CITY OF BRENTWOOD

Water Cost of Service Study

Final Report / April 12, 2016

RAFTELIS
FINANCIAL CONSULTANTS, INC.

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1. EXECUTIVE SUMMARY

The City of Brentwood (City) engaged Raftelis Financial Consultants, Inc. (RFC) to conduct a comprehensive financial plan and develop cost of service water rates for implementation in fiscal years (FY) 2016 through FY 2018. The rate study process was conducted in conjunction with input from City staff. This report documents the resultant findings, analyses, and proposed changes that were developed with input from and approved by City staff.

The major objectives of the study include the following:

1. Ensure *Revenue Sufficiency* to meet the operation and maintenance (O&M) and capital needs of the City's water utility.
2. Address the water supply and water restriction use in the City.
3. Ensure that rates are *Fair and Equitable* and are based on *Cost of Service* guidelines used in the industry.
4. Plan for *Rate and Revenue Stability* to prevent rate spikes and provide for adequate operating and capital reserves and the overall financial health of the water utility under varying conditions.

This executive summary provides an overview of the study and includes findings and recommendations for water rates.

The remainder of the report defines a unit of water as a thousand gallon (kgal). Also, a fiscal year for the City is from July 1 to June 30 the following year. Therefore, July 1, 2014 through June 30, 2015 is identified as FY 2015; July 1, 2015 through June 30, 2016 is identified as FY 2016 and so on.

System Background

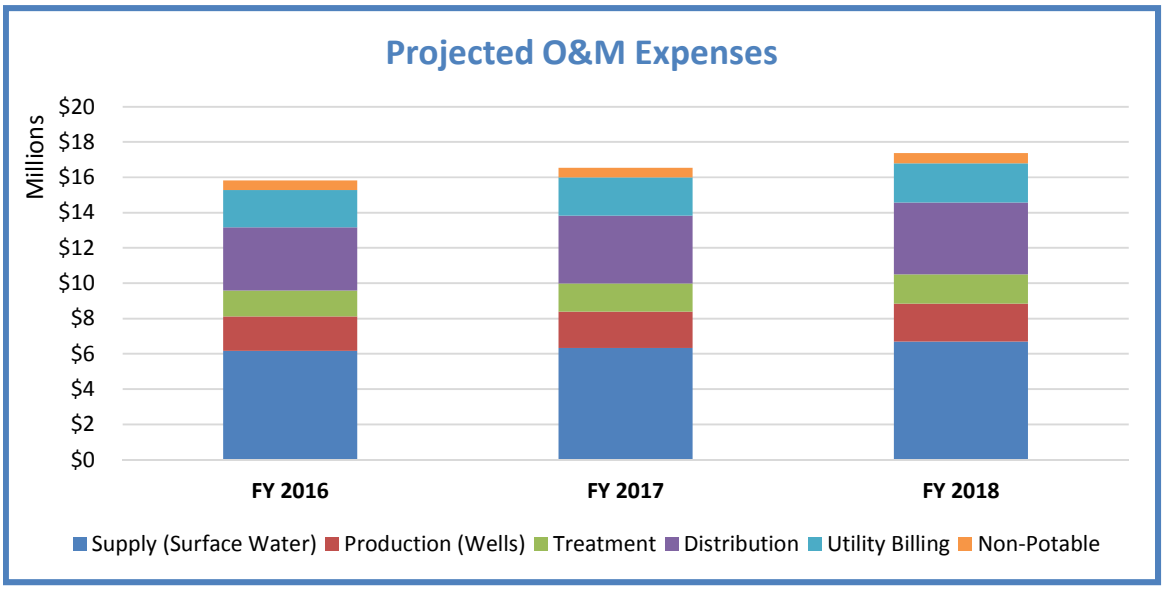
The water utility supplies potable water to over 17,500 customer accounts through 172 miles of transmission and distribution pipelines. Water is supplied through two main sources: local groundwater, from the City's groundwater wells, and surface water that originates from rivers within the Sierra mountain range and flow into the Delta. Surface water is treated at the City of Brentwood Water Treatment Plant (Brentwood TP) and the Randall Bold Water Treatment Plant (RBWTP). The cost of water supply has increased in the last several years due to continued years of drought, tightening water supplies and environmental and regulatory requirements.

Financial Plan

In order to determine the revenue adjustments needed to meet the ongoing expenses of the City and provide fiscal stability, RFC projected the revenue requirements, including operations and maintenance (O&M) expenses, capital improvement expenses, debt service costs, reserve requirements, etc., for the study period from FY 2016 to 2018. O&M expenses include the cost of operating and maintaining water supply, treatment, storage, and distribution facilities, as well as the costs of providing technical services such as engineering services and other administrative costs of the water system including meter reading and billing. O&M projections are based on the City's FY 2016 adopted budget and the City's projected budgetary increases in FY 2017 and FY 2018. The City uses different inflation factors for different expenditures within the budget. On average, the O&M costs are increasing at approximately 4.8 percent per year. **Figure 1-1** shows the projected water O&M expenses over the planning period.

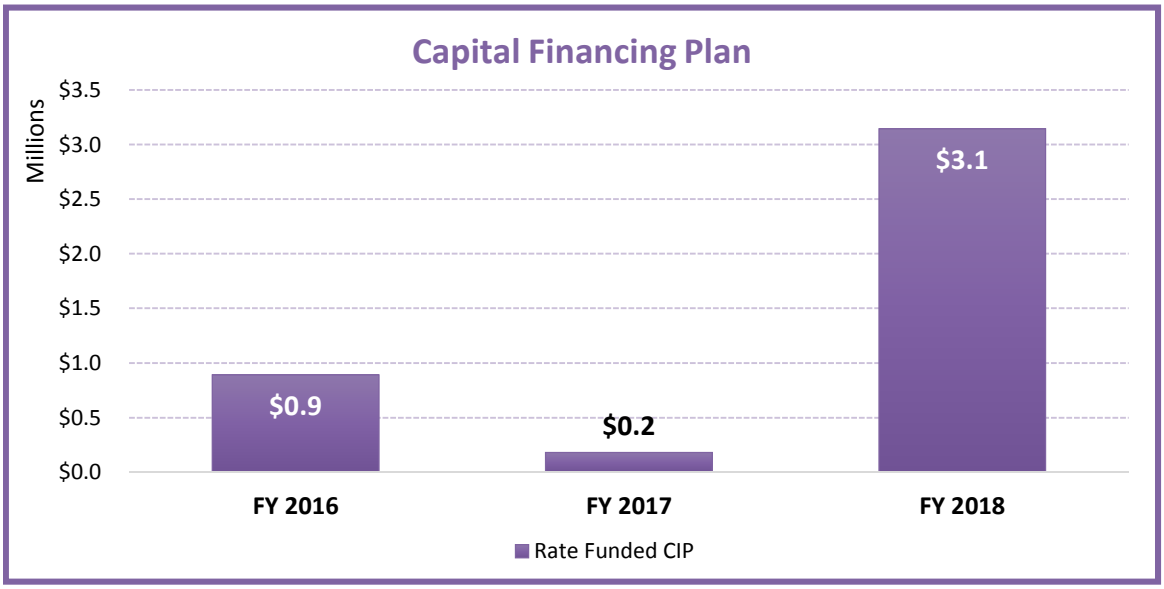
Due to the current drought and ongoing conservation efforts, the "new normal" potable water usage is projected to be the average usage of the previous three years, from FY 2013 through FY 2015. Water shortage projections due to the drought are conducted separately. The proposed financial plan and water rates are based on the new normal water usage.

Figure 1-1: Projected O&M Expenses



In addition to the operating expenses, the City is planning significant capital expenditures over the next three years (FY 2016 to 2018), totaling about $4.2 million, to be funded by water rates. Existing and anticipated annual debt service payments range from $2.8 million to $4.4 million over the planning period. **Figure 1-2** shows the water CIP that will be funded by rates over the planning period.

Figure 1-2: Capital Financing Plan



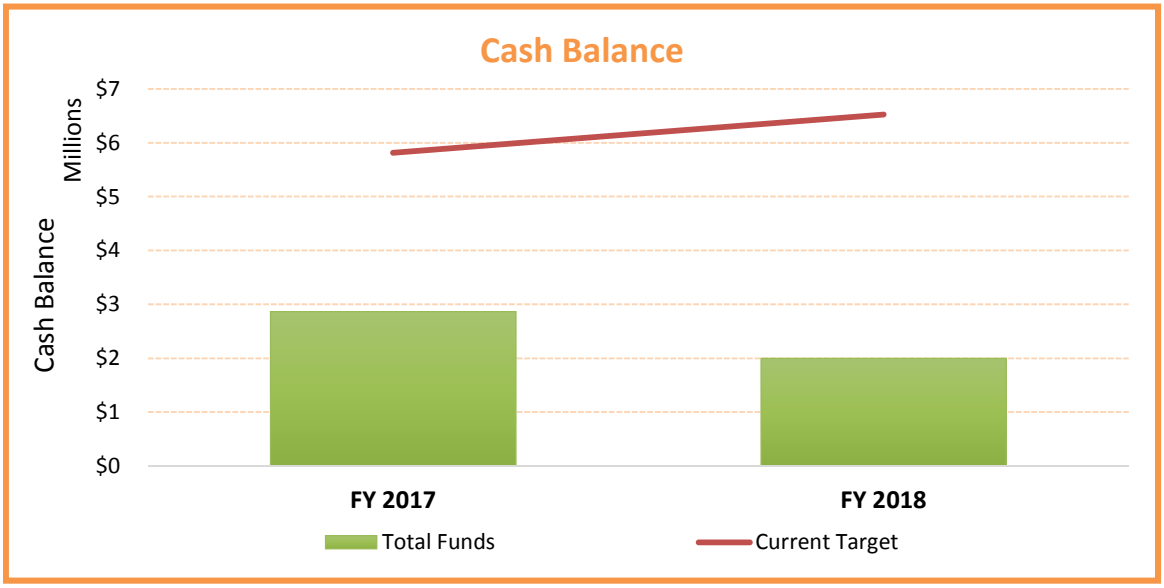
To ensure that the City will have adequate revenues to fund water operating and capital expenses and to maintain sufficient reserves, RFC recommends the revenue adjustments in **Table 1-1**. These increases are also needed to finance the capital and inflationary expenses.

