



Seattle Public Utilities
2022-2024
Drainage and Wastewater
Rate Study

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PREFACE - STRATEGIC BUSINESS PLAN COMPARISON

The 2021-2026 Strategic Business Plan Update sets a non-binding six-year rate and service path for Seattle Public Utilities, with a built-in three-year review and update. The SBP rate path was proposed nearly a year before this rate study. In the intervening time, several major assumptions were updated that create a variance between the SBP and the drainage and wastewater rate proposal.

The most impactful change to the rate path is including the impacts of the COVID-19 pandemic. Wastewater rates are volume based, and fell 7 percent from 2019 to 2020, but the costs to operate the system are largely fixed. This is particularly true for the capital expenditures directed at consent-decree requirements that drive revenue requirements. Fortunately, the missing revenue was offset by the low interest rate environment, a side effect of the pandemic, eliminating the need to have collected it, and resulting in rate paths slightly lower and smoother than those included in the SBP.

The SBP update was submitted in 2020 but was not adopted until May 2021 with Council Resolution 32000 due to the COVID-19 pandemic.

Table P-1 compares the projected rate path from the SBP to the rates proposed in this rate study.

Table P-1: Rate Path Comparison

Wastewater Rate Path	2022	2023	2024
Strategic Business Plan Update	3.1%	5.9%	0.5%
Rate Study	2.0%	3.9%	2.9%

Drainage Revenue Requirement	2022	2023	2024
Strategic Business Plan Update	8.6%	7.2%	3.9%
Rate Study	6.0%	6.2%	6.0%

1. EXECUTIVE SUMMARY

The Drainage and Wastewater Utility provides wastewater and stormwater management services to Seattle residences and businesses. The fund is supported by utility fee revenue, enumerated for wastewater on SPU combined utility bills based on metered water usage, and for drainage on King County property tax bills, reflecting an estimate of each parcel's contribution to stormwater run-off.

Wastewater and drainage rates consist of a system component, set to recover SPU operations and maintenance and capital expenses, and a treatment component, set to recover payments assessed by SPU's two contracted treatment providers, King County Wastewater Treatment Division and Southwest Suburban Sewer District, for flows sent to their facilities.

Drainage and wastewater rates were last increased on January 1, 2021, using the passthrough mechanism established by Seattle Municipal Code 21.28.040. This mechanism is used periodically in years between rate studies to adjust SPU treatment rates for off-cycle adoption of rates for treatment at King County facilities. Wastewater rates were increased by 7.3 percent and drainage rates by 7.4 percent. These rate increases were slightly lower than those in the 2019-2021 Rate Study (7.3 percent and 8.0 percent, respectively) due to a lower-than-expected increase to the County's treatment rate, and a reduction in volumes projected to be sent for treatment due to COVID-19. This rate study incorporates projected future treatment increases of 4.0 percent annually. These increases have not been approved by the King County Council and while this document presents rates including assumed future increases, the ordinance supported by this document only includes treatment rate increases based on treatment rates formally adopted by the King County Council. If King County Council adopts any rate increases before the next rate study, SPU will submit separate legislation utilizing the pass-through mechanism. The table below summarizes proposed revenue requirements and rates.

Table 1-1: Proposed DWF Retail Rate Revenue Requirement and Monthly Bill Impacts

	2021	2022	2023	2024			
Revenue Requirement (\$ millions)							
Wastewater	\$311.4	\$334.0	+\$22.6	\$351.2	+\$17.2	\$363.4	+\$12.2
Drainage	\$164.7	\$174.5	+\$9.8	\$185.0	+\$10.6	\$196.1	+\$11.1
Total DWF	\$476.1	\$508.5	+\$32.4	\$536.3	+\$27.7	\$559.5	+\$23.3
Wastewater							
Wastewater Rate per CCF	\$16.67	\$17.01	+\$0.34	\$17.68	+\$0.67	\$18.19	+\$0.51
Residential (4.3 CCF)	\$71.68	\$73.14	+\$1.46	\$76.02	+\$2.88	\$78.22	+\$2.19
Drainage							
Townhome (<2,000 sqft)	\$16.30	\$17.28	+\$0.98	\$18.34	+\$1.06	\$19.45	+\$1.11
Single-Family Residential (0.15 acres)	\$50.00	\$53.01	+\$3.02	\$56.27	+\$3.26	\$59.66	+\$3.39
Salmon Bay Park (2.8 acres)	\$6,101	\$6,469	+\$368	\$6,867	+\$398	\$7,281	+\$414
Supermarket, 120 parking spots (2.5 acres)	\$17,900	\$18,980	+\$1,081	\$20,148	+\$1,167	\$21,362	+\$1,214
Chief Sealth High School (32 acres)	\$100,419	\$106,482	+\$6,063	\$113,030	+\$6,549	\$119,841	+\$6,811

2. FINANCIAL POLICY OVERVIEW

SPU is directed through a set of Seattle City Council-adopted¹ financial policies to adopt rates sufficient to satisfy a comprehensive, inter-connected framework of rules for sound financial management in rate setting. These financial policies:

- Shape the financial profile of the Fund to lenders and the financial community.
- Manage exposure to financial risk.
- Provide intergenerational equity.

Each financial policy sets a financial metric target which results, on a planning basis, in a minimum revenue requirement, the highest of which sets a binding constraint on rate setting. SPU may adhere to a more stringent internal planning target when tracking market conditions and peer utility performance expose any financial risk or weakness. The policies are:

1. Minimum year-end operating cash balance of one month of treatment contract expenses

One-month of treatment expense over the rate period is projected to range from \$14 to \$16 million, providing two weeks of operating liquidity at year-end. A financial risk assessment exercise conducted in 2019 deemed two weeks insufficient and a higher internal operating target of 80 to 100 days of operating expense was recommended. The Fund ended 2020 with \$218.7 million (131 days) which SPU intends to draw down to \$106.8 million (90 days) and divert those funds to the capital program.

Table 2-1: Operating Cash Balance Financial Policy

Cash Balance Target	2022	2023	2024
Binding - One month treatment expense	\$14.3	\$15.5	\$16.4
Planning - 80 days operating expense	\$85.1	\$90.2	\$94.8
Projected Balance	\$90.4	\$96.0	\$106.8

(\$ millions)

2. Cash finance at least 25% of the capital improvement plan over a four-year average

A minimum 'down-payment' on capital expenditures with operating cash prevents a rapid increase in debt service and debt burden. SPU intends to divert the existing surplus of operating cash to the capital program, funding 43 percent of the capital program with cash in 2022, 36 percent in 2023, and 60 percent in 2024.

3. A debt service coverage ratio of at least 1.5

The debt service coverage ratio is the ratio between the operating margin on a cash basis, with taxes paid to the City of Seattle removed, and the debt service obligation. Per the ordinances which authorize the Fund to issue revenue bonds and the covenants between the Fund and

¹ Council Resolution 30612, 2003; SLI 13-1-A-1 2012

bond holders, City taxes are subordinate priority to the debt service obligation. Following a review of peer utilities' financial performance and credit rating practices that indicated the guarantee of priority to bond holders would be insufficient, SPU implemented a target of 1.8 using the existing metric and 2.0 using a more stringent metric that does not provide credit for City taxes. The ratio under both metrics is projected to be high, partially due to a large portion of financing for the capital program consisting of low-interest loans with initial payments beyond 2024.

4. Net income should be generally positive

Net income is projected to be positive in each year.

5. Debt-to-asset ratio should not exceed 70 percent.

The ratio of debt to assets is a metric of debt burden and an indicator of inflexibility to handle financial stress. The ratio is projected to hover around 60 percent.

6. No more than 15 percent of total debt should be variable rate

A cap on variable rate debt limits the Fund's exposure to interest rate volatility. The Fund does not have and does not plan to issue any variable rate debt.

Table 2-2: Projected Drainage & Wastewater Fund Financial Policy Results

Policy (Target)	2022	2023	2024	2025	2026
1. Operating Cash Balance (80 days Op Expense)	\$90.4	\$96.0	\$106.8	\$118.6	\$131.4
2. Cash Financing of CIP (25% over 4 years)	43%	36%	60%	42%	33%
3. Debt Service Coverage (>2.0)	3.1	2.9	2.7	2.8	2.7
<i>Without Credit for Taxes Paid (>1.5)</i>	2.1	2.0	1.8	1.9	1.8
4. Net Income (generally positive)	\$76.5	\$44.2	\$41.1	\$58.8	\$72.8
5. Debt-to-Asset Ratio (<70%)	58%	60%	58%	59%	60%
6. Variable Rate Debt (<15%)	0%	0%	0%	0%	0%

3. REVENUE REQUIREMENT

The binding constraint on creating a financial plan and setting rates is satisfying the revenue requirement that the most stringent financial policy requires. The binding constraint is determined by optimizing the capital financing portfolio and the utilization of operating cash to achieve a rate path equitable to all rate payers, current and future. For the rate period, optimization was dictated by the financing needs of the large upcoming capital program. An expansion of capital investment requires the Fund to take on more debt, though because the expansion is temporary, in this case to complete the bulk of the Ship Canal Water Quality Project, SPU intends to utilize the prudent option of a one-time drawdown of operating cash to pay for a one-time expenditure. The drawdown will reduce operating cash to the extent that maintaining the financial policy minimum will be the binding constraint through 2024.

