

**City of Portland
Bureau of Environmental Services**



**FY 2021-22 Sewer and Stormwater System
Annual Rate Study**

July 2021

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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 2021-22 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 2021-22 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 Rate Study does not establish the recommended level or priority of Bureau services - these are addressed in the Five-Year Financial Plan and the annual budget. The Rate Study does, however, determine how BES funds these services and allocates costs among customer classes and service parameters. 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, 2021. Rates for FY 2021-22 reflect changes in operating and capital costs, forecast changes in customer usage due to the economic crisis and pandemic caused by COVID-19. The typical monthly bill for single-family residential customers, assuming no participation in a discount program, increases by 3.15% relative to FY 2020-21 rates.

Table 1 - FY 2020-21 and FY 2021-22 Sanitary Sewer and Stormwater Drainage Rate Comparison

	Adopted FY 2020-21	Adopted FY 2021-22
Residential Sanitary Sewer and Stormwater Drainage		
Sanitary Sewage Volume (\$ / CCF)	\$11.55	\$11.92
Stormwater Drainage (\$ / 1,000 Square Feet of Impervious Area / Month)	\$12.52	\$12.68
<i>Off-Site Portion of Charge</i>	\$8.14	\$8.24
<i>On-Site Portion of Charge</i>	\$4.38	\$4.44
Average Single-Family Bill (\$ / Month)	\$77.85	\$80.30
Low-Income Discount (\$ / Month)	-\$38.30	-\$39.47
Extreme Low-Income Discount (\$ / Month)	-\$61.28	-\$63.16
Commercial / Industrial Sanitary Sewer and Stormwater Drainage		
Special Meter Charge (\$ / Month)	\$50.00	\$50.00
Sanitary Sewage Volume (\$ / CCF)	\$11.365	\$11.798
Stormwater Drainage (\$ / 1,000 Square Feet of Impervious Area / Month)	\$13.10	\$13.10
<i>Off-Site Portion of Charge</i>	\$8.52	\$8.52
<i>On-Site Portion of Charge</i>	\$4.58	\$4.58
Clean Water to Stormwater Drainage System (\$ / CCF)	\$1.200	\$1.200
Extra Strength Sanitary Sewer		
Biochemical Oxygen Demand (\$ / Pound)	\$0.900	\$0.900
Total Suspended Solids (\$ / Pound)	\$1.206	\$1.206
Portland Harbor Superfund		
Volume Charge (\$ / CCF)	\$0.12	\$0.13
Impervious Area Charge (\$ / 1,000 Square Feet of Impervious Area / Month)	\$0.32	\$0.34
<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. The operating revenue requirement includes the recurring cost of providing service, overhead charges, and maintaining planned contingency reserves. The Bureau's adopted budget provides a detailed description of these operating costs for the upcoming fiscal year. The capital revenue requirement includes 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. Capital expenditures are funded via debt (long-term bonds), available cash, and current year rate revenues. The Five-Year Financial Plan describes planned CIP expenditures for the upcoming fiscal year and discusses the Bureau's debt management policies.

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 – Columbia Boulevard Wastewater Treatment Plant (CBWTP) and Tryon Creek Wastewater Treatment Plant (TCWTP).

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 appropriately 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 recommendations now expected to be available at the end of FY 2020-21 and potential 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 FY 2021-22. 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 has 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. The precise level of stormwater drainage service provided to individual customers is also a function of property slope, soil type, semi-impervious area, and access to and use of public rights of way. However, considering each of these additional factors individually would result in higher administrative and transaction costs relative to the size of the stormwater drainage rate, potentially increasing costs to all customers. 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 2021-22 RATES

III.A. Revenue Requirement Calculation

The Bureau's total revenue requirement in the approved budget for FY 2021-22 is \$634.9 million. CIP related expenditures for the construction of new sanitary sewer and stormwater drainage facilities constitute \$227.1 million, or approximately 35.7% of the gross revenue requirement. O&M expenditures constitute \$197.8 million, or approximately 31.0% 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 prior years' capital expenditures from the proceeds of long-term bonds. In FY 2021-22, debt service payments are projected at \$172.8 million, or approximately 27.2% 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 \$53.8 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:

- \$237.8 million in transfers from the Sewer System Construction fund to the Sewer System Operating Fund (reflecting payment of CIP expenditures from bond proceeds);
- \$20.0 million Rate Stabilization fund transfer;
- \$8.9 million in system development charge revenue;
- \$4.5 million in wholesale service revenue;
- \$12.0 million revenue is from miscellaneous service reimbursements, interest income, licenses and permits, and other minor revenues.