Table 1-1: Annual Revenue Increases

Effective Date	Increases
June 2016	9%
July 2017	9%

Figure 1-3 shows the resulting cash balance for the water utility. The red line represents the total current target, which equals to 30 percent of annual operating expenses and debt service payments.

Figure 1-3: Cash Balance



Cost of Service Analysis and Rate Design

To calculate fair and equitable rates so that users pay in proportion to the cost of providing service, RFC performed a cost allocation of the total revenue requirements consistent with industry standards. The cost of service allocation is based on the Base-Extra Capacity Method described in the American Water Works Association (AWWA) *Manual M1*. Under this method, costs are apportioned amongst various cost parameters to determine the costs to provide service under average conditions, meet peaking requirements, provide meter capacity and provide customer service. Costs to serve different customer classes are determined; rates are then designed to recover the costs equitably consistent with Proposition 218 requirements.

Proposed Water Rates

RFC recommends that the City retains its current inclining rate structure, with revisions to the residential and non-residential tiers. The proposed residential tiers are: Tier 1 is set at 0 to 5 thousand gallons (kgal) per month, which represents the total available lowest cost water supply; Tier 2 is set at 6 to 14 kgal per month, which represents the FY 2013 and 2014 average monthly water usage; Tier 3 is set at 15 to 20 kgal per month, which represents the FY 2013 and 2014 average summer water usage; Tier 4 is any usage above Tier 3. Non-residential customers will have two tiers, with Tier 1 set at 0 to 5 kgal per month since all customers benefit equally from the available lowest cost water supply. The rates are also revised to be more consistent with cost of service. **Table 1-2** shows the proposed rates for the next two years, effective in June 1, 2016 and in July 1, 2017.

The City reserves the right to pass through costs that are not within the City's control, such as water purchased costs, electrical costs, chemical costs etc. to the proposed rates when such an action is deemed necessary. The financial plan has built in projected increases in these costs. However, in

the event that those costs exceed the projected amount, the Council may decide to pass through the increase to the customers.

Table 1-2: Proposed Monthly Water Rates

		June 1, 2016	July 1, 2017
Monthly Base Rate			
Meter Size			
5/8" or 3/4"		$21.61	$23.56
1"		$29.83	$32.52
1 1/2"		$50.39	$54.93
2"		$75.07	$81.83
3"		$153.21	$167.00
4"		$268.36	$292.65
6"		$543.89	$592.85
Commodity Rate ($/kgal)			
Residential	Monthly (kgal)		
Tier 1	5	$2.49	$2.72
Tier 2	14	$4.96	$5.41
Tier 3	20	$5.93	$6.47
Tier 4	21+	$6.52	$7.11
Non-Residential			
Tier 1	5	$2.31	$2.52
Tier 2	6+	$4.60	$5.02
Hydrant		$6.04	$6.59
Non-Potable		$1.31	$1.43

Customer Impacts

Table 1-3 below shows the impacts of an average residential customer with a 1-inch meter using an average 12 kgal of water monthly. For comparison purposes, the impacts on very low-end to very high-end users are also shown. Due to rounding in the calculations, some values may not add to the penny.

Table 1-3: Residential Water Monthly Rate Impacts

Residential	Usage (kgal)	Current Bill	Proposed Bill	Difference
Low volume	5	$47.62	$42.28	-11.2%
Median	10	$63.97	$67.08	4.9%
Average	12	$71.75	$77.00	7.3%
Summer Avg.	17	$91.20	$104.71	14.8%
High	25	$126.17	$155.10	22.9%
Very high	40	$203.77	$252.90	24.1%

2. OVERVIEW

INTRODUCTION

In August 2015, City of Brentwood (City) engaged Raftelis Financial Consultants, Inc. (RFC) to conduct a cost of service rate study (Study) for the water utility to meet regulatory requirements and ensure that there is a recovery of costs proportionate to the service provided to its customers. This Report documents the resultant findings, analyses, and proposed changes.

The major objectives of the study include the following:

1. Ensure *Revenue Sufficiency* to meet the operation and maintenance (O&M) and capital needs of the City's water utility.
2. Address the water supply and water restriction use in the City.
3. Ensure that rates are *Fair and Equitable* and are based on *Cost of Service* guidelines used in the industry.
4. Plan for *Rate and Revenue Stability* to prevent rate spikes and provide for adequate operating and capital reserves and the overall financial health of the water utility under varying conditions.

This Report provides an overview of the Study and includes findings and recommendations for water rates.

ORGANIZATION OF THE REPORT

This Report includes four sections in addition to the Executive Summary and this Overview. A brief description of the remaining sections follows.

1. ***Section 3 – Water Rates*** describes the long-range financial plan for the water utility, findings and results of the water rate study, and a detailed discussion of the proposed water rates and the customer impacts resulting from the proposed rates. It also includes a description of the water system, the water cost of service methodology, the determination of annual revenues required from rates, and a detailed discussion on the Cost of Service, which includes allocation of costs to water parameters and the determination of unit costs, and water rates derivation.
2. ***Section 4 – Appendix A: Drought Surcharges*** includes the derivation of the drought surcharges at various levels of water conservation to recover the revenue shortfall that results from demand reduction during a drought or water shortage condition.
3. ***Section 5 – Appendix B*** provides larger, easier to read tables found in the body of the report and show the data and the various calculations conducted to derive the unit costs and rates. The original table number from the main body of the report is retained for easy reference.

3. WATER RATES

This section describes the long-range financial plan for the water utility, findings and results of the water rate study, and a detailed discussion of the proposed water rates and the customer impacts resulting from the proposed rates. It also includes a description of the water system, the water cost of service methodology, the determination of annual revenues required from rates, and a detailed discussion on the Cost of Service, which includes allocation of costs to water cost causation parameters and the determination of unit costs.

SYSTEM BACKGROUND

The water utility supplies potable water to over 17,500 customer accounts through 172 miles of transmission and distribution pipelines. Water is supplied through two main sources: local groundwater, from the City's groundwater wells, and surface water that originates from rivers within the Sierra mountain range and flows into the Delta. Surface water is treated at the City of Brentwood Water Treatment Plant (Brentwood TP) and the Randall Bold Water Treatment Plant (RBWTP). The cost of water supply has increased in the last several years due to continued years of drought, tightening water supplies and environmental and regulatory requirements.

On January 17, 2014, Governor Jerry Brown issued a drought state of emergency declaration in response to record-low water levels in California's rivers and reservoirs as well as an abnormally low snowpack. On April 1, 2015, Governor Brown issued an Executive Order calling for statewide mandatory water reductions of up to 25%. Additionally, on May 5, 2015, the State Water Resources Control Board approved regulations, based on Governor Brown's Executive Order, mandating the City to reduce its water consumption by 32% percent for June 2015 through February 2016 as compared to the same months in 2013.

ACCOUNT AND USAGE ASSUMPTIONS

Table 3-1 shows the estimated number of water accounts by meter size for fiscal year (FY) 2015 through FY 2018. RFC estimated the number of accounts by tabulating FY 2015 (actual) account data provided by the City and escalating the number of accounts by approximately 1.4 to 1.5 percent per year, to account for growth, based on City estimates. The number of accounts (meters) are used to forecast the amount of fixed revenue the City will receive from the meter service charge.

Table 3-1: Projected Water Accounts by Meter Size

Accounts Data	FY 2015	FY 2016	FY 2017	FY 2018
TOTAL REGULAR METERS				
5/8" or 3/4"	7,954	8,062	8,182	8,302
1"	9,729	9,861	10,008	10,154
1 1/2"	206	209	212	215
2"	385	390	396	402
3"	35	35	36	37
4"	32	32	33	33
6"	14	14	14	15
TOTAL REGULAR METERS	**18,355**	**18,605**	**18,882**	**19,158**

The revenue calculated for each of the fiscal years in the Financial Plan is a function of the number of meters, meter size, account growth, water use, and existing rates. Due to the current water shortage, the City has, like most water purveyors, realized reduced water use due to conservation. The rate study is designed to determine water rates for the next two years; thus the water usage projections are based on a "new normal" assumption for FY 2016 through FY 2018. The demand reductions related to the drought are projected separately in Appendix A. For purposes of this rate cycle, City staff has estimated that the "new normal" usage is the average of the water usage from FY 2013 through FY 2015, and remains constant for the planning period.

Water Use

Table 3-2 shows the projected water use for FY 2016 through FY 2018 by customer class. The projections are based on a "new normal" assumption for FY 2016 through FY 2018.

Table 3-2: Projected Water Use by Customer Class

Usage Data by Tier (KGAL)		FY 2015	FY 2016	FY 2017	FY 2018
Residential					
Tier 1	10	1,615,702	1,795,810	1,822,567	1,849,177
Tier 2	20	500,674	558,036	566,350	574,619
Tier 3	30	141,756	158,015	160,369	162,711
Tier 4	31+	68,693	76,575	77,716	78,851
Subtotal Residential		**2,326,825**	**2,588,436**	**2,627,003**	**2,665,358**
Non-Residential					
Tier 1	10	77,411	87,160	88,459	89,750
Tier 2	11+	524,264	612,407	621,532	630,606
Subtotal Non-Residential		**601,675**	**699,567**	**709,991**	**720,356**
Hydrant					
Tier 1	10	582	512	512	512
Tier 2	11+	21,479	18,882	18,882	18,882
Subtotal Hydrant		**22,061**	**19,393**	**19,393**	**19,393**
Non-Potable		355,093	431,105	437,525	443,909
TOTAL USAGE		**3,305,654**	**3,738,501**	**3,793,912**	**3,849,016**

INFLATIONARY AND OTHER ASSUMPTIONS

This section describes the assumptions used in projecting operating and capital expenses as well as reserve coverage requirements that determine the overall revenue adjustments required to ensure the financial stability of the City. Revenue adjustments represent the average increase in rates for the City as a whole, rate changes for individual classes will depend on the cost of service.

