

**City of Portland
Bureau of Environmental Services**



**FY 2022-23 Sewer and Stormwater System
Annual Rate Study**

July 2022

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I. INTRODUCTION AND SUMMARY OF RATES

The Sewer and Stormwater System Rate Study is the final step in a three-part financial planning process performed each year by the Bureau of Environmental Services (Bureau, or BES). The first step in this process consists of updating the Bureau's Five-Year Financial Plan, the primary document addressing key policy issues related to the provision of sanitary sewer and stormwater drainage services for the current Fiscal Year (FY) and beyond. The Five-Year Financial Plan includes a forecast of operating and capital improvement program (CIP) expenditures, a CIP financing plan, and an estimate of the percentage change in residential customer monthly bills required to meet the Bureau's forecast expenditures.

The second step in the financial planning process is the preparation of a budget request for the upcoming FY. The FY 2022-23 budget request is based on the first year of the Five-Year Financial Plan. The budget development process culminates with the budget request being submitted to the City Budget Office for review and eventual inclusion in the citywide Mayor's Proposed Budget.

The final step in the financial planning process is development of the annual Rate Study based on the FY 2022-23 budget as approved by City Council. The Rate Study calculates the sanitary sewer and stormwater drainage rates necessary to fund Bureau operations for the upcoming FY using formal cost of service ratemaking principles first adopted by City Council in 1977. The Rate Study also calculates system development charges (SDCs) for new customers connecting to the sanitary sewer and stormwater drainage system. Council then adopts the rates and charges calculated in the Rate Study for implementation on July 1.

The primary objectives of the Rate Study are to ensure that: 1) Bureau capital and operations are funded at the levels approved by City Council in the Adopted Budget; 2) costs are recovered from customers in a fair and equitable manner using City Council-adopted cost of service ratemaking principles; and, 3) cost recovery mechanisms are compatible with other City objectives such as environmental protection, sustainability, and compliance with legal and regulatory constraints.

Table 1 on the following page presents adopted sanitary sewer and stormwater drainage rates beginning July 1, 2022. Rates for FY 2022-23 reflect changes in operating and capital costs, as well as forecast changes in customer usage due to continuing recovery from the economic impacts of COVID-19. The typical monthly bill for single-family residential customers, assuming no participation in a discount program, increases by 3.14% relative to FY 2021-22 rates.

Table 1 - FY 2021-22 and FY 2022-23 Sanitary Sewer and Stormwater Drainage Rate Comparison

	Adopted FY 2021-22	Adopted FY 2022-23
Residential Sanitary Sewer and Stormwater Drainage		
Sanitary Sewage Volume (\$ / CCF)	\$11.92	\$12.35
Stormwater Drainage (\$ / 1,000 Square Feet of Impervious Area / Month)	\$12.68	\$13.00
<i>Off-Site Portion of Charge</i>	\$8.24	\$8.45
<i>On-Site Portion of Charge</i>	\$4.44	\$4.55
Average Single-Family Bill (\$ / Month)	\$80.30	\$82.82
Low-Income Discount (\$ / Month)	-\$39.47	-\$40.73
Extreme Low-Income Discount (\$ / Month)	-\$63.16	-\$65.17
Commercial / Industrial Sanitary Sewer and Stormwater Drainage		
Special Meter Charge (\$ / Month)	\$50.00	\$40.00
Sanitary Sewage Volume (\$ / CCF)	\$11.723	\$12.172
Stormwater Drainage (\$ / 1,000 Square Feet of Impervious Area / Month)	\$13.10	\$13.46
<i>Off-Site Portion of Charge</i>	\$8.52	\$8.75
<i>On-Site Portion of Charge</i>	\$4.58	\$4.71
Clean Water to Stormwater Drainage System (\$ / CCF)	\$1.200	\$1.200
Extra Strength Sanitary Sewer		
Biochemical Oxygen Demand (\$ / Pound)	\$0.900	\$0.828
Total Suspended Solids (\$ / Pound)	\$1.206	\$1.198
Portland Harbor Superfund		
Volume Charge (\$ / CCF)	\$0.13	\$0.12
Impervious Area Charge (\$ / 1,000 Square Feet of Impervious Area / Month)	\$0.34	\$0.36
<i>CCF - Hundred cubic feet of sanitary sewage flow</i>		

II. BACKGROUND ON COST OF SERVICE RATEMAKING

The Bureau utilizes the following five-step process to calculate rates. This process is common to most sanitary sewer and stormwater drainage utilities throughout the United States.

Step 1: Determine the Total Revenue Requirement. The revenue requirement is the amount of revenue required to meet total projected expenditures as described in the Five-Year Financial Plan. Expenditures are separated into two broad categories: operating and capital. Operating expenditures include the recurring cost of providing service, overhead charges, and maintaining planned contingency reserves. Capital expenditures include debt service payments on long-term bonds that financed prior capital improvements and the cost of capital improvements expected to be paid from available resources in the current year. The Bureau's adopted budget provides a detailed description of these costs for the upcoming fiscal year.

Step 2: Allocate the Revenue Requirement to Individual Service Parameters. Under cost of service ratemaking principles, the revenue requirement is allocated to individual service components called service parameters. As discussed further in Section III below, the Bureau uses service parameters that best represent the services provided to customers. These service parameters fall into three broad categories:

Sanitary Sewage Flow includes the costs of managing the volume of sanitary sewer and stormwater drainage flow from the collection system to the two treatment plants.

Sanitary Sewage Strength captures the costs of processing at the treatment plants. Sanitary sewage strength is measured according to two characteristics: biochemical oxygen demand (BOD), or the amount of oxygen required to break down organic material in flow; and total suspended solids (TSS), or the amount of suspended particles in flow.

Stormwater Drainage Service includes all the costs of managing the quantity and quality of stormwater runoff.

There are a variety of approaches for allocating costs to service parameters. Some allocations are evident. For example, pump station maintenance costs are allocated to sanitary sewage flow because a pump station's function is to transport wastewater – not to treat it. Some allocations are less obvious – such as allocating the cost of maintenance functions within a *combined* sanitary sewer and stormwater drainage system among both sanitary sewage flow and stormwater drainage. These types of allocations are based on previous consulting studies, best practices, and the professional judgment of Bureau personnel.

