,157,491	87	647	11,460
3	2019	140	70,094	1,753,443	39	501	12,525
4	Recent Year	140	70,094	1,753,443	39	501	12,525
5	2-Yr Average	85	45,376	991,022	63	399	9,474

Notes: For Community Gardens projections, recent year projection factors are being used.

COST RECOVERY OF DISCOUNTS, CREDITS, GRANTS, AND TAP

SCHEDULE BV-6: WP-3

This memorandum outlines the cost recovery approach used for billing discounts, stormwater credits, incentives, grants and the Tiered Assistance Program (TAP). These approaches were used in development of the Fiscal Year (FY) 2020-FY 2025 financial plan in conjunction with the FY 2021 - FY 2022 Rate Proceeding.

Program Name	Cost Recovery Approach
Discounts	<ul style="list-style-type: none"> Proportionate recovery from all retail service types. Includes discounts provided to senior citizens, the Philadelphia Housing Authority (PHA) and charities (including schools, universities, colleges, hospitals, and places used for actual religious worship).
Utility Emergency Services Fund (UESF) Grants	<ul style="list-style-type: none"> Proportionate recovery from all retail service types.
Tiered Assistance Program (TAP)	<ul style="list-style-type: none"> Proportionate recovery of program administration and support from all retail service types. Discounts provided to TAP customers (i.e., TAP lost revenue referred to as TAP Costs in the TAP Rate Rider) recovered via the TAP Rate Rider surcharge rates, which are included in the overall water and sewer quantity charges.
Stormwater Management Incentives Program (SMIP) & Greened Acre Retrofit Program (GARP) Grants	<ul style="list-style-type: none"> Recovered by Wastewater (<i>Sanitary Sewer & Stormwater</i>) revenues. Proportionate recovery from applicable wastewater wholesale customers¹ and all retail service types.
Stormwater Credits	<ul style="list-style-type: none"> Recovered via <u>Stormwater</u> Revenues. Proportionate recovery from <u>all</u> retail service types. Includes Community Gardens.
Stormwater Customer Assistance Program (CAP)	<ul style="list-style-type: none"> Recovered by <u>Non-residential service type</u> Stormwater Revenues.

Notes:

- SMIP/GARP is recovered from wastewater wholesale customers in accordance with their contract terms.

SENIOR CITIZEN INCOME THRESHOLD ADJUSTMENT SCHEDULE BV-6: WP-4

This document provides the approach for the determination of income threshold for the senior citizens discount per the Code of General Ordinances of the City of Philadelphia (the Philadelphia Code) and also as reflected in the Philadelphia Water Department’s (PWD or the Water Department) Rates and Charges.

Background

The senior citizen discount is codified in the Philadelphia Code Chapter 19-1900. Section 19-1901 of the Philadelphia Code defines an “Eligible Senior Citizen” as follows:

“A residential customer of record of the Water Department age sixty-five (65) or older residing in the City of Philadelphia whose gross annual household income does not exceed as set forth below;

An amount not to exceed fourteen thousand (\$14,000) dollars, except as adjusted to reflect the net change in the Consumer Price Index (All Urban Consumers (CPI-U) for Philadelphia (All Items)), such adjustment to occur from time to time at the discretion of the Water Commissioner, but no less often than at each general residential customer rate determination.”

Methodology

Per the Philadelphia Code, Black & Veatch Management Consulting, LLC (Black & Veatch) has evaluated the senior citizen income discount threshold for inclusion in the current rate proceeding. Described below is the calculation methodology followed to determine the appropriate threshold level.

Baseline Income Threshold

The baseline income threshold for senior citizen discount utilized was \$14,000 in fiscal year (FY) 1987, the year Section 19-1901, as amended, went into effect. Each year thereafter, this amount was escalated, as described in the paragraph below. Per the FY 2019 - FY 2020 Rate Determination (the Rate Determination), the current senior citizen income threshold, as stated in Section 5.2(b)(1)(iii) of the Water Department’s Rates and Charges (Effective September 1, 2019), is \$32,300.

Escalation Factor

The escalation factor is determined using the Consumer Price Index (CPI) data obtained from the Bureau of Labor Statistics (BLS) website. The report generated from the BLS website is for item and regional indices as specified in the ordinance above. The report specifications are:

CPI-All Urban Consumers (Current Series) Original Data Value Not Seasonally Adjusted Area: Philadelphia-Wilmington-Atlantic City, PA-NJ All Items Base Period: 1982-84=100 Years: 1982 to 2019

We use the index for April to determine the escalation factor applied to the baseline income threshold because it is the latest month for which data is available to update the threshold before the start of the next fiscal year.

Calculation of New Income Threshold

Black & Veatch calculated the new income threshold for senior citizen discounts by escalating the baseline income threshold with the escalation factor determined above. The calculated amount calculated is rounded up to the nearest \$100.

For purposes of income threshold projections in future years, Black & Veatch recommends projecting the escalation factor as the average annual change in the CPI over the most recent five years. The most recent CPI Escalation Factor is multiplied by the average change in CPI to calculate the projected escalation factors. Following the same process, as used in the current proceeding, we would then determine the new threshold for senior citizen discount by escalating the baseline threshold (i.e., \$14,000) by the resulting escalation factors. The amount calculated is then rounded up to the nearest \$100.

Results

The tables that follow present the results of the senior citizen discount income threshold calculations.

Table 1 presents the escalation factors, calculated income thresholds, and annual change in CPI from FY 1987 through FY 2020.

