

CITY OF SANTA ROSA

**Water Rate Structure Analysis and
Alternative Conservation Pricing**

FINAL REPORT

September 21, 2005



THE REED GROUP, INC.

WATER RATE STRUCTURE ANALYSIS AND ALTERNATIVE CONSERVATION PRICING

SUMMARY AND RECOMMENDATIONS

In January 2001 the City of Santa Rosa entered into a Memorandum of Understanding (MOU) between the Sonoma County Water Agency (SCWA) and ten other agencies receiving water through SCWA's facilities (MOU signatory agencies). The SCWA MOU committed the City to evaluate its water rate structure with respect to providing incentives for water conservation. In February 2001 the City determined that current rate structure clearly meets the definition of "conservation pricing" as defined by the best management practices (BMPs) of the California Urban Water Conservation Council (CUWCC). This is the minimum standard required under the SCWA MOU. The City's rates meet this requirement because:

- ❖ Water rates include a uniform commodity rate applicable to all units of water usage,
- ❖ The uniform rate is relatively high (accounting for about 85 percent of rate revenues), while the monthly service charges are relatively low, and
- ❖ The City's charges for sewer service are also based on water usage, with a relatively high commodity charge compared to the fixed service charge.

However, recent developments within the City and statewide have led the City to reconsider the water rate structure for irrigation usage. With the assistance of The Reed Group, Inc., City staff worked with the Water Conservation Subcommittee of the Board of Public Utilities to study a variety of water rate structure issues. This effort has resulted in recommendations to implement a three-tier commodity rate structure for the City's single family residential and irrigation customers. These recommendations have been motivated by the following findings:

- ❖ About 38 percent of the City's total annual water use is due to irrigation by single family residential customers and dedicated irrigation water service connections. During peak summer months, more than 52 percent of the City's total water usage is due to irrigation.
- ❖ Recently developed data indicate that significant and widespread irrigation inefficiencies exist within the City of Santa Rosa's customer base.
- ❖ The water conservation incentive embodied in the current water rate structure is supplemented by the conservation effect of the City's sewer rates. However, irrigation water usage (including irrigation by single family residential customers) is unaffected by sewer rate conservation incentives.
- ❖ Energy costs, and in particular peak season energy costs, are uncertain but expected to increase significantly in coming years. Reducing peak season demands could help reduce this area of cost uncertainty.

As a result of deliberations during three meetings with the Water Conservation Subcommittee, the following three-tier water rate structures are proposed for single family residential and dedicated irrigation customers.

Single Family

Tier 1	Sewer cap plus 8,000 gallons per month
Tier 2	22,000 gallons above Tier 1 allocation
Tier 3	All usage in excess of Tier 2 allocation

Irrigation

Tier 1	Up to 125 percent of monthly water budget
Tier 2	125 percent to 200 percent of monthly water budget
Tier 3	All usage in excess of 200 percent of monthly water budget

It is recommended that the tier rates be established such that the weighted average rate paid under the tier rates is equal to the uniform rate applicable to multi-family and commercial customers. Also, the Tier 2 rate is proposed to be 125 percent of the Tier 1 rate, and the Tier 3 rate is proposed to be 150 percent of the Tier 2 rate (187.5 percent of the Tier 1 rate). The tier escalation factors are intended to provide an increasing financial incentive to conserve water (increasing marginal cost). Maintaining a balanced relationship between the tiered rates and the uniform rate structure maintains equity between customer categories and meets cost of service principles.

Exhibit 1 summarizes potential water rate schedules for 2006 and 2007 consistent with the City's recommendations for overall increases in water rates of 9 percent in each year. The Water Conservation Subcommittee recommends that the new tiered rate structure be implemented beginning in 2007. This provides City staff with a year to educate customers on the proposed rate structure changes and to assist customers that may be adversely affected. The 2006 rate schedule is provided for information purposes and may be useful to staff for preparing comparative bills under the current and proposed rate structures during 2006.

Details of the water rate structure analyses and basis for the recommendations are contained in the balance of this report. Supplemental information is also contained in presentation materials provided to the Water Conservation Subcommittee on August 8 and August 23, 2005, as well as the Board of Public Utilities study session held on September 1, 2005.