To ensure that revenue requirements are allocated to individual service parameters in the most accurate and equitable manner, the Bureau periodically employs consultants to review the cost allocations used in the rate model. In 1998, the consulting firm Black & Veatch reviewed the Bureau's capital cost allocations and offered specific recommendations that continue to be utilized. In 2005, Black & Veatch completed a comprehensive review of the Bureau's sanitary

sewer and stormwater drainage rate model. Black & Veatch concluded that the Bureau is allocating O&M and capital costs in a "reasonable manner consistent with industry practices."

In June 2019, BES began working with a consultant to review service parameter allocations and the Bureau’s rate development methodology. The result of this independent review may result in recommendations that will affect future rate studies and impacts to ratepayers. Progress on this project has been delayed due to the global COVID-19 pandemic and the bureau reorganization, with preliminary options now available and a targeted implementation (following a period of public review) for FY 2023-24.

Step 3: Calculate the Revenue Required from Rates (Rate Revenue Requirement). Multiple revenue sources fund the total revenue requirement including rate revenues, SDCs, wholesale contract revenues, fees, and interest earnings. To determine the amount of rate revenue required from customers, the expected non-rate revenue is deducted from the total revenue requirement.

Step 4: Assign Units of Measure to Each Service Parameter. The fourth step in the rate setting process is to quantify each service parameter by a unit of measure and forecast those units for the ensuing fiscal year. The units of service for sanitary sewage flow and strength are a direct measure of a customer’s wastewater discharge and, therefore, a direct measure of the level of service. Stormwater can have multiple measures to identify a customer’s drainage level of service. The Bureau uses impervious area (a commonly used metric for stormwater cost allocation across the United States) as the stormwater drainage service unit of measure. Table 2 below shows the units by which service parameters are currently quantified.

Table 2 - Units of Measure for Service Parameters

Service Parameter	Units of Measure
Sanitary Sewage Flow	Hundreds of Cubic Feet (CCF)
Sanitary Sewage Strength	
Biochemical Oxygen Demand (BOD)	Pounds per CCF
Total Suspended Solids (TSS)	Pounds per CCF
Clean Water to Stormwater System	Hundreds of Cubic Feet (CCF)
Basic Stormwater Drainage Service	Square Feet of Impervious Area (in 1,000s)
Commercial / Industrial Stormwater Drainage Service	Square Feet of Impervious Area (in 1,000s)
Special Meter Charge	Number of Special Meter Bills

Step 5: Calculate Sanitary Sewer and Stormwater Rates. The calculation of specific sanitary sewer and stormwater drainage rates is the final step in the rate setting process. Rates are based upon the forecast customer base for each service parameter, costs allocated to those service parameters, and other market-and regulatory-driven influences. The ratemaking process – including tables of data and results – is discussed further in Section III below.

III. CALCULATION OF FY 2022-23 RATES

III.A. Revenue Requirement Calculation

The Bureau's total revenue requirement in the approved budget for FY 2022-23 is \$698.8 million. CIP related expenditures for the construction of new sanitary sewer and stormwater drainage facilities constitute \$239.4 million, or approximately 33.6% of the gross revenue requirement. O&M expenditures constitute \$209.4 million, or approximately 29.4% of the gross revenue requirement, and include the cost of direct labor, materials and services, as well as the utility license fees, City general fund overhead allocations and transfers to the Sewer System Rate Stabilization Fund (Fund 617000). All payments for O&M and CIP related expenditures are made through the Sewer System Operating Fund (Fund 600000) with CIP expenditures reimbursed by the Sewer System Construction (Fund 614000).

Debt service payments to bondholders are the result of funding capital expenditures from the proceeds of long-term bonds. In FY 2022-23, debt service payments are projected at \$182.0 million, or approximately 25.5% of the gross revenue requirement. Debt service payments are made from the Sewer System Debt Redemption Fund (Fund 609000) and reimbursed by the Sewer System Operating Fund. Cash-funded CIP expenses are forecast to be \$68.0 million.

Non-rate revenue and non-rate funded expenditures are then deducted from the total revenue requirement to identify the rate revenue requirement. The difference between the gross and net revenue requirements is due to the following revenue requirement offsets:

- \$251.7 million in transfers from the Sewer System Construction fund to the Sewer System Operating Fund (reflecting payment of CIP expenditures from bond proceeds);
- \$5.0 million Rate Stabilization fund transfer;
- \$20.8 million in system development charge revenue;
- \$5.0 million in wholesale service revenue;
- \$14.3 million in miscellaneous service reimbursements, interest income, licenses and permits, and other minor revenues.

After subtracting the \$296.7 million in offsets, the Bureau's rate revenue requirement (the amount of revenue that must be obtained from sanitary sewer and stormwater drainage rates) is projected to be \$402.0 million before adjusting for foregone revenues from various programs (Clean River Rewards, Financial Assistance, Crisis Vouchers, and Laundry Discounts), and other revenue reductions not associated with customer statistics. After adjusting for foregone revenues, the net rate revenue requirement is projected to be \$387.7 million. Table 3 on the following page details the Bureau's rate revenue requirement calculation for FY 2022-23.