The table below summarizes the revenue requirement for wastewater rates and drainage rates over the rate period. Each category, in millions of dollars, is followed by that component's contribution to the change in the retail rate. For example, O&M is projected to increase from \$64.0 million in 2021 to \$71.3 million in 2022. A 2.3 percent rate increase is necessary to collect enough revenue to cover this increase. The net sum of each category's impact is the rate increase. Details about each component are in the following sections.

Table 3-1: Components of the Revenue Requirement (\$ millions)

WASTEWATER	2021		2022		2023		2024	
Operating Expenses								
O&M	\$ 64.0	\$ 71.3	+2.3%	\$ 74.5	+0.9%	\$ 78.6	+1.1%	
Treatment	155.7	161.5	+1.8%	175.0	+3.9%	184.9	+2.7%	
Taxes	41.4	44.9	+1.1%	47.1	+0.6%	48.6	+0.4%	
Capital								
Cash Contribution	\$ 23.2	\$ 46.4	+7.2%	\$ 46.1	-0.1%	\$ 47.7	+0.5%	
Loans and Grants	28.4	4.7	-7.3%	(16.2)	-6.0%	(23.0)	-1.8%	
Debt Service	25.0	25.3	+0.1%	27.5	+0.6%	29.3	+0.5%	
Subtotal Expenditures	\$ 337.7	\$ 354.2	+5.1%	\$ 353.8	-0.1%	\$ 366.2	+3.4%	
Less Non-Rates Revenue	(13.1)	(8.4)	+1.5%	(8.2)	+0.1%	(8.2)	-0.0%	
Less Decrease in Cash Balance	(13.2)	(11.8)	+0.4%	5.6	+5.0%	5.4	-0.0%	
Rates Revenue Requirement	\$ 311.4	\$ 334.0	+7.0%	\$ 351.2	+4.9%	\$ 363.4	+3.3%	
Plus UDP	11.3	13.1	+0.5%	14.7	+0.5%	15.4	+0.2%	
Retail Rate Revenue Requirement	\$ 322.7	\$ 347.1	+7.6%	\$ 366.0	+5.4%	\$ 378.8	+3.5%	
Change in Demand			-5.6%		-1.5%		-0.6%	
Change in Wastewater Retail Rate			+2.0%		+3.9%		2.9%	
DRAINAGE								
	2021		2022		2023		2024	
Operating Expenses	\$ 73.9	\$ 75.8	+1.2%	\$ 79.0	+1.8%	\$ 83.2	+2.2%	\$ 73.9
O&M	9.8	10.2	+0.2%	11.1	+0.5%	11.7	+0.3%	9.8
Treatment	23.1	24.9	+1.1%	26.4	+0.8%	27.9	+0.8%	23.1
Taxes								
Capital	\$ 23.2	\$ 54.1	+18.4%	\$ 50.1	-2.2%	\$ 53.6	+1.9%	\$ 23.2
Cash Contribution	33.1	5.8	-16.3%	(19.9)	-14.4%	(28.1)	-4.4%	33.1
Loans and Grants	39.6	40.0	+0.3%	44.3	+2.4%	48.3	+2.1%	39.6
Debt Service	\$ 202.6	\$ 210.8	+4.9%	\$ 191.0	-11.1%	\$ 196.6	+3.0%	\$ 202.6
Subtotal Expenditures	(14.6)	(6.3)	+4.9%	(6.0)	+0.2%	(5.9)	+0.0%	(14.6)
Less Non-Rates Revenue	(23.3)	(30.0)	-4.0%	-	+16.9%	5.4	+2.9%	(23.3)
Less Decrease in Cash Balance	\$ 164.7	\$ 174.5	+5.8%	\$ 185.0	+5.9%	\$ 196.1	+5.9%	\$ 164.7
Rates Revenue Requirement	3.1	3.4	+0.2%	3.9	+0.2%	4.1	+0.1%	3.1
Plus UDP	\$ 167.8	\$ 177.9	+6.0%	\$ 188.9	+6.2%	\$ 200.2	+6.0%	\$ 167.8
Retail Rate Revenue Requirement	\$ 73.9	\$ 75.8	+1.2%	\$ 79.0	+1.8%	\$ 83.2	+2.2%	\$ 73.9

(\$ millions)

Operations and Maintenance

SPU projects expenditures for the ongoing operations and maintenance of the Drainage and Wastewater System, including indirect administrative and City central support activities, of \$147 million in 2022 (\$71.3 for wastewater and \$75.8 for drainage, see table above), rising to \$162 million by 2024.

Total Fund expenditures are allocated between Wastewater and Drainage based on a direct allocation of each project, the most granular programmatic level of the City Budget, to the wastewater (8 percent of total O&M), drainage (14 percent), or combined (17 percent) systems. Combined system expenses are assigned 45 percent to wastewater and 55 percent to drainage based on an analysis of system infrastructure and requirements of the Consent Decree between SPU and the EPA governing SPU's Combined Sewer Overflow program. Remaining projects (60 percent) inherit the results of the above direct allocation at their respective org, division, or branch levels within the Utility's organizational hierarchy. Based on 2020 actual expenditures, SPU allocated 47 percent of total O&M to drainage. See Table 3-2 for the allocation results in three high-level categories.

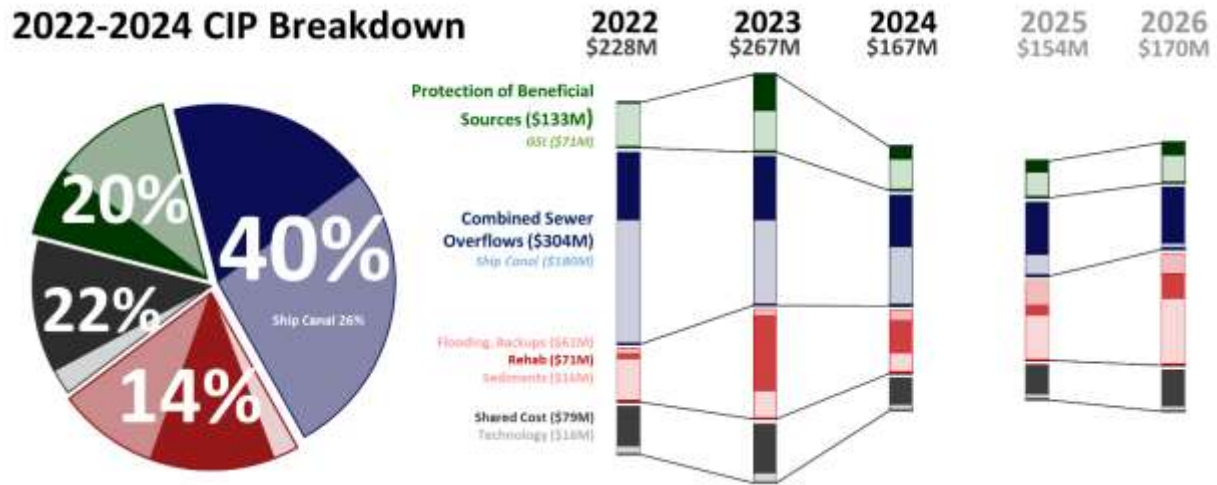
Table 3-2: O&M Allocation to Drainage

Infrastructure O&M and Planning	51%
Administrative	32%
Overhead	49%
Total	47%

Capital Financing Expense

Annual capital expenditures over \$200 million are planned for each year of the rate period, more than double the average of the last five years. The largest projects are the Ship Canal Water Quality Project (26 percent of total planned expenditures) followed by Green Stormwater Infrastructure and pipe renewal and rehabilitation (35 percent combined, see GSI under 'Protection of Beneficial Uses' in green and 'rehab' in red).

Figure 3-1: Planned CIP Expenditures



The capital program can be financed through a combination of operating cash contributions, low-interest loans, revenue bonds, and grants. SPU proposes to increase operating cash contributions above the 25 percent minimum set by financial policies to a 45 percent average over the rate period to address the short-term increase in planned capital expenditures, requiring close to \$100 million each year.