After subtracting the \$283.2 million in offsets, the Bureau's net revenue requirement (the amount of revenue that must be obtained from sanitary sewer and stormwater drainage rates) is projected to be \$351.7 million before adjusting for write-offs and other revenue reductions not associated with customer statistics. Table 3 on the following page details the Bureau's rate revenue requirement calculation for FY 2021-22.

Table 3 - Calculation of Rate Revenue Requirement

	Forecast FY 2021-22
<u>O&M AND CIP EXPENSES</u>	
Personal Services	\$71,225,099
Materials & Services - External	48,655,310
Materials & Services - Internal	45,942,241
Capital Outlay (non-CIP)	2,171,000
Expenditures for Capital Improvement Projects	227,109,000
Cash Transfers:	
General Fund Overhead	6,510,316
Utility License Fees	17,560,000
Rate Stabilization Fund	0
Pension Obligation Bonds Fund	4,986,285
Under Expenditure Savings	(15,781,083)
TOTAL O&M AND CIP EXPENSES	\$408,378,168
Debt Service Payments	
Existing Debt Service	\$27,782,075
Existing/New Junior Lien Debt Service	144,960,660
Debt Issuance/Servicing Costs	37,685
Cash Transfers to Sewer Construction Fund:	
Cash Financed Capital Improvements	53,750,000
TOTAL DEBT AND CIP TRANSFERS	\$226,530,420
GROSS REVENUE REQUIREMENT	\$634,908,588
<u>LESS: OTHER SYSTEM RESOURCES</u>	
Transfers In	
CIP Reimbursement from Construction Fund	\$237,800,000
Rate Stabilization Fund Transfer In	20,000,000
Other Cash Transfers	200,000
Service Reimbursements	2,234,873
Intergovernmental Revenue	232,500
Licenses and Permits	1,572,000
Interest on Investments	1,985,600
Miscellaneous	4,237,500
Service Charges	
System Development Charges	8,900,000
Wholesale Sewer Contracts	4,490,000
Inspections	316,000
Rents	792,615
Other Service Charges	2,247,500
Debt to Cover Bond Issuance Costs	0
Increase/(Decrease) from Budget	(1,800,000)
TOTAL OTHER RESOURCES	\$283,208,588
RATE REVENUE REQUIREMENT	\$351,700,000

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 encourage sitewide pre-design 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 Costs to Service Parameters

The allocation of O&M costs to the eleven (counting Portland Harbor flow and impervious area charges separately) service parameters described above is a two-step process. For each of the Bureau's cost center and functional area combinations, budgeted expenditures are classified as either direct or indirect. Direct costs are functions 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).

III.A.3. Allocation of Capital Costs to Service Parameters

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.4. 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 percentage as total direct revenues.

III.A.5. Calculation of Service Parameter Net Revenue Requirements

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

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

Table 4 below summarizes the development of the net revenue requirement by service parameter for FY 2021-22. All capital expenditures are allocated to sanitary flow, BOD, TSS, and basic impervious area. Revenue requirements for other service parameters are operating only.