Table 3 - Calculation of Rate Revenue Requirement

	Forecast FY 2022-23
<u>O&M AND CIP EXPENSES</u>	
Personal Services	\$76,727,356
Materials & Services - External	49,487,198
Materials & Services - Internal	47,990,890
Capital Outlay (non-CIP)	5,901,000
Expenditures for Capital Improvement Projects	239,375,500
Cash Transfers:	
General Fund Overhead	8,747,818
Utility License Fees	18,940,000
Rate Stabilization Fund	10,000,000
Pension Obligation Bonds Fund	5,185,735
Under Expenditure Savings	<u>(13,598,123)</u>
TOTAL O&M AND CIP EXPENSES	\$448,757,374
Debt Service Payments	
Existing First Lien Debt Service	\$29,276,959
Existing/New Subordinate Lien Debt Service	152,697,276
Debt Issuance/Servicing Costs	30,481
Cash Transfers to Sewer Construction Fund:	
Cash Financed Capital Improvements	<u>68,000,000</u>
TOTAL DEBT AND CIP TRANSFERS	<u>\$250,004,716</u>
GROSS REVENUE REQUIREMENT	<u>\$698,762,090</u>
<u>LESS: OTHER SYSTEM RESOURCES</u>	
Transfers In	
CIP Reimbursement from Construction Fund	\$251,700,000
Rate Stabilization Fund Transfer In	5,000,000
Other Cash Transfers	200,000
Service Reimbursements	1,787,180
Intergovernmental Revenue	237,500
Licenses and Permits	1,821,000
Interest on Investments	1,340,500
Miscellaneous	5,510,000
Service Charges	
System Development Charges	20,750,000
Wholesale Sewer Contracts	5,000,000
Inspections	514,000
Rents	968,052
Other Service Charges	2,784,500
Debt to Cover Bond Issuance Costs	30,481
Increase/(Decrease) from Budget	<u>(900,000)</u>
TOTAL OTHER RESOURCES	<u>\$296,743,213</u>
RATE REVENUE REQUIREMENT	<u>\$402,018,877</u>
Foregone Rate Revenues	<u>-\$14,365,845</u>
NET RATE REVENUE REQUIREMENT	<u>\$387,653,031</u>

III.A.1. Summary of Service Allocation Parameters

The revenue requirement is allocated to the following service parameters that best approximate the services the Bureau provides to its customers.

Basic Sanitary Flow (Flow) represents the total volume of sanitary sewage discharged by customers, measured in hundreds of cubic feet (CCF) per year.

Commercial/Industrial Flow (C/I) represents the volume of sanitary sewage discharged by commercial and industrial customers, measured in CCF per year.

Biochemical Oxygen Demand (BOD) is one measure of sanitary sewage discharge strength. It represents the oxygen required by microorganisms to break down the organic content of sanitary sewage. The stronger the discharge, the greater the quantity of oxygen required. This service parameter is measured in pounds per CCF of sanitary sewage flow.

Total Suspended Solids (TSS) is another measure of sanitary sewage discharge strength. It represents the weight of suspended particulate matter per unit of sanitary sewage flow. This service parameter is also measured in pounds per CCF of sanitary sewage flow.

Extra Strength BOD measures sanitary sewage BOD specifically from extra strength customers. This service parameter is measured in pounds per CCF of sanitary sewage flow.

Extra Strength TSS measures sanitary sewage TSS specifically from extra strength customers. This service parameter is measured in pounds per CCF of sanitary sewage flow.

Basic Impervious Area (IA) represents total impervious surface area that contributes to the City's stormwater drainage system. It is measured in thousands of square feet.

Commercial/Industrial Impervious Area (C/I-IA) represents commercial and industrial impervious surface area that contributes to the City's stormwater drainage system. It is also measured in thousands of square feet.

Special Meter Services represents additional meters required to monitor discharge directly, as opposed to indirectly through water consumption. Special meter services are measured by the number of special meter billings.

Portland Harbor represents costs related to the Portland Harbor Superfund site (including evaluation and legal discussions, and beginning in FY 2019-20, Bureau contributions to citywide efforts). These costs are related to both sanitary sewage and stormwater flow, 40 percent of the costs will be recovered on a flow basis and 60 percent will be recovered on an impervious area basis.

III.A.2. Allocation of Operations and Maintenance and Capital Costs to Service Parameters

The allocation of O&M costs to service parameters described above begins with classifying costs as either direct or indirect. Direct costs are actions BES provides that specifically relate to one or more service parameters whereas indirect costs are services that support group or Bureau activities. Direct costs for each cost center are allocated on a percentage basis among the service parameters. The percentage of total direct costs allocated to each service parameter is then used to allocate the indirect costs, either at the group level (for costs wholly within a group function) or the Bureau level (for bureau-wide costs).

The allocation of capital costs to service parameters is based on the existing asset approach. The depreciated value of existing system assets is allocated to the service parameter that influenced the sizing or capacity of that asset. The percent of total depreciated value assigned to each service parameter is used to allocate capital items. As discussed previously, the capital cost allocations used in this rate study reflect the findings and recommendations made in 1998 (reaffirmed in 2005) by Black & Veatch Corporation, updated to reflect current system assets.

III.A.3. Allocation of Non-Rate Revenue Offsets to Service Parameters

The allocation of non-rate revenues to service parameters is based on a review of each individual revenue category. Revenues classified as offsets to capital costs, such as SDCs, are allocated to the service parameters using the same percentage allocation basis as capital costs. The remaining revenues, including cash transfers from other funds, contract revenues, and interest income, are allocated in a manner similar to O&M costs. Revenues are allocated directly to service parameters where appropriate, and indirect revenues are allocated in the same way as indirect costs.

III.A.4. Calculation of Service Parameter Net Revenue Requirements

Service parameter net revenue requirements are calculated per the following formula for each individual service parameter:

$$\begin{aligned} &O\&M \text{ and Capital Costs} - \text{Revenue Offsets} \\ &= \text{Service Parameter Rate Revenue Requirement} \end{aligned}$$

Table 4 below summarizes the development of the net revenue requirement by service parameter. All capital expenditures are allocated to sanitary flow, BOD, TSS, and basic impervious area as all customers benefit from assets broadly. Revenue requirements for other service parameters are operating only.

Table 4 - Development of Service Parameter Rate Revenue Requirement

	Rate Revenue Requirement
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Sanitary Sewage Flow	\$	182,448,186
Commercial / Industrial Flow-Related Services		675,583
Residential Flow-Related Services		3,257,175
Biochemical Oxygen Demand (BOD)		33,564,132
BOD - Extra Strength		684,550
Total Suspended Solids (TSS)		28,241,266
TSS - Extra Strength		612,205
Basic Impervious Area		139,264,903
Commercial/Industrial Impervious Area		4,499,833
Residential Impervious Area		1,787,187
Portland Harbor/Willamette River (Flow)		2,628,128
Portland Harbor/Willamette River (IA)		3,942,506
Special Meter Services		413,223
Grand Total	\$	402,018,877

III.B. Customer Characteristics and Forecast Demand

To develop cost of service rates, the service parameters for each customer class must be forecast. The Bureau uses granular customer data to forecast changes and refine customer growth assumptions for future years. The economic and health crises caused by COVID-19 has resulted in large variations to historical customer usage patterns and made forecasting more unpredictable for the next several years. Growth assumptions vary by customer class based on the level of recovery in the prior year.