Table 3-3: Projected CIP Financing

	2021	2022	2023	2024	2021-24	Rate Period
Cash and Grants	\$46.4	\$100.5	\$96.2	\$101.4	\$344.4	\$298.0
Revenue Bonds	\$55.6	\$43.5	\$120.3	\$36.6	\$256.0	\$200.4
Loans	\$83.7	\$84.4	\$50.0	\$31.0	\$249.0	\$165.4
Total CIP	\$185.7	\$228.3	\$266.5	\$168.9	\$849.4	\$663.8
Cash-Funded %	25%	44%	36%	60%	41%	45%

(\$ millions)

A further 25 percent will be financed through a combination of: \$123 million in State Revolving Fund loans from the Washington State Department of Ecology, a \$192 million WIFIA loan from the EPA, and a \$10 million Public Works Trust Fund loan from the Washington State Department of Commerce. Another three percent is funded through grants. Loans and grants are only included if they have already been granted.

SPU plans to fund the remaining 30 percent through three revenue bond issues, one \$83 million issue already completed in 2021 and two \$90 million issues in mid-2022 and mid-2023. These two issues will add \$12 million to annual debt service and provide funding into 2025.

Use of Cash Balances

Operating cash balances increase when revenues generated by rates exceed total cash expenditures, which in contrast to income statement expenses do not include non-cash expenses such as depreciation, amortization, environmental liabilities, losses on the sales of assets, or pension liability write-downs, but do include the cash expenses of the principal portion of debt payments. Cash balances can be drawn down to the minimum required by the Fund's financial policies, but financial management practices explicitly limit such draw down to pay for one-time and not ongoing expenses. Because on-going expenses are paid for through rate revenues, in any given year incoming cash from rate revenues will at least balance out outgoing cash to expenses. Large one-time expenses, such as the Ship Canal Water Quality Project, provide an opportunity to draw down cash balances to reduce the revenue requirement in the relevant years; this practice avoids the need to raise rates to cover the impact of a one-time expense and then lower rates as the impact wanes.

Operating cash balances have steadily increased through Seattle's post-recession economic expansion. SPU plans to manage funding the capital program by increasing operating cash contributions (see Section 3.2) and decreasing the share funded by debt. Offsetting the peaks of the capital cycle with operating cash can smooth out the size of debt issuances to the same amount each year, providing stability and predictability to rates and financial performance. DWF cash balances will be reduced from \$218 million at the beginning of 2021 to \$90 million by the end of 2022 and then built back up to \$107 million by the end of 2024.

Non-Rate Revenue

Non-rate revenue includes permit fees, operating and capital grants, contributions in aid of construction, interest income, other miscellaneous revenues, and capital contributions. An increase in non-rate revenues has the effect of reducing the revenue requirement that must be recovered through rates. Grants, contributions, miscellaneous revenues, and permit fees are conservatively held flat in this proposal as it is not fiscally prudent to pattern rates on unsecured revenue. However, SPU expects to increase outside sources of funding wherever opportunities can be identified.

4. PROPOSED WASTEWATER RATES

Overview and Proposed Wastewater Rates

SPU wastewater customers pay a single flat volumetric charge per 100 cubic feet (CCF). There are no monthly fees or tiers of service. A minimum of one CCF per month is assessed on all active accounts. The single-volumetric charge is a combination of a system rate, to cover SPU's internal costs and taxes incurred on system rate revenue, and a treatment rate, to cover payments for wastewater treatment and taxes incurred on treatment rate revenue. The system rate is updated through the rate study process, currently on a 3-year cycle. The treatment rate is updated when the King County Council formally adopts legislation modifying the treatment rates charged to SPU. During the rate study process, any adopted County treatment rate increases are incorporated into proposed SPU treatment rates. If legislation to update the County treatment legislation is adopted by the King County Council mid-cycle, the Seattle Municipal Code provides a mid-term treatment rate adjustment process to formulaically update SPU's treatment rate based on adopted changes to the County's treatment rate.

This rate study includes a treatment rate increase for 2022. The County has not formally adopted any rate increases beyond 2022, and no additional changes to SPU treatment rates are included in the legislation supported by this rate study. This rate study however does include projected increases to the County treatment rate in 2023 and 2024 in all future year results unless otherwise indicated.

Table 4-1 presents system and treatment rates included in legislation based on adopted County treatment rates, and projected future passthroughs based on projected future County treatment rate increases.

Table 4-1: Proposed Wastewater Rates (per CCF)

	2021 Adopted	2022 Proposed	2023 Proposed	2024 Proposed
System Rate	\$ 7.42	\$ 7.67	\$ 7.67	\$ 7.67
Treatment Rate	\$ 9.25	\$ 9.34	\$ 9.34	\$ 9.34
Future Passthrough			\$ 0.67	\$ 1.18
Total Wastewater Rate	\$ 16.67	\$ 17.01	\$ 17.68	\$ 18.19

SPU System Rate

The system rate is set to collect enough revenue to cover planned operations, maintenance, and investment expenditures. These expenditures are offset by non-rates revenues including permit fees and standard charges among others. Any non-rate revenue collected reduces the amount required to be collected through rate revenues. Most of these components (operations, maintenance, debt service, and non-rates revenues) tend to be stable, increasing at a rate that is either controlled (debt service) or inflationary (operations and maintenance). Cash contributions to CIP can, on the other hand, be a source of volatility as capital expenditures can vary widely from year to year when the scheduling of a few large projects determines the timing of expenditures. One strategy to counter this volatility is to draw operating cash balances down during years of high capital expenditures and increase operating cash balances during years of lower capital expenditures. SPU proposes to draw wastewater cash balances down by \$11.8 million in 2022, reducing the amount of revenue that needs to be collected by the same

amount, after which cash balances will be managed according to financial policy minimums. See Table 4 2 for an enumeration of each of these components.

Table 0-1 Wastewater System Rate Components

Rate Component	2022	2023	2024
	Proposed	Proposed	Proposed
O&M	\$ 71.3	\$ 74.5	\$ 78.6
City Taxes	\$ 19.3	\$ 19.5	\$ 19.7
State Taxes	\$ 3.6	\$ 3.7	\$ 3.7
Subtotal Operations & Maintenance	\$ 94.2	\$ 97.7	\$ 102.0
Debt Service	\$ 25.3	\$ 27.5	\$ 29.3
Cash to CIP	\$ 46.4	\$ 46.1	\$ 47.7
Subtotal Capital Financing	\$ 71.8	\$ 73.6	\$ 77.0
Subtotal Expenditures	\$ 166.0	\$ 171.3	\$ 178.9
Non Rate Revenue	\$ (8.4)	\$ (8.2)	\$ (8.2)
Loan Drawdown Bridge	\$ 4.7	\$ (16.2)	\$ (23.0)
Use of Cash Balances	\$ (11.8)	\$ 5.6	\$ 5.4
Sewer System Revenue Requirement	\$ 150.6	\$ 152.4	\$ 153.2
UDP Enrollment	3.8%	4.0%	4.1%
Sewer System Rate Revenue Requirement	\$ 156.4	\$ 158.8	\$ 159.7
Volume (CCF, Millions)	20.4	20.7	20.8
System Rate	\$ 7.67	\$ 7.67	\$ 7.67

(\$ millions, except final rate)

In addition to typically utilizing revenue bonds to provide debt-financing for the capital program, SPU also seeks alternative funding through loans or grants when possible. This rate period includes significant loan funding, so much so that the lag between when capital expenditures are made from the operating fund and when loan reimbursement funding is received into the operating fund presents a liquidity concern that need to be considered in planning. The year-end balance is labeled "Loan Financing" above.

The final step is to adjust for enrollment in the Utility Discount Program. In 2020, 2.9 percent of gross wastewater revenue was returned to customers through bill discounts. SPU intends to expand UDP enrollment, growing UDP to 3.8 percent of revenue in 2022 and to 4.1 percent in 2024. Adjusting the revenue requirement for the revenue loss from UDP is the revenue that the base system rate must recover. Divided by the number of units sold (CCF), is the unit system rate.

Treatment Rate

Payments for wastewater treatment are the single largest component of both wastewater and total DWF operating expense, with 99% of treatment expense paid to King County and the remainder to Southwest Suburban Sewer District. See Table 4-3 for components and derivation of the treatment rate. Note that 2023 and 2024 are labeled as "Projected" as opposed to "Proposed" because King County Council has not yet adopted rate increases beyond 2022. Expenses and the derived treatment rate in "Projected" years are based on estimated future County and Southwest Suburban treatment rates.