Exhibit 1
City of Santa Rosa -- Water Utility
Proposed Water Rates for 2006 and 2007

<i>Fixed Monthly Service Charges</i>			
Meter Size (inches)	Bills Rendered On and After January 1, 2006 (1)	Bills Rendered On and After January 1, 2007 (2)	
5/8"	\$ 5.53	\$ 6.03	
1"	\$ 10.06	\$ 10.97	
1 1/2"	\$ 19.25	\$ 20.98	
2"	\$ 32.35	\$ 35.26	
3"	\$ 75.65	\$ 82.46	
4"	\$ 128.70	\$ 140.28	
6"	\$ 281.74	\$ 307.10	
<i>Commodity Rates for Delivered Water</i>			
<i>Multi-Family and Commercial Accounts</i>			
Uniform Rate	\$ 3.15	\$ 3.43	
<i>Single Family and Irrigation Accounts</i>			
Tier 1	\$ 2.95	\$ 3.22	
Tier 2	\$ 3.69	\$ 4.02	
Tier 3	\$ 5.53	\$ 6.03	
<i>Single Family Tier Allocations</i>			
Tier 1	Sewer Cap + 8,000 gallons per month		
Tier 2	Sewer Cap + 30,000 gallons per month		
Tier 3	Usage in excess of Tier 2 allocation		
<i>Irrigation Tier Allocations</i>			
Tier 1	Up to 125% of water budget		
Tier 2	Up to 200% of water budget		
Tier 3	Usage in excess of Tier 2 allocation		

Notes:

- (1) Sample rates for information and comparative billing purposes during 2006.
- (2) Proposed rates to be adopted and implemented for 2007.

CURRENT WATER RATES

The City's water rates were last adjusted in January 2005¹ although the basic rate structure has been in place for many years. **Exhibit 2** summarizes the current water rates and rate structure applicable to all customers.

The City's water rates include two separate components. A fixed monthly service charge is charged to each service based on the size of the water meter. Higher charges for larger meter sizes reflect the fact that larger services can place a larger demand on the water system. Service charges, therefore, reflect cost to the City of meeting the potential demand that a customer could place on the water system (and the City needs to be prepared to serve). The water rates also include a uniform commodity rate that applies to each 1,000-gallon (tg) unit of water use. Customers are billed monthly for water service.

Exhibit 2
City of Santa Rosa - Water Utility
Current (2005) Water Rates

<i>Monthly Service Charges</i>		<i>Uniform Commodity Rate</i>	
5/8" meter	\$5.07	All water use	\$2.89/tg
1" meter	\$9.23		
1 1/2" meter	\$17.66		
2" meter	\$29.68		
3" meter	\$69.40		
4" meter	\$118.07		
6" meter	\$258.48		
			tg = 1,000 gallons

The uniform commodity rate generates about 85 percent of the City's water rate revenue, with the service charges generating about 15 percent of revenue. As a result of this balance, the City's rate revenue can vary significantly with variation in water use patterns (seasonal and annual). Many utilities attempt to recover the fixed costs of providing service through the fixed component of the rates, and recover variable costs (those costs that vary with the volume of water sales) through commodity rates. The City's water conservation objective contributed to the decision to place a greater emphasis on the commodity rate component of the rate structure, even though this results in increased revenue volatility relative to costs.

Average single family water use in Santa Rosa is about 8,700 gallons per month or about 290 gallons per day. Most single family customers have 5/8" water meters. The average monthly single family water bill is currently \$30.21.

¹ See Ordinance No. 3642 dated December 2, 2003.

CUSTOMER ACCOUNTS AND WATER USE CHARACTERISTICS

The City of Santa Rosa has nearly 49,000 active water service customers (connections). **Exhibit 3** summarizes the number of customers and annual water use by customer category. The multi-family category includes apartments, condominiums, and mobile home parks. The commercial category includes business, industrial, and institutional accounts. Outside of the single family residential category, most irrigation water use is through dedicated irrigation service connections. However, a portion of multi-family and commercial customers include some irrigation. The City provides incentives to customers to separate irrigation systems from interior usage by adding additional service connection(s). However, for many existing customers it is not practical or feasible to make the plumbing changes. Nearly all single family customers have a single service for both domestic and irrigation usage.