Table 1 Senior Citizen Discount – Income Threshold Calculation

Fiscal Year	CPI Reference Date	CPI Value	CPI Escalation Factor	CPI Adjusted Income	Annual Change in CPI Adjusted Income
1986	Apr 1985	108.100			
1987	Apr 1986	110.000	1.00	\$ 14,000.00	
1988	Apr 1987	115.500	1.05	\$ 14,700.00	5.00%
1989	Apr 1988	120.000	1.09	\$ 15,272.73	3.90%
1990	Apr 1989	126.700	1.15	\$ 16,125.45	5.58%
1991	Apr 1990	134.300	1.22	\$ 17,092.73	6.00%
1992	Apr 1991	140.800	1.28	\$ 17,920.00	4.84%
1993	Apr 1992	145.400	1.32	\$ 18,505.45	3.27%
1994	Apr 1993	149.600	1.36	\$ 19,040.00	2.89%
1995	Apr 1994	153.100	1.39	\$ 19,485.45	2.34%
1996	Apr 1995	157.800	1.43	\$ 20,083.64	3.07%
1997	Apr 1996	162.100	1.47	\$ 20,630.91	2.72%
1998	Apr 1997	166.000	1.51	\$ 21,127.27	2.41%
1999	Apr 1998	167.100	1.52	\$ 21,267.27	0.66%
2000	Apr 1999	171.100	1.56	\$ 21,776.36	2.39%
2001	Apr 2000	175.800	1.60	\$ 22,374.55	2.75%
2002	Apr 2001	181.200	1.65	\$ 23,061.82	3.07%
2003	Apr 2002	183.100	1.66	\$ 23,303.64	1.05%
2004	Apr 2003	187.200	1.70	\$ 23,825.45	2.24%
2005	Apr 2004	194.800	1.77	\$ 24,792.73	4.06%
2006	Apr 2005	203.300	1.85	\$ 25,874.55	4.36%
2007	Apr 2006	211.600	1.92	\$ 26,930.91	4.08%
2008	Apr 2007	215.270	1.96	\$ 27,398.00	1.73%
2009	Apr 2008	223.622	2.03	\$ 28,460.98	3.88%
2010	Apr 2009	221.686	2.02	\$ 28,214.58	-0.87%
2011	Apr 2010	227.432	2.07	\$ 28,945.89	2.59%
2012	Apr 2011	233.143	2.12	\$ 29,672.75	2.51%
2013	Apr 2012	237.782	2.16	\$ 30,263.16	1.99%
2014	Apr 2013	240.345	2.18	\$ 30,589.36	1.08%
2015	Apr 2014	243.694	2.22	\$ 31,015.60	1.39%
2016	Apr 2015	243.717	2.22	\$ 31,018.53	0.01%
2017	Apr 2016	245.300	2.23	\$ 31,220.00	0.65%
2018	Apr 2017	248.411	2.26	\$ 31,615.95	1.27%
2019	Apr 2018	251.850	2.29	\$ 32,053.64	1.38%
2020	Apr 2019	256.528	2.33	\$ 32,649.02	1.86%

Notes: CPI Adjusted Income for FY 1987 and CPI Indices as per the Philadelphia Code.

Table 2 presents the average change in CPI over the most recent 5-year, 10-year, 15-year, and 20-year timeframes.

Table 2 Average Annual Change in CPI

Description	Average Annual Change
5-Year Average	1.09%
10-Year Average	1.47%
15-Year Average	1.86%
20-Year Average	2.05%

Table 3 presents the projected senior citizen income thresholds using the 5-year average escalation factor.

Table 3 Projections for Senior Citizen Income Threshold

Fiscal Year	Annual CPI Income Change	CPI Escalation Factor Used	Projected CPI Adjusted Income	Projected Income Threshold for PWD Use
Current Threshold				\$32,300
2021	1.09%	2.36	\$33,006	\$33,100
2022	1.09%	2.38	\$33,367	\$33,400

Notes: CPI Escalation Factor used is based on the 5-year average change in CPI

Based upon the senior citizen income threshold of \$14,000 established by the Philadelphia Code for FY 1987 and the projected adjustments per CPI, Black & Veatch recommends that the senior income threshold be adjusted to \$33,200 in FY 2021 in conjunction with the upcoming rate proceeding for the requested rate period of FY 2021 to FY 2022.

**In the Matter of the Philadelphia Water
Department's Proposed Change in Water,
Wastewater and Stormwater Rates and Related
Charges**

Fiscal Years 2021-2022

Philadelphia Water Department

Black & Veatch Management Consulting, LLC

Schedule BV-7

Dated: February 11, 2020

Company Description

Black & Veatch Holding Company is a leading, global engineering, construction and consulting company specializing in infrastructure development in the fields of energy, water and information. Our Mission sets the bar high—***Building a World of Difference®***. We live up to this ideal by delivering reliable and innovative infrastructure solutions to our client's most complex challenges, helping to improve and sustain the quality of life around the world.

Founded in 1915, Black & Veatch is an employee-owned company based in Overland Park, Kansas that has approximately 11,000 professionals operating out of more than 110 offices worldwide. Through this network of collaboratively connected offices, we have served our clients—many of whom we have provided services to for decades. We value long lasting relationships and believe that rapport enables superior customer service and support.

BLACK & VEATCH MANAGEMENT CONSULTING, LLC

Black & Veatch Management Consulting, LLC is a wholly-owned subsidiary of Black & Veatch Holding Company that brings together more than 200 professionals. These professionals include experienced industry executives, senior analysts and technology experts from across the electric, water, oil, natural gas and technology industries. This experience—combined with seamless access to the company's world-class engineering, procurement, construction and operations capabilities, experienced senior executives, economists, senior policy experts and regulatory officials, engineers and internationally respected subject-matter experts—makes Black & Veatch uniquely qualified to assist clients with their most complex challenges.

Black & Veatch's diverse consulting service offerings span financial, process, and technology solutions, and many of our experienced professionals possess cross functional skills including asset management, cost of service/rate design, business process / work flow analysis, and implementation services.

Team Resumes

Ann Bui

Managing Director

Ms. Bui has more than 30 years of experience working with utilities on more than 400 engagements and has provided financial and business planning services for public and investor-owned utilities across the US of all different sizes ranging from those with less than 5,000 service connections to those that serve populations over 3 million.

Ms. Bui is a Managing Director and Client Director for Black & Veatch Management Consulting's Advisory and Planning - Water Business Line. In this role, she oversees all rate and financial planning work for water and wastewater clients. She has also provided services to agencies located internationally in the United Arab Emirates, Chile, Hong Kong, and Singapore.

Her recent assignments have focused on water insecurity; addressing affordability and assistance program needs; quantifying the financial impact of deferred asset maintenance; developing innovative approaches for structuring alternative delivery projects using private and public financing instruments and preparing financial feasibility reports supporting more than \$6 billion of revenue bond sales and more than \$2 billion in state revolving fund loans.

Ms. Bui has completed due diligence engagements for entities of many internationally well-established companies such as KKR, Macquarie Capital, Credit Suisse, Morgan Stanley, J.P. Morgan, Goldman Sachs, Bank of America Merrill Lynch, Rothschild, Canada Pension Plan Investment Board, Barclays, Fiera Infrastructure, Alma Global, and PGGM. Her due diligence efforts have supported successful buy-side/sell-side water and wastewater assets totaling over \$5 billion.

Over the past two decades, Ms. Bui has provided expert witness testimony in front of the California Public Utilities Commission, the Indiana Utilities Regulatory Commission, and the Kentucky Public Service Commission. Additionally, she has served as an expert witness in front of utility rate commissions for such clients as Philadelphia Water Department and Washington Suburban Sanitary Commission.

An active proponent of advancing the water industry, Ms. Bui is a long-standing member of several industry associations. She is the immediate past Chair of the American Water Works Association (AWWA) Finance, Accounting, and Management Controls (FAMC) Committee and is involved with AWWA's Strategic Practices Committee, AWWA's Rates and Charges Committee, the National Association of Clean Water Agency's (NACWA's) Utility Management Committee, and with the Water Environment Federation (WEF).