Table 0-1 Wastewater Treatment Rate Components

Expenditure Category	2022 Proposed	2023 Proposed	2024 Proposed
Treatment by King County	\$ 171.0	\$ 185.4	\$ 196.0
Treatment by SWSSD	\$ 0.6	\$ 0.7	\$ 0.7
Less treatment paid by Drainage	\$ 10.2	\$ (11.1)	\$ 11.7
Treatment Expense	\$ 161.5	\$ 175.0	\$ 184.9
City Taxes	\$ 22	\$ 23.9	\$ 25.2
Revenue Requirement	\$ 183.5	\$ 198.8	\$ 210.2
UDP Enrollment	3.8%	4.0%	4.1%
Rate Revenue Requirement	\$ 190.7	\$ 207.2	\$ 219.1
Volume (CCF, Millions)	20.4	20.7	20.8
Treatment Rate	\$ 9.34	\$ 10.01	\$ 10.52

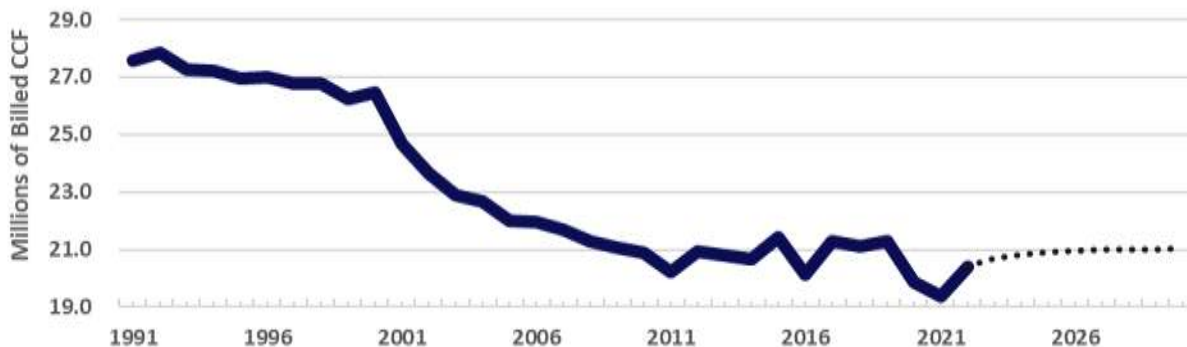
(\$ millions, except final rate)

Wastewater Demand

The fee for wastewater services is assessed on a volumetric basis measured in 100 cubic foot (CCF) units. The rate is derived by dividing the gross revenue requirement of the system by projected billed volumes. The numerator, the revenue requirement, is largely a fixed cost. The cost to maintain and replace pipe and other utility infrastructure assets that serve customers, whether or not they have any demand, is a function of the size of the system and depreciation over time. The variable portion of expense to serve larger customers is relatively negligible. With costs being fixed, decreases in wastewater demand do not result in compensatory decreases in cost and require instead an increase to rates.

Demand for wastewater services has been in a long-term decline due to efficiency gains in two forms: conservation and redevelopment. Efficiency gains resulted in a five percent decline over the 1990s that was accelerated by a focus on conservation, a response to drought conditions starting in 2000, to 20 percent over the 2000s. Rapid population growth post-recession placed roughly the same upward pressure on wastewater demand as efficiency gains did downward. Seattle's population grew 28% in ten years over which time billed wastewater volumes hovered around 20 million CCF ever year.

Chart 4-1: Historic and Projected Wastewater Volumes



This phase ended with the COVID-19 pandemic. The sectors of the economy more acutely impacted by shutdown orders tended to be large consumers of water and generators of wastewater. Closures in the commercial and education sectors led to a four percent rise in single-family consumption and a 13

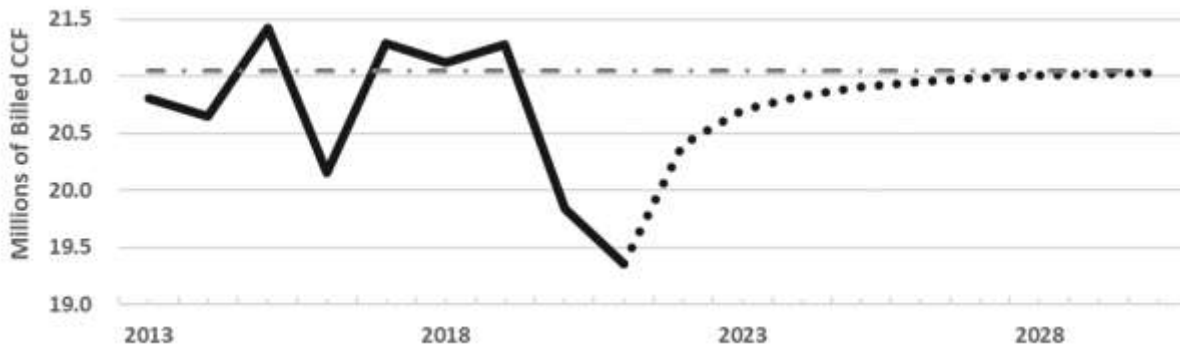
percent decline in commercial consumption. Commercial consumption is the combination of business and multi-family consumption, hiding the true effect on business. Large residential firms and low-income housing operators had little change in consumption. Meanwhile, the normal social interactions that were newly found to be dangerous were concentrated in commercial activities that also happened to be large wastewater generators; see Table 4-4. Particularly hard hit were large hotels in the downtown core, the University of Washington, and commercial premises with a heavy restaurant presence.

Table 0-1 COVID-19 Impact on Wastewater Demand

Change from November 2019 to November 2020	
Downtown Hotels	-70%
University of Washington	-46%
All Other Education	-52%
Commercial – Shopping/Dining Center	-77%
Commercial - Industrial	-80%
Commercial - Heavy Industrial	-100%

As the vaccine rollout allows for the resumption of unimpeded social and commercial activities, wastewater volumes are expected to recover but the patterns those activities take on in the new post-pandemic normal are unknown. The resumption of in-person education and residence hall occupancy at schools and universities is relatively known. The long-term impacts to on-site work, the cruise industry, business travel, and brick and mortar retail and dining are still unknown. This makes projecting wastewater volume for the next few years a product of conservative assumptions tied to a close monitoring of the early stages of recovery.

Table 4-5: Wastewater Volume Forecast



Wastewater volume projections assume a long-tailed recovery stretching into 2027 transitioning to slow growth into the long-term. This projection is based on a slowly emerging trend that seems to indicate that per-premise consumption is changing from falling to stable; however, this trend is the product of demand for new residential construction and the growth management, density, and zoning issues that the housing crisis will force the City to address, all of which are external, unknown, and politically sensitive. For the purposes of this rate study, volumes are projected to recover to 20.4 million CCF by the end of the rate period, a two percent decline.

5. DRAINAGE COST ALLOCATION / RATE DESIGN

Once the rate revenue requirement is set, it is assigned to different customer classes. A customer class is a group of customers that places a unique cost on the utility or is administratively easier to serve as a group. In the case of drainage, there is a unique cost of service associated with the management of stormwater run-off from different types of land cover found on customer properties. These land cover types essentially act as customer classes for drainage cost allocation purposes.

The steps required to allocate drainage system costs to land surface types and then to drainage customer rates can be summarized as follows:

- Drainage costs are grouped into two broad classifications: account-allocated expense and flow-allocated expense.
- Flow-related costs are further allocated between four surface type categories based on cost weighted average run-off.
- A unit rate for account costs and for each surface type is developed based on the total number of accounts and square footage of land surface by type citywide.
- Rates are developed for each customer class by applying the surface type unit rates to the typical surface type composition for each tier.

Drainage Allocation Classifications

Drainage rates are composed of four distinct components, in addition to the account rate: impervious surface rate, managed grass rate, unmanaged grass rate, and good forest rate. Total flow-related expense is allocated based on the cost of managing the run-off from any given surface type.

The amount of run-off from any given parcel depends on the type of surface it contains. Impervious surface absorbs less run-off than pervious, or porous surface, and therefore generates more stormwater run-off during a given storm event. Likewise, pervious surface with significant ground and tree cover will generate less run-off than a highly managed pervious surface such as a lawn. The more intense the storm, the greater the run-off for all surface types.

Impervious surface is hard or compacted surface from which most water runs off when exposed to rainwater. Common impervious surfaces include roof tops, concrete or asphalt paving, compact gravel and packed earth.

Pervious managed grass is the most common type of pervious area in the City and includes such surfaces as lawns, landscaped parks, and golf courses. Managed grass absorbs nearly all rainwater during average storms but produces increasing amounts of run-off with more intense storm events due to its greater soil compaction.