Exhibit 3
City of Santa Rosa -- Water Utility
Summary of Customer Accounts and Water Use

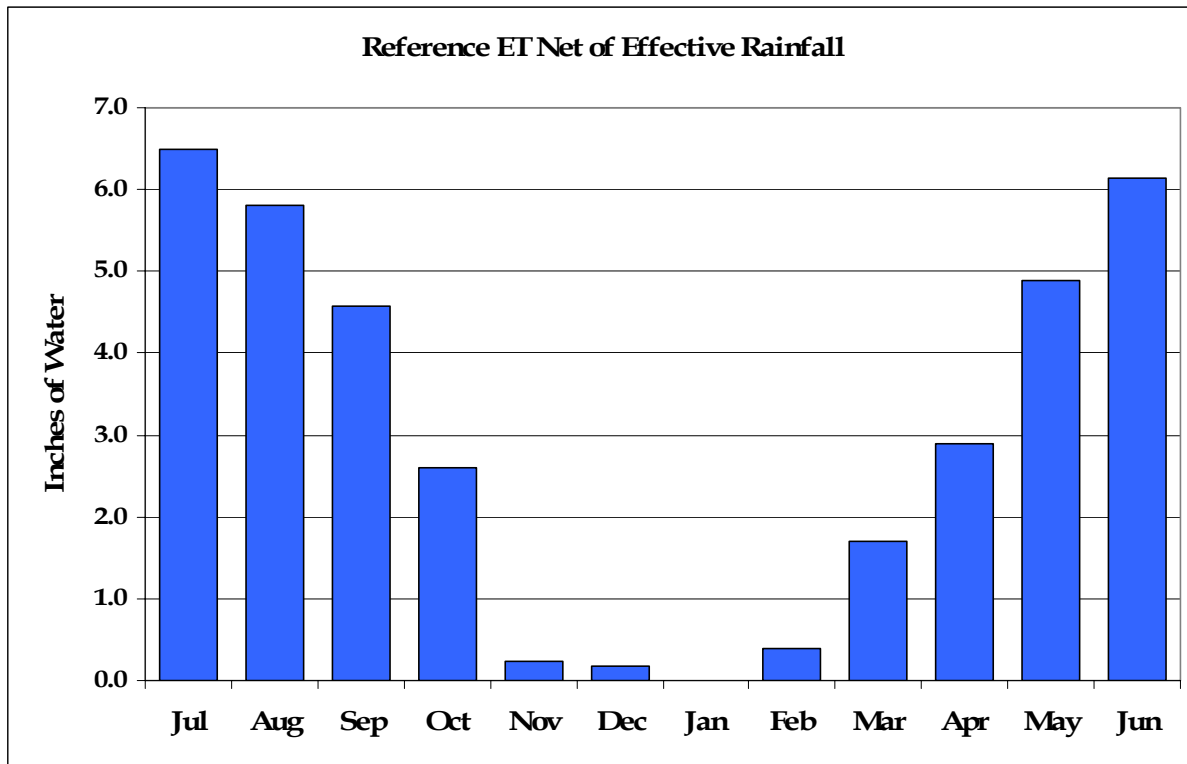
	No. of Active Accounts by Meter Size							Total	Annual Water Use
	5/8"	1"	1 1/2"	2"	3"	4"	6"		
Single Family	40,682	753	17	11		1		41,464	4,130,541
Multi-Family/Mobile Home	1,790	687	102	430	41	6	7	3,063	1,109,902
Commercial/Industrial/Inst.	1,263	803	126	448	56	19	12	2,727	1,123,246
Irrigation w/ Water Budget	401	654	43	455	27	18	1	1,599	838,343
Totals	44,136	2,897	288	1,344	124	44	20	48,853	7,202,032

In recent years the City has been working to establish “water budgets” for each of the 1,600 dedicated irrigation service connections. A water budget is the amount of water required to sustain plants and is based on evapotranspiration (ET) data, landscaped area, and plant types. The evapotranspiration rate is determined daily and the water budget for each landscape is determined monthly (in arrears). **Exhibit 4**, on the next page, summarizes the 10-year historical average monthly reference evapotranspiration (ET_o), net of effective rainfall, for Santa Rosa (ET_{net}). ET rates are expressed in inches and represent the depth of water to be applied to turf grass during a specified time period.