- Sanitary flow is projected to:
 - Increase for commercial customers as economic activity increases.
 - Remain flat for multifamily customers as the increase in the number of units will offset usage per capita decreases.
 - Decrease slightly for single family customers as more folks return to work and usage patterns return to pre-COVID trends.
- Extra strength is projected to increase closer to pre-pandemic levels as this customer group decreased significantly during the beginning of COVID.
- Impervious area is projected to increase commensurate with projected account growth, which is 1.0% for commercial and multifamily customers and 0.5% for single family customers. Recent trends on impervious area growth have made it difficult to project.
- Financial assistance is projected to decrease slightly as unemployment is decreasing and the economy slowly recovers from COVID-related shocks.

The BOD and TSS sanitary sewage strength demand characteristic assumptions for regular strength customers are 293 mg/l and 288 mg/l, respectively. Residential accounts with four or less units do not have measured impervious area due to data constraints. Assumed impervious area is as follows: single family – 2,400 square feet IA; duplex – 1,200 square feet IA per unit; triplex and quadplex – 1,000 square feet IA per unit.

The quantities shown in Table 5 below represent forecast total units of demand by service parameter projected for FY 2021-22 and FY 2022-23. Total forecast units of demand, together with the service parameter’s revenue requirements, determine the unit cost of service for each service parameter.

Table 5 - Forecast Sewer System Customer Flow and Strength Characteristics

Customer Statistic and Customer Class	Projected FY 2021-22	Projected FY 2022-23	Percent Change
Flow			
Single-Family	7,659,464	7,582,869	-1.0%
Multifamily	4,182,624	4,182,624	0.0%
Commercial	7,160,899	7,304,117	2.0%
Total	19,002,987	19,069,610	0.4%
Flow Strength (lbs) - BOD			
Single-Family	14,010,684	13,870,577	-1.0%
Multifamily	7,650,852	7,650,852	0.0%
Commercial	13,098,709	13,360,683	2.0%
Extra-Strength	9,026,940	9,478,287	5.0%
Total	43,787,185	44,360,399	1.3%
Flow Strength (lbs) - TSS			
Single-Family	13,771,594	13,633,878	-1.0%
Multifamily	7,520,291	7,520,291	0.0%
Commercial	12,875,182	13,132,685	2.0%
Extra-Strength	1,410,872	1,481,416	5.0%
Total	35,577,939	35,768,270	0.5%
Impervious Area (1,000 sq. ft.)			
Single-Family	374,752	376,626	0.5%
Multifamily	97,740	98,717	1.0%
Commercial	484,580	489,426	1.0%
Total	957,072	964,769	0.8%
Portland Harbor Superfund - Flow			
Single-Family	7,571,125	7,491,250	-1.1%
Multifamily	4,176,954	4,176,954	0.0%
Commercial	7,379,325	7,526,911	2.0%
Total	19,127,404	19,195,115	0.4%
Portland Harbor Superfund - Impervious Area			
Single-Family	377,244	379,130	0.5%
Multifamily	99,350	100,343	1.0%
Commercial	536,270	541,632	1.0%
Total	1,012,864	1,021,105	0.8%
Clean to Storm Flow	72,780	72,780	0.0%
Special Meter Bills	10,943	10,943	0.0%

III.C. Calculation of Unit Cost of Service

The next step in rate development is to compute the unit cost of service for each service parameter. The total O&M and capital rate revenue requirement by service parameter in Table 4 serves as the numerator in the equation. The forecast units for each service type in Table 5 serves as the denominator. Dividing the service parameter revenue requirement by its forecast number of units produces unit costs of service by parameter, as shown in Table 6.

Table 6 - Per Unit Cost of Service by Service Parameter

Service Parameter	Rate Rev. Req.	Annual Units	Forecast FY 2022-23	Units
Basic Sanitary Flow	\$ 182,448,186	19,069,610	\$9.567	Flow in CCF
Biochemical Oxygen Demand	33,564,132	44,360,399	\$0.757	Pounds of BOD
Total Suspended Solids	28,241,266	35,768,270	\$0.790	Pounds of TSS
Commercial / Industrial Flow-Related Services	675,583	7,304,117	\$0.092	Flow in CCF
Residential Flow-Related Services	3,257,175	11,765,493	\$0.277	Flow in CCF
Total Impervious Area	139,184,032	964,769	\$144.267	1,000 SF Impervious Area
Commercial / Industrial Impervious Area	4,499,833	489,426	\$9.194	1,000 SF Impervious Area
Residential Impervious Area	1,787,187	475,343	\$3.760	1,000 SF Impervious Area
Portland Harbor/Willamette River	2,628,128	19,195,115	\$0.137	Flow in CCF
Portland Harbor/Willamette River	3,942,506	1,021,105	\$3.861	1,000 SF Impervious Area
Special Meter Services	413,223	10,943	\$37.761	Special Meter Bills
Extra Strength Biochemical Oxygen Demand	684,550	9,478,287	\$0.072	Pounds of BOD
Extra Strength Total Suspended Solids	612,205	1,481,416	\$0.413	Pounds of TSS
Clean to Storm	80,871	72,780	\$1.111	Flow in CCF
Total	\$ 402,018,877			

The rate revenue requirement allocated to basic sanitary flow for FY 2022-23 is \$182.4 million. Total sanitary sewer flow for all customer classes is forecast to be 19.1 million CCF. Dividing the cost by the forecast service demand yields an estimated unit cost of \$9.567 per CCF. This unit cost allows revenue requirements to be charged to each customer class (and to individual customers) based on their contribution to basic sanitary flow.