To ensure that future costs are reasonably projected, it is necessary to make informed assumptions about inflationary factors and water costs and use. O&M projections are based on the City's FY 2016 adopted budget and the City's projected budgetary increases in FY 2017 and FY 2018. The City uses different inflation factors for different expenditures within the budget. On average, the O&M costs are increasing at approximately 4.8 percent per year.

FINANCIAL PLAN

The assumptions shown above were incorporated into the Financial Plan. To develop the Financial Plan, RFC projected annual expenses and revenues, modeled reserve balances, capital expenditures and calculated debt service coverage ratios to estimate the amount of additional rate revenue needed per year. This section of the report provides a discussion of O&M expenses, the Capital

Improvement Plan (CIP), reserve funding, projected revenue under existing rates and the revenue adjustments needed to ensure the fiscal sustainability and solvency of the City.

Revenue Requirement

A utility's yearly revenue requirement is the amount of yearly revenue needed to operate, maintain and ensure fiscal solvency of the City. The revenue requirement includes O&M expenses, rate funded capital expenditures, debt service payments and reserve requirements (funding for reserves).

O&M Expenses

The City's FY 2016 O&M budget and projected O&M expenses are shown in **Table 3-3**. The Financial Plan study period is from FY 2016 to 2018. O&M expenses include the cost of purchased surface water, operating and maintaining groundwater wells, treatment, distribution facilities, meter reading and billing, and providing non-potable water service. **Table 3-3** summarizes the projected O&M expenses in two different ways: by function and by type of expenditures.

Table 3-3: Projected Water O&M Expenses

	Budgeted FY 2016	Projected FY 2017	Projected FY 2018
Supply (Surface Water)	$6,170,500	$6,340,076	$6,690,425
Production (Wells)	$1,959,429	$2,060,807	$2,155,852
Treatment	$1,453,588	$1,577,896	$1,663,424
Distribution	$3,580,299	$3,848,673	$4,067,082
Utility Billing	$2,110,207	$2,163,858	$2,217,801
Non-Potable	$548,406	$555,678	$574,046
TOTAL O&M EXPENSES	**$15,822,428**	**$16,546,988**	**$17,368,631**

	Budgeted FY 2016	Projected FY 2017	Projected FY 2018
Personnel Services	$4,091,326	$4,491,596	$4,795,344
Supplies and Services	$7,987,077	$8,150,422	$8,564,148
Other Supplies and Services	$2,208,614	$2,265,386	$2,323,411
Internal Service	$735,296	$759,681	$784,913
Capital Outlay	$251,709	$324,226	$326,768
Non-Potable	$548,406	$555,678	$574,046
TOTAL O&M EXPENSES	**$15,822,428**	**$16,546,988**	**$17,368,631**

Capital Improvement Plan

Table 3-4 shows the City's CIP, which totaled approximately $4.2 million. The projects will be funded through rates.

Table 3-4: Detailed Capital Improvement Plan – Inflated

		FY 2016	FY 2017	FY 2018
Fund #560 - Water				
56394	BWTP Maintenance and Capital Upgrades	$685,000	$0	$697,000
0	Corporation Yard Wash Pad	$6,062	$0	$0
56381	RBWTP Maintenance and Capital Upgrades	$169,000	$0	$298,000
0	Los Vaqueros capacity buy-in	$0	$0	$2,000,000
56395	Well Sites and Pump Stations Painting and Recoating	$30,000	$30,000	$0
56395	Reservoir Painting and Recoating	$0	$150,000	$150,000
Total Water Funds		**$890,062**	**$180,000**	**$3,145,000**

Debt Service

The City is not planning to issue any debt during this planning period. **Table 3-5** shows the existing debt service payments for the next three years. Debt service payments for the planning period range from $2.8 million to $4.4 million.

Table 3-5: Debt Service Payments

Fund 560 Only	FY 2016	FY 2017	FY 2018
Water Revenue Bonds Series 2008			
Principal	$987,500	$1,035,000	$1,090,750
Interest	$192,875	$125,125	$47,025
Total Debt Service	**$1,180,375**	**$1,160,125**	**$1,137,775**
Water Revenue Refunding Bonds Series 2014			
Principal	$0	$0	$1,306,346
Interest	$1,657,656	$1,676,906	$1,941,735
Total Debt Service	**$1,657,656**	**$1,676,906**	**$3,248,081**
TOTAL EXISTING DEBT SERVICE	**$2,838,031**	**$2,837,031**	**$4,385,856**

Proposed Financial Plan and Revenue Adjustments

The proposed revenue adjustments help ensure adequate revenue to fund operating expenses, capital expenditures and compliance with bond covenants. The Financial Plan model assumes the revenue adjustment occurs on June 1, 2016 and on July 1, 2017. The proposed revenue adjustments would enable the City to execute the CIP shown in **Table 3-4** and exceed its debt service coverage requirement of 125% over the study period.

Table 3-6 shows the proposed revenue adjustments for 2016 and 2017. These increases are needed to finance the operating and capital expenses and reserves funding.

Table 3-6: Proposed Rate Adjustments

Effective Date	Increases
June 2016	9%
July 2017	9%

Table 3-7 shows the cash flow detail over the next two years.

Table 3-7: Proposed Water Cash Flow

Potable Water		FY 2017	FY 2018
Revenue at Current Rates		$18,857,026	$19,131,241
Additional Revenue:			
Fiscal Year	**Revenue Adjustments**		
2016	9.0%	$1,697,132	$1,721,812
2017	0.0%	$0	$0
2018	9.0%		$1,876,775
Additional Rate Revenue		$1,697,132	$3,598,587
Total Rate Revenue		$20,554,158	$22,729,828
Current Services		$243,042	$253,357
Other Revenue		$257,243	$293,593
Standby Charges		$102,476	$101,451
Operating Transfers		$0	$0
Interest Income		$16,856	$22,941
TOTAL REVENUE		**$21,173,775**	**$23,401,170**
O&M Expenses			
Supply (Surface Water)		$6,340,076	$6,690,425
Production (Wells)		$2,060,807	$2,155,852
Treatment		$1,577,896	$1,663,424
Distribution		$3,848,673	$4,067,082
Utility Billing		$2,163,858	$2,217,801
Existing Debt Service		$2,837,031	$4,385,856
Proposed Debt Service		$0	$0
Rate Funded Capital Projects*		$166,000	$3,085,000
Reserve Funding		$159,913	$251,919
TOTAL EXPENSES		**$19,154,255**	**$24,517,359**
Net Cash Flow		**$2,019,520**	**($1,116,189)**

*Non-potable water is responsible for a portion of the capital costs, shown in Table 3-23. Potable capital costs, in addition to non-potable capital costs (as shown in Table 3-23), represent total Capital Improvement Plan, Table 3-4.

Table 3-8 shows the calculated debt coverage calculation. The City's debt service payments are split between the water rates fund and the facility fees fund. In order to calculate accurate debt coverage ratios, the total revenue, including the facilities fees revenue, is included as well as the total debt service payments. The City meets and exceeds debt coverage requirement of 125 percent during this planning period.

Table 3-8: Debt Coverage Calculation

Debt Coverage Calculation	FY 2017	FY 2018
Projected Facility Fees Revenue	$1,241,891	$1,373,770
Projected Non-Potable Revenue	$569,678	$634,046
Projected Water Revenue	$21,173,775	$23,401,170
Non-Potable O&M Expenses	$555,678	$574,046
Water O&M Expenses, less depreciation	$15,160,079	$15,948,353
Total Debt Service	$3,511,225	$5,060,050
Calculated Debt Coverage	207%	176%
Required Debt Coverage	125%	125%

Figures 3-1 through **3-4** display the FY 2016 through FY 2018 Financial Plan in graphical format. **Figure 3-1** shows the modeled revenue adjustments (blue bars) for the next three years on the left hand axis. Given the current drought situation, the City is implementing rates for FY 2016 and FY 2018. FY 2019 and beyond will be evaluated in the future when more water usage has been collected to project future water use more accurately. **Figure 3-1** also graphs the calculated and required debt coverage requirements as shown by the green and red lines respectively on the right hand axis.

Figure 3-1: Proposed Revenue Adjustments and Debt Coverage Ratio

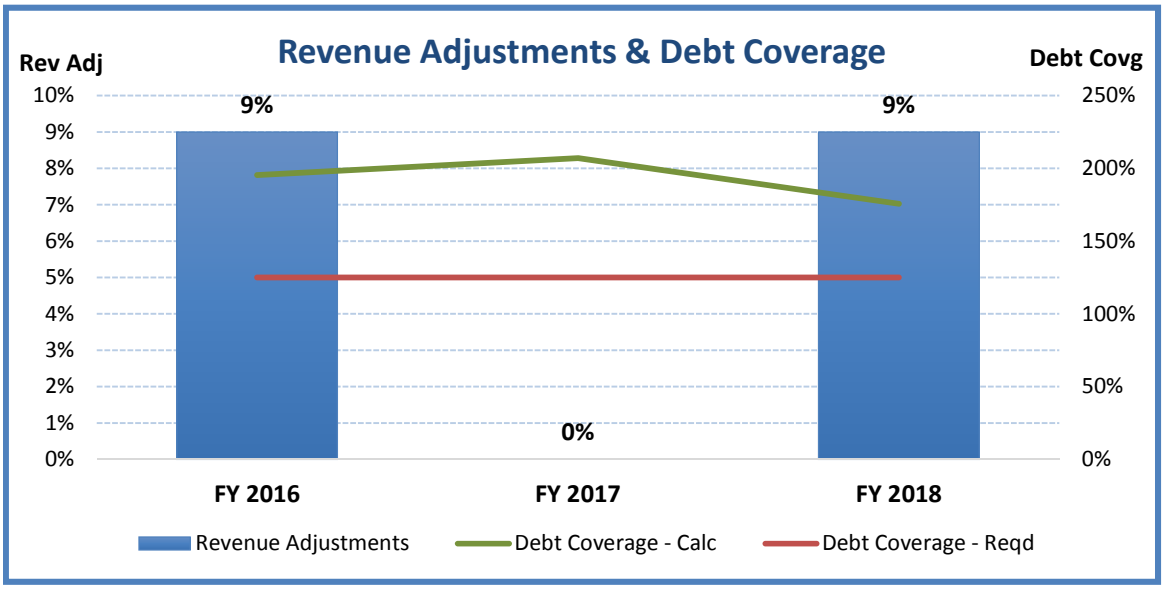


Figure 3-2 graphically illustrates the Financial Plan – it compares existing and proposed revenues with projected expenses. The expenses include water supply, O&M, debt service, capital costs, and reserves transfer are shown by the stacked bars; and total revenues at existing and proposed rates

are shown by the horizontal orange and blue lines, respectively. Current revenue from existing rates, in orange, does not meet future total expenses and clearly shows the need for revenue adjustments.