EDUCATION

Masters, Business Administration, Finance, University of California – Davis, 1995

MS, Chemical, University of California Los Angeles, 1989

BS, Chemical, British Columbia University, 1986, Canada

YEARS EXPERIENCE

30

PROFESSIONAL REGISTRATION

License, Engineer-In-Training, #XE094654, California, 1995

PROFESSIONAL ASSOCIATIONS

AWWA

Past Chair - AWWA's Finance, Accounting & Management Controls Committee

Member - AWWA's Strategic Management Practices Committee

Member – AWWA's Rates & Charges

WEF

NACWA's Utility Management Committee

RELEVANT EXPERTISE

Financial & Management Consulting Services; Debt Issuance Support; Elasticity Studies; Cost of Service & Rate Design; Institutional & Organizational Studies; Alternative Financing; Valuations/M&A

Under her six-year tenure as FAMC Vice-Chair and Chair, she was a lead author and editor for AWWA's book ***Financial Management for Water Utilities: Principles of Finance, Accounting and Management Controls***. Additionally, she has been an author or peer reviewer for AWWA's M1 – Principles of Water Rates, Fees and Charges, the current update to M1, the current update of WEF's Manual of Practice 27, Financing and Charges for Wastewater Systems, and WEF's User-Fee Funded Stormwater Program. She is presently leading the update for AWWA's M29 – Water Capital Financing.

Ms. Bui is the coordinating editor for Journal AWWA's ***Money Matters***, a column focused on financial issues in the water industry.

REPRESENTATIVE PROJECT EXPERIENCE

Philadelphia Water Department; Water, Wastewater and Stormwater Cost of Service Studies; Pennsylvania; 2003 – 2006; 2017-Ongoing

Project Director. Ms. Bui has worked with the City of Philadelphia since 2003 and currently serves as the Project Director for Black & Veatch's multi-utility cost of service work with the Philadelphia Water Department (PWD). The 2018 Rate Case incorporated program costs for PWD's long-term control plan, green infrastructure, public-private grants to incentivize stormwater improvements, and restructuring of the City's assistance programs. The 2018 Rate Case also included development of a customer assistance rate rider as well as changes in public fire protection cost recovery.

Washington Suburban Sanitary Commission; Comprehensive Water and Wastewater Rate Study; Laurel, Maryland, United States; 2016-In-Progress

Project Director. Ms. Bui is directing the completion of a comprehensive water and wastewater rate study for WSSC. Phase 1 of the project included analysis of WSSC's current rate structure as well as numerous alternative rate structures, and extensive public outreach to a bi-county working group as well as a stakeholder representatives group. Workshops included explanation of the rate-making process, WSSC priorities and goals for rate setting, and discussion of stakeholder issues and concerns. Phase 2 included a comprehensive cost of service and rate design study for WSSC's water and wastewater utilities. The Black & Veatch team continues to advise WSSC on alternative rate structures as management and the Board consider a new rate structure that better addresses WSSC's goals and objectives.

Water Supplies Department; Water Conservation and Loss Analysis; Hong Kong, China; 2016

Technical Reviewer. Ms. Bui is serving as the lead reviewer and subject matter expert for the regulatory and infrastructure governance aspect of Black & Veatch's engagement with the Hong Kong Water Supplies Department (WSD) as part of a larger Total Water Management program. The WSD supplies more than 7 million people. Under this part of the engagement, Ms. Bui reviewed recommendations made to improvement the organization's governance and structure to meet current and future regulatory needs.

American Water Company; Automated Metering Infrastructure Rate Case Support and Water-Budget Rate Setting Expert Witness; California; 2016 – 2018

Expert Witness and Project Director. Served as the Project Director for California American Water's (CAW's) Rate Case petition for an Automated Metering Infrastructure (AMI) program in front of the California Public Utilities

Commission (CPUC) and served as an expert witness for CAW's separate CPUC rate petition regarding its water budget-based rate design for the Monterey service area.

City of San Diego; Cost of Service Study and System Development Charge Update; San Diego, CA ; 2012 - 2016

Project Director. Comprehensive cost of service studies for water and wastewater, including update of system development charges. Conducted over 70 stakeholder meetings to support successful adoption of rate structure changes and multi-year rate increases.

Western US - Water, Wastewater, Stormwater, & Solid Waste Utility Enterprise Financial Planning, Rate & Cost-of-Service Studies, Indirect Cost Allocations, Management Audits /Organizational Assessment Studies, & Business Planning Activities

- City of Glendale, AZ
- City of Phoenix, AZ
- City of Tucson, AZ
- City of Flagstaff, AZ
- City of Scottsdale, AZ
- City of Henderson, NV
- City of Las Vegas, NV
- City of Santa Monica, CA
- Los Angeles Bureau of Sanitation
- City of Long Beach, CA
- City of Orange, CA
- City of Palo Alto, CA
- City of Napa, CA
- City of South Gate, CA
- City of San Diego, CA
- County of San Diego, CA
- Cambria Community Services District, CA
- Marin Municipal Water District, CA
- Helix Water District, CA
- Rancho California Water District, CA
- Indio Water Authority, CA
- City of San Clemente, CA
- City of Soledad, CA
- San Joaquin County, CA
- City of Port Hueneme, CA
- Santa Ynez River Water Conservation District, CA
- Guam Waterworks Authority
- City of Salem, OR
- City of Oxnard, CA
- City of Los Angeles, Stormwater Division
- City of San Juan Capistrano, CA
- City of Downey, CA
- Camrosa Water District, CA
- City of Pico Rivera, CA
- Leucadia Water District
- City of Orange, CA
- City of Yuba City, CA
- City of Antioch, CA
- Encinitas Wastewater Authority, CA
- City of Escondido, CA
- Dublin San Ramon Service District, CA
- Padre Dam Municipal Water District, CA
- Sweetwater Authority, CA
- Western Municipal Water District, CA
- Cucamonga Valley Water District, CA
- City of Patterson, CA
- City of Chino Hills, CA
- Riverside Public Utilities, CA
- Vallecitos Water District, CA
- City of Fountain Valley, CA
- City of Westminster, CA
- City of Santa Ana, CA
- City of Lomita, CA
- Atascadero Mutual Water Company, CA
- Golden States Water Company
- California American Water
- City of Ontario, CA
- City of San Jose, CA
- County of San Bernardino, CA

- Goleta Water District
- Burbank Water & Power, CA
- Metropolitan Water District of Southern California
- City of Tacoma, WA
- Cherry Hills Sanitation District, CO
- Parker Water and Sanitation District, CO
- Waste Management Inc., CO
- Vallejo Flood Control District, CA
- Central Contra Costa Sanitation District, CA
- LA DWP
- City of Santa Clara, CA
- City of Menlo Park, CA
- Olivehain Municipal Water District
- Port of San Diego
- Simi Valley Sanitation, CA
- Las Campanas Water & Sewer Cooperative, NM