Table 4 - Development of Service Parameter Rate Revenue Requirement

	Gross Revenue Requirement	Revenue Offset	Rate Revenue Requirement
Sanitary Sewage Flow			
<i>Operating</i>	\$ 42,516,573	\$ (2,105,537)	\$40,411,035
<i>Capital</i>	135,214,629	(12,096,512)	123,118,117
<i>Subtotal</i>	\$177,731,202	(\$14,202,049)	\$163,529,152
Biochemical Oxygen Demand (BOD)			
<i>Operating</i>	\$ 17,943,752	\$ (1,899,643)	\$16,044,109
<i>Capital</i>	16,678,456	(1,536,518)	15,141,938
<i>Subtotal</i>	\$34,622,208	(\$3,436,161)	\$31,186,047
Total Suspended Solids (TSS)			
<i>Operating</i>	\$ 15,061,835	\$ (1,924,807)	\$13,137,028
<i>Capital</i>	14,891,479	(1,405,490)	13,485,989
<i>Subtotal</i>	\$29,953,314	(\$3,330,297)	\$26,623,017
Basic Impervious Area			
<i>Operating</i>	\$ 51,681,656	\$ (394,958)	\$51,286,698
<i>Capital</i>	71,605,966	(6,403,028)	65,202,938
<i>Subtotal</i>	\$123,287,622	(\$6,797,986)	\$116,489,636
Commercial/Industrial Impervious Area	\$ 4,167,861	\$ (44,300)	\$4,123,561
Portland Harbor/Willamette River (Flow)	5,037,182	(2,219,787)	2,817,395
Portland Harbor/Willamette River (IA)	7,555,985	(3,329,681)	4,226,304
Commercial / Industrial Flow-Related Services	968,851	(176,887)	791,964
Special Meter Services	543,144	(66,333)	476,811
BOD - Extra Strength	747,415	0	747,415
TSS - Extra Strength	688,697	0	688,697
Grand Total	\$385,303,481	(\$33,603,481)	\$351,700,000

III.B. Customer Demand Characteristics

To develop cost of service rates, the service parameters for each customer class must be forecast. The Bureau now has access to more granular and accurate customer data to better forecast changes and identify more accurate assumptions for how customers grow. The economic and health crises caused by COVID-19 has resulted in variations to historical customer usage patterns and made forecasting more unpredictable for FY 2020-21 and FY 2021-22. Growth assumptions are flat for parameters that increased during FY 2020-21 (impervious area, residential sewer flow) and moderate recovery for parameters that decreased (commercial flow, extra strength loading).

The BOD and TSS sanitary sewage strength demand characteristic assumptions for residential and regular strength commercial customers are 293 mg/l and 288 mg/l, respectively. Table 5 below summarizes forecast customer usage for FY 2021-22. Residential accounts with four or less units are not measured 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.

Table 5 - Forecast Sewer System Customer Flow and Strength Characteristics

Customer Class/Type	Annual Billed Flow (CCF)	Impervious Area (1,000 sq. ft)	Strength	
			BOD (mg/l)	TSS (mg/l)
Residential Single-Family	7,570,540	347,090	13,396,282	13,167,677
Multifamily	4,147,697	91,294	7,586,843	7,457,375
Commercial	5,793,266	444,565	10,597,037	10,416,200
Extra Strength			7,603,466	1,064,247
Total	17,511,503	882,949	39,183,628	32,105,498

III.C.Forecast Customer Counts

Table 6 presents FY 2021-22 forecast sanitary sewer and stormwater drainage customer account totals.

Table 6 - Forecast Customer Accounts

	Forecast FY 2021- 22
<u>RESIDENTIAL</u>	
Single-Family	169,565
Multifamily	13,969
TOTAL RESIDENTIAL ACCOUNTS	183,534
<u>COMMERCIAL</u>	
Commercial	14,433
Extra Strength (subset)	1,752
Clean Water to Stormwater Drainage System (subset)	16
TOTAL COMMERCIAL ACCOUNTS	14,433
TOTAL SYSTEM ACCOUNTS	197,967

III.C.6. Extra Strength Charges

Extra strength charges apply to customers with sanitary sewage discharges in excess of residential or baseline strength. This excess is measured in terms of BOD and TSS. The bureau has two types of extra strength customers: measured and class average. Measured extra strength customers are monitored for their actual discharge. Due to the administrative oversight required for these customers, measured extra strength is focused on high-strength customers and there are very few. Class average customers are charged based on the average strength of flow from that industry.

III.D. Forecast Demand by Service Parameter

The quantities shown in Table 7 below represent forecast FY 2021-22 total units of demand by service parameter. Total forecast units of demand, together with the service parameter revenue requirements, determine the unit cost of service for each service parameter.