Figure 3-2: Proposed Potable Water Financial Plan

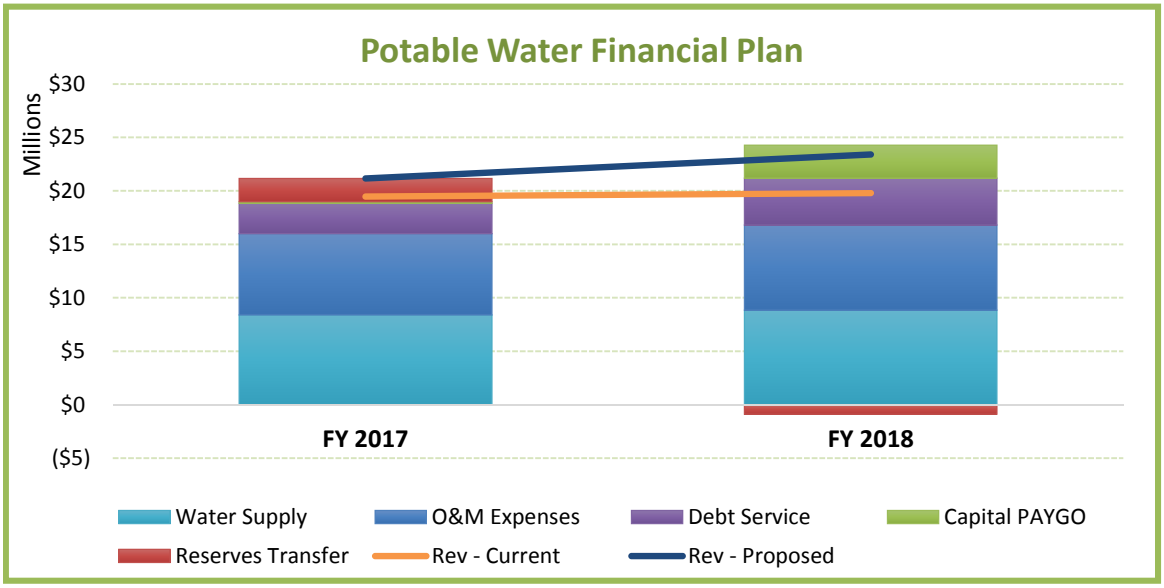


Figure 3-3 summarizes the projected CIP to be funded by water rates.

Figure 3-3: Projected CIP and Funding Sources

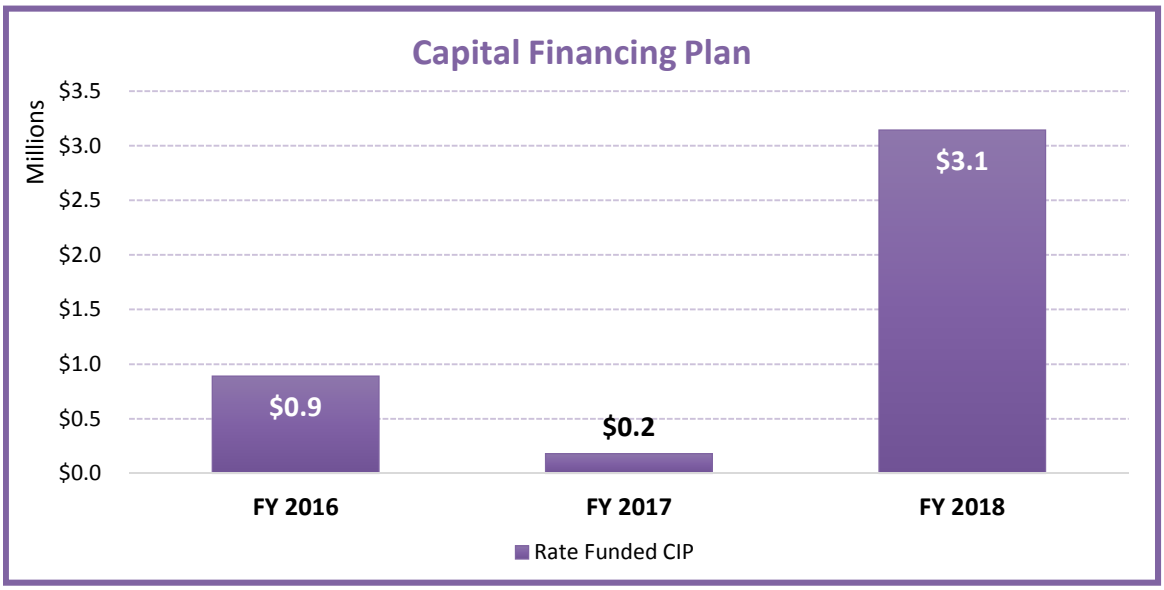


Figure 3-4 displays the resulting fund balance for the water utility. The red line represents the total current target, which equals to 30 percent of annual operating expenses and debt service payments. To reduce the impact to customers during the drought, the reserves targets will be met in the next rate cycle.

Figure 3-4: Total Cash Balance

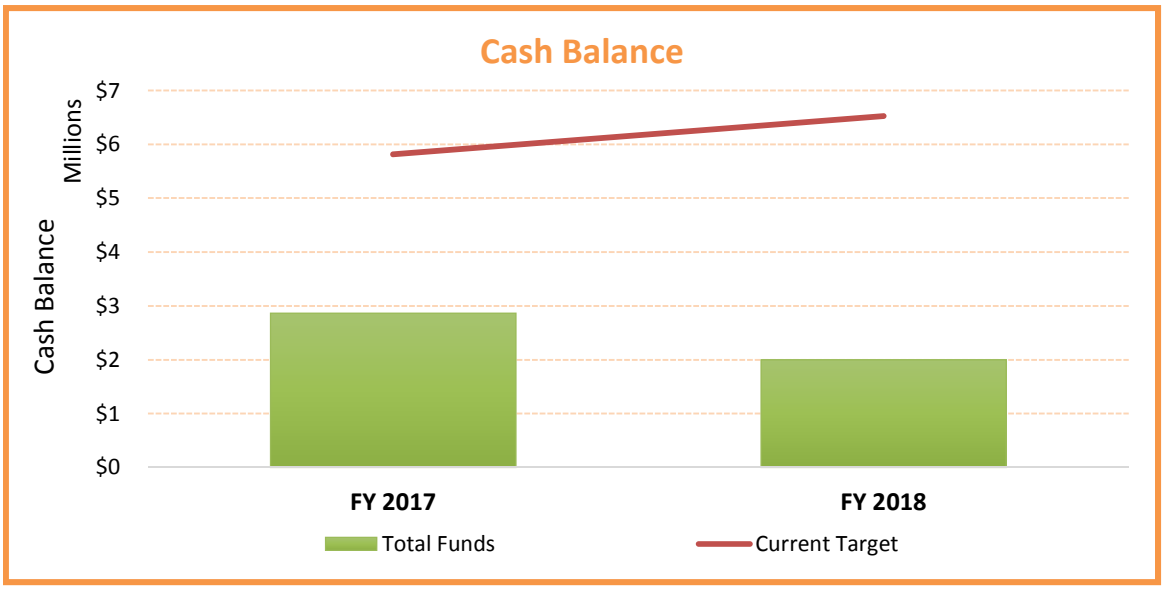


Table 3-9 shows the projected cash balance and the reserves target for each of the proposed reserves in the water utility. This table corresponds with **Figure 3-4**.

Table 3-9: Projected Cash Balance

Water Fund	FY 2017	FY 2018
Beginning Balance	$684,228	$2,863,661
Net Cash Flow	$2,019,520	($1,116,189)
Reserve Funding	$159,913	$251,919
Ending Balance	**$2,863,661**	**$1,999,391**
Interest Income	*$16,856*	*$22,941*
Current Reserve Target	$5,815,206	$6,526,346

COST-BASED RATE-SETTING METHODOLOGY

As stated in the American Water Works Association (AWWA) M1 Manual, "the costs of water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers." To develop utility rates that comply with Proposition 218 and industry standards while meeting other emerging goals and objectives of the utility, there are four major steps discussed below.

1) Calculate Revenue Requirement

The rate-making process starts by determining the test year revenue requirement - which for this study is FY 2017. The revenue requirement should sufficiently fund the utility's O&M, debt service, and capital expenses, and reserve funding.

2) Cost Of Service Analysis (COS)

The annual cost of providing water service is distributed among customer classes commensurate with their service requirements. A COS analysis involves the following:

1. Functionalizing costs. Examples of functions are supply, treatment, transmission, distribution, storage, meter servicing and customer billing and collection.
2. Allocating functionalized costs to cost causation components. Cost causation components include base delivery, maximum day, maximum hour[1], meter service, customer servicing and conservation costs.
3. Calculating cost to serve each customer class. Allocate cost causation components to customer demands to determine unit costs for each cost causation component and spread the unit costs to customer classes in proportion to their demands on the water system. This is described in the M1 Manual published by AWWA.

A COS analysis considers both the average quantity of water consumed (base delivery costs) and the peak rate at which it is consumed (peaking or capacity costs as identified by maximum day and maximum hour demands).[2] Peaking costs are costs that are incurred during peak times of consumption. The water system is designed to handle peak demands and additional costs are associated with designing, constructing, and operating and maintaining facilities to meet peak demands. The peak demand costs need to be allocated to those imposing such costs on the utility. In other words, not all customer classes share the same responsibility for peaking related costs.