Midwestern & Eastern US - Water, Wastewater, Stormwater, Solid Waste & Gas Utility Enterprise Financial Planning, Rate & Cost-of-Service Studies, System Development Charges, Indirect Cost Allocations, & Business Planning Activities

- City of Dayton, OH
- Greater Cincinnati Water Works, OH
- Metropolitan Sewer District of Hamilton County, OH
- City of Mason, OH
- City of Columbia, OH
- City of Wyoming, MI
- City of Detroit, MI
- Great Lakes Water Authority, MI
- City of Grand Rapids, MI
- City of Holland, MI
- Philadelphia Water Department, PA
- Philadelphia Gas Works, PA
- Sewerage and Water Board of New Orleans, LA
- Puerto Rico Aqueduct and Sewer Authority, PR
- Northern Kentucky Water District, KY
- Louisville Water Company, KY
- Warren County, KY
- Alleghany County Sanitary Authority, PA
- Johnson County Wastewater, KS
- Unified Government of Wyandotte County, KS
- WaterOne, KS
- City of Kansas City, MO
- City of Jasper, AL
- City of Highland, IL
- City of Bloomington Department of Utilities, IN
- City of Columbus, SC
- City of Charleston, SC
- Charleston Water System, SC
- Beaufort-Jasper Water and Sewer Authority, SC
- Regional Water Authority, SC
- Gulf Coast Water Authority, TX
- San Antonio Water System, TX
- City of Arlington, TX
- North Texas Municipal Water Authority, TX
- Washington Suburban Sanitary Commission
- New Jersey American Water

PUBLICATIONS & PRESENTATIONS

“Water Reuse Cost Allocations and Pricing” Journal AWWA, November 2019.

“A Smoother Road to AMI: Leveraging applicable lessons from the Power Industry” Journal AWWA, September 2017.

“What is a World-Class Utility and How Does Yours Become One? Water Online, July 25, 2017

“Where are We Heading Next? Strategic Directions in the Water Industry”, presented at the Conference of Infrastructure Financing Agencies, Federal Policy Meeting in Washington, D.C., April 2017.

“What’s in Your Wallet? Ways to Address Aging Infrastructure and Lack of Money.” Annual Utility Management Conference. June 2016

“No More Sacred Cows”, published in Journal AWWA, January 2016.

“Business Risks to the Capital Financing Process”, published in AWWA’s Opflow magazine, September 2015.

“Securing Solid Revenues Streams for Water Utilities is Crucial for Financial Resilience”, published in Breaking Energy, September 10, 2015.

“Revenues and Expenses and Ratios, Oh My! A Finance Primer for Non-Finance Professionals”, presented at the Annual Utility Management Conference in Glendale, Ariz., March 2013.

Bui, Ann T., Editor, Financial Management for Water Utilities: Principles of Finance, Accounting and Management Controls, 2012, published by AWWA, Denver, Colo.

“Checks and Balances: An Overview of the New Financial Management for Water Utilities Handbook”, presented at the Annual AWWA Conference in Dallas, Tex., June 2012.

“Introduction to Financial Planning” presented at the Pacific Northwest Section of the Clean Water Association Winter Short Course University, Portland, Oreg., February 2010.

“Money Makes the World Go ‘Round: An Overview of the New Financial Management for Water Utilities Handbook,” presented at the Annual AWWA Conference in San Diego, Calif., June 2009.

“Key Performance Indicators” presented at the Annual AWWA Conference in San Diego, Calif., June 2009.

“Everything You Ever Wanted to Know About Finance Management but were Afraid to Ask: An Overview of the New Financial Management for Water Utilities Manual”, presented at the Annual AWWA Conference in Atlanta, Ga., June 2008.

“Alternative Funding Sources” presented at the Regional Water Authority Conference in Rancho Cordova, Calif., April 2007.

“Financial Benchmarks” presented at the Annual AWWA Conference in San Francisco, Calif., June 2005.

“Maximize Debt Market Options – Minimize Revenue Adjustments” presented at the Kentucky/Tennessee AWWA/WEF Conference in Nashville, Tenn., August 2004.

“Quantification and Reduction of Risk from Hazardous Air Emissions - Key note address,” presented at the AIChE Annual Conference in San Francisco, Calif., November 1994.

Dave Jagt

Manager, Consulting

Mr. Jagt, a Manager with Black & Veatch Management Consulting, LLC., has over 30 years of experience, spanning a variety of projects, including utility revenue forecasting, estimation and projection of revenue requirements, financial planning and rate design, capital improvement program review and financing, computer rate modeling, fixed-asset record keeping and present worth analyses. Dave also has experience with civil engineering projects, such as hydraulic design, computer hydraulic modeling, structural design, building plan review, and preparation of specifications and bid documents.

EDUCATION

BS, Civil Engineering, Virginia Polytech Inst St U, 1987

YEARS' EXPERIENCE

32

EXPERTISE

Bond Feasibility; Computer Modeling; Financial Planning; Fixed Asset Recordkeeping; Rate Design

REPRESENTATIVE PROJECT EXPERIENCE

Philadelphia Water Department; Water and Wastewater Financial Rate Study; Philadelphia, Pennsylvania; 2007-Present

Project Manager/Task Lead. Mr. Jagt has performed comprehensive studies of revenue requirements, costs of service and rates for water and wastewater utilities. The cost of service studies involved allocation of costs of service and determination of charges for 10 municipal wholesale wastewater customers and two wholesale water customers in accordance with the terms of wholesale service contractual agreements with these customers. He assisted with the development of the Tiered Assistance Program Rate Rider Surcharge (TAP-R), a rate rider concept to recover costs related to the PWD's Tiered Customer Assistance Program (TAP), and supported the TAP-R reconciliation. He assisted with contract negotiations with municipal wholesale customers, including the development of exceedance charges. He assisted with issuance of revenue bonds, including preparation of required engineering and financial feasibility studies, presentations before bond rating agencies and preparation of official statements.

Mr. Jagt has participated in enhancements to stormwater cost allocation and rate methodologies and the impacts of the alternative rates on various representative customers. The City's evolving geographic information system network and new billing system facilitated the establishment of stormwater charges based upon the customer's impervious and gross property area.

Mr. Jagt served as a task lead for the Water Department's Alternative Rate Structure study, which consisted of a review of the existing water and stormwater rate structures, supporting policies and programs, as well as an evaluation of a potential rider for pension expenses. The study also included discussions with various stakeholders and prior rate proceeding participants to gather feedback on potential alternatives. A report was issued to the Rate Board in the Fall of 2019.

