



Water Demand Offset Fee Study

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1. BACKGROUND AND SUMMARY

The City of Santa Rosa (City) first adopted a Water Shortage Contingency Plan (Shortage Plan) in 1992 and has updated the Shortage Plan at least every five years. The Shortage Plan considers the response to limited water supplies during various stages of water shortage. A water shortage may occur due to a variety of potential scenarios, such as drought, climate change, regulatory constraints, natural or human caused disasters, and catastrophic events which may occur at any time. The Shortage Plan is the City's operating manual that allows the City Council, staff, and the public to identify and efficiently implement pre-determined steps to manage a water shortage. The City's 2020 Shortage Plan was adopted by City Council on June 8, 2021. The City's stages of water supply shortage as defined in the 2020 Shortage Plan are shown in **Table 1**.

Table 1 – City 2020 Water Shortage Contingency Plan Levels

Shortage Level	Complete Both	
	Percent Shortage Range ^(a) Numerical value as a percent	Water Shortage Condition (Narrative description)
1	Up to 10%	Voluntary - 10% reduction in use communitywide
2	Up to 15%	Mandatory - 15% reduction in use communitywide
3	Up to 20%	Mandatory - 20% reduction in use communitywide
4	Up to 25%	Mandatory - 25% reduction in use communitywide
5	Up to 30%	Mandatory - 30% reduction in use, with water allocations assigned to each customer
6	Up to 40%	Mandatory - 40% reduction in use, with water allocations assigned to each customer
7	Up to 50%	Mandatory - 50% reduction in use, with water allocations assigned to each customer
8	Over 50%	Mandatory - more than 50% reduction in use, with water allocations assigned to each customer

(a) One stage in the Water Shortage Contingency Plan must address a water shortage of 50 percent.

The Shortage Plan includes a program of water use prohibitions and restrictions for each stage of water supply shortage. These prohibitions and restrictions in the 2020 Shortage Plan are summarized in **Table 2**.

During declared water shortage emergencies that require water allocations (water rationing), existing City water connections are assigned individual water allocations that require water conservation sufficient to ensure that water demand does not exceed the limited supply for the duration of the water shortage emergency. In the 2020 Shortage Plan, water allocations are required in Stages 5, 6, 7, and 8.

Table 2 – Water Supply Shortage – Water Use Prohibitions and Restrictions

Prohibitions and Restrictions ^(a)	Stage When Effective
Water Waste Ordinance prohibitions	All water conditions
Prohibition on use of potable water for washing hard surfaces (e.g., sidewalks, driveways, patios)	Stage 1
Hose end shut-off nozzles required	Stage 1
Water served in restaurants on request only	Stage 2
Hotel and lodging industry must incorporate signs/messages regarding washing of linens only upon request	Stage 2
Prohibition on pressure washing with potable water unless a variance is obtained	Stage 3
Landscape irrigation limited to hours of 8 p.m. to 6 a.m.	Stage 3
Prohibition on filling and operating ornamental fountains	Stage 4
Prohibition on filling new swimming pools and spas	Stage 5
Recycled water must be used for construction dust control in some situations	Stage 5
New construction must offset water demand by a ratio of one to one	Stage 5
Prohibition on filling or topping of existing swimming pools and spas	Stage 6
Prohibition on installing water using landscape in new construction	Stage 6
New construction must offset water demand two to one ^(b)	Stage 6
Prohibition on installing or replanting water using landscapes	Stage 7
New construction must offset water demand three to one ^(b)	Stage 7
Landscape irrigation is prohibited	Stage 8
New construction must offset water demand four to one ^(b)	Stage 8

(a) Prohibitions and restrictions from previous stage(s) remain in effect.

(b) The City is preparing an Amended 2020 Water Shortage Contingency Plan with one offset requirement of 100 percent for Stages 5 through 8.

The Shortage Plan establishes that no water would be available to allocate to new demand created by development during water shortage emergencies that require water allocations (water rationing). However, the City acknowledges the severity of the housing shortage crisis and therefore the Shortage Plan allows development to continue during these water shortage stages so long as the new water demand created by new construction is offset.