Table 7 - Forecast Annual Service Units by Service Parameter

Service Parameter	Forecast FY 2021-22	Units
Basic Sanitary Sewage Flow	17,511,503	Flow in CCF
Biochemical Oxygen Demand	39,183,628	Pounds of BOD
Total Suspended Solids	32,105,498	Pounds of TSS
Total Impervious Area	882,949	1,000 SF Impervious Area
Commercial / Industrial Impervious Area	444,565	1,000 SF Impervious Area
Portland Harbor/Willamette River	17,069,962	Flow in CCF
Portland Harbor/Willamette River Commercial / Industrial Flow Related Services	972,301	1,000 SF Impervious Area
Special Meter Services	5,793,266	Flow in CCF
Extra Strength Biochemical Oxygen Demand	10,587	Special Meter Bills
Extra Strength Total Suspended Solids	7,603,466	Pounds of BOD
Clean to Storm Flow	1,064,247	Pounds of TSS
	71,556	Flow in CCF

III.E. 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 7 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 8.

Table 8 - Per Unit Cost of Service by Service Parameter

Service Parameter	Rate Rev. Req.	Annual Units	Forecast FY 2021-22	Units
Basic Sanitary Flow	\$163,529,152	17,511,503	\$9.338	Flow in CCF
Biochemical Oxygen Demand	31,186,047	39,183,628	\$0.796	Pounds of BOD
Total Suspended Solids	26,623,017	32,105,498	\$0.829	Pounds of TSS
Total Impervious Area	116,489,636	882,949	\$131.933	1,000 SF Impervious Area
Commercial / Industrial Impervious Area	4,123,561	444,565	\$9.275	1,000 SF Impervious Area
Portland Harbor/Willamette River	2,817,395	17,069,962	\$0.165	Flow in CCF
Portland Harbor/Willamette River Commercial / Industrial Flow Related Services	4,226,304	972,301	\$4.347	1,000 SF Impervious Area
Special Meter Services	791,964	5,793,266	\$0.137	Flow in CCF
Extra Strength Biochemical Oxygen Demand	476,811	10,587	\$45.037	Special Meter Bills
Extra Strength Total Suspended Solids	747,415	7,603,466	\$0.098	Pounds of BOD
Total	<u>688,697</u>	1,064,247	\$0.647	Pounds of TSS
	\$351,700,000			

The rate revenue requirement allocated to basic sanitary flow for FY 2021-22 is \$163.5 million. Total sanitary sewer flow for all customer classes is forecast to be 17.5 million CCF. Dividing the cost by the forecast service demand yields an estimated unit cost of \$9.338 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.F. Calculation of Cost of Service Sanitary Sewer and Stormwater Drainage Rates

The unit costs displayed in Table 8 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 \$9.338 per CCF, the cost of residential strength at \$2.947 per CCF (explained below), and the cost of providing low-income discounts at \$0.265 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).

$$\begin{aligned}
 \text{Residential Strength in } \frac{\text{lbs}}{\text{CCF}} * \text{Cost in } \frac{\$}{\text{lb}} &= \text{Strength Cost in } \frac{\$}{\text{CCF}} \\
 \text{BOD} - 1.83 \times \$0.7450 &= \$1.456 \\
 \text{TSS} - 1.80 \times \$0.8109 &= \$1.491 \\
 \text{BOD} + \text{TSS} &= \text{Residential Strength} \\
 \$1.456 + \$1.491 &= \$2.947
 \end{aligned}$$

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 34,300 customers (based upon current participation).

Residential flow and impervious area charges are also adjusted to account for the foregone revenue from the low-income discount program. The low-income discount rate is based on 50% of the typical single-family sewer and stormwater bill and the extreme low-income 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 12 in Section V of this document.

III.G. Typical Commercial Customer Bills

Table 9 below illustrates estimated commercial customer bills computed from proposed sewer rates for FY 2021-22, as compared to bills under FY 2020-21 rate structure excluding the effects of the CRR. Assuming no discounts, bill changes range from an increase of 1.1% to 3.8%, depending on the customer type and usage characteristics.