Water budgets, unique for each irrigation service, can provide customers with specific information regarding the amount of water needed to maintain each landscape. By comparing actual water use histories with the calculated water budgets for each account, the City determined that there are significant and widespread irrigation inefficiencies within the City. Specifically, the available data indicate:

- ❖ About 82 percent of irrigation customers use more than 200 percent of water budget at least once during the year
- ❖ A third of irrigation customers use more than 200 percent of water budget for at least 4 of the six peak summer months (May-October)

Exhibit 4
City of Santa Rosa - Water Utility
10-Year Historical Monthly Average Net Evapotranspiration (ET_{net})



- ❖ Nearly 25 percent of irrigation water usage is water applied in excess of 200 percent of monthly water budgets
- ❖ One in eight irrigation water bills include water usage in excess of 500 percent of water budget.

Single family customers represent the largest customer category making up 85 percent of the accounts and 57 percent of total annual water usage. Single family water usage is comprised of indoor and outdoor water use. Indoor water use generally ends up in the sewer system. Charges for residential sewer service are based on estimated indoor water. Water usage for each customer is averaged over the months of December, January, and February to determine a sewer cap. Monthly water usage up to the sewer cap is the usage from which sewer bills are determined. The sewer cap is unique for each single family customer and is recalculated each winter. Variations in the sewer cap reflect differences in number of people in a household, number and type of water using fixtures, water using habits, and other factors.

The sewer cap represents indoor water usage. Water use in excess of the sewer cap represents outdoor water usage (primarily irrigation). About 45 percent of annual single family water usage is in excess of the sewer cap. Irrigation water usage among single family residential

customers also varies significantly. While intuitively one might expect a strong correlation between lot size and irrigation water use, in fact there is a relatively weak correlation between these two factors. Single family residential water use data indicates significant variation in residential irrigation water usage. However the variation in usage is only very weakly related to lot size. This weak correlation might be explained in part by differences between lot size and landscaped area, variations in plant types within the landscaped area, irrigation practices, and other factors.

TIER RATE DESIGN

Following discussions on potential water rate structure design, the Water Conservation Subcommittee and staff agreed that three-tier rate structures should be developed for both single family residential and dedicated irrigation water services. Tier rate structure design was further guided by the following objectives:

- ❖ Tier rate structures should be revenue neutral relative to the uniform commodity rate applicable to other customer categories
- ❖ Tiered rates should focus on encouraging efficient irrigation water usage. The tier structure for single family residential customers should accommodate the various indoor water needs of customers (as expressed by the sewer caps assigned to each single family account)
- ❖ Most water usage should be in the first tier (Tier 1), and this tier should provide sufficient water for normal or typical irrigation needs
- ❖ The second tier (Tier 2) should provide an increased financial incentive for customers to conserve. Water usage included in the second tier is intended to include irrigation usage that exceeds basic irrigation needs, but still within a range of discretion and/or reasonable management tolerances (see discussion below)
- ❖ The third tier (Tier 3) should apply to excessive water usage and provide an even stronger financial incentive to reduce usage in this range.

Tier structures for single family residential and dedicated irrigation services follow a slightly different philosophical basis, as described below.