The City wishes to establish a Water Demand Offset (WDO) Fee to be paid by developers whose projects increase demand for water during declared water shortage emergencies that require water allocations for existing customers. The WDO Fees would fund existing or new City demand management efforts, water supply projects, and/or water conservation programs to offset the new water demands. The City would determine the most cost-effective and appropriate ways to use the WDO Fee revenue. Developers wishing to add new or increased water demand during declared water shortage emergencies that require water allocations would be required to pay WDO Fees to ensure a net zero impact on water demand.

The remainder of this report summarizes the proposed WDO Fees and the methodology that was employed to calculate the fees.

2. WATER DEMAND OFFSET FEE CALCULATIONS

City staff provided information on current water conservation measures, costs, and water savings, and staff and consultant jointly developed estimates for a standardized approach for determining the cost of measures that would provide lasting and measurable water savings benefits.

2.1. NEW WATER DEMAND CREATED BY DEVELOPMENT

The City charges developers a separate connection fee (sometimes referred to as the “demand fee”) as a requirement for connecting to the water system or for increasing demand at an existing connection. The connection fee is calculated based on the estimated peak month average daily water use created by each development project.

In contrast, the WDO Fee is based on the annual average daily water demand created by each development project. **Table 3** summarizes the water use factors used for various types of development served by the City’s water utility. These water use factors were determined by examining the water usage from connections to the water system occurring from FY 2018 through FY 2021. The WDO Fees for residential development are calculated based on the average daily water usage estimates for each type of residential development identified. WDO Fees for commercial, industrial, and institutional development and irrigation connections are based on the estimated water usage of each development project.

Table 3 –Water Use Factors for Water Demand Offset Fees

Type of Development	Average Daily Water Usage (gal)	Thousand Gallons per Month
RESIDENTIAL (per housing unit) ¹		
Single Family Residential		
Small Lot (6,000 sq. ft. and under)	156	4.7
Large/Medium Lot (over 6,000 sq. ft. to 1 acre)	221	6.6
Large Lot (over 1 acre)	401	12.0
Duplex and Triplex	131	3.9
Condos, Apartments and Mobile Homes		
with separate irrigation	100	3.0
without separate irrigation	119	3.6
Eligible ADUs, SROs, Senior Housing, and Small, High-Density Apartment Units ²	69	2.1
COMMERCIAL, INDUSTRIAL, INSTITUTIONAL, AND IRRIGATION		
Based on Proposed Project ³	(na)	(na)

¹ Residential data based on average water usage over the past 4 years (FY2018 through FY2021)

² Applies only to ADUs that are subject to Demand Fees. "SROs" are single Room Occupancy. Small, High-Density apartments include all apartments 750 square feet and smaller.

³ Water demand for these customers is based on the estimated annual water demand for each proposed project.

2.2. WATER SAVING ESTIMATES

The City has direct experience, as well as reliable cost and water savings estimates, with a wide range of demand management efforts, water supply enhancement projects, and water conservation programs. For this WDO Fee study, the following three water savings programs were selected for analysis because they can be implemented relatively quickly and are anticipated to generate sufficient participation and therefore water savings:

- (1) Direct install bathroom conversions consisting of installation of ultra-high efficiency toilets and high efficiency faucet aerators, showerheads, and kitchen faucet aerators by qualified licensed plumbing contractors;
- (2) Enhanced rebates for high efficiency residential clothes washer upgrades; and

- (3) Enhanced rebates for ornamental turf conversions to low water using landscaping at commercial, industrial, and institutional (CII) and multi-family residential landscapes irrigated via dedicated irrigation services ¹.

For this reason, this WDO Fee analysis is based on the estimated costs and water savings associated with those programs.

The focus of this study on direct install bathroom conversions, enhanced rebates for high efficiency residential clothes washers, and enhanced rebates for CII turf conversions does not imply that the City is limited in the future to those programs. The water utility could use WDO Fee revenue on any programs or measures that would achieve the needed water demand offsets.

The estimated daily water use factors for the three studied programs are summarized in **Table 4**.