City of Norfolk Department of Utilities, Norfolk, Virginia | Water Utility Wholesale Contract True-up Calculations | 1995–2003 and 2010–2019

Project Manager/Project Advisor. Mr. Jagt managed and assisted with the preparation of biennial rate projections and revenue true-up calculations during the period of 1995 to 2003 and 2010 to 2019 for Norfolk's wholesale water contracts with the City of Virginia Beach and the U.S. Navy. A Black & Veatch-developed computer model facilitated the comparisons of adopted rates (using budget projections) with recalculated rates (using actual

costs) to determine amounts of revenue to be reserved for use by the annual audit and to meet the contract-specified two-year, or biennial true-up, periods.

As stipulated by the contracts, adopted wholesale rates were based on budget projections and specified formulas recognizing the utility basis of cost allocations. The true-up comparisons revealed actual costs of wholesale service based on audited financial results.

City of Columbia, South Carolina – Department of Utilities & Engineering | Water, Sewer and Stormwater Rate Study | 2017 - 2019

Water and Sewer Study Task Lead. Mr. Jagt assisted with the comprehensive study of water and sewer utility rates for FY 2018 and FY 2019. The study covered multi-year projections of revenue and revenue requirements, cost of service by customer class, design rate schedules of rates for the sale of water to retail and wholesale service customers, and sewer service. Additionally, Mr. Jagt provided support to the City during public sessions related to educating and informing existing stakeholders about the City's FY 2018 water and sewer financial plan and rates.

Department of Utilities, Norfolk, Va. | Water Revenue Bond Feasibility Studies | 1993–2015

Project Manager/Project Advisor. Mr. Jagt managed and assisted with Black & Veatch's evaluations of the Norfolk Department of Utilities' ability to issue water revenue bonds (Series 1993, 1995, 1998, 2001, 2010, 2012, 2013, 2014, and 2015). The studies included a formal review of system facilities for sound operating conditions, current regulatory compliance, sufficient treated and raw water capacity, and adequate staffing. A detailed review and projection of all revenue requirements including operation and maintenance expense, recurring capital, existing debt service, cost of new debt, maintenance of required reserve funds, Payment in Lieu of Taxes (PILOT), transfers to General Fund, and anticipated major capital improvements was also performed.

Key West, Florida | Wholesale Wastewater Rates Assessment and Contract Review | 2016

Task Leader. Mr. Jagt was a task leader for a cost of service analysis for wholesale wastewater service and assisted with a review of the existing wholesale wastewater services agreement and drafting an updated wholesale wastewater agreement. This study included an assessment and analysis of the existing wholesale wastewater rate furnished to the US Navy, the development of a proposed wholesale wastewater rate for Key Haven, a new service territory that was acquired and operated by the Florida Key Aqueduct Authority (FKAA), and an update of the existing Navy Wholesale Wastewater Agreement.

City of Wilmington, Delaware | Water, Wastewater, Stormwater Utility Annual Financial Planning and Rate Study | 2016

Technical Advisor. As Technical Advisor, Mr. Jagt assisted with the rate support efforts for the wholesale wastewater treatment rates. The study involved assisting with the development of a presentation of the wholesale wastewater treatment cost of service analysis methodology and results and assisting with providing responses to the wholesale customer queries regarding the proposed cost of service rates.

Harford County, Maryland | Comprehensive Utility Revenue Rate Study | 2015

Task Leader. Mr. Jagt was a task leader for a comprehensive water/sewer utility revenue study for Harford County. This comprehensive study included eight (8) interrelated work items comprising of 13 tasks. The work items included Operating and Capital Funding Analysis; Infrastructure Reinvestment Forecasting; Billing Period Modification Analysis; Labor Resource Analysis; Connection Fee Study; Electronic Bill Payment Investigation; Rate Benchmarking; and Rate Seminar. The objective of this comprehensive revenue study is to prepare a six-year financial plan incorporating the financial results from all of the other work items, to determine the magnitude of

annual revenue adjustments required during the six-year study period, and its impact on rates. Mr. Jagt was the task lead for the Operating and Capital Funding Analysis and Connection Fee Study work items.

Pittsburgh Water and Sewer Authority, Pittsburgh | Stormwater Management and Rate Structure Project | 2012

Consultant. Mr. Jagt assisted with the development of stormwater cost allocation analysis, financial planning, user fee funding options evaluation and Equivalent Residential Unit (ERU) rate development as part of the stormwater utility feasibility evaluation. The study included concept development, development of combined sewer cost allocation methodology for debt service and O&M costs, analysis of annual stormwater revenue requirements and funding options and the development of stormwater Equivalent Residential Unit (ERU) rates.

Philadelphia Water Department | Stormwater Implementation Services, City of Philadelphia, Pennsylvania | 2009–2011

Consultant. Mr. Jagt provided assistance with the implementation of Philadelphia Water Department's parcel area based stormwater charges. The implementation assistance included reviewing the Credit and Appeals manual, frequently asked questions documents, and parcel fact sheets, which were provided to non-residential customers as part of the public outreach program. The parcel area based stormwater charge bill is to go live on July 1, 2010.

Henrico County, Richmond, VA | Stormwater Utility Study | 2011

Consultant. Mr. Jagt performed the stormwater financial planning, and funding options evaluation. The study included program review and level of service alternatives evaluation, financial planning and funding options analysis, impervious area analysis and rate structure evaluation. The study also included a preliminary review of credits program, appeals process and billing options evaluation.

Public Utilities Department, Chesapeake, Va. | Water Revenue Bond Feasibility Study | 2010

Project Manager. Mr. Jagt managed Black & Veatch's evaluation of the ability of the City of Chesapeake to issue \$36.4 million in water and sewer revenue bonds, Series 2010. The project included conducting site inspections of water and sewer system facilities to evaluate their adequacy to provide utility service, projection of revenue requirements and revenues; cash flow financial planning analyses; evaluation of adequate working capital balances; and debt service coverage analyses, including system maximum and annual debt ratios.

Mr. Jagt also participated in the bond working group for official statement and agreement of trust reviews and in developing presentations to bond rating agencies. He prepared a final engineering report included in the bond issue's official statement.

City of Dallas, Texas | Stormwater Fee Study | 2009–2010

Task Leader. Mr. Jagt assisted with the effort to update the stormwater user fee program for the City of Dallas. He led the financial planning and cost of service analyses. The study involved the following key tasks:

- *Financial Planning:* Developed stormwater revenue requirements for a multi-year financial plan utilizing an Excel based model. Revenue requirements developed served as the basis for the Utility's FY 2009 budget.
- *Parcel Data Analysis:* Involved an extensive parcel data analysis of the City's parcel data received from Dallas County along with billing data received from the new billing system (SAP Pay1) and the previous billing system (CIABS). Analysis also provided an estimation of the runoff coefficient for parcels. A review of the billing mechanism and procedures for ongoing maintenance were reviewed as well as an update of parcel impervious data.

- *User Fee Methodology*: Reviewed various stormwater user fee billing methodologies and alternative rate structures. Defined a methodology based on impervious area for residential, and runoff coefficient based impervious area for the non-residential parcels.
- *Rate Schedule*: Defined a rate schedule with a five-tiered rate structure for the residential parcels and an individually computed fee for commercial parcels. Unimproved (vacant) land parcels saw an increase applicable to the level of uncapped/capped gross area square footage.