3) Rate Design and Calculations

Rates do more than simply recover costs. Within the legal framework and industry standards, properly designed rates should support and optimize a blend of various utility objectives, such as conservation, affordability for essential needs and revenue stability among other objectives. Rates may also act as a public information tool in communicating these objectives to customers.

4) Rate Adoption

Rate adoption is the last step of the rate-making process to comply with Proposition 218. RFC documented the rate study results in this Study Report to help educate the public about the proposed changes, the rationale and justifications behind the changes and their anticipated financial impacts in lay terms.

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[1] *Collectively maximum day and maximum hour costs are known as peaking costs or capacity costs.*

[2] *System capacity is the system's ability to supply water to all delivery points at the time when demanded. It is measured by each customer's water demand at the time of greatest system demand. The time of greatest demand is known as peak demand. Both the operating costs and the capital asset related costs incurred to accommodate the peak flows are generally allocated to each customer class based upon the class's contribution to the peak event.*

COST OF SERVICE ANALYSIS

The principles and methodology of a cost of service analysis were described in the preceding section. A cost of service analysis distributes a utility's revenue requirements (costs) to each customer class. After determining a utility's revenue requirements, the next step in a cost of service analysis is to functionalize its O&M costs, based on the City's current O&M classification:

1. Supply (Surface Water) – represents the cost of purchasing surface water
2. Production (Wells) – represents the cost of producing water from groundwater wells
3. Treatment – represents the cost of treating the water
4. Distribution – represents the operating and maintenance cost of the water distribution system
5. Utility Billing – represents the costs associated with billing and customer service
6. Non-Potable – represents the cost of operating and maintaining the non-potable water system

The functionalization of costs allows us to better allocate the functionalized costs to the **cost causation components**. The cost causation components include:

1. Supply – costs that are associated with providing water supply to all customers
2. Base Delivery costs – costs that are associated with providing service under average conditions
3. Peaking costs (maximum day and maximum hour) – costs that are associated with meeting the peak demand in excess of the average rate of use
4. Fire protection – costs that are associated with providing fire protection capacity
5. Meter service – costs that are associated with maintenance and capital costs of meters and services
6. Billing and customer service – costs that are incurred to provide billing and customer service
7. General and administrative costs – costs that do not have any direct cost causation

Peaking costs are further divided into maximum day and maximum hour demand. The maximum day demand is the maximum amount of water used in a single day in a year. The maximum hour demand is the maximum usage in an hour on the maximum usage day. Different facilities, such as distribution and storage facilities (and the O&M costs associated with those facilities), are designed to meet the peaking demands of customers. Therefore, extra capacity[3] costs include the O&M and capital costs associated with meeting peak customer demand. This method is consistent with the AWWA M1 Manual, and is widely used in the water industry to perform cost of service analyses.

Allocation of Functionalized Expenses to Cost Components

[3] *The terms extra capacity, peaking and capacity costs are used interchangeably.*

After functionalizing expenses, the next step is to allocate the functionalized expenses to cost causation components. To do so we must identify system wide peaking factors which were provided by the City and are shown in **Table 3-10**. The system-wide peaking factors, provided by the City, are used to derive the cost component allocation bases (i.e., percentages) shown in **Table 3-10**. Functionalized expenses are then allocated to the cost components using these allocation bases. To understand the interpretation of the percentages, we must first establish the base use as the average daily demand during the year.

To determine the relative proportion of costs to assign to Base Delivery, Max Day and Max Hour, allocations are calculated based on these factors. Cost components that are solely Base Delivery related to provide average day demand (ADD), such as source of supply, are allocated 100 percent to Base Delivery. Cost components that are designed to meet Max Day peaks, such as reservoirs and transmission facilities, are allocated to Base Delivery and Max Day factors. Since facilities such as reservoirs and distribution systems are also designed to handle fire flow, an allocation is also provided for fire flow. The Max Day allocation is as follows:

Base Delivery:	43%	= (1.00/2.10)x100 – 5% (half the fire allocation)
Max Day:	47%	= (2.10-1.00)/2.10x100 – 5% (half the fire allocation)
Fire:	10%	

Cost components such as those related to the distribution system that are designed for Max Hour peaks are allocated similarly. The allocation of Max Hour facilities is shown below:

Base Delivery:	22%	= (1.00/4.00)x100 – 3.33% (1/3 fire allocation)
Max Day:	24%	= (2.10-1.00)/4.00x100 – 3.33% (1/3 fire allocation)
Max Hour:	44%	= (4.00-2.10)/4.00x100 – 3.33% (1/3 fire allocation)
Fire:	10%	

Collectively the maximum day and hour cost components are known as peaking costs. These allocation bases are used to assign the functionalized costs to the cost causation components.

Table 3-10: System-Wide Peaking Factors and Allocation to Cost Causation Components

	Factor	Base Delivery	Max Day	Max Hour	Fire
Base	1.00	100%	0%	0%	0%
Max Day	2.10	43%	47%	0%	10%
Max Hour	4.00	22%	24%	44%	10%
Average		32%	36%	22%	10%

Table 3-11 shows the derivation of the peaking factors by customer class and tier by dividing the total maximum monthly usage by the average monthly usage for each customer class and tier. These peaking factors are used to allocate the peaking costs to each customer class and tier in the rate derivation section.

Table 3-11: Peaking Factors by Customer Class

Customer Specific	Proposed Tiers	Max Monthly	Average Monthly	Peaking Factor
Residential		314,373	193,902	1.62
Tier 1	5	88,248	84,002	1.05
Tier 2	14	121,660	73,667	1.65
Tier 3	20	47,090	18,695	2.52
Tier 4	21+	57,375	17,537	3.27
Non-Residential		105,080	51,978	2.02
Tier 1	5	4,187	3,626	1.15
Tier 2	6+	100,893	48,352	2.09
Hydrant		7,501	1,838	4.08

To allocate meter-related costs appropriately, the concept of equivalent meters needs to be understood. By using equivalent meters instead of a straight meter count, the analysis accounts for the fact that larger meters impose larger demands and are more expensive to install, maintain, and replace than smaller meters and commit a greater capacity in the system. Equivalent meters are used in calculating meter service costs.

Equivalent meters are based on meter hydraulic capacity. Equivalent meters represent the potential demand on the water system in terms of the base or smallest meter size. A ratio of hydraulic capacity is calculated by dividing large meter capacities by the base meter capacity. The base meter is the smallest meter, in our case, a 3/4-inch meter. The actual number of meters by size is multiplied by the corresponding capacity ratio to calculate equivalent meters. The capacity ratio is calculated using the meter capacity in gallons per minute (gpm) provided in the AWWA M22 Manual. **Table 3-12** shows the equivalent meters for FY 2017.

Table 3-12: Equivalent Meters

Meter Size	Capacity (gpm)	Number of Meters	Equivalent Meters
5/8" or 3/4"	30	8,182	8,182
1"	50	10,008	16,680
1 1/2"	100	212	706
2"	160	396	2,112
3"	350	36	420
4"	630	33	691
6"	1,300	14	624
TOTAL		**18,882**	**29,417**

Table 3-13 allocates the O&M and capital expenses to each cost component. The functional costs are allocated according to industry standards based on the nature of the water function. For

example: water supply and production costs are allocated 100 percent to the Supply component. Treatment costs are allocated on the basis of Max Day. Distribution costs are allocated on the basis of Max Hour. Utility billing costs are allocated 100 percent to the Customer component. Some costs which cannot be readily classified into one of the functions are allocated to General and then spread amongst all the other cost causation components proportionate to the overall cost allocation.

Table 3-13 shows the total resulting cost causation component allocation for O&M expenses. This resulting allocation is used to allocate the City's operating revenue requirement to the cost causation components.

Table 3-13 also shows the total resulting allocation for the City's assets. The resulting total asset allocation is derived in a similar manner as the O&M allocation - first, RFC functionalized the City's assets and then allocated them to the cost causation components resulting in the asset total allocation shown at the bottom of **Table 3-13**.

Table 3-13: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Supply (Surface Water)	100%								100%
Production (Wells)	100%								100%
Treatment		48%	52%						100%
Distribution		22%	24%	44%	10%				100%
Utility Billing							100%		100%

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Supply (Surface Water)	$6,340,076	$0	$0	$0	$0	$0	$0	$0	$6,340,076
Production (Wells)	$2,060,807	$0	$0	$0	$0	$0	$0	$0	$2,060,807
Treatment	$0	$751,379	$826,517	$0	$0	$0	$0	$0	$1,577,896
Distribution	$0	$833,879	$930,096	$1,699,830	$384,867	$0	$0	$0	$3,848,673
Utility Billing	$0	$0	$0	$0	$0	$0	$2,163,858	$0	$2,163,858
TOTAL O&M EXPENSES	**$8,400,883**	**$1,585,258**	**$1,756,613**	**$1,699,830**	**$384,867**	**$0**	**$2,163,858**	**$0**	**$15,991,311**
% Allocation	53%	10%	11%	11%	2%	0%	14%	0%	100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Land								100%	100%
Well		100%							100%
Reservoir		43%	47%	0%	10%				100%
Distribution		22%	24%	44%	10%				100%
Transmission		43%	47%	0%	10%				100%
Buildings								100%	100%
Machinery & Equipment						100%			100%
Vehicles								100%	100%
Pumps		48%	52%						100%
Treatment Plant		48%	52%						100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Land	$0	$0	$0	$0	$0	$0	$0	$62,556	$62,556
Well	$0	$5,748,989	$0	$0	$0	$0	$0	$0	$5,748,989
Reservoir	$0	$5,259,657	$5,847,328	$0	$1,234,109	$0	$0	$0	$12,341,095
Distribution	$0	$11,802,296	$13,164,100	$24,058,527	$5,447,214	$0	$0	$0	$54,472,137
Transmission	$0	$0	$0	$0	$0	$0	$0	$0	$0
Buildings	$0	$0	$0	$0	$0	$0	$0	$819,421	$819,421
Machinery & Equipment	$0	$0	$0	$0	$0	$1,444,305	$0	$0	$1,444,305
Vehicles	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumps	$0	$1,370,190	$1,507,209	$0	$0	$0	$0	$0	$2,877,398
Treatment Plant	$0	$31,453,545	$34,598,899	$0	$0	$0	$0	$0	$66,052,444
TOTAL ASSETS	**$0**	**$55,634,676**	**$55,117,536**	**$24,058,527**	**$6,681,323**	**$1,444,305**	**$0**	**$881,977**	**$143,818,346**
% Allocation	0%	39%	38%	17%	5%	1%	0%	1%	100%

Revenue Requirement Determination

Table 3-14 shows the revenue requirement derivation with the total revenue required from rates. The totals shown in the "Operating" and "Capital" columns are the total O&M and capital revenue requirements, respectively, that are allocated to the cost causation components using the allocation percentages shown in **Table 3-13**.