Table 4 –Water Use Factors for Water Demand Offset Fees ¹

	Daily Use (per person) ²	Number of people ³	Current Fixture Flow	Replacement Fixture Flow	Water Savings (gpd)
Ultra-high Efficiency Toilet	5 uses/day	2.7	1.6 gal/use	0.8 gal/use	10.8
Bathroom Faucet Aerator	8.1 min/day	2.7	2.2 gal/min	1.0 gal/min	26.2
Kitchen Faucet Aerator ⁴	4.05 min/day	2.7	2.5 gal/min	1.5 gal/min	10.9
Showerheads	5.3 min/day	2.7	2.5 gal/min	1.5 gal/min	14.3
Residential Clothes Washer ⁵	0.4	2.7	23 gal/use	13 gal/use	10.8
CII Turf conversion (1,000 sq. ft.)	n/a	n/a	n/a	n/a	0.8 ⁶

¹ Small discrepancies in sums of values shown in tables are due to rounding.

² Source: Handbook of Water Use and Conservation, Amy Vickers, 2001

³ US Census Bureau, QuickFacts, Population Estimates, Persons per Household, 2015-2019

⁴ Assumes only 50% of minutes per day (half of potential water savings) because about half of households in Santa Rosa have been found to have standard kitchen faucets that can be retrofitted with City provided aerators.

⁵ Source: [http://toolbox.calwep.org/wiki/Clothes_washers_\(residential\)#WASHER_LIFE](http://toolbox.calwep.org/wiki/Clothes_washers_(residential)#WASHER_LIFE)

⁶ Average water savings determined to be 31 gals per year per square foot at CII sites based on EKI study (included in 2020 UWMP).

3. PROGRAM IMPLEMENTATION COST ESTIMATES

The cost of implementing WDO programs is more than the material and installation cost of devices such as ultra-high efficiency toilets. WDO programs also require program development, program coordination, public outreach, and administration. The following subsections provide a comprehensive analysis of direct and indirect costs associated with each program. The “fully loaded”

¹ Turf conversions at CII and multi-family sites have been shown to save nearly three times as much water per square foot converted compared to single family residential sites in the City’s service area.

cost per unit (e.g., dollars per toilet) was calculated by dividing annual program cost by the number of units estimated to be installed per year.

3.1. DIRECT INSTALL BATHROOM CONVERSION PROGRAM COSTS

A bathroom conversion program does not currently exist at the City; therefore, the creation of the program would require new additional internal labor for the marketing and outreach effort, contract development, and program implementation and tracking. The City's total annual internal labor costs for the bathroom conversion program is summarized in **Table 5**. It is assumed that the City would convert approximately 1,000 locations per year, which comes out to \$89 in City labor costs per bathroom conversion.

Table 5 –Annual Internal Labor Costs for Direct Install Bathroom Conversion Program¹

Position Title	Total Program Annual Hours	Fully Loaded Hourly Rates ²	Approx. Cost
WUE Coordinator	140	\$95.76	\$ 13,400
WUE Technician	3	\$56.26	\$ 200
WUE Representative	277.5	\$84.33	\$ 23,400
WUE Intern	250	\$16.25	\$ 4,100
Senior Administrative Assistant (Temp)	100	\$66.31	\$ 6,600
Deputy Director of Water Resources	6	\$128.44	\$ 800
Director of Santa Rosa Water	0.5	\$152.77	\$ 100
Administrative Secretary	251.5	\$58.65	\$ 14,800
Administrative Analyst	1.5	\$80.96	\$ 100
Paralegal	1.5	\$73.16	\$ 100
Human Resources Technician (Risk Management)	1.5	\$63.15	\$ 100
Assistant City Attorney	1.5	\$137.27	\$ 200
Purchasing Agent	5	\$100.68	\$ 500
Marketing and Outreach Coordinator	100	\$87.73	\$ 8,800
Community Outreach Specialist	100	\$59.36	\$ 5,900
Graphic Design Support ³	N/A	N/A	\$ 10,000
Annual Totals:	1240		\$ 89,100

¹ Small discrepancies in sums of values shown in tables are due to rounding.

² Source: City of Santa Rosa Calculated Billable Rates Summary By Job Code, October 2020

³ Graphic design support costs based on previous contracts for drought outreach.