Water Revenue Bureau, City of Philadelphia, Pennsylvania | Utility Billing Appeals Process Optimization | 2009

Consultant. Mr. Jagt assisted in conducting a Utility Billing Appeals Process Optimization study for the Water Revenue Bureau (WRB). The purpose of the study was to do a comprehensive review of the existing billing dispute/appeals and hearing process to facilitate better alignment of business processes with Philadelphia Water Department (PWD) regulations; and to streamline policies, staffing, and workflow to enhance the overall operations for meeting desired service levels. The key elements of the study included the following:

- Formation of a WRB Advisory Group;
- Review of existing business processes and workflow, and policies and regulations;
- Gap analysis on processes, technology, policy, and staffing issues/constraints;
- Optimization of business workflow and technology utilization;
- Staffing and workload analysis to determine staffing needs;
- Development of recommendations for requisite policy changes; and
- Development of procedures to integrate the stormwater utility billing appeals with the water/sewer appeals processes.

Department of Utilities, Lynchburg, Va. | Water and Wastewater Financial Planning Model, Water Wholesale Cost-of-Service Study, and CSO Compliance Report Certification | 2006–2007

Project Manager. Mr. Jagt managed Black & Veatch's effort to develop financial planning models that would allow the City to conduct water and wastewater utility financial planning and rate analyses. The models allowed the City staff to analyze historical customer account and billed volumes, revenues and revenue requirements; develop projections of customer accounts and billed volumes, revenue under existing rates and revenue requirements; prepare cash-based flow of funds statements for each utility; develop financial plans for each utility; and calculate test year rates necessary to provide the net revenue requirements of each utility as established by the financial plans.

In addition, Black & Veatch assisted the City in conducting a cost-of-service water rate study for purposes of developing the cost of service and rates for the City's wholesale water service to the Counties of Amherst, Bedford and Campbell. Black & Veatch determined revenue requirements and units of service; evaluated revenue requirement basis and cost allocation methodologies; allocated revenue requirements to functional cost components; distributed functional cost component costs to customer classes; determined proposed rates for wholesale service; and assisted with the development of a wholesale service water rate agreement.

Black & Veatch also reviewed and certified the City-prepared Annual CSO Compliance Report. Black & Veatch checked the accuracy of the current year data on each of the provided schedules. The City's Annual CSO

Compliance Report also includes verification that the annual residential wastewater bill based on 700 cubic feet per month is greater than or equal to 1.25 percent of median household income to ensure that enough funds are being spent on wastewater projects.

Department of Utilities, Chesapeake, Va. | Comprehensive Water and Wastewater Rate Study | 2005–2006

Project Manager. Mr. Jagt managed Black & Veatch’s comprehensive analysis of the City’s water and wastewater rates. The study includes the development of a 10-year financial plan for water and wastewater separately and combined, cost of service for the identified test year and cost-of-service rate design to equitably recover costs from customers based on their identified service requirements. Black & Veatch also developed a sophisticated financial planning and rate model for the City.

SELECTED PUBLICATIONS

Co-presented paper entitled, *“Sustainable Wet Weather Funding Can Be Achieved by Developing Multi-Objective Stormwater Utility Programs,”* at WEFTEC 2014 in New Orleans, La., September 2014.

Presented technical presentation entitled, *“Building Financial Resiliency: The Critical Role of Establishing and Adhering to Financial Performance Metrics,”* at the 2014 Tri-Association Conference in Ocean City, MD., August 2014.

Coauthored paper on *“Fairfax County, Virginia OWM’s Approach to Sewer Utility Financial and Operational Planning,”* Presented at Chesapeake Water Environment Association and The Water and Waste Operations Association of Maryland, Delaware and District of Columbia 30th Joint Annual Conference, Ocean City, Md., July 1999.

Coauthored paper on *“A Combined Water and Wastewater Utility Approach to Meeting Increasing Costs While Operating Efficiently”* presented to WEF/AWWA Joint Conference in March 1999.

Coauthored paper on *“Useful Marketing Strategies Necessary for Bond Issue Preparedness,”* Presented to Chesapeake AWWA in September 1998. and 1998 Annual VA Section AWWA Conference, Roanoke, Va., October 1998.

Coauthored paper entitled, *“Fairfax County, Virginia OWM’s Approach to Sewer Utility Financial & Operational Planning,”* presented at Annual WEFTEC “96”, in Dallas, Texas, October 1996.

Co-presented paper entitled, *“Norfolk’s Use of Computer Models During Water Sales Contract Negotiations,”* at AWWA’s 1995 Computer Conference in Norfolk, Va., April 1995.

Coauthored article entitled, *“Long Range and Short Range Planning: Fairfax County OWM’s Approach to Today’s Decision Making,”* published in Virginia Review, September/October 1994.

Brian Merritt

Manager, Consulting

Civil/water resources project management professional with over 17 years of experience in the engineering and consulting industry. Extensive experience in project management, stormwater fee implementation and development, cost of service, financial planning and rate design, engineering design, permitting, public outreach, program evaluations and planning, and funding strategy implementation.

REPRESENTATIVE PROJECT EXPERIENCE

Philadelphia Water Department, City of Philadelphia, Pennsylvania | Financial Planning and Cost of Service Study | 2019-Present

Project Manager. Mr. Merritt served as project manager for the Water Department's Alternative Rate Structure study, which consisted of a review of the existing water and stormwater rate structures, supporting policies and programs, as well as an evaluation of a potential rider for pension expenses. The study also included discussions with various stakeholders and prior rate proceeding participants to gather feedback on potential alternatives. A report was issued to the Rate Board in the Fall of 2019. During this time Mr. Merritt also supported the 2019 reconciliation of the Tiered Assistance Program Rate Rider Surcharge (TAP-R). Current work includes the financial planning, stormwater cost of service analysis, and rate study update for the Philadelphia Water Department (PWD). The study involves a six-year financial planning, cost of service analysis, cost allocation analysis, policy issues review, rate design, and rate case support.

City of Norfolk Department of Utilities, Norfolk, Virginia | Water Utility Wholesale Contract True-up Calculations | 2019

Project Support. Mr. Merritt aided in the preparation of biennial revenue true-up calculations for Norfolk's wholesale water contract with the City of Virginia Beach for the periods of FY 2018 and FY 2019. As stipulated by the contract, adopted wholesale rates were based on budget projections and specified formulas recognizing the utility basis of cost allocations. The true-up comparisons revealed actual costs of wholesale service based on audited financial results. Mr. Merritt supported the review of updated fixed asset listings to update utility basis cost allocations, revisions to demand based allocations, updates to annual O&M expenses, as well as review of billing and revenue adjustments.