RFC calculated the revenue requirement using FY 2017 expenses, which include O&M expenses, rate funded capital expenses and existing and proposed debt service. To arrive at the rate revenue requirement, we subtract revenue offsets from other expenses and make adjustments for annual cash balances. The adjustments, shown as negative values are subtracted (therefore added as a result of subtracting a negative number) to arrive at the total revenue requirement from rates. This is the amount that fixed charge and commodity rates are designed to collect.

Table 3-14: Revenue Requirement Determination

	FY 2017		
	Operating	**Capital**	**Total**
Revenue Requirements			
O&M Expenses	$15,991,311		$15,991,311
Existing Debt Service		$2,837,031	$2,837,031
Proposed Debt Service		$0	$0
Rate Funded Capital Projects		$166,000	$166,000
Reserve Funding		$159,913	$159,913
Total Revenue Requirements	**$15,991,311**	**$3,162,944**	**$19,154,255**
Less: Revenue Offsets			
Current Services	$243,042		$243,042
Other Revenue	$257,243		$257,243
Standby Charges		$102,476	$102,476
Operating Transfers	$0		$0
Interest Income	$16,856		$16,856
Total Revenue Offsets	**$517,141**	**$102,476**	**$619,617**
Less: Adjustments			
Adjustment for Cash Balance		($2,019,520)	($2,019,520)
Adjustment for Midyear Increase	$0		$0
Total Adjustments	**$0**	**($2,019,520)**	**($2,019,520)**
Revenue Requirement from Rates	**$15,474,170**	**$5,079,988**	**$20,554,158**

Unit Cost Component Derivation

Our end goal is to proportionately distribute the cost causation components to each user class. To do so we must calculate the cost causation component unit costs, which starts by assessing the total

units demanded by each class for each cost causation component. This is shown in **Table 3-15**. The capacity or peaking factor for each customer class is taken from **Table 3-11**. The total equivalent meters are from **Table 3-12**.

Table 3-15: Derivation of Cost Causation Component Units

				Maximum Day Requirements			Maximum Hour Requirements				
	Monthly Tiers (kgal)	Annual Use (kgal)	Average Daily Use (kgal/day)	Capacity Factor	Total Capacity (kgal/day)	Extra Capacity (kgal/day)	Capacity Factor	Total Capacity (kgal/day)	Extra Capacity (kgal/day)	No. of Meters (Equiv.)	No. of Bills (No.)
Residential											
Tier 1	5	1,135,528	3,111	1.05	3,267	156	2.00	6,222	2,955		
Tier 2	14	999,560	2,739	1.65	4,519	1,780	3.14	8,607	4,088		
Tier 3	20	253,830	695	2.52	1,752	1,057	4.80	3,338	1,586		
Tier 4	21+	238,086	652	3.27	2,133	1,481	6.23	4,063	1,930		
Non-Residential											
Tier 1	5	49,202	135	1.15	155	20	2.19	295	140		
Tier 2	6+	660,789	1,810	2.09	3,784	1,973	3.98	7,207	3,423		
Hydrant		19,393	53	4.08	217	164	7.77	413	196		
TOTAL		**3,356,387**				**6,631**			**14,319**	**29,417**	**226,582**

Table 3-16 shows the cost causation component unit cost derivation. The operating revenue requirement shown in **Table 3-14** is allocated to the cost causation components using the resulting O&M allocation from **Table 3-13**. Similarly the capital revenue requirement in **Table 3-14** is allocated to the cost causation components using the asset resulting allocation from **Table 3-13**. General and Administrative costs, which cannot be tied to a specific function, are redistributed in proportion to the resulting allocation of the other cost causation components, except Supply. The Fire cost component represents public fire protection costs and are reallocated to the meter component. To provide revenue stability a portion of the extra capacity costs are allocated to the meter component in order to collect approximately 30 percent of the rate revenue from fixed charges. The total adjusted cost of service is divided by the units of service to calculate the unit cost. For example, the unit cost for the base component is determined by dividing the total base cost by total water use in kgal, annual billing and customer service costs are divided by the estimated number of annual monthly bills. The unit costs are used to distribute the cost causation components to the customer classes. **Tables 3-15** through **3-17** are reproduced in Appendix B in a larger format.

Table 3-16: Unit Cost Calculation

	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Operating Expenses	$8,129,208	$1,533,993	$1,699,806	$1,644,860	$372,421	$0	$2,093,882	$0	$15,474,170
Capital Expenses	$0	$1,965,142	$1,946,876	$849,801	$235,999	$51,016	$0	$31,153	$5,079,988
Total Cost of Service	**$8,129,208**	**$3,499,135**	**$3,646,682**	**$2,494,661**	**$608,420**	**$51,016**	**$2,093,882**	**$31,153**	**$20,554,158**
Allocation of General Cost		$8,796	$9,166	$6,271	$1,529	$128	$5,263	($31,153)	$0
Allocation of Public Fire Protection Cost					($609,950)	$609,950			$0
Allocation of Peaking Cost to Meter			($2,193,509)	($1,500,559)		$3,694,068			$0
Total Adjusted Cost of Service	**$8,129,208**	**$3,507,930**	**$1,462,339**	**$1,000,373**	**$0**	**$4,355,162**	**$2,099,145**	**$0**	**$20,554,158**
Unit of Service	3,356,387	3,356,387	6,631	14,319		29,417	226,582		
Unit	kgal	kgal	kgal/day	kgal/day		equiv meters	bills		
Unit Cost	$2.42	$1.05	$220.55	$69.86		$12.34	$9.26		

Distribution of Cost Causation Components to Customer Classes

The final step in a cost of service analysis is to distribute the cost causation components to the user classes using the unit costs derived in **Table 3-16** to arrive at the cost to serve each customer class. **Table 3-17** shows the derivation of the cost to serve (i.e., cost of service for) each class. The Supply, Base Delivery, Max Day, and Max Hour cost components are collected through the commodity (volumetric) rates ($/kgal) for potable water. The Meter and Customer cost components are collected through the City's monthly meter service charges providing fixed revenue. The proposed fixed revenue from rates is approximately 30%, compared to the existing fixed revenue of approximately 35% and conversely the variable revenue increases from the current 65% to 70% providing for greater incentive for conservation. The California Urban Water Conservation Council recommends that no more than 30% of the rate revenue should be collected from fixed charges to ensure a strong conservation incentive through the commodity rates.

To derive the cost to serve each class, the unit costs from **Table 3-16** are multiplied by the units shown in **Table 3-15** for each customer class. For example, the supply costs for the SFR class is calculated by multiplying the supply unit cost ($2.42 per kgal) by the annual SFR use in each tier (**Table 3-15**). Similarly the *customer* costs are derived by multiplying the *customer* unit cost ($9.26 per bill) (**Table 3-17**) by the number of bills (226,582 bills) (**Table 3-15**). Similar calculations for each of the remaining user classes and tiers and cost components yield the total cost to serve each user class shown in **Table 3-17**. Note that the total cost of service is equal to the revenue requirement in **Table 3-14** as intended. We have now calculated the cost to serve each user class and can proceed to derive rates to collect the cost to serve each class.

Table 3-17: Allocation of Cost to Customer Class

	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Residential									
Tier 1	$2,750,261	$1,186,798	$34,306	$206,482					$4,177,847
Tier 2	$2,420,945	$1,044,690	$392,582	$285,619					$4,143,836
Tier 3	$614,780	$265,291	$233,128	$110,774					$1,223,974
Tier 4	$576,646	$248,835	$326,563	$134,827					$1,286,871
Non-Residential									
Tier 1	$119,167	$51,423	$4,459	$9,799					$184,848
Tier 2	$1,600,438	$690,624	$435,208	$239,169					$2,965,439
Hydrant	$46,971	$20,269	$36,092	$13,703					$117,035
Base Meters						$4,355,162	$2,099,145		$6,454,307
TOTAL	**$8,129,208**	**$3,507,930**	**$1,462,339**	**$1,000,373**	**$0**	**$4,355,162**	**$2,099,145**	**$0**	**$20,554,158**

RATE DERIVATION

Existing Rate Structure and Rates

The City's existing rate structure consists of a monthly base charge, which is a fixed charge determined on the basis of the size of the meter serving a property. In addition, the City has a four-tiered commodity rate structure for residential customers, and a two-tiered rate structure for non-residential customers. Non-potable water customers have a different uniform rate. **Table 3-18** shows the existing rate structure and rates.

Table 3-18: Existing Monthly Rate Structure and Rates

Monthly Base Rate		
Meter Size		
5/8" or 3/4"		$20.85
1"		$31.27
1 1/2"		$62.55
2"		$104.25
3"		$187.65
4"		$271.05
6"		$562.96
Commodity Rate ($/kgal)		
Residential	Monthly (kgal)	
Tier 1	10	$3.27
Tier 2	20	$3.89
Tier 3	30	$4.66
Tier 4	31+	$5.43
Non-Residential		
Tier 1	10	$3.27
Tier 2	11+	$3.89
Non-Potable		$1.20

Proposed Monthly Fixed Charge

Table 3-19 shows the derivation of the monthly base charge. The cost of service analysis derived in **Table 3-17** feeds into the meter charge derivation as the meter charge is designed to collect the amount of revenue shown in the "Meter" and "Customer" columns of **Table 3-19**.