The last two types of pervious area, woods and unmanaged grass and good forest, are vegetated surfaces of a specific types such as forests or non-forested land that are in the natural progression back to a forested state. This category includes large undeveloped areas in places such as Seward Park, Carkeek Park, and various greenbelts throughout the City. These surface types perform similarly to

managed grass during average storm events but infiltrate significantly more rainwater during more intense storms.

To determine the cost of managing the run-off from any given surface type, SPU looked at two factors:

- The expected volume of run-off from each surface type during differing intensities of storms
- The cost of O&M and infrastructure oriented towards the management of the run-off during each of these storm events

The revenue requirement for account and each surface type is derived by multiplying the cost weighted run-off percentages by the revenue requirement. See Appendix E for the step-by-step calculation underlying the cost share percentages. The cost class allocations are used in the development of drainage rates for each customer tier.

Table 5-1: Revenue Requirement Allocation by Type

	2022	2023	2024
Account	\$2.4	\$2.6	\$2.7
Impervious	144.8	153.7	162.9
Pervious – Managed Grass	27.6	29.3	31.1
Pervious – Woods and Unmanaged Grass	2.4	2.5	2.6
Pervious – Good Forest	0.8	0.8	0.9
Total Revenue Requirement	\$177.9	\$188.9	\$200.2

(\$ in millions)

Drainage Rate Design

Drainage customer bills are intended to recover the cost of service associated with managing the stormwater run-off from individual parcels. In the first part of this chapter, SPU defines the cost of service associated with managing the run-off from different land surface types and with account-related services. The following steps are required to develop drainage rates which assign these costs to individual customer parcels:

- Define customer classes and rate tiers for parcels with similar surface type characteristics (and therefore similar costs of service)
- Develop unit rates for each surface type and account classification
- Determine an average customer land composition profile for each rate tier
- Apply the surface type and account unit rates to applicable profile factors for each tier

Customer Classes and Tiers

Small Residential

Small residential customers with billable areas less than 10,000 square feet are homogeneous in terms of surface cover, which makes property size the key determinant of parcel stormwater flow contribution. Small residential customers are assigned to one of five size-based categories, each representing a range of total area (e.g., 3,000 to 4,999 square feet).

Large Residential and General Service

Large single family and duplex parcels 10,000 square feet or greater (“large residential”) and general service parcels (all sizes), pay a unit rate (per 1,000 square feet of billable area) based on their actual property characteristics (percent impervious and parcel size) rather than category averages. There is too much variation between these properties in terms of parcel size and surface characteristics to be fairly captured by a flat rate structure like that applied to small residential customers. SPU has five impervious surface-based rate categories. Each category represents a range of impervious surface (e.g., 66-85% impervious).

General service and large residential parcels which contain significant amounts of highly pervious (absorbent) area, such as forested land or other unmanaged vegetated areas such as pasturelands and meadows, and which are composed of no more than 65% impervious area, may also qualify for discounted low impact rates. Parcels with these surface types generate significantly less stormwater run-off than parcels with similar amounts of impervious surface but whose pervious area is less absorbent (e.g., a highly managed lawn).

Account and Surface Type Unit Rates

Unit rates for each surface type and for account-allocated expense are calculated as described below.

Surface Type Rates

Unit rates are calculated by dividing the expense allocated to each surface type by the total citywide area for that surface type (as expressed in thousands of square feet). Area by surface type is collected from aerial photos in the City’s Geographic Information System (GIS). This same data source is used to identify the area of each surface type for each city parcel, used for drainage billing purposes.

Table 5-3 presents the area units and calculated unit rates for each surface type.

Table 5-2: Surface Type Unit Rates

	Area (1,0000 sqft)	2022	2023	2024
Impervious	792,533	\$182.7	\$193.9	\$205.6
Pervious - Managed Grass	655,429	\$42.1	\$44.7	\$47.4
Pervious - Woods and Unmanaged Grass	105,430	\$22.3	\$23.7	\$25.1
Pervious - Good Forest	54,603	\$14.6	\$15.5	\$16.4

Account Rates

Account expense is driven by the number of customers rather than by the volume of run-off. To determine these rates, the account-allocated component of the revenue requirement is first assigned to small residential and general service/large residential customer groups based on an 80/20 split of the total number of parcels in each group and then divided by the billing units for each group.

Table 5-4: Account Unit Rates

	Units	2022	2023	2024
General Service	847,256 sqft	\$ 0.92	\$ 0.98	\$ 1.04
Small Residential	145,837 Parcels	\$ 10.90	\$ 11.57	\$ 12.26

Surface Type Profile by Tier

Drainage bills for each customer are intended to reflect the cost of managing the run-off from that parcel. Each tier rate is composed of a flow and an account component. Both components reflect the average cost for a tier composed of properties with similar characteristics.

The flow component of each tier rate is based on the average percentage of total area attributable to each surface type, as calculated using GIS data for individual parcels assigned to a given tier. For small residential customers, averages are based on a random sample of properties assigned to each flat rate tier. For general service and large residential customers, the percentages are based on citywide GIS data for all parcels assigned to a given tier.

Table 5-5 presents the average land cover profile by tier used to calculate the flow component of the tier drainage rate.

Table 5-5: Surface Type Average Profile by Tier (sq. ft)

		Woods & Grass	Unmanaged Grass	Good Forest	Impervious	Total
Small Residential						
< 2000 sq. ft.		5,663	0	0	16,119	21,783
2000-2999 sq. ft.		6,744	0	0	11,003	17,747
3000-4999 sq. ft.		88,492	0	0	88,492	176,985
5000-7999 sq. ft.		153,876	1,023	326	137,652	292,876
8000-9999 sq. ft.		127,008	3,040	1	86,700	216,749
General Service/Large Residential						
Undeveloped	Regular	63,546	4,003	1,532	6,605	75,686
	Low Impact	31,392	66,976	46,339	5,746	150,452
Light	Regular	63,035	7,495	662	26,699	97,890
	Low Impact	11,291	11,906	4,145	7,121	34,463
Moderate	Regular	61,706	6,472	554	69,908	138,640
	Low Impact	3,774	3,067	1,007	5,049	12,896
Heavy		28,873	1,338	37	93,886	124,134
Very Heavy		10,030	111	0	237,554	247,694

Rate Calculation by Tier

The rate assigned to each customer tier is equal to the sum of a flow component and an account component.

For all customers, the flow component of the rate is calculated by multiplying the surface type rates (Table 5-4) by the average area assumptions for the tier found in Table 5-5. The formula for this calculation is as follows:

$$\text{Flow component} = (IA/1,000 * I\$) + (MGA/1,000 * MG\$) \\ + (UMGA/1,000 * UMG\$) + (GF/1,000 * GF\$)$$

Where:

- IA=Tier average impervious area
- I\$=Impervious surface rate per 1,000 sq. ft.
- MGA=Tier average managed grass area
- MG\$=Managed grass surface rate per 1,000 sq. ft.
- UMGA=Tier average unmanaged grass area
- UMG\$=Unmanaged grass surface rate per 1,000 sq. ft.
- GF=Tier average good forest area
- GF\$=Good Forest surface rate per 1,000 sq. ft.

The account component for small residential customers is the same flat rate per customer. For general service and large residential customers, the account rate is multiplied by parcel area.

The proposed rates presented in Table 5-6 are equal to the sum of the flow component, for the system and treatment rates, and the account component, for the system rate only, for each tier. Small residential tiers are based on a flat rate per parcel; all other parcels are based on area.

Table 5-6: Proposed Drainage Rates

	2022			2023			2024		
	Treatment	System	Rate	Treatment	System	Rate	Treatment	System	Rate
Small Residential									
< 2000 sq. ft.	\$12.83	\$191.38	\$204.21	\$13.92	\$202.85	\$216.77	\$14.73	\$215.11	\$229.84
2000-2999	\$22.45	\$314.68	\$337.13	\$24.36	\$333.50	\$357.86	\$25.77	\$353.65	\$379.42
3000-4999 sq. ft.	\$31.47	\$434.44	\$465.91	\$34.15	\$460.41	\$494.56	\$36.12	\$488.24	\$524.36
5000-7999 sq. ft.	\$43.00	\$589.67	\$632.67	\$46.66	\$624.92	\$671.58	\$49.36	\$662.69	\$712.05
8000-9999 sq. ft.	\$54.43	\$743.56	\$797.99	\$59.07	\$788.00	\$847.07	\$62.48	\$835.63	\$898.11
General Service									
Undeveloped	\$3.65	\$50.03	\$53.68	\$3.96	\$53.03	\$56.99	\$4.19	\$56.23	\$60.42
Low Impact	\$2.09	\$29.02	\$31.11	\$2.27	\$30.75	\$33.02	\$2.40	\$32.61	\$35.01
Light	\$5.44	\$74.22	\$79.66	\$5.91	\$78.65	\$84.56	\$6.25	\$83.40	\$89.65
Low Impact	\$4.22	\$57.70	\$61.92	\$4.58	\$61.15	\$65.73	\$4.84	\$64.85	\$69.69
Moderate	\$7.74	\$105.13	\$112.87	\$8.40	\$111.41	\$119.81	\$8.89	\$118.14	\$127.03
Low Impact	\$6.24	\$84.96	\$91.20	\$6.78	\$90.03	\$96.81	\$7.17	\$95.47	\$102.64
Heavy	\$10.25	\$138.87	\$149.12	\$11.12	\$147.17	\$158.29	\$11.76	\$156.07	\$167.83
Very Heavy	\$12.23	\$165.60	\$177.83	\$13.28	\$175.49	\$188.77	\$14.04	\$186.10	\$200.14

King County Council has not adopted any rate increases beyond 2022; rates based on SPU internal projections of future increases

Other Drainage Credits and Discounts

Drainage bill discounts are available for property owners that help reduce the impact of stormwater on the City’s system. Billing exemptions (which reduce the overall drainage bill) are also available for large natural areas that offer systemic benefits greater than those offered by other types of undeveloped lands or which clearly do not benefit from or impact the stormwater system.