Metropolitan St. Louis Sewer District (MSD), St. Louis, Missouri | Rate Consultant to MSD Rate Commission | 2019

Project Support. Black & Veatch has served as a rate consultant to MSD's Rate Commission the last two rate cycles. MSD establishes rates through a thorough stakeholder engagement process, whereby a broad cross section of stakeholders serve as a Rate Commission to evaluate MSD's Rate Proposal, supporting documentation, and testimony. In response to a request made by the Rate Commission, Mr. Merritt supported the Black & Veatch team in the development of wastewater rate comparisons of MSD's wastewater rates and rate structure to those of selected peer utilities across the country. This work included a review of industry trends, as well as

EDUCATION

MS, Civil & Environmental Engineering, Lehigh University, 2007

BS, Civil & Environmental Engineering, Lehigh University, 2000

YEARS' EXPERIENCE

17

EXPERTISE

Stormwater Fee and Utility Implementation; Stormwater Management; Strategic Planning; Hydraulics; Hydrology; Green Infrastructure Planning and Design; Credit Program Development; Rate Structure Analysis and Design; Stormwater Financial Planning; Public Outreach and Stakeholder Engagement; Stormwater Needs Assessments.

the costs of wastewater collection and treatment, underlying infrastructure needs, regulatory requirements, revenue sources, rate structures as well as resulting customer rates and bill impacts.

City of Takoma Park, Maryland | Stormwater Rate Study | 2018-2019

Project Manager. Mr. Merritt has been working with the City of Takoma Park, Maryland to complete a review of their stormwater billing information and associated stormwater rates. The City had not holistically re-evaluated its stormwater rate structure since initial implementation in the late 1990s. In addition, the City had obtained updated impervious area data (i.e. planimetric data) for the entire service area. Mr. Merritt worked with the City to assess impacts of the updated data set on the existing rate structure and identify potential rate adjustments needed to maintain revenue sufficiency for the stormwater program. Customer bills were also evaluated to assess potential impacts on the various stormwater customer classes. In addition, alternative rate structures were developed to help improve the public understanding and improve the overall equity of the stormwater rate structure. A rate study report was delivered to staff in late 2018, with consideration by City Council expected to follow.

City of Jonesboro, Arkansas | Stormwater Feasibility Study | 2018-2019

Project Support. Mr. Merritt has been assisting in the evaluation of a dedicated stormwater fee for the City of Jonesboro, Arkansas. This involves the evaluation of policies related to stormwater revenue requirements, impervious area development, customer classification, rate structure development, billing and enforcement as well as credit and appeals. Work also includes establishing stormwater units of service and analyzing the operations, capital and other costs to determine the revenue requirements. The funding approach is currently under consideration by City staff and leadership.

Unified Government of Wyandotte County and Kansas City, Kansas | Stormwater Feasibility Study | 2018-2019

Project Support. Mr. Merritt has been assisting in the development and evaluation of an impervious area based stormwater user fee for the Unified Government of Wyandotte County and Kansas City, Kansas (UG). UG currently charges all customer a flat fee for stormwater services. Work includes the review of available data sources, evaluation of stormwater rate structures, development of stormwater customers classifications, establishing stormwater units of service as well as the development of credit and appeals policies. Other areas of work have included the development of updates stormwater revenue requirements including an assessment of operation and maintenance, capital improvement and capital financing need. As of March 2019, the impervious area based stormwater fee is still under development, with recommendations expected to be delivered to the UG Board of Commissioners by mid-2019.

City of Columbia, South Carolina – Department of Utilities & Engineering | Stormwater Bond Feasibility Study | 2018

Project Support. Mr. Merritt worked with the City of Columbia, South Carolina to perform a five-year financial feasibility analysis of the City's Stormwater System operating results associated with the issuance of Stormwater System Revenue Bonds. The analysis included a forecast of revenues and revenue requirements, to determine the financial feasibility of the City issuing the Series 2018 Bonds.

City of Newark, New Jersey | Stormwater Utility Feasibility Study | 2017-2019

Project Support. Mr. Merritt has been assisting in the evaluation of a stormwater utility for the City of Newark, New Jersey. The project involves a review of the City's current stormwater management program, identification of program improvements and level of service enhancements, as well as capital improvements needs. Part of the

evaluation includes the allocation of combined sewer related costs between sewer and stormwater revenue requirements. Work also includes impervious area development, customer classification, rate structure development, policy development including credits, appeals, as well as billing and enforcement. Work is currently ongoing with recommendations anticipated to be provided to City leadership in Mid-2019 along with anticipated planned public outreach and education efforts.

City of Newark, Delaware | Stormwater Utility Implementation | 2016-2018

Project Support. Mr. Merritt has been assisting in the development and implementation of a stormwater utility for the City of Newark, Delaware. This involves the evaluation of policies related to stormwater revenue requirements, impervious area development, customer classification, rate structure development, billing and enforcement as well as credit and appeals. Work also includes establishing stormwater units of service and analyzing the operations, capital and other costs to determine the revenue requirements. During 2017, Mr. Merritt assisted with the implementation phase of the project helping the City with the finalization of customer service processes including credit and appeals, billing integration and parcel account mapping. The City began billing for stormwater in January 2018.

City of Cincinnati, Ohio – Stormwater Management Utility | Stormwater Rate Study | 2016-2018

Project Manager. Mr. Merritt has been working with the City of Cincinnati Ohio's Stormwater Management Utility (SMU) to complete a comprehensive review of their stormwater rates. Current work includes the evaluation of projected revenue requirements and anticipated system-wide revenue increases due to the anticipated need for a large capital program to rehabilitate and/or replace components of the City's Barrier Dam as well as other critical stormwater infrastructure. Additional costs associated with NPDES MS4 Phase II permit requirements, increased operation and maintenance costs, were also evaluated. A financial plan report was delivered to staff in and City Council ultimately adopted updated stormwater rates to support the revenue requirements of SMU.

Philadelphia Water Department, City of Philadelphia, Pennsylvania | Financial Planning and Cost of Service Study | 2017-2018

Project Manager. Mr. Merritt supported the financial planning, stormwater cost of service analysis, and rate study update for the Philadelphia Water Department (PWD). The study involved a six-year financial planning, cost of service analysis, cost allocation analysis, policy issues review, rate design, and rate case support. Mr. Merritt aided in the development of the financial plan, cost of service analysis including: sewer cost of service, system-wide billing units estimates, stormwater cost allocation, user fee methodology, credit, incentive and customer assistance program cost recovery. Mr. Merritt worked with the project team to develop a rate rider concept to recover costs related to the PWD's Tiered Customer Assistance Program (TAP). Mr. Merritt led the stakeholder engagement support services provided under this contract. Mr. Merritt also helped with drafting testimony for the rate proceedings.