Table 9 - FY 2020-21 vs. FY 2021-22 Typical Commercial Customer Bill Comparison *

Typical Customer	Usage Characteristics						Monthly Rates		Percent Change
	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 2020-21	Proposed FY 2021-22	
Large Office Building	1		1,417	38,100	-	-	\$ 16,786	\$ 17,414	3.7%
Large Dairy	2		176	39,000	9.83	2.70	\$ 4,676	\$ 4,755	1.7%
Large Metal Plater	5	5	9,011	119,900	-	9.23	\$ 205,389	\$ 209,383	1.9%
Small Graphic Arts	1		4	1,500	-	-	\$ 62	\$ 64	2.7%
Industrial Laundry	1	2	6,610	104,000	3.35	3.08	\$ 121,806	\$ 124,736	2.4%
Large Nightclub	2		185	4,800	-	-	\$ 2,189	\$ 2,271	3.7%
Small Print Shop	1		9	1,500	-	-	\$ 123	\$ 128	3.3%
Large Church		2	39	20,100	-	-	\$ 721	\$ 739	2.5%
Big Box Retailer	1		443	657,000	8.45	3.03	\$ 18,895	\$ 19,104	1.1%
Brewery	4	2	3,385	30,000	15.60	1.07	\$ 91,189	\$ 92,689	1.6%
Hospital Complex	11	6	5,251	632,500	-	-	\$ 68,792	\$ 71,131	3.4%
Neighborhood Tavern	1		30	5,100	-	-	\$ 413	\$ 426	3.2%
Auto Repair Shop		1	15	10,000	-	-	\$ 303	\$ 309	2.2%
Large Hotel	1		3,876	39,300	-	-	\$ 45,043	\$ 46,761	3.8%
Fast Food	1		52	29,600	-	-	\$ 994	\$ 1,018	2.4%
Large Process Industry	1		1,311	547,100	2.67	0.20	\$ 25,860	\$ 26,452	2.3%
Department Store	1		286	38,100	-	-	\$ 3,796	\$ 3,923	3.4%
Meat Packer	1		1,773	25,000	0.39	-	\$ 21,326	\$ 22,112	3.7%
Large Manufacturer	3	2	12,210	414,000	-	-	\$ 145,788	\$ 151,205	3.7%
Small Nightclub		2	40	3,000	-	-	\$ 496	\$ 513	3.6%
Convenience Store		1	30	15,000	-	-	\$ 542	\$ 555	2.5%
Fast Food		1	123	15,000	-	-	\$ 1,614	\$ 1,669	3.4%
Electronics Manufacture	1		20,240	73,900	-	-	\$ 233,448	\$ 242,416	3.8%
Zoo	1		14,859	497,400	-	-	\$ 177,331	\$ 183,923	3.7%
Small Office Building		1	57	34,500	-	-	\$ 1,121	\$ 1,148	2.3%

* 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. In the case of the stormwater drainage SDC, new customers are reimbursing for the capacity for draining the public right of way, and for draining excess runoff from properties adjacent to the right of way.

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 intent of the sanitary sewer and stormwater drainage SDCs is to recover an equitable share of facilities costs from new development. 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 \$2,868,235,201. 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 381,503 EDUs. Dividing the above total cost by this amount yields an average cost of \$7,518 per EDU. The customer's charge is therefore:

$$\text{Sanitary SDC} = \$7,518 \times \text{EDU}$$

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 \$578,970,179. 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 10.

Table 10 - Stormwater SDC Summary

Cost Category	Costs Allocate to Category	Total Units in Service Area	Unit Cost	Unit of Measurement
On-Site	\$263,431,431	1,002,786	\$263	1,000 square feet of impervious area less right of way (charge per 1,000 square feet)
Off-Site				
Local	\$292,096,301	37,234,868	\$7.84	Linear feet of frontage (charge per foot)
Arterial	\$23,442,446	5,381,224	\$4.36	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:

$$\text{Storm SDC} = (\$263 \times \text{Net New Impervious Area}) + (\$7.84 \times \text{Feet of Site Frontage}) \\ + (\$4.36 \times \text{Net New Vehicle Trips})$$

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. Only 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 2021-22, 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. There has been one representative extension projects completed since FY 2010-2011, although there are several projects currently in design that will be included within the next five years.

Table 12 illustrates how the FY 2021-22 line and branch charges were calculated.