A. Low Impact Rates

Discounts² of 19 to 41 percent are applied to the rate for undeveloped natural areas of 0.5 acres or greater containing sufficient amounts of qualifying “highly infiltrative” surface (i.e., forested areas, unmanaged grasslands, etc.). Certain athletic facilities with engineered designs that mimic the stormwater retention benefits of these large natural areas are also eligible for low impact rates.

B. Stormwater Facility Credit Program (SFCP)

This program offers credits of up to 50 percent for privately-owned systems that slow down stormwater flow and/or provide water quality treatment for run-off from impervious areas, thus lessening the impact to the City’s stormwater system, creeks, lakes or Puget Sound.

² Relative to the rates for non-qualifying properties with like amounts of impervious surface.

Stormwater systems are structures such as vaults, rain gardens, permeable pavements and filtration systems. SPU offers a 10 percent discount for any new or remodeled commercial building that utilizes a rainwater harvesting system meeting credit requirements. Those systems that involve indoor uses of rainwater must be permitted by Seattle-King County Department of Health to qualify for the rate reduction. Systems must meet the applicable stormwater and drainage code requirements for the building and site.

C. Rainwater Harvest Credit

SPU offers a 10 percent discount for any new or remodeled commercial building that utilizes a rainwater harvesting system meeting credit requirements. Those systems that involve indoor uses of rainwater must be permitted by Seattle-King County Department of Health to qualify for the rate reduction. Systems must meet the applicable stormwater and drainage code requirements for the building and site.

D. Undeveloped Riparian Corridor Exemption

Developed riparian corridors³ with small buffers and bank armoring increase the risk of flooding and downstream property damage. In contrast, undeveloped riparian corridors with a sufficient buffer act as floodplains which allow creeks to expand during peak periods, mitigating downstream flood damage.

The discount assumes exemption of the entire 100-foot qualifying creek buffer from the parcel's billable area. Qualifying criteria for this exemption are found in SPU Director's Rule FIN-211.2.

E. Wetlands Exemption

Wetlands act like natural drainage systems, protecting and improving water quality and storing floodwaters which are slowly released over time. Wetlands also serve as an important habitat for fish and wildlife. Only wetlands of at least 1,000 square feet in area and with no development within the wetland area will be considered for this exemption.

An application is required to qualify for this exemption, including the provision of supporting documentation demonstrating that the wetland meets all required criteria, as defined in SPU Director's Rule FIN-211.3

F. Undeveloped Islands Exemption

This credit applies to undeveloped islands with less than ten percent impervious area. These islands do not benefit from, nor do they impact, the drainage system or surrounding receiving waters.

³ Riparian corridor is defined in SMC 25.09.020.B.5.A.

6. UTILITY DISCOUNT PROGRAM

The City assists qualified customers with discounted utility services. Customers may receive their discount in one of three ways: 1) as a credit to their SPU wastewater bill; 2) where no wastewater bill is received, as a credit to the customer's City Light bill; or 3) in the form of a credit voucher. The latter two options are typically applicable to renters who pay drainage, wastewater, and water utility fees indirectly as part of their rental payment. For customers who do not receive a wastewater bill, a fixed credit is calculated which is equal to 50 percent of a typical residential bill for the class of customer receiving the credit. See Table 6-1 for proposed discounts. Proposed credits do not include projected changes in the King County treatment rate. Increases in the treatment rate will result in increases to credits through the pass-through mechanism established by SMC 21.28.040.

Table 6-1: Utility Discount Program Credits

		Proposed 2022	Proposed 2023	Proposed 2024
Wastewater				
Customers Receiving				
SPU Bills		50% discount off actual usage		
SCL Bills Only		50% discount of 'typical' customer class consumption		
Single-Family	4.3 CCF	\$ 36.57	\$ 38.01	\$ 39.11
Multi-Family	3.0 CCF	\$ 25.52	\$ 26.52	\$ 27.29
Drainage (SPU and SCL)				
Typical Monthly Bill*		\$ 52.72	\$ 55.97	\$ 59.34
Single-Family	100%**	\$ 26.36	\$ 27.98	\$ 29.67
Duplex	50%**	\$ 13.18	\$ 13.99	\$ 14.83
Multi-Family	10.7%**	\$ 2.82	\$ 2.99	\$ 3.17

Note: Rates proposed in legislation do not include projected mid-term treatment rate adjustments

* 'Typical' residential parcel of 5,000 - 7,9999 sq. ft.

** Ratio of 'typical' bill for customers in each discount class to 'typical' single-family parcel bill

APPENDIX A — FINANCIAL SUMMARY

Table A-1: Drainage and Wastewater Fund Financial Summary

	2020 Actuals	2021 Project	2022 Proposed	2023 Proposed	2024 Proposed
Operating Revenue					
Wastewater	\$ 300.7	\$ 311.4	\$ 334.1	\$ 351.2	\$ 363.4
Drainage	\$ 153.4	\$ 164.7	\$ 174.5	\$ 185.0	\$ 196.1
Other	\$ 6.2	\$ 6.3	\$ 10.1	\$ 10.4	\$ 10.7
Total Operating Revenue	\$ 460.3	\$ 482.4	\$ 518.7	\$ 546.7	\$ 570.2
Operating Expenses					
Treatment	\$ 166.6	\$ 165.5	\$ 171.7	\$ 186.0	\$ 196.6
O&M	\$ 158.5	\$ 137.8	\$ 147.2	\$ 153.5	\$ 161.8
City Taxes	\$ 54.3	\$ 57.8	\$ 62.5	\$ 65.9	\$ 68.7
State Taxes	\$ 6.5	\$ 6.7	\$ 7.3	\$ 7.6	\$ 7.8
Depreciation	\$ 33.7	\$ 34.5	\$ 39.2	\$ 39.1	\$ 39.3
Total Operating Expenses	\$ 385.9	\$ 402.3	\$ 428.0	\$ 452.1	\$ 474.3
Net Operating Income	\$ 74.4	\$ 80.1	\$ 90.7	\$ 94.6	\$ 95.9
Other Income (Expenses)					
Net Interest Expense	\$ -22.1	\$ (34.5)	\$ (32.9)	\$ (37.4)	\$ (40.3)
Other Non-Operating	\$ 9.9	\$ 5.6	\$ 3.8	\$ 3.0	\$ 2.6
Total Other Income (Expenses)	\$ -12.2	\$ (29.0)	\$ (29.1)	\$ (34.4)	\$ (37.7)
Grants and Contributions	\$ 21.7	\$ 15.7	\$ 0.8	\$ 0.8	\$ 0.8
Net Income (Loss)	\$ 83.9	\$ 66.9	\$ 62.4	\$ 60.9	\$ 59.0

(\$ millions)

APPENDIX B — DWF COST ASSIGNMENT DETAIL

Drainage and Wastewater Cost Assignment Methodology

SPU conducted its last review of DWF cost assignment factors in 2021, using 2020 actual data. Those factors were used to determine the 2022-2024 drainage and wastewater system cost of service.

This rate study uses the methodology described below for assigning operating expenses between drainage and wastewater lines of business. The cost assignment methodology is consistent with that of the rate studies used to propose rates for 2004 through 2021. The current rate study uses 2020 actual labor expense as the basis for labor related cost splits. Consistent use of actual expense over time helps to minimize errors in cost assignment resulting from variations between actual and budgeted spending.