City of Columbia, South Carolina – Department of Utilities & Engineering | Water, Sewer and Stormwater Rate Study | 2017

Stormwater Task Lead. Mr. Merritt assisted with a water, sewer and stormwater rate study for the City of Columbia, South Carolina's Department of Utilities & Engineering. Mr. Merritt led the stormwater portion of the study. Project work included: development of a multi-year financial plan, revenue and revenue requirements review, stormwater rate structure alternatives analysis, development of financial metrics, review of capital program needs and financing. The project included the development of a Stormwater Rate Study report and

presentation of the Rate Study findings and recommendations to City Council. Based upon the study's findings, the City adopted a series (i.e. multi-year) stormwater rate increases.

City of Havre de Grace, Maryland | Water and Sewer Rate Study | 2016-2017

Project Manager. Mr. Merritt served as project manager for the City of Havre de Grace, Maryland's comprehensive review of their current water and sewer rates. The project integrated an asset renewal forecast with the rate study and development of alternative funding mechanisms (such as an asset reinvestment charge) to alleviate the current deficit fiscal position and adequately fund water and sewer operations and capital program obligations. Work also included: Preparation of a reasonable estimate of repair and renewal forecast for all of the water system treatment, storage, transmission, and distribution assets; Development a five-year financial plan for the water/sewer enterprise fund to assure financial self-sufficiency; Review of the existing rate structure and design rate schedules to enable a defensible recovery of fixed and variable costs of the water and sewer utilities; and presentation of the Rate Study findings and recommendations to the Water and Sewer Rate Commission and to the City Administration and Council.

Philadelphia Water Department, City of Philadelphia, Pennsylvania | Stormwater Cost of Service and Rate Study | 2015-2016

Project Support. Mr. Merritt supported the stormwater cost of service analysis, and rate study update for the Philadelphia Water Department. The study involved a six-year financial planning, cost allocation analysis, stormwater fee policy issues review, rate design, and rate case support. Mr. Merritt aided in the development of stormwater related analysis including: sewer cost of service, system-wide billing units estimates, stormwater cost allocation, user fee methodology, credit, incentive and customer assistance program cost recovery. Mr. Merritt helped with drafting testimony for the rate proceedings.

Pittsburgh Water and Sewer Authority, Pittsburgh | Stormwater Management and Rate Structure Project | 2015-2019

Project Manager. Mr. Merritt is currently serving as Project Manager for Black & Veatch's portions of the Pittsburgh Water and Sewer Authority's (PWSA) Stormwater User Fee Development and Implementation project. Phase 2 builds from work previously conducted in 2012, and is intended to take the decisions and recommendations developed during Phase I- Feasibility Study up to the development of a draft ordinance for consideration by Pittsburgh City Council. Project work includes updates to the stormwater cost allocation analysis, financial planning, user fee funding and rate structure finalization. Mr. Merritt is providing technical advice and input into PWSA's public outreach efforts.

South Fayette Township, Allegheny County, Pennsylvania | Stormwater Program Needs Assessment | 2015

Project Manager, while with a former employer, assisting South Fayette Township in a comprehensive needs assessment of their existing stormwater program. The goal of the project was to define an enhanced program that meets the future needs and priorities of the community while addressing operation and maintenance, infrastructure replacement, and MS4 compliance responsibilities. All of the main streams, which run through the Township, are impaired. Impairments include acid mine drainage, nutrients, PCBs, and sediments. Actions to address these pollutants must be considered as part of the next MS4 permit cycle. A stormwater needs assessment committee was conveyed to gain public input into which program areas needed the most attention and to develop a five-year plan on which to evaluate funding options.

White Township, Indiana County, Pennsylvania | Stormwater Assessment Feasibility Study | 2014-2015

Project Manager, while with a former employer, assisting White Township in a program evaluation process that could result in the implementation of a stormwater user fee in the Township. This fee would be used to support enhancements to the Township's stormwater management program with resources directed to meet community-wide goals and needs. The project was intended to provide the Township with sufficient information on the viability of implementing a stormwater user fee, prior to investing in full implementation. Responsible for program evaluation and planning, billing system and data evaluation, impervious area data analysis, parcel and account review, rate structure development, initial rate estimates, public/Board of Commissioners presentations as well as overall project and client management. White Township implemented their stormwater fee in early 2016.

Radnor Township, Montgomery County, Pennsylvania | Stormwater Program and Fee Implementation | 2012-2013

Project Manager, while with a former employer, for the evaluation and development of an updated stormwater management program and funding mechanism for Radnor Township, PA. Led project team working with the Township personnel to develop a dedicated funding source to help meet the community's goals for infrastructure maintenance, flood mitigation, and green infrastructure. Services included stormwater program assessment and level of services analysis, financial analysis, data and master account file development, stakeholder meeting facilitation, rate evaluation, rate structure and ordinance development. Radnor convened a stormwater advisory committee to provide input into key policy issues such as the stormwater program needs, level of service considerations, the overall program plan, rate structure, credit and incentive program options and public education requirements. Assisted the Township with appeals policy development, billing system implementation support, customer service training, draft credit program development, and public education efforts. The stormwater user fee was approved by the Radnor Board of Commissioners in September 2013.

City of Meadville, Crawford County, Pennsylvania | Stormwater Program and Fee Implementation Project | 2012-2013

Project Manager, while with a former employer, for the evaluation and development of an updated stormwater management program for the City of Meadville, PA. Assessed the current stormwater program with the goal of establishing a functioning stormwater funding mechanism that fully accounts for the City's stormwater program costs. Tasks included a review of the City's current level of service, evaluation of the stormwater program's organizational structure, future needs assessment, current cost estimation, facilitation of Citizen's Advisory Groups, ordinance development, credit and appeals policy and program development, customer service training, management of public outreach and education activities as well as GIS and billing database development. Two separate Citizen's Advisory Groups were convened, one to provide input on the initial stormwater fee policies and the second to help develop a detailed stormwater credit and appeals program to enhance the equity of the fee and provide incentivizes to private property owners to better manage stormwater on-site. The Meadville stormwater fee was approved by their City Council in November 2012 and the first bills were processed in 2013.

SELECTED PUBLICATIONS AND PRESENTATIONS

Presentations – Stormwater Utility Implementation

- "Road to Resiliency: Integrated Stormwater Management Planning and Funding," NJ Future, May 2015
- New Jersey Watershed Institute Stormwater Seminar, June 2019

- Government Finance Officers Association of Pennsylvania, April 2015
- Villanova University Guest Lecturer – Sustainability & Science, 2014
- St Joseph’s University Stormwater Workshop, 2014
- Villanova University Stormwater Symposium, 2013
- 3 Rivers Wet Weather, 2013
- Erie County GIS Workshop, 2013
- PA Northwest City Manager’s Meeting, 2012

Publications

“Sustainable Stormwater Programs and Financing”, Pennsylvania Borough News, October 2014