- ❖ Single Family Residential - The proposed tier structure includes sufficient water for irrigation purposes (in excess of the sewer cap) for a typical single family parcel in Tier 1. The median single family parcel is slightly smaller than 7,000 square feet. Allowing for the footprint of the house, as well as driveway, walkway, and patio areas, a typical lot might include 2,000 to 3,000 square feet of irrigated landscape (lawn and garden areas). Based on ET rates in peak summer months, staff determined that 8,000 gallons (8 tg) per month is a reasonable water allocation for such a landscaped area. In addition, analysis of single family water usage suggests that average irrigation usage during peak summer months is about 8 tg per month. As a result, the Tier 1 allocation for single family residential customers is recommended to be 8 tg over the sewer cap. The second

break point for the single family tier structure was established such that only about 2 percent of single family water usage would be at the Tier 3 rate. The second break point was established to limit the punitive nature of the rate structure, and is proposed to be 30 tg per month in excess of the sewer cap. Based on this break point, about 5 percent of single family customers will be in Tier 3 at least once per year, and about 1 percent of the single family water bills will include Tier 3 usage.

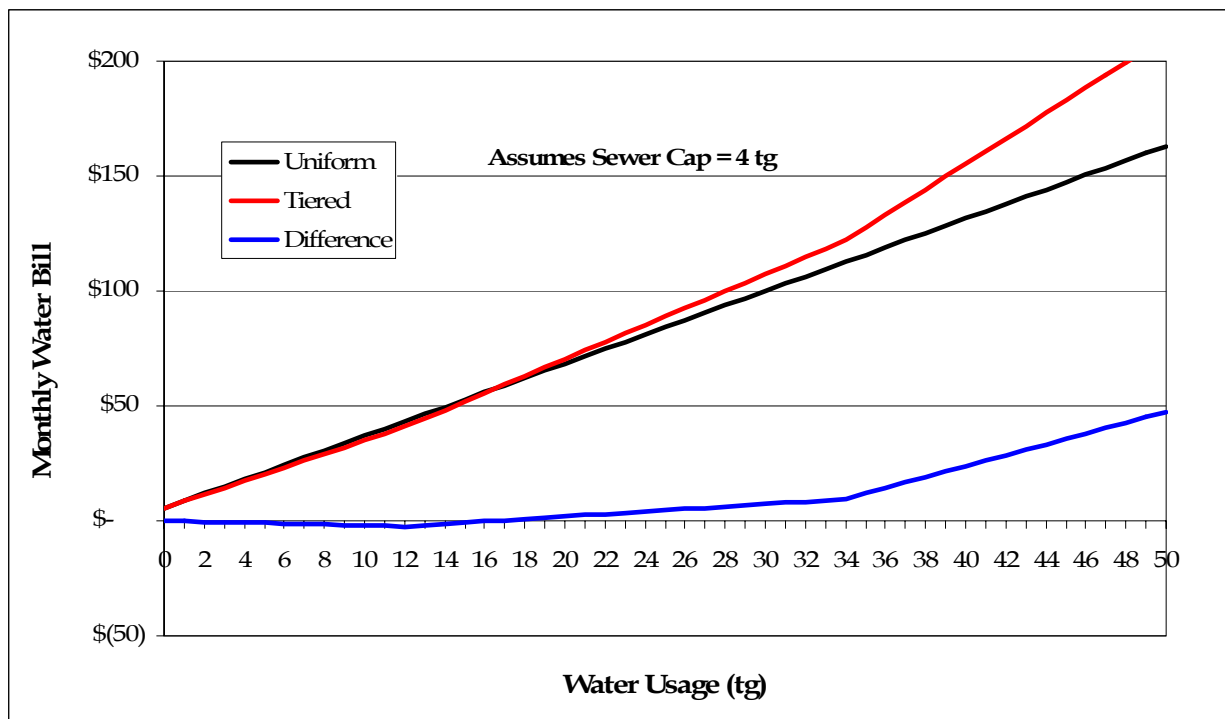
- ❖ Dedicated Irrigation - The City has established landscape requirements that specify the types of plant materials, limits of landscaping, and other requirements for landscaped areas. In addition, the City has established water budgets for each dedicated water service connection. The water budgets reflect the amount of water needed to sustain each landscape in a healthy state assuming efficient irrigation and water management practices. The approach to tier structure design for irrigation services is intended to motivate customers to properly manage irrigation of these landscaped areas. Specifically, the Tier 1 irrigation allocation allows for water usage up to 125 percent of water budget. The 25 percent over water budget is intended to accommodate the inefficiencies inherent in any irrigation system, even when properly planned, installed, and operated. The Tier 2 irrigation allocation includes water usage up to 200 percent of water budget. Staff believes that this allocation reflects a reasonable expectation for the irrigation management of all landscapes and should reasonably be attained by all irrigation customers. Above 200 percent of water budget the Tier 3 rate would apply.