DWF Operating Expenses are grouped into three categories:

Direct Operating Expense

Some expenses are assigned 100 percent to the applicable line of business (e.g., drainage billing administration). The majority of shared direct operating expenses are assigned based on actual direct labor expenses of an identified proxy. For example, most regulatory direct operating expense is related to water quality and combined sewer overflow (CSO) issues. Therefore, these activities are assigned based on actual direct labor expense for a subset of water quality and CSO-related capital and operating activities. The use of a programmatic proxy is useful in capturing any shifts in the focus of regulatory support over time.

Management estimates are used to identify the cost assignment factors for a limited number of activities. The bulk of activities using management estimates are related to billing and customer service activities. SPU is responsible for wastewater billing and for drainage and wastewater customer service.⁴ Management estimates are used to identify labor effort associated with the support of each line of business for a targeted subset of customer service budgeted activities.

Administration

Except for Project Delivery and Engineering (PDE), the cost assignment of all general management expense is based on the sum of actual direct labor expenses for direct operating activities.

Administrative expense for PDE is assigned based on actual direct labor expense charged to capital projects by each division.

This methodology creates a direct link between administrative functions and the activities they support. In addition, this methodology provides a consistent mechanism for updating administration cost assignment from year to year in case the programmatic focus changes.

⁴ King County administers billing for drainage.

General and Administrative Expense

Finance, Accounting, and Risk Management (FARS) expense is assigned based on the sum of actual direct labor expense for all direct operating and administrative activities which charge to the DWF budget.

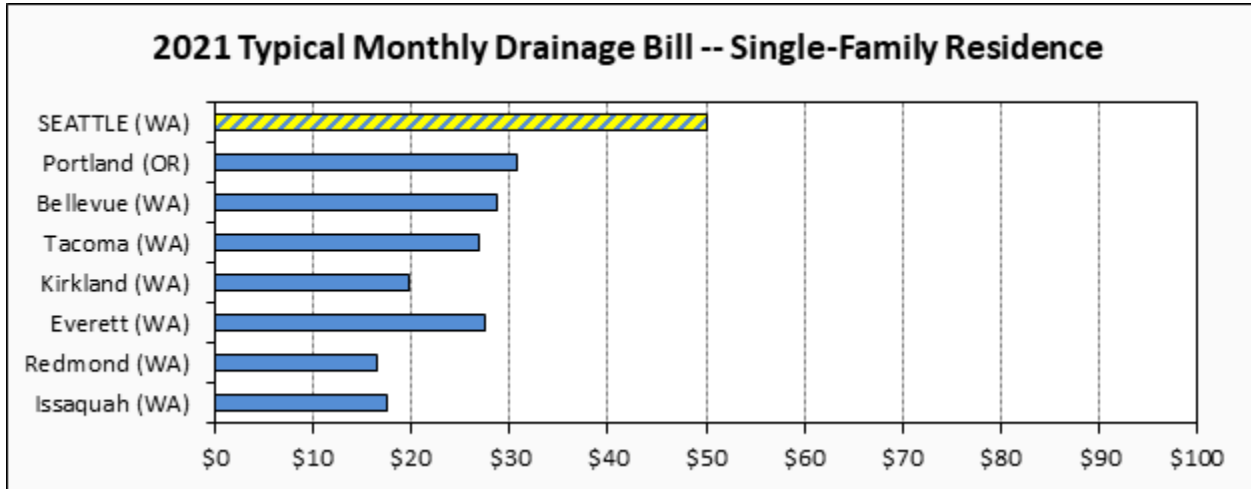
Cost Assignment Factor

The DWF total operating budget for each operating activity is divided between the wastewater and drainage lines of business using cost assignment factors. These factors represent the typical amount of support provided to each line of business in carrying out a specific type of activity. Therefore, drainage and wastewater each receive their proportional shares of activities.

APPENDIX C — COMPARATIVE RATES

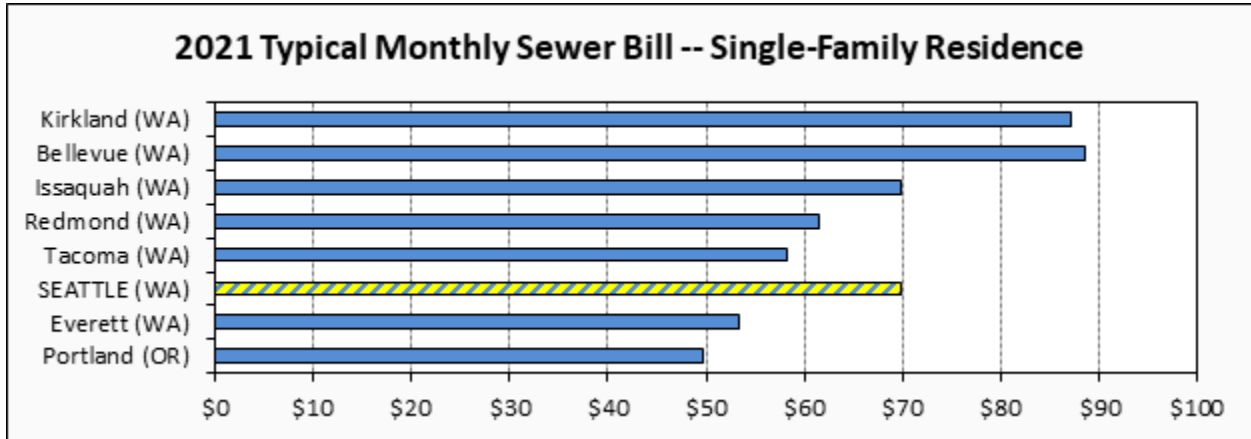
The following tables compare 2021 City of Seattle drainage and wastewater fees to those of other regional utilities.

Figure C-1: Monthly Drainage Bill Comparison - Typical Single-Family Residence



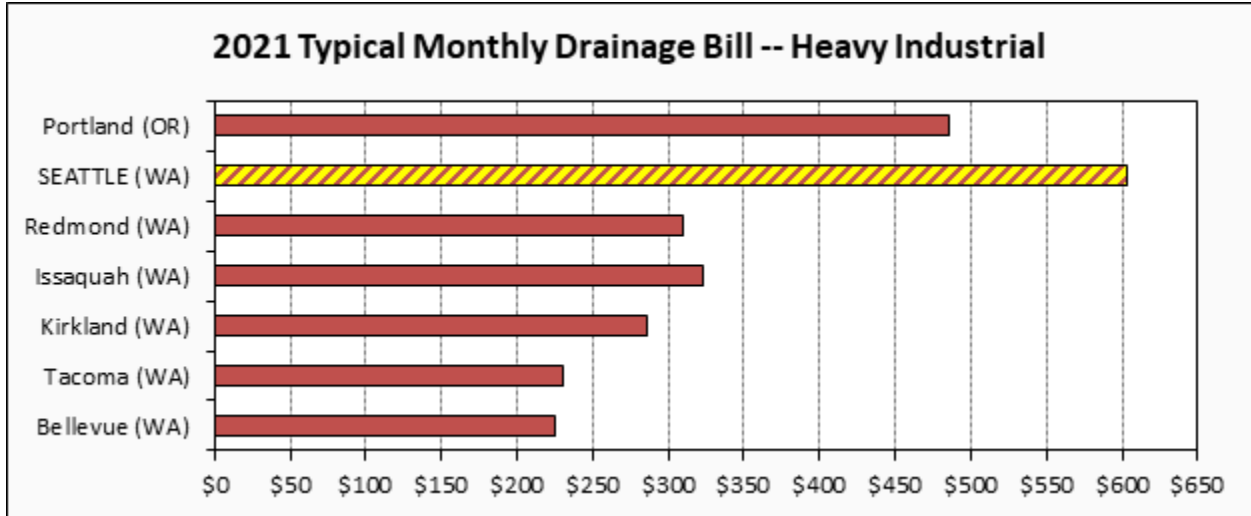
Note: Based on actual bills from respective cities, except Issaquah and Kirkland are estimated.