Fixed Meter Charge Components

There are two components that comprise the fixed meter charges: meter capacity and customer service (or billing), both are described below. This charge recognizes the fact that even when a customer does not use any water, the City incurs fixed costs in connection with maintaining the ability or readiness to serve each connection.

Meter Capacity Component

The meter capacity component collects capacity (also known as peaking) related costs. Capacity related costs can be allocated to and collected through the meter service charge by meter size. This reflects the fact that larger meters have the potential to demand more capacity compared to smaller meters. The potential capacity demanded is proportional to the potential flow through each meter size as established by the AWWA hydraulic capacity ratios which are shown in the "Meter Ratio" column of **Table 3-19**. The ratios show the potential flow through each meter size compared to the

flow through a 3/4-inch meter. For example, the "Meter Ratio" column in **Table 3-19** shows that the flow through a 2-inch meter is 5.3 times that of a 3/4-inch and therefore the meter capacity component of the base charge is 5.3 times that of the 3/4-inch meter. The meter capacity component for a 3/4-inch meter is derived in the "Meter" column of **Table 3-19** and the capacity component for larger meters is scaled up using the AWWA capacity ratios shown in the "Meter Ratio" column of **Table 3-19**.

Allocating capacity costs by meter size is a common way to provide greater revenue stability, especially in light of decreasing revenues during a drought or other water shortage. Two drawbacks are that it creates higher bills for low volume water users and reduces incentives for conservation by reducing the commodity (or variable) rates. In the City's case, the fixed or meter portion of the revenue is decreasing so that there is greater incentive for conservation.

Customer/Billing Component

The customer/billing component recovers costs associated with meter reading, customer billing and collection as well as customer service costs. These costs are the same for all meter sizes as it costs the same to provide billing and customer services to a small meter as it does a larger meter. The customer/billing component is derived in the "Customer/Billing" column of **Table 3-19.**

Table 3-19: Derivation of the Monthly Base Charge

Meter Size	Meter Ratio	Meter	Customer/ Billing	Total Charges	Current Charges	Difference
5/8" or 3/4"	1.00	$12.34	$9.26	$21.61	$20.85	4%
1"	1.67	$20.56	$9.26	$29.83	$31.27	-5%
1 1/2"	3.33	$41.13	$9.26	$50.39	$62.55	-19%
2"	5.33	$65.80	$9.26	$75.07	$104.25	-28%
3"	11.67	$143.94	$9.26	$153.21	$187.65	-18%
4"	21.00	$259.09	$9.26	$268.36	$271.05	-1%
6"	43.33	$534.63	$9.26	$543.89	$562.96	-3%

Proposed Commodity Rates

Residential Tier Definitions

The City's current rate structure includes four tiers for residential customers. Tier 1 is from 0 to 10 kgal per month, Tier 2 is 11 to 20 kgal per month, Tier 3 is 21 to 30 kgal per month, and Tier 4 is 31 kgal per month or more. RFC is proposing new tiers for residential customers based upon the class' usage consumption patterns. The new proposed tiers are as follows:

- Tier 1: 0 to 5 kgal per month – this represents the amount of water available from the lowest cost water supply source equally to all customers.
- Tier 2: 6 to 14 kgal per month – this represents the FY 2013 and 2014 average monthly water usage for residential customers. This allocation provides sufficient water for an average residential customer.

- Tier 3: 15 to 20 kgal per month – this represents the FY 2013 and 2014 average summer water usage between June and September for residential customers. This allocation provides sufficient outdoor water for an average residential customer.
- Tier 4: Over 21 kgal per month

Non-Residential Tier Definitions

The City's current rate structure includes two tiers for non-residential customers. Tier 1 is from 0 to 10 kgal per month, Tier 2 is 11 kgal per month or more. RFC is proposing that the City retains the two tier structure. However, Tier 1 would be changed to 0 to 5 kgal per month, which is the same as residential Tier 1 since Tier 1 represents the amount of water available from the lowest cost water supply source.

Unit Cost Definitions

The commodity rates for each class and tier are derived by summing of the unit rates ($/kgal) for:

1. Supply
2. Base Delivery
3. Peaking

Supply costs are costs related to the cost of purchasing and producing water. The City has three sources of water, each incurring different costs, as shown in **Table 3-20**. Each source of supply is allocated to each customer class based on the proportional amount of water usage in each class. Within each customer class, each available supply is allocated to each tier based on the usage in each tier, with priority given to the lower tiers. For example, the residential class is allocated 1,004,650 kgal of groundwater, which is in turn allocated entirely to Tier 1 because it represents the most essential use. This principle applies to the Non-Residential customer class as well.

Table 3-20: Allocation of Water Supply

Sources	Groundwater	Brentwood TP	RBWTP	Total
Available Supply (kgal)	1,283,590	1,305,637	767,160	**3,356,387**
Cost	$1,249,317	$4,172,256	$2,707,635	**$8,129,208**
Unit Cost ($/kgal)	$0.97	$3.20	$3.53	**$2.42**

	Usage (kgal)	Groundwater	Brentwood TP	RBWTP	Total	Unit Cost
Residential	2,627,003	1,004,650	1,021,906	600,447	2,627,003	$2.42
Non-Residential	709,991	271,523	276,187	162,280	709,991	$2.42
Hydrant	19,393	7,417	7,544	4,433	19,393	$2.42
TOTAL	**3,356,387**	**1,283,590**	**1,305,637**	**767,160**	**3,356,387**	**$2.42**

	Usage (kgal)	Groundwater	Brentwood TP	RBWTP	Total	Unit Cost
Residential						
Tier 1	1,135,528	1,004,650	130,877	0	1,135,528	$1.23
Tier 2	999,560	0	891,029	108,531	999,560	$3.23
Tier 3	253,830	0	0	253,830	253,830	$3.53
Tier 4	238,086	0	0	238,086	238,086	$3.53
Subtotal Residential	**2,627,003**	**1,004,650**	**1,021,906**	**600,447**	**2,627,003**	**$2.42**
Non-Residential						
Tier 1	49,202	49,202	0	0	49,202	$0.97
Tier 2	660,789	222,322	276,187	162,280	660,789	$2.53
Subtotal Non-Residential	**709,991**	**271,523**	**276,187**	**162,280**	**709,991**	**$2.42**
Hydrant	19,393	7,417	7,544	4,433	19,393	$2.42
TOTAL	**3,356,387**	**1,283,590**	**1,305,637**	**767,160**	**3,356,387**	**$2.42**

Base Delivery costs are the operating and capital costs associated with delivering water to all customers at a constant average rate of use – also known as serving customers under average daily demand conditions. Therefore base delivery costs are spread over all units of water irrespective of customer class or tiers. Based on **Table 3-16**, the delivery or base unit cost is $1.05 per kgal.

Peaking costs, or extra-capacity costs, represent costs incurred to meet customer peak demands in excess of a base use (or average daily demand). Total extra capacity costs are comprised of maximum day and maximum hour demands. The peaking costs are distributed to each tier and class using peaking factors derived from customer use data. **Table 3-21** shows the peaking unit cost for each customer class and tier, which is calculated by dividing the total peaking costs for each class and tier, from **Table 3-17**, by the total usage in each class and tier, from **Table 3-15**.

Table 3-21: Peaking Cost Calculation

Customer Class	Monthly Tier (kgal)	Peaking Costs	Usage (kgal)	Unit Cost
Residential				
Tier 1	5	$240,788	1,135,528	$0.21
Tier 2	14	$678,201	999,560	$0.68
Tier 3	20	$343,903	253,830	$1.35
Tier 4	21+	$461,390	238,086	$1.94
Non-Residential				
Tier 1	5	$14,258	49,202	$0.29
Tier 2	6+	$674,377	660,789	$1.02
Hydrant		$49,795	19,393	$2.57

Table 3-22 shows the proposed commodity rate, which makes up of the three previously discussed rate component, for each customer class. The Supply component is from **Table 3-20**; the Delivery component is from **Table 3-16**; and the Peaking component is from **Table 3-21**. The non-potable water rate is based on the calculation shown in **Table 3-23**.

Table 3-22: Proposed Commodity Rates

Customer Class	Monthly Tier (kgal)	Supply	Delivery	Peaking	Total Rate
Residential					
Tier 1	5	$1.23	$1.05	$0.21	**$2.49**
Tier 2	14	$3.23	$1.05	$0.68	**$4.96**
Tier 3	20	$3.53	$1.05	$1.35	**$5.93**
Tier 4	21+	$3.53	$1.05	$1.94	**$6.52**
Subtotal Residential					
Non-Residential					
Tier 1	5	$0.97	$1.05	$0.29	**$2.31**
Tier 2	6+	$2.53	$1.05	$1.02	**$4.60**
Subtotal Non-Residential					
Hydrant		$2.42	$1.05	$2.57	**$6.04**
Non-Potable					**$1.31**

Non-Potable Water

Non-potable water rates are calculated to recover costs associated providing non-potable water service. **Table 3-23** shows the calculation for the City's retail non-potable water customers.

Table 3-23: Non-Potable Water Rate Calculation

Non-Potable Water	FY 2016	FY 2017	FY 2018
O&M Expenses	$548,406	$555,678	$574,046
Capital Expenses	$12,500	$14,000	$60,000
Total Expenses	**$560,906**	**$569,678**	**$634,046**
Non-Potable Usage	431,105	437,525	443,909
Non-Potable Rate ($/kgal)	$1.31	$1.31	$1.43

Table 3-24 shows the proposed rates for the next two years. These rates are effective in June 1, 2016 and in July 1, 2017. The City reserves the right to pass through costs that are not within the City's control, such as water purchased costs, electrical costs, chemical costs etc. to the proposed rates when such an action is deemed necessary. The financial plan has built in projected increases in these costs. However, in the event that those increases exceed the projected amount, the Council may decide to pass through the increase to the customers.