Table 11 - Sewer System Line and Branch Charge Calculation

PROJECTS	Completed FY ending 6/30:	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	\$1,302,234	597735	\$2.18	\$310,809	\$545,255	103	\$5,294
N Hunt & Endicott SEP	2003	\$102,762	\$180,277	182300	\$0.99	\$103,875	\$182,228	26	\$7,009
none	2004								
none	2005								
S. Airport Way Phase 1 SEP	2006	\$1,634,161	\$2,476,190	1208111	\$2.05	\$172,873	\$261,948	47	\$5,573
SE 60th & Steele SEP	2006	\$1,620,383	\$2,455,314	1039206	\$2.36	\$713,268	\$1,080,791	209	\$5,171
none	2007								
S. Airport Way Phase 3	2008	\$4,619,392	\$6,527,023	4806281	\$1.36	\$1,141,991	\$1,613,590	102	\$15,820
SE Tolman and 69th Ave	2008	\$653,463	\$923,319	256177	\$3.60	\$310,335	\$438,491	61	\$7,188
S. Airport Way Phase 5	2009	\$1,837,445	\$2,517,818	1884393	\$1.34	\$555,685	\$761,445	54	\$14,101
S. Airport Way Phase 2A	2010	\$932,630	\$1,244,282	345791	\$3.60	\$179,998	\$240,148	20	\$12,007
NE 87th & Columbia Swr Ext.	2010	\$117,368	\$156,589	59110	\$2.65	\$22,379	\$29,858	2	\$14,929
N. Alberta Emerg. Swr Replacement	2010	\$91,804	\$122,482	17000	\$7.2048	\$40,712	\$54,316	4	\$13,579
Lents San. Sewer Ext.	2011	\$3,251,378	\$4,209,700	1444272	\$2.91	\$798,813	\$1,034,258	185	\$5,591
Deltaewood Ph. 1 & 2	2011	\$386,089	\$499,886	173818	\$2.88	\$174,881	\$226,426	42	\$5,391
NW 29th & Savier San Sewer Ext.	2011	\$301,088	\$389,832	54100	\$7.2058	\$120,993	\$156,654	13	\$12,050
none	2012								
none	2013								
none	2014								
none	2015								
none	2016								
none	2017								
none	2018								
North Buckman NCS San. Sewer Ext.	2019	\$626,659	\$652,322	69088	\$9.4419	\$184,363	\$191,912	23	\$8,344
none	2020								
TOTALS (after excluding High/Low projects):		\$16,187,510.27	\$22,824,668	11,885,994	\$1.920	\$2,975,715.22	\$4,122,939	580	\$7,109

min \$0.99 min \$5,171
max \$9.442 max \$15,820

SUMMARY	Line Charge	Branch Charge
Adopted Line & Branch Charges for FY 2019-20:	\$1.91	\$7,103
Proposed Charges for FY 2020-21	\$1.96	\$7,271
Percent change	2.1%	2.0%

V. SUMMARY AND FORECAST OPERATING RESULTS

Table 12 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 3.15% 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 4.030 CCF per month. 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.