III.D. Calculation of Cost of Service Sanitary Sewer and Stormwater Drainage Rates

The unit costs displayed in Table 6 are used to develop rates charged to customers. For certain rates, such as impervious area, the unit cost is divided by 12 months to arrive at the rate. For others, such as the extra strength charge, the rate is calculated as the sum of total BOD and extra strength BOD.

For flow rates, the calculation is a little more complex. For example, the residential sanitary volume rate includes the cost of flow at \$9.567 per CCF, the cost of residential strength at \$2.804 per CCF (explained below), and the cost of providing low-income discounts at \$0.277 per CCF.

Residential strength is calculated converting assumed residential strength for BOD and TSS from mg/l to lbs/CCF. The strength of 293 mg/l for BOD and 288 mg/l for TSS converts to approximately 1.83 lbs/CCF for BOD and 1.80 lbs/CCF for TSS. Then, the cost of strength per CCF of flow is multiplied by the rate per pound as shown below (numbers may not equal due to rounding).

$$\begin{aligned}
 \text{Residential Strength in } \frac{\text{lbs}}{\text{CCF}} * \text{Cost in } \frac{\$}{\text{lb}} &= \text{Strength Cost in } \frac{\$}{\text{CCF}} \\
 \text{BOD} - 1.83 \times \$0.757 &= \$1.384 \\
 \text{TSS} - 1.80 \times \$0.790 &= \$1.420 \\
 \text{BOD} + \text{TSS} &= \text{Residential Strength} \\
 \$1.384 + \$1.420 &= \$2.804
 \end{aligned}$$

The rate structure also includes the Clean River Rewards program (CRR), a discount on the on-site portion of the stormwater charge. Adopted rates reflect CRR participation levels of about 35,000 customers (based upon current participation).

Residential flow and impervious area charges are also adjusted to account for the foregone revenue from the financial assistance program. The tier 1 financial assistance rate is based on 50% of the typical single-family sewer and stormwater bill and the tier 2 financial assistance rate is 80% of the typical sewer and stormwater bill. The foregone revenue results in an offsetting upward adjustment in the rate.

After determining the cost of service rates, minor adjustments are made to account for policy objectives (for example, phasing in of large increases and/or one-time corrections to significant assumptions) and to avoid inconsistencies in support of the pending comprehensive rate study. Note that any policy changes to the rates will result in net neutral rate revenue collected, as the rate revenue requirement is separate from how the Bureau will collect those revenues.

In computing rates, the Bureau’s policy is to round to the nearest tenth of a cent for commercial flow rates and extra strength rates. All other rates are rounded to the nearest cent.

A summary of all sanitary sewer and stormwater drainage rates is included in Table 10 in Section V of this document.

III.E. Typical Commercial Customer Bills

Table 7 below illustrates estimated commercial customer bills computed from proposed sewer rates for FY 2022-23 compared to bills under the FY 2021-22 rate structure, excluding the effects of the CRR. Assuming no discounts, bill changes range from a decrease of 2.5% to an increase of 3.7%, depending on the customer type and usage characteristics.

Table 7 - FY 2020-21 vs. FY 2021-22 Typical Commercial Customer Bill Comparison *

Typical Customer	Usage Characteristics						Monthly Rates		
	Monthly Accounts per Customer	Quarterly Accounts per Customer	Sanitary Flow (ccf/month)	Impervious Area (Stormwater) (square feet)	Extra Strength BOD (lbs./ccf)	Extra Strength TSS (lbs./ccf)	Current FY 2021-22	Proposed FY 2022-23	Percent Change
Large Office Building	1		1,417	38,100	-	-	\$ 17,308	\$ 17,944	3.7%
Large Dairy	2		176	39,000	9.83	2.70	\$ 4,742	\$ 4,705	-0.8%
Large Metal Plater	5	5	9,011	119,900	-	9.23	\$ 208,707	\$ 212,042	1.6%
Small Graphic Arts	1		4	1,500	-	-	\$ 64	\$ 66	3.4%
Industrial Laundry	1	2	6,610	104,000	3.35	3.08	\$ 124,241	\$ 125,423	1.0%
Large Nightclub	2		185	4,800	-	-	\$ 2,257	\$ 2,340	3.7%
Small Print Shop	1		9	1,500	-	-	\$ 127	\$ 131	3.6%
Large Church		2	39	20,100	-	-	\$ 736	\$ 761	3.4%
Big Box Retailer	1		443	657,000	8.45	3.03	\$ 19,071	\$ 19,233	0.8%
Brewery	4	2	3,385	30,000	15.60	1.07	\$ 92,435	\$ 90,102	-2.5%
Hospital Complex	11	6	5,251	632,500	-	-	\$ 70,737	\$ 73,280	3.6%
Neighborhood Tavern	1		30	5,100	-	-	\$ 424	\$ 439	3.6%
Auto Repair Shop		1	15	10,000	-	-	\$ 308	\$ 318	3.3%
Large Hotel	1		3,876	39,300	-	-	\$ 46,470	\$ 48,187	3.7%
Fast Food	1		52	29,600	-	-	\$ 1,014	\$ 1,048	3.4%
Large Process Industry	1		1,311	547,100	2.67	0.20	\$ 26,353	\$ 26,881	2.0%
Department Store	1		286	38,100	-	-	\$ 3,902	\$ 4,042	3.6%
Meat Packer	1		1,773	25,000	0.39	-	\$ 21,979	\$ 22,716	3.4%
Large Manufacturer	3	2	12,210	414,000	-	-	\$ 150,289	\$ 155,805	3.7%
Small Nightclub		2	40	3,000	-	-	\$ 510	\$ 529	3.6%
Convenience Store		1	30	15,000	-	-	\$ 553	\$ 572	3.4%
Fast Food		1	123	15,000	-	-	\$ 1,660	\$ 1,719	3.6%
Electronics Manufacture	1		20,240	73,900	-	-	\$ 240,898	\$ 249,811	3.7%
Zoo	1		14,859	497,400	-	-	\$ 182,809	\$ 189,519	3.7%
Small Office Building		1	57	34,500	-	-	\$ 1,143	\$ 1,181	3.3%

* Assumes no participation in the CRR program. CRR program participants will receive a discount of up to 35% of the total stormwater charge.