This study assumes that each typical bathroom conversion would replace one toilet, one showerhead, two bathroom faucet aerators², and one kitchen faucet aerator with high efficiency fixtures³. The plumber's direct material cost per toilet is approximately \$225 for a 2-piece ADA compliant unit with flange replacement and angle stop and riser. The City's direct material cost for providing two bathroom aerators, one kitchen faucet aerators, and one showerhead is approximately \$9. The service charge paid by the City to plumbers for each conversion would be \$450.

Table 6 provides the total cost per bathroom conversion for the direct install program.

Table 6 – Total Cost per Bathroom Conversion

\$450	= Plumber service charge
\$225	= Direct cost per toilet
\$9	= Fixtures provided by City
\$89	= Internal labor cost per conversion
\$773	= Total cost per bathroom converted

3.2. HIGH EFFICIENCY RESIDENTIAL CLOTHES WASHER REBATE ENHANCEMENT PROGRAM COSTS

This study assumes that the clothes washer rebate value at the time of implementation would be increased by \$100. For example, currently the City has a high efficiency residential clothes washer rebate program that provides a rebate of \$50 per washer, bringing the total rebate to \$150 per clothes washer if this WDO rebate enhancement program were implemented today.

As a consequence of enhancing the clothes washer rebate value, it is estimated that the City's existing program management efforts will increase by 25 percent for the additional marketing and outreach, customer service, and administration and tracking required for the enhanced rebate program. The City's annual internal labor costs for the washer rebate program is summarized in **Table 7**. The City issues approximately 200 rebates per year, which comes out to about \$198.50 in internal labor cost per clothes washer for each rebate. Therefore, the additional 25 percent labor cost attributable to the enhanced rebate program is approximately \$50.

² The water savings for two-sink bathrooms are assumed to be the same as one-sink bathrooms, provided both aerators are replaced.

³ This study assumes that about half of households have standard kitchen faucets that can be retrofitted with City provided aerators.

Table 7 –Annual Internal Labor Costs for High Efficiency Residential Clothes Washer Rebate Enhancement Program ¹

Position Title	Total Program Annual Hours	Fully Loaded Hourly Rates ²	Approx. Cost
WUE Coordinator	80	\$95.76	\$ 7,700
WUE Technician	50	\$56.26	\$ 2,800
WUE Intern	40	\$16.25	\$ 700
Senior Administrative Assistant (Temp)	40	\$66.31	\$ 2,700
Deputy Director of Water Resources	10	\$128.44	\$ 1,300
Marketing and Outreach Coordinator	100	\$87.73	\$ 8,800
Community Outreach Specialist	100	\$59.36	\$ 5,900
Graphic Design Support ³	N/A		\$ 10,000
Revenue Operations Supervisor	3.4	\$86.01	\$ 300
Annual Totals:	423		\$ 40,200

¹ Small discrepancies in sums of values shown in tables are due to rounding.

² Source: City of Santa Rosa Calculated Billable Rates Summary By Job Code, October 2020

³ Graphic design support costs based on previous contracts for drought outreach.

Table 8 provides the total cost per residential clothes washer for the enhanced rebate program.

Table 8 –Total Cost per High Efficiency Residential Clothes Washer for Enhanced Rebate

\$100	= Rebate enhancement
\$50	= Internal labor cost per enhanced rebate
\$150	= Total cost per enhanced rebate

3.3. CII TURF CONVERSION REBATE ENHANCEMENT PROGRAM COSTS

This study assumes that the CII turf conversion rebate value at the time of implementation would be increased by \$1.00 per square foot. For example, currently the City has a CII turf conversion rebate program that provides a rebate of \$1.50 per square foot, bringing the total rebate to \$2.50 per square foot if this WDO rebate enhancement program were implemented today.

As a consequence of enhancing the turf conversion rebate value, it is assumed that the City's existing program management efforts will increase by 25 percent for additional marketing and outreach, customer service, inspections, and program administration and tracking. The City's annual internal labor costs for the turf rebate program is summarized in **Table 9**. The City issues rebates for approximately 200,000 square feet per year, which comes out to about \$0.45 in additional internal labor costs per square foot for the enhanced rebate program. Therefore, the additional 25 percent labor cost attributable to the enhanced rebate program is approximately \$0.11.