Tier rates have been calculated to be revenue neutral relative to the uniform commodity rate that would apply for other customer classes. Tier rates were established such that Tier 2 would be 25 percent higher than Tier 1, and Tier 3 would be 50 percent higher than Tier 2 (87.5 percent higher than Tier 1). It was felt that these tier increases would provide the desired conservation incentive to customers by increasing the marginal cost for increased water usage. All single family and irrigation customers would benefit from the Tier 1 rate, which would be slightly lower than the uniform rate applicable to other customers. This tier structure meets the revenue neutrality requirement and also provides a “carrot and stick” approach to encouraging water conservation.

The tiered water rate structure is anticipated to result in a reduction of water usage in the higher tiers. The exact amount of conservation is difficult to estimate, as other factors also have an impact on consumption decisions (e.g., weather patterns). Water rate calculations reflect an estimated 0.5 percent reduction in total citywide annual water usage as a result of tiered rates for single family and irrigation customers. Tiered commodity rate revenue may also be more volatile than under the current uniform rate structure since marginal water usage may be at the higher tier rates (particularly during summer months). Following discussions with the Water Conservation Subcommittee, it is recommended that any excess revenue generated from the tiered water rates (in excess of estimated tier revenue) be (1) assigned to a water rate stabilization for use in the future if revenues are below estimates, and/or (2) used to extend additional water conservation education and assistance to the single family and irrigation customers affected by the tiered rates.

Most single family and irrigation water bills will be somewhat lower under the tier structure, relative to the uniform rate structure. However, if water usage extends significantly into the second tier or into the third tier, higher water bills will result. **Exhibit 5** provides a comparison of single family water bills under the current uniform rate and the proposed tiered rate structures. A similar pattern will exist for irrigation customers, although specific characteristics will depend on the meter size and water budget of each customer. Customers in the second and third tiers will have greater economic incentive to reduce water usage (they will save more money) relative to the current uniform rate structure.

Exhibit 5
City of Santa Rosa - Water Utility
Comparison of Uniform and Tiered Rate Structure for Single Family Customers



IMPLEMENTATION AND ADMINISTRATION

Tiered water rate structures are, by definition, more complex than uniform rate structures. Furthermore, the proposed rate structure goes further than most because the tiered rate structure is effectively customized for each single family and irrigation customer. As a result, when implementing the tiered rates the City should:

- ❖ Allow sufficient time to modify the utility billing system and printing of utility bills to accommodate the proposed rate structure changes and presentation on utility bills.

- ❖ Communicate with customers through newsletters or other means the purpose and goals of the proposed rates, as well as how the rates will work and how they may affect customers' water bills.
- ❖ Consider direct communication with large volume single family customers that may be adversely affected by the new rate structure, including informing customers of assistance programs for reducing water use.
- ❖ Offer comparative bill analyses for affected customers that demonstrate how individual customers might be affected based on historical water usage.
- ❖ Complete the determination of water budgets for all dedicated irrigation services, including verifying landscaped area estimated using NASA data.
- ❖ Work with irrigation customers to explain water budgets and the proposed water budget-based tier structure. This should include reviewing historical water usage relative to water budgets.
- ❖ Train staff to respond to customer inquiries on the proposed rate structure.
- ❖ Consider establishing an administrative appeal process for water budgets assigned to irrigation customers.

City staff has noted that some multi-family and commercial accounts have some irrigation water usage associated with their water meters (i.e., mixed use meters). It may be possible to extend the tier rate concepts developed for single family and irrigation customers by considering sewer caps and/or developing water budgets for irrigated landscapes. Extension of tiered rates to this limited customer group could be achieved at a future date, such as part of the 2008 rate update cycle.