IV. SANITARY SEWER AND STORMWATER DRAINAGE CAPITAL CHARGES

The Bureau has several charges designed to recover the costs or prior system capital investment from new customers to the system: the sanitary sewer system development charge (SDC), the stormwater drainage SDC, and line and branch charges. The sanitary sewer SDC and the stormwater drainage SDC are subject to Oregon Revised Statutes 223.297 to 223.314 and have been calculated as reimbursement fees (i.e., to pay for portions of the system already built). Line and branch charges are not subject to these requirements.

The purpose of the sanitary sewer SDC and the stormwater drainage SDC is to ensure that new customers pay an equitable portion of the costs of existing major sanitary sewer and stormwater drainage facilities that serve the community. As growth occurs, new customers pay connection charges and SDCs for a share of the costs of major facilities.

Line and branch charges recover the costs of constructing the connection to local collector sewers from the properties they serve. Historically, collector sewers were assessed to benefited properties through local improvement district processes. Because of changes made after the Mid-County Sewer Project in the 1990s, most of the new collector sewers being constructed in Portland are now financed as part of the Bureau's capital improvement program. Recovery of these costs occurs through payment of line and branch charges from properties adjacent to these sewer lines.

IV.A. System Development Charges

The calculation methodology takes the costs of existing facilities and several additional factors into consideration in arriving at a cost basis for reimbursement. Factors considered in developing the calculation methodology include:

The cost of existing facilities. The sanitary sewer and stormwater drainage SDCs are based on the replacement cost of existing facilities. Replacement cost calculations use the Engineering News Record Construction Cost Index 20-City Average and applies a linear regression analysis to develop a forward-looking construction cost escalator to identify their present replacement value.

Ratemaking principles employed to finance publicly owned capital improvements. Only that portion of facilities costs paid by current and past customers are fully eligible for SDC recovery. For facilities funded by bond issuances (essentially all facilities since 1985), replacement costs are prorated over the term of the bonds (20 or 25 years) to approximate the cumulative debt service paid on the bonds.

Gifts or grants from federal or state government or private persons. The portion of facilities funded by these revenue sources are not included in the cost basis for SDCs.

Prior contributions by existing ratepayers. A return on equity for the portion of facilities constructed with ratepayer funds is included in the calculation as a carrying cost for current and past ratepayers. The return on equity portion calculates simple

interest foregone on each year's original project cost using each year's annual average yield on 6-month Treasury Bills.

The value of unused capacity available for future system users. The methodology values total capacity, meaning new development pays for capacity in the existing system on the same basis as current ratepayers.

To compute reimbursable facilities costs for the sanitary sewer and stormwater drainage SDCs, the original costs of facilities are adjusted by an index of construction costs to develop a present value replacement cost for those facilities. These costs are also adjusted to reflect a return on equity for existing ratepayers, who incurred the investment cost of constructing them. However, only that portion of facilities costs actually paid by ratepayers is included in the reimbursable cost total. For example, if a facility built five years ago was financed with 20-year revenue bonds, only one fourth of that facility's adjusted costs are included in as a reimbursable cost for purposes of the sanitary sewer SDC. The calculation of reimbursable facilities costs is the same for the stormwater drainage SDC.

IV.B. Sanitary Sewer SDC Calculations

Applying the above methodology to sanitary sewer facilities yields total costs of \$3,155,920,843. These costs specifically exclude Local Improvement District development projects, developer permit projects, and grant-funded facilities.

For each customer paying a sanitary sewer SDC, the SDC is calculated as an average cost per equivalent dwelling unit (EDU) times the number of dwelling units. For purposes of the sanitary sewer SDC, one EDU corresponds to the sanitary flow from a single-family dwelling. The Bureau maintains a table of EDU equivalencies by type of occupancy. The total system treatment capacity is 380,298 EDUs. Dividing the above total cost by this amount yields an average cost of \$8,299 per EDU. The customer's charge is therefore:

$$\text{Sanitary SDC} = \$8,299 \times \text{EDU}$$

IV.C. Stormwater Drainage SDC Calculations

The calculation of the stormwater drainage SDC is intended to reflect the use of existing stormwater drainage facilities by new development. This use has several dimensions, corresponding to the various functions of the system. These functions include collection, conveyance, and treatment of stormwater flows from properties and from public rights of way. This service includes access to individual properties on local streets and use of arterial streets, unimpeded by flooding. It also includes protection of individual properties from hazardous materials spills in the right of way, as well as protection from flows originating elsewhere.

The charge has two components: an on-site charge and an off-site charge. The on-site charge reflects direct usage of public stormwater drainage facilities, corresponding to flows from properties. Credits against this portion of the charge reflect the contributions made by developers in managing on-site flows. The off-site charge reflects the indirect uses and benefits,

corresponding to flows from public rights of way. The measure of proportionality for this charge is intended to reflect the relationship between these uses and benefits and the characteristics of the development.

Applying the above methodology to stormwater drainage facilities yields total costs of \$629,140,821. These costs specifically exclude Local Improvement District projects, developer permit projects, and grant-funded facilities.

Total facilities costs are divided between on-site and off-site costs. On-site costs represent that portion of total costs for facilities handling stormwater drainage flows from individual properties. Off-site costs represent the portion of total costs for facilities handling stormwater drainage flows from rights of way. Even a development discharging no water directly to public facilities uses and benefits from facilities handling off-site flows in one or more of the following ways: 1) access to properties unimpeded by stormwater-related flooding of rights of way; 2) general use of the right of way unimpeded by stormwater-related flooding; 3) protection from hazardous materials spills in the right of way; and 4) protection from off-site flows.

The allocation between on-site and off-site costs is based on a computation of relative flow contributions from properties and rights of way. Off-site costs are further split to reflect the various benefits received from facilities draining the right of way. There are two principal benefits: drainage of arterial streets and access to individual properties. These costs are split according to the relative amounts of impervious area in each type of street, adjusting for the portion of arterial streets used for access to properties. The units of service for the three categories described are shown in Table 8.