Table 9 –Annual Internal Labor Costs for CII Turf Conversion Rebate Enhancement Program ¹

Position Title	Total Program Annual Hours	Fully Loaded Hourly Rates ²	Approx. Cost
WUE Coordinator	90	\$95.76	\$ 8,600
WUE Technician	675	\$56.26	\$ 38,000
WUE Intern	850	\$16.25	\$ 13,800
Deputy Director of Water Resources	10	\$128.44	\$ 1,300
Marketing and Outreach Coordinator	100	\$87.73	\$ 8,800
Community Outreach Specialist	100	\$59.36	\$ 5,900
Graphic Design Support ³	N/A	N/A	\$ 10,000
Senior Administrative Assistant (Temp)	50	\$66.31	\$ 3,300
Annual Totals:	1875		\$ 89,700

¹ Small discrepancies in sums of values shown in tables are due to rounding.

² Source: City of Santa Rosa Calculated Billable Rates Summary By Job Code, October 2020

³ Graphic design support costs based on previous contracts for drought outreach.

Table 10 provides the total cost per square foot of CII turf converted for the enhanced rebate program.

Table 10 –Total Cost per Square Foot of CII Turf Conversion for Enhanced Rebate

\$1.00	= Rebate enhancement
\$0.11	= Internal labor cost per square foot rebated
\$1.11	= Total cost per square foot rebated

4. WATER DEMAND OFFSET FEE CALCULATION

The WDO Fee amount was calculated based on the average cost associated with the three programs previously discussed. **Table 11** summarizes the daily water savings expected from each approach as well as the cost per unit in order to calculate the cost per daily gallon of water saved.

Table 11 – Cost per Gallon Offset by Program

Program	Daily Water Savings (gal)	Cost per Unit	Cost Per Daily Gallon Saved
<i>Bathroom Conversion Install (per home)</i>	62.3	\$773.00	\$12.41
<i>CII Turf Conversion (per sq. ft.)</i>	0.08	\$1.11	\$13.07
<i>High Efficiency Clothers Washer (per unit)</i>	10.80	\$150.00	\$13.89

WDO Fees were calculated based on the cost of entirely offsetting the anticipated future use of water by new development through the implementation of the three programs previously described. For example, the analysis determined the number of toilet replacements it would take to offset the new water demands created by a new single-family home.

Table 12 summarizes the number of units that would need to be installed to offset the new water demand associated with each new type of development.

Table 12 – Number of Retrofits Required to Offset Demand per New Connection

Type of Development	Bathroom Conversions	CII Turf Conversions (1,000 sq. ft.)	Washer Retrofit	Thousand Gallons per Month
RESIDENTIAL (per housing unit) ¹				
Single Family Residential				
Small Lot (6,000 sq. ft. and under)	2.5	1,837	14.4	4.7
Large/Medium Lot (over 6,000 sq. ft. to 1 acre)	3.5	2,602	20.5	6.6
Large Lot (over 1 acre)	6.4	4,721	37.1	12.0
Duplex and Triplex	2.1	1,542	12.1	3.9
Condos, Apartments and Mobile Homes				
with separate irrigation	1.6	1,177	9.3	3.0
without separate irrigation	1.9	1,401	11.0	3.6
Eligible ADUs, SROs, Senior Housing, and Small, High-Density Apartment Units ²	1.1	812	6.4	2.1
COMMERCIAL, INDUSTRIAL, INSTITUTIONAL, AND IRRIGATION				
Per Thousand Gallons per Month ³	0.5	388.5	3.1	1.0

¹ Residential data based on average water usage over the past 4 years (FY2018 through FY2021)

² Applies only to ADUs that are subject to Demand Fees. "SROs" are single Room Occupancy. Small, High-Density apartments include all apartments 750 square feet and smaller.

³ Water demand for these customers is based on the estimated annual water demand for each proposed project.

Table 13 shows the required cost to offset different types of development with the various program approaches. Water use estimates for new development from **Table 3** were used in the fee calculations. The average cost of the three programs (bathroom conversions, turf rebates, and washer rebates) was weighted based on the relative amount of water that is being saved by each program in a typical year.