Figure C-2: Monthly Wastewater Bill Comparison - Typical Single-Family Residence



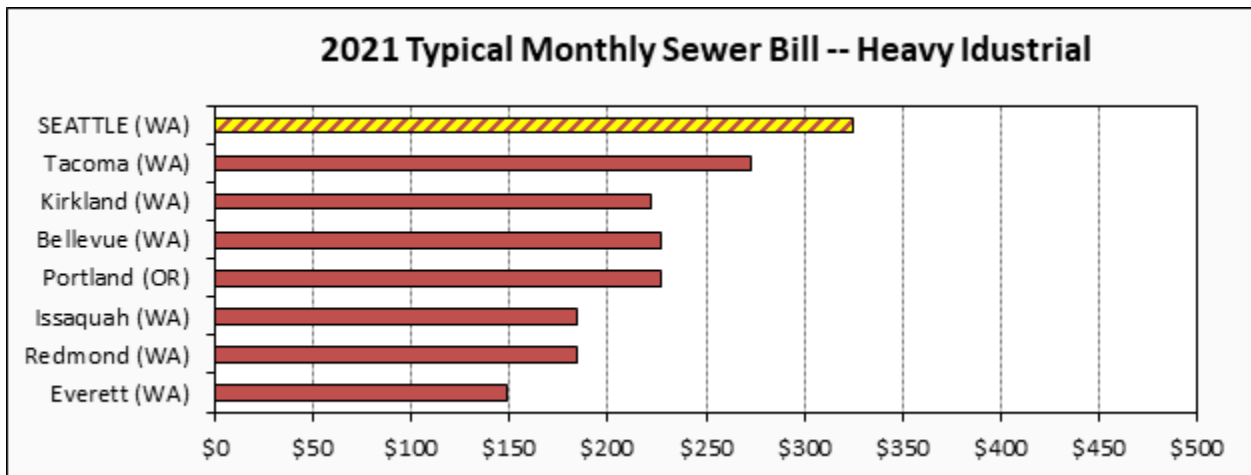
Note: Based on actual bills from respective cities, except Issaquah and Kirkland are estimated.

Figure C-3: Monthly Drainage Bill Comparison - Commercial



Note: Actual bills from respective cities, except Issaquah and Kirkland are estimated.

Figure C-4: Monthly Wastewater Bill Comparison - Commercial



Note: Actual bills from respective cities, except Issaquah and Kirkland are estimated.

APPENDIX D— DRAINAGE COST ALLOCATION DETAIL

Run-off is a factor of area and run-off coefficients. Run-off coefficients, or flow factors, represent a mathematical calculation of the portion of rainfall that becomes direct run-off during a storm event. For example, a 0.35 coefficient means that 35 percent of the rain falling on a particular surface ends up as run-off, while 65 percent is infiltrated.

Flow factors for a particular surface type will vary depending on the underlying storm assumptions. Storms are classified by intensity (how many inches of rain fall in a given time), duration (how long the storm lasts), and recurrence interval. Storms which occur more frequently (e.g., once 2 years) are considered to be less severe than storms with higher recurrence intervals (e.g., a 25-year storm).

The infrastructure and operation and maintenance expenses of the drainage system are oriented to the frequency of storm events, as noted below.

- **25-year events.** The flood management service goal is to prevent flooding of private property in 25-year storm events, defined as the maximum rainfall received in 24 hours for the largest storm expected over a 25-year period. This means that pipes and some other portions of the drainage system designed for peak storm events must be sized to manage these 25-year volumes.
- **2-year events.** The regulatory goal for combined sewer overflows is an average of not more than one overflow per site per year. In practice, this means controlling CSOs in a 2-year event, defined as the rainfall that would be received in a recurrence of the second-largest storm in one year during the period of record. Both the King County treatment system and Seattle's Drainage and Wastewater Utility have incurred substantial CSO control costs and expect to continue to incur them in the future.
- **6-month events.** Water quality infrastructure focuses on high-frequency events, defined as storms that occur on average twice per year. These investments are an increasingly significant portion of infrastructure costs as water quality regulations become more stringent and Seattle moves to reduce impacts on creeks and other receiving waters.
- **Average storm events.** A variety of the remaining SPU drainage assets and activities, ranging from Customer Service to general operations, are not associated with any of the preceding significant storm events, but are designed to serve the overall needs of the drainage system and its customers. These are assigned based on average storm events, defined as the average of all storm events over the course of a year.

Surface Type Cost Share Definition Methodology

The following steps are used to determine the percentage of total flow related expense to be allocated to each surface area type.

Step 1: Identify run-off coefficients and area for each surface type city wide.

Run-off coefficients and surface type area are the inputs used to calculate total run-off by surface type for each storm event.

Table D-1 presents the run-off coefficients assumed for the four storm events underlying surface type flow calculation.

Table D-1: Run-off Coefficients by Surface Type and Storm Event

Surface Type	25-Year Storm	2-Year Storm	6-Month Storm	Average Storm
Impervious	0.925	0.890	0.848	0.613
Pervious - Managed Grass	0.564	0.433	0.314	0.022
Pervious - Woods and Unmanaged Grass	0.349	0.214	0.114	0.021
Pervious - Good Forest	0.249	0.127	0.048	0.020

Run-off coefficients represent the percentage of rainfall which results in stormwater run-off. A run-off coefficient of 0.56 means that 56 percent of the rainfall landing on a surface ends up as run-off while the remaining 44 percent is infiltrated into the ground or cracks. The table above demonstrates that impervious surface has the most amount of run-off under all storm events, but that run-off increases for ALL surface types with an increase in the intensity of the storm.

Table D-2 provides a summary of area by surface type for the City of Seattle. These area calculations were derived from aerial photos present in the City’s GIS system.

Table D-2: Square Footage by Surface Type (City of Seattle)

Surface Type	Sq. Ft	% of Total
Impervious	792,533,331	49%
Pervious - Managed Grass	655,429,445	41%
Pervious - Woods and Unmanaged Grass	105,430,165	7%
Pervious - Good Forest	54,602,936	3%
Total	1,607,995,877	100%

Step 2: Calculate run-off for each surface type for each storm event

In Table D-3, the run-off coefficients found in Table D-1 are multiplied by the applicable surface type square footage to calculate total run-off by surface type and storm event. Table D-3 presents this data in both flow-units and as a percentage of total flow for each storm event.

Table D-3: Run-off Volumes by Surface Type

Surface Type	25-Year Storm		2-Year Storm		6-Month Storm		Average Storm	
	Flow Units	% of Flow	Flow Units	%	Flow Units	%	Flow Units	%
Impervious	733,093,331	64%	705,354,664	69%	672,068,264	75%	485,822,932	96%
Pervious - Managed Grass	369,662,207	32%	283,800,950	28%	205,804,846	23%	14,419,448	3%
Pervious - Woods & Grass	36,795,128	3%	22,562,055	2%	12,019,039	1%	2,214,033	0%
Pervious - Good Forest	13,596,131	1%	6,934,573	1%	2,620,941	0%	1,092,059	0%
Total	1,153,146,797	100%	1,018,652,242	100%	892,513,090	100%	503,548,472	100%

Step 3: Determine Cost Weights for Each Storm Event

To develop a single percentage of total cost represented by each storm event, the total flow percentages for each storm event found in Table D-3 are weighted by the percent of total drainage system expense associated with managing each storm event.

The first step in determining cost weights by storm event is to assign pre-tax flow expense to storm event categories. Most capital expense and O&M infrastructure maintenance expense is allocated to the storm event(s) which the associated infrastructure is designed to manage, except for pipe expense which is allocated between storm events using an incremental cost approach. Flow allocated expenses not directly related to a specific type of infrastructure are typically assigned to the Average Storm event.

Table D-4 presents actual pre-tax flow expense by category. The cost weights by storm event found at the bottom of the table represent the percent of total expense associated with each storm event.

Table D-4: Pre-Tax Flow Expense by Storm Event

	25 Year	2 Year	6 Month	Avg Storm	Total
Category					
SPU CSOs Assets	\$0	\$0	\$0	\$0	\$0
Pipe Assets	\$0	\$0	\$0	\$0	\$0
WQ Assets	\$0	\$0	\$0	\$0	\$0
Other Assets	\$40,057	\$67,366	\$67,159	\$73,602	\$248,184
TOTAL CAPITAL	\$40,057	\$67,366	\$67,159	\$73,602	\$248,184
O&M-Treatment	\$0	\$32,974	\$0	\$0	\$32,974
O&M Other	\$15,215	\$11,016	\$14,313	\$148,305	\$188,850
TOTAL O&M	\$15,215	\$43,990	\$14,313	\$148,305	\$221,824
TOTAL PRE-TAX EXPENSE	\$55,272	\$111,356	\$81,472	\$221,908	\$470,008
Cost Weight by Storm Event	11.8%	23.7%	17.3%	47.2%	100.0%

Step 4: Determine Flow-Based Cost Shares by Surface Type

By applying the applicable storm event cost weight from Table D-4 to the percentage of flow represented by each surface type under each design storm scenario (found in Table D-3), SPU can calculate a cost weighted run-off share for each surface type. These shares are used to allocate the flow-based revenue requirement between different surface types in the development of surface type rates, as further described in the chapter "Drainage Cost Allocation."

Table D-5: Flow-Based Cost Share by Surface Type

Surface Type	Cost Share
Impervious	82.5%
Pervious - Managed Grass	15.7%
Pervious - Woods and Unmanaged Grass	1.3%
Pervious - Good Forest	0.5%