Table 8 - Stormwater SDC Summary

Cost Category	Costs Allocate to Category	Total Units in Service Area	Unit Cost	Unit of Measurement
On-Site	\$286,259,074	1,106,553	\$259	1,000 square feet of impervious area less right of way (charge per 1,000 square feet)
Off-Site				
Local	\$317,407,897	37,979,565	\$8.36	Linear feet of frontage (charge per foot)
Arterial	\$25,473,851	5,451,180	\$4.67	Daily vehicle trips (charge per trip)

In the absence of mitigation measures, flow from an individual site will be roughly proportional to the impervious area on that site. Access to an individual site is made using the right of way fronting the site. Daily vehicle trips are a proportionate measure of use of streets.

For each customer paying a stormwater drainage SDC, the cost for each category is the product of service units times unit cost. The total charge is the sum of costs for the three categories. Using data from the above table, this is:

$$\text{Storm SDC} = (\$259 \times \text{Net New Impervious Area}) + (\$8.36 \times \text{Feet of Site Frontage}) + (\$4.67 \times \text{Net New Vehicle Trips})$$

Credits against the impervious area portion of the stormwater drainage SDC are allowed, reflecting on-site stormwater drainage facilities exceeding development standards, or direct (permitted) discharge of stormwater to the Columbia or Willamette rivers, or to the Columbia Slough.

IV.D. Line and Branch Charges

Line and branch charges are based upon the average costs of constructing collector sewers and house branches, adjusted to current dollars. Projects that have been completed since 2003 are included within the computation. This calculation excludes the highest and lowest line charge. Line sewer costs are divided by the net assessable square footage to determine a line charge for each project resulting in an average line charge. Total house branch costs are divided by the total number of house branches constructed to determine a house branch cost for each project.

These costs are then forecast for FY 2022-23, using the Engineering News Record Construction Cost Index 20-City Average and applying linear regression analysis to develop a forward-looking construction cost estimate. BES has transitioned from the large, low unit-cost Mid-County projects from the 1990s to a more current cost based on smaller, higher unit-cost sewer extension projects. As such, fewer projects have been added in recent years. Based on a methodology evaluation from the consultant-led rate study, line and branch charges will be updated to better reflect cost of service on current types of construction projects.

Table 9 illustrates how the line and branch charges were calculated.

Table 9 - Sewer System Line and Branch Charge Calculation

PROJECTS	Fiscal Year Completed	Line Charge:				Branch Charge:			
		Total Line Costs	Total Line Costs in Current Dollars	Total Benefitted Area (Sq. Feet)	Line Charge per Sq. Ft.	Total House Branch Costs	Total House Branch Costs In Current Dollars	Total # of House Branches	Average Branch Charge
N Cecelia & Hodge SEP	2003	\$742,308	\$1,385,039	597735	\$2.32	\$310,809	\$579,925	103	\$5,630
N Hunt & Endicott SEP	2003	\$102,762	\$191,740	182300	\$1.05	\$103,875	\$193,816	26	\$7,454
none	2004								
none	2005								
S. Airport Way Phase 1 SEP	2006	\$1,634,161	\$2,633,643	1208111	\$2.18	\$172,873	\$278,605	47	\$5,928
SE 60th & Steele SEP	2006	\$1,620,383	\$2,611,439	1039206	\$2.51	\$713,268	\$1,149,515	209	\$5,500
none	2007								
S. Airport Way Phase 3	2008	\$4,619,392	\$6,942,054	4806281	\$1.44	\$1,141,991	\$1,716,192	102	\$16,825
SE Tolman and 69th Ave	2008	\$653,463	\$982,029	256177	\$3.83	\$310,335	\$466,373	61	\$7,645
S. Airport Way Phase 5	2009	\$1,837,445	\$2,677,917	1884393	\$1.42	\$555,685	\$809,863	54	\$14,997
S. Airport Way Phase 2A	2010	\$932,630	\$1,323,402	345791	\$3.83	\$179,998	\$255,418	20	\$12,771
NE 87th & Columbia Swr Ext.	2010	\$117,368	\$166,546	59110	\$2.82	\$22,379	\$31,756	2	\$15,878
N. Alberta Emerg. Swr Replacement	2010	\$91,804	\$130,270	17000	\$7.6629	\$40,712	\$57,770	4	\$14,442
Lents San. Sewer Ext.	2011	\$3,251,378	\$4,477,380	1444272	\$3.10	\$798,813	\$1,100,023	185	\$5,946
DeltaWood Ph. 1 & 2	2011	\$386,089	\$531,672	173818	\$3.06	\$174,881	\$240,823	42	\$5,734
NW 29th & Savier San Sewer Ext.	2011	\$301,088	\$414,620	54100	\$7.6640	\$120,993	\$166,615	13	\$12,817
none	2012								
none	2013								
none	2014								
none	2015								
none	2016								
none	2017								
none	2018								
North Buckman NCS San. Sewer Ext.	2019	\$626,659	\$693,801	69088	\$10.0423	\$184,363	\$204,116	23	\$8,875
none	2020								
SE Claybourne & 135th Sewer Extens	2021	\$2,421,542	\$2,494,188	601957.6	\$4.14	\$973,259	\$1,002,456	79	\$12,689
TOTALS (after excluding High/Low projects):		\$18,609,051.82	\$26,770,198	12,487,952	\$2.144	\$3,948,973.94	\$5,387,559	659	\$8,175

min \$1.05 min \$5,500
max \$10.042 max \$16,825

SUMMARY	Line Charge	Branch Charge
Adopted Line & Branch Charges for FY2021-22:	\$1.96	\$7,271
Proposed Charges for FY2022-23	\$2.21	\$8,421
Percent change	12.8%	15.8%

V. SUMMARY AND FORECAST OPERATING RESULTS

Table 10 shows the proposed rates, SDCs, and line and branch charges calculated in this document along with a comparison with last year's rates. The average single-family bill increase is approximately 3.14% assuming standard impervious area with no CRR and an average flow of 4.070 CCF per month in FY 2021-22. The average flow of a single-family customer last year was the same. Whereas the average flow per single-family customer has consistently decreased over the past many years, behavior changes tied to COVID-19 resulted in a slightly higher average flow per customer in FY 2021-22 that is unlikely to decrease significantly next year.