Table 13 –Calculation of Water Demand Offset Fee based on Weighted Average of Offset Costs

Type of Development	Demand Offset Fee ¹			Weighted Average Offset Costs
	Offset Cost for Bathroom Conversion	Offset Cost with CII Turf Rebate	Offset Cost with Washer Rebate	
RESIDENTIAL (per housing unit)				
Single Family Residential				
Small Lot (6,000 sq. ft. and under)	\$1,936	\$2,039	\$2,167	\$1,964
Large/Medium Lot (over 6,000 sq. ft. to 1 acre)	\$2,743	\$2,888	\$3,069	\$2,782
Large Lot (over 1 acre)	\$4,976	\$5,241	\$5,569	\$5,047
Duplex and Triplex	\$1,626	\$1,712	\$1,819	\$1,649
Condos, Apartments and Mobile Homes				
with separate irrigation	\$1,241	\$1,307	\$1,389	\$1,259
without separate irrigation	\$1,477	\$1,555	\$1,653	\$1,498
Eligible ADUs, SROs, Senior Housing, and Small, High-Density Apartment Units ²	\$856	\$902	\$958	\$868
COMMERCIAL, INDUSTRIAL, INSTITUTIONAL AND IRRIGATION				
Per Thousand Gallons per Month ³	\$410	\$431	\$458	\$415

¹WDO fee is assessed per housing unit for residential and per TGAL for CII accounts

²Applies only to ADUs that are subject to Demand Fees. "SROs" are single Room Occupancy. Small, High-Density apartments include all apartments 750 square feet and smaller.

³Water demand for these customers is based on the estimated annual water demand for each proposed project.

5. RECOMMENDED WATER DEMAND OFFSET FEE

It is recommended that the City establish the WDO Fee based on the costs and water savings associated with the average cost of known and successful programs, as presented herein.

The fee schedule presented in

Table 14 shows proposed fee amounts for any water shortage emergency that requires water allocations (rationing). If the City revises the shortage stage structure and/or the percentage offset required for one or more shortage levels, the WDO Fees shown in

Table 14 should be prorated to determine the resulting fees.

Table 14 – Proposed Schedule of Water Demand Offset Fees

Type of Development	WDO Fee ¹
RESIDENTIAL (per housing unit)	
Single Family Residential	
Small Lot (6,000 sq. ft. and under)	\$1,964
Large/Medium Lot (over 6,000 sq. ft. to 1 acre)	\$2,782
Large Lot (over 1 acre)	\$5,047
Duplex and Triplex	\$1,649
Condos, Apartments and Mobile Homes	
with separate irrigation	\$1,259
without separate irrigation	\$1,498
Eligible ADUs, SROs, Senior Housing, and Small, High-Density Apartment Units ²	\$868
COMMERCIAL, INDUSTRIAL, INSTITUTIONAL, AND IRRIGATION ¹	
Per Thousand Gallons per Month ³	\$415

¹ WDO fee is assessed per housing unit for residential and per TGAL for CII accounts

³ Applies only to ADUs that are subject to Demand Fees. "SROs" are single Room Occupancy. Small, High-Density apartments include all apartments 750 square feet and smaller.

³ Water demand for these customers is based on the estimated annual water demand for each proposed project.

To account for inflation, it is recommended that the City adjust the WDO Fees on an annual basis at the beginning of the calendar year (January 1) starting in 2023, using the Engineering News Record's 20-Cities CCI (20-cities CCI). The 20-cities CCI is a broadly accepted construction cost index that attempts to reflect the monthly changes in general construction and labor costs. Adjusting WDO Fees annually using this index helps the City maintain fees commensurate with inflationary cost changes between periodic comprehensive updates. The WDO Fees presented herein have been indexed to a 20-cities CCI value of 12,464 (August 2021).

It is also recommended that the City update WDO Fee calculations whenever feasible when updating the Water Shortage Plan, which is scheduled to occur every five years. Water usage behavior, program costs, and water savings can all evolve over time and such periodic updates will help ensure that the fee will continue to effectively offset the new water demand created by development.