Table 12 - Sanitary Sewer and Stormwater Drainage Rates and SDCs

	Adopted FY 2020-21	Adopted FY 2021-22	Percent Change
Residential Sanitary Sewer and Stormwater Drainage			
Sanitary Sewage Volume (\$ / CCF)	\$11.55	\$11.92	3.20%
Stormwater Drainage (\$ / 1,000 Square Feet of Impervious Area / Month)	\$12.52	\$12.68	1.28%
<i>Off-Site Portion of Charge</i>	\$8.14	\$8.24	1.23%
<i>On-Site Portion of Charge</i>	\$4.38	\$4.44	1.37%
Average Single-Family Bill (\$ / Month)	\$77.85	\$80.30	3.15%
Low-Income Discount (\$ / Month)	-\$38.30	-\$39.47	3.05%
Extreme Low-Income Discount (\$ / Month)	-\$61.28	-\$63.16	3.07%
Commercial / Industrial Sanitary Sewer and Stormwater Drainage			
Special Meter Charge (\$ / Month)	\$50.00	\$50.00	0.00%
Sanitary Sewage Volume (\$ / CCF)	\$11.365	\$11.798	3.81%
Stormwater Drainage (\$ / 1,000 Square Feet of Impervious Area / Month)	\$13.10	\$13.10	0.00%
<i>Off-Site Portion of Charge</i>	\$8.52	\$8.52	0.00%
<i>On-Site Portion of Charge</i>	\$4.58	\$4.58	0.00%
Clean Water to Stormwater Drainage System (\$ / CCF)	\$1.200	\$1.200	0.00%
Extra Strength Sanitary Sewer			
Biochemical Oxygen Demand (\$ / Pound)	\$0.900	\$0.900	0.00%
Total Suspended Solids (\$ / Pound)	\$1.206	\$1.206	0.00%
Portland Harbor Superfund			
Volume Charge (\$ / CCF)	\$0.12	\$0.13	8.33%
Impervious Area Charge (\$ / 1,000 Square Feet of Impervious Area / Month)	\$0.32	\$0.34	6.25%
System Development Charges			
Sanitary Sewer System Development Charge (\$ / Equivalent Dwelling Unit)	\$7,235	\$7,518	3.91%
Line and Branch Charges			
Line Charge (\$ / Square Feet)	\$1.91	\$1.96	2.62%
Branch Charge (\$ / Branch)	\$7,103	\$7,271	2.37%
Stormwater Drainage System Development Charge			

\$ / 1,000 Square Feet of Impervious Area	\$243	\$263	8.23%
\$ / linear feet of frontage	\$7.76	\$7.84	1.03%
\$ / daily vehicle trip	\$4.28	\$4.36	1.87%
<i>CCF - Hundred cubic feet of sanitary sewage flow</i>			

Table 13 illustrates the forecast operating results for the Sewer System Funds 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 13 - Forecast Sewer System Funds Projected Annual Report Bond Coverage

	Forecast FY 2021-22
<u>OPERATING REVENUES</u>	
Service Charges & Fees	\$352,354,017
System Development Charges	\$8,900,000
Line & Branch Charges	\$350,000
Wholesale Contracts	\$4,490,000
Other Service Charges	\$2,372,500
Reimbursements - Other City Funds	\$1,723,170
Other Funds Cash Transfers	\$0
Transfer from Rate Stabilization Fund	\$20,000,000
Product Sales	\$3,500,000
Inspection Fees	\$316,000
Rents	\$169,850
Intergovernmental Revenue and Minor Miscellaneous Revenue	\$370,000
Licenses & Permits	\$422,000
TOTAL OPERATING REVENUES	\$394,967,537
<u>OPERATING EXPENSES</u>	
Personal Services	\$70,562,639
Materials & Services - External	\$38,984,114
Materials & Services - Internal	\$44,141,121
Capitalized Overhead	-\$15,544,390
General Fund Overhead	\$6,510,316
Transfer to Rate Stabilization Fund	\$0
PERS Bonds Transfer	\$4,984,048
Allowance for Uncollectable Rate Revenue	\$2,199,986
TOTAL OPERATING EXPENSES	\$151,837,834
OPERATING INCOME (LOSS)	\$243,129,703
<u>NON-OPERATING REVENUES</u>	
Fund 600XXX-Operations - Interest Income	\$745,000
Fund 614XXX-Construction - Interest Income	\$750,000
Fund 609XXX-Debt Redemption - Interest Income	\$200,000
Fund 617XXX-Rate Stabilization - Interest Income	\$600,000

TOTAL NON-OPERATING REVENUES	<u>\$2,295,000</u>
NET INCOME (LOSS)	<u>\$245,424,703</u>
SUMMARY OF INCOME FOR DEBT SERVICE COVERAGE CALCULATION	
Operating Income	\$243,129,703
Interest Income	\$2,295,000
Bonded Connection Charges and Line & Branch Charges	<u>\$0</u>
TOTAL INCOME FOR DEBT SERVICE COVERAGE CALCULATION	\$245,424,703
<u>DEBT SERVICE PRINCIPAL AND INTEREST</u>	
First Lien Debt Service Payments	\$27,782,075
Second Lien Debt Service Payments	<u>\$144,960,660</u>
TOTAL DEBT SERVICE PAYMENTS	\$172,742,735
First Lien Debt Service Coverage	8.83
Combined First & Second Lien Debt Service Coverage	1.42