Table 10 - Sanitary Sewer and Stormwater Drainage Rates and SDCs

	Adopted FY 2021-22	Adopted FY 2022- 23	Percent Change
Residential Sanitary Sewer and Stormwater Drainage			
Sanitary Sewage Volume (\$ / CCF)	\$11.92	\$12.35	3.61%
Stormwater Drainage (\$ / 1,000 Square Feet of Impervious Area / Month)	\$12.68	\$13.00	2.52%
<i>Off-Site Portion of Charge</i>	\$8.24	\$8.45	2.55%
<i>On-Site Portion of Charge</i>	\$4.44	\$4.55	2.48%
Average Single-Family Bill (\$ / Month)	\$80.30	\$82.82	3.14%
Low-Income Discount (\$ / Month)	-\$39.47	-\$40.73	3.19%
Extreme Low-Income Discount (\$ / Month)	-\$63.16	-\$65.17	3.18%
Commercial / Industrial Sanitary Sewer and Stormwater Drainage			
Special Meter Charge (\$ / Month)	\$50.00	\$40.00	-20.00%
Sanitary Sewage Volume (\$ / CCF)	\$11.723	\$12.172	3.80%
Stormwater Drainage (\$ / 1,000 Square Feet of Impervious Area / Month)	\$13.10	\$13.46	2.72%
<i>Off-Site Portion of Charge</i>	\$8.52	\$8.75	2.70%
<i>On-Site Portion of Charge</i>	\$4.58	\$4.71	2.77%
Clean Water to Stormwater Drainage System (\$ / CCF)	\$1.200	\$1.200	0.00%
Extra Strength Sanitary Sewer			
Biochemical Oxygen Demand (\$ / Pound)	\$0.900	\$0.828	-8.00%
Total Suspended Solids (\$ / Pound)	\$1.206	\$1.198	-0.25%
Portland Harbor Superfund			
Volume Charge (\$ / CCF)	\$0.13	\$0.12	-7.69%
Impervious Area Charge (\$ / 1,000 Square Feet of Impervious Area / Month)	\$0.34	\$0.36	5.88%
System Development Charges			
Sanitary Sewer System Development Charge (\$ / Equivalent Dwelling Unit)	\$7,518	\$8,299	10.39%
Line and Branch Charges			
Line Charge (\$ / Square Feet)	\$1.96	\$2.21	12.76%
Branch Charge (\$ / Branch)	\$7,271	\$8,421	15.82%

Stormwater Drainage System Development Charge			
\$ / 1,000 Square Feet of Impervious Area	\$263.00	\$259.00	-1.52%
\$ / linear feet of frontage	\$7.84	\$8.36	6.63%
\$ / daily vehicle trip	\$4.36	\$4.67	7.11%
<i>CCF - Hundred cubic feet of sanitary sewage flow</i>			

Table 11 illustrates the forecast operating results for the Sewer System Fund’s projected bond coverage in the Comprehensive Annual Financial Report (Annual Report), given the sources of rate revenues, non-rate revenues, costs, and other adjustments based on Bureau data. It shows that adopted rates will allow the Bureau to collect sufficient revenues to meet debt service coverage requirements as specified in revenue bond covenants. This table shows the amount of rate revenue expected based on the Adopted Budget.

Table 11 - Forecast Sewer System Funds Projected Annual Report Bond Coverage

	Forecast FY 2022-23
<u>OPERATING REVENUES</u>	
Service Charges & Fees	\$388,086,128
System Development Charges	\$20,750,000
Line & Branch Charges	\$650,000
Wholesale Contracts	\$5,000,000
Other Service Charges	\$2,609,500
Reimbursements - Other City Funds	\$1,258,677
Other Funds Cash Transfers	\$0
Transfer from Rate Stabilization Fund	\$5,000,000
Product Sales	\$4,500,000
Inspection Fees	\$514,000
Rents	\$280,335
Intergovernmental Revenue and Minor Miscellaneous Revenue	\$367,500
Licenses & Permits	\$521,000
TOTAL OPERATING REVENUES	\$429,537,140
<u>OPERATING EXPENSES</u>	
Personal Services	\$75,893,866
Materials & Services - External	\$42,326,002
Materials & Services - Internal	\$45,939,671
Capitalized Overhead	-\$14,349,970
General Fund Overhead	\$8,747,818
Transfer to Rate Stabilization Fund	\$10,000,000
PERS Bonds Transfer	\$5,183,408
Allowance for Uncollectable Rate Revenue	\$2,418,125
TOTAL OPERATING EXPENSES	\$176,158,920
OPERATING INCOME (LOSS)	\$253,378,220
<u>NON-OPERATING REVENUES</u>	
Fund 600XXX-Operations - Interest Income	\$485,000
Fund 614XXX-Construction - Interest Income	\$300,000
Fund 609XXX-Debt Redemption - Interest Income	\$180,000

Fund 617XXX-Rate Stabilization - Interest Income	\$525,000
TOTAL NON-OPERATING REVENUES	<u>\$1,490,000</u>
NET INCOME (LOSS)	<u>\$254,868,220</u>
SUMMARY OF INCOME FOR DEBT SERVICE COVERAGE CALCULATION	
Operating Income	\$253,378,220
Interest Income	\$1,490,000
Bonded Connection Charges and Line & Branch Charges	<u>\$0</u>
TOTAL INCOME FOR DEBT SERVICE COVERAGE CALCULATION	<u>\$254,868,220</u>
<u>DEBT SERVICE PRINCIPAL AND INTEREST</u>	
First Lien Debt Service Payments	\$29,276,959
Second Lien Debt Service Payments	<u>\$152,697,276</u>
TOTAL DEBT SERVICE PAYMENTS	<u>\$181,974,235</u>
First Lien Debt Service Coverage	8.71
Combined First & Second Lien Debt Service Coverage	1.40