Table 3-24: Proposed Monthly Water Rates

		June 1, 2016	July 1, 2017
Monthly Base Rate			
Meter Size			
5/8" or 3/4"		$21.61	$23.56
1"		$29.83	$32.52
1 1/2"		$50.39	$54.93
2"		$75.07	$81.83
3"		$153.21	$167.00
4"		$268.36	$292.65
6"		$543.89	$592.85
Commodity Rate ($/kgal)			
Residential	Monthly (kgal)		
Tier 1	5	$2.49	$2.72
Tier 2	14	$4.96	$5.41
Tier 3	20	$5.93	$6.47
Tier 4	21+	$6.52	$7.11
Non-Residential			
Tier 1	5	$2.31	$2.52
Tier 2	6+	$4.60	$5.02
Hydrant		$6.04	$6.59
Non-Potable		$1.31	$1.43

BILL IMPACTS

Table 3-25 shows the impacts of an average residential customer with a 1-inch meter using an average 12 kgal of water monthly. For comparison purposes, the impacts on very low-end to very high-end users are also shown. Due to rounding in the calculations, some values may not add to the penny.

Table 3-25: Residential Water Monthly Rate Impacts

Residential	Usage (kgal)	Current Bill	Proposed Bill	Difference
Low volume	5	$47.62	$42.28	-11.2%
Median	10	$63.97	$67.08	4.9%
Average	12	$71.75	$77.00	7.3%
Summer Avg.	17	$91.20	$104.71	14.8%
High	25	$126.17	$155.10	22.9%
Very high	40	$203.77	$252.90	24.1%

4. APPENDIX A: DROUGHT SURCHARGES

As part of the Study, RFC calculated the demand reduction surcharges to recover the revenue shortfall that occurs as a result of demand reduction during water shortage situations. According to the City's Water Shortage Contingency Plan, the City has four levels of water supply shortage. Stage 1 Water Supply Shortage calls for a demand reduction of up to 10 percent; Stage 2 calls for a reduction of up to 20 percent; Stage 3 Water Supply Shortage calls for demand reduction of up to 35 percent and Stage 4 up to 50 percent. Since Stage 1 is considered a minor drought and can be met with irrigation usage restrictions, RFC recommends that drought surcharges be implemented for Stages 2 to 4 only.

A Drought Surcharge may be imposed by the Brentwood City Council during times of a declared drought when the City Council has implemented a Stage 2, 3, or 4 water shortage. The Drought Surcharges correspond to increasingly severe stages of mandated conservation and reduced water usage. Drought Surcharges are charged on each unit of water used and are calculated to recover costs resulting from loss of revenue due to less water being used, funding of conservation programs such as landscape conversion incentives and the free Recycled Water Fill Station, among other drought-related customer service activities. The amount of the temporary Drought Surcharge for each Stage is based upon the City's projected revenue shortfall and cost increases associated with that Stage. A Drought Surcharge could only be implemented while there is a declared Drought Stage, and the City Council would always retain the discretion not to implement a Drought Surcharge as well as the discretion to end a Drought Surcharge, even while a declared Drought Stage continued, based upon projected water usage reductions, revenue losses, and expenses.

To determine the demand reduction surcharges, the first step is to project the water demand reduction for each customer class under each level of shortage. **Table 4-1** shows the projected water demand for each customer class and tier at each level of reduction. RFC analyzed individual customer usage data, assuming that customers using more water are expected to reduce more since they have more discretionary water use. Overall, in our analysis, the City is projected to reduce its total water usage by 19 percent in Stage 2, 32 percent in Stage 3, and 46 percent in Stage 4. The projected demand reduction under each Stage is based on the "new normal" water usage in FY 2017 which represents a reduction of approximately 4.4 percent.

Table 4-1: Projected Water Demand by Stage

Usage Data (kgal)	Monthly Tier	Proposed Rates	FY 2017	% Reduction	Stage 2 - up to 20%	% Reduction	Stage 3 - up to 35%	% Reduction	Stage 4 - up to 50%
Residential									
Tier 1	5	$2.49	1,135,528	0%	1,135,528	-3%	1,098,030	-6%	1,064,563
Tier 2	14	$4.96	999,560	-17%	831,514	-35%	652,011	-61%	390,587
Tier 3	20	$5.93	253,830	-54%	115,841	-81%	47,638	-97%	6,843
Tier 4	21+	$6.52	238,086	-73%	63,518	-91%	22,478	-99%	3,421
Subtotal Residential			**2,627,003**	**-18%**	**2,146,401**	**-31%**	**1,820,157**	**-44%**	**1,465,414**
Non-Residential									
Tier 1	5	$2.31	49,202	0%	49,202	0%	49,202	-1%	48,762
Tier 2	6+	$4.60	660,789	-25%	493,222	-39%	402,309	-56%	287,641
Subtotal Non-Residential			**709,991**	**-24%**	**542,424**	**-36%**	**451,510**	**-53%**	**336,403**
Hydrant		$6.04	19,393	0%	19,393	0%	19,393	0%	19,393
Total Potable Water			**3,356,387**		**2,708,218**		**2,291,061**		**1,821,210**
% Total Reduction					-19%		-32%		-46%

The next step is to estimate the water supply cost savings that result when there is a reduction in demand. The City purchases a significant amount of surface water. Thus, as demand reduces, the City will be able to purchase less water, which in turn would reduce the water supply costs. Almost all other costs are fixed and will not vary based on water demand. **Table 4-2** shows the estimated cost savings in the water supply costs for each Stage due to the reduction in usage. The total supply assumes a five percent water loss from the water usage shown in **Table 4-1**. Since the Randall-Bold Treatment Plant has a minimum water purchase of 1,864 AF, it is kept the same for all Stages. The Surface Water supply purchases are estimated based on the variable portion of water purchase costs per existing agreement with Contra Costa Water District. The groundwater source makes up the remainder of the required water supply for each Stage.

For each water supply source, there are some fixed costs, which do not vary by the amount of water purchased, within the water purchase costs, as shown in the middle section of **Table 4-2**. This fixed cost remains the same for all Stages. The variable unit cost for each source is assumed to remain the same in each Stage. Since the amount of water purchased or produced decreases in each Stage, the total variable cost decreases. This resulted in a cost saving, shown in the last line of **Table 4-2**, for each Stage as compared to the normal year cost.

Table 4-2: Estimated Cost Savings by Stage

	FY 2017	Stage 2 - up to 20%	Stage 3 - up to 35%	Stage 4 - up to 50%
SUPPLY (AF)				
Groundwater Wells	4,136	3,363	2,719	2,005
CCWD Randall-Bold Treatment Plant	2,472	1,864	1,864	1,864
Surface Water	4,207	3,500	2,800	2,000
Total Potable Supply	**10,815**	**8,727**	**7,383**	**5,869**
FIXED COST ($/AF)				
Groundwater Wells	$0			
CCWD Randall-Bold Treatment Plant	$1,095			
Surface Water	$555			
TOTAL FIXED COSTS	**$5,044,099**	**$5,044,099**	**$5,044,099**	**$5,044,099**
VARIABLE COST ($/AF)				
Groundwater Wells	$302	$302	$302	$302
CCWD Randall-Bold Treatment Plant	$0	$0	$0	$0
Surface Water	$436	$436	$436	$436
TOTAL VARIABLE COSTS	**$3,085,110**	**$2,542,930**	**$2,042,903**	**$1,478,160**
TOTAL WATER SUPPLY COSTS	**$8,129,208**	**$7,587,029**	**$7,087,002**	**$6,522,259**
Cost Savings		$542,179	$1,042,207	$1,606,950

The final step is to calculate the drought surcharges, shown in **Table 4-3**. First, the projected potable water revenue is calculated by multiplying the demand projections from **Table 4-1** for each Stage and the proposed water rates in FY 2017. The revenue shortfall is determined by comparing this revenue for each Stage with the FY 2017 revenues. Next, we add the estimated cost savings from **Table 4-2**. The City also incurs some drought related expenses relating to water conservation programs such as conversion incentives and the Recycled Water Fill Station in addition to customer service costs. The drought related expenses are estimated at $700,000. The sum these three components: revenue shortfall, cost savings, and drought related expenses, result in the net revenue shortfall to be recovered in each Stage. The total shortfall is divided by the projected demand in each Stage to arrive at a uniform dollar increase per unit of water for each Stage. This means that in Stage 2, all customers will pay an additional $1.38 per kgal of water consumption. **Table 4-3** shows the proposed surcharges that will be effective June 1, 2016 and July 1, 2017. The July 2017 surcharges represent a nine percent increase over the June 2016 surcharges, consistent with the revenue demand and rates schedule shown in **Table 3-24**.

Table 4-3: Drought Surcharge by Stage

	FY 2017	Stage 2 - up to 20%	Stage 3 - up to 35%	Stage 4 - up to 50%
Projected Potable Revenue	**$14,113,233**	**$10,552,463**	**$8,478,531**	**$6,203,882**
Revenue Shortfall		($3,560,770)	($5,634,701)	($7,909,351)
Cost Savings		$542,179	$1,042,207	$1,606,950
Net Drought Related Expenses		($700,000)	($700,000)	($700,000)
Net Revenue Shortfall to be Recovered		**($3,718,591)**	**($5,292,495)**	**($7,002,401)**
$ Increase per unit - June 1, 2016		$1.38	$2.32	$3.85
$ Increase per unit - July 1, 2017		$1.50	$2.53	$4.20

5. APPENDIX B

Table 3-13: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Supply (Surface Water)	100%								100%
Production (Wells)	100%								100%
Treatment		48%	52%						100%
Distribution		22%	24%	44%	10%				100%
Utility Billing							100%		100%

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Supply (Surface Water)	$6,340,076	$0	$0	$0	$0	$0	$0	$0	$6,340,076
Production (Wells)	$2,060,807	$0	$0	$0	$0	$0	$0	$0	$2,060,807
Treatment	$0	$751,379	$826,517	$0	$0	$0	$0	$0	$1,577,896
Distribution	$0	$833,879	$930,096	$1,699,830	$384,867	$0	$0	$0	$3,848,673
Utility Billing	$0	$0	$0	$0	$0	$0	$2,163,858	$0	$2,163,858
TOTAL O&M EXPENSES	**$8,400,883**	**$1,585,258**	**$1,756,613**	**$1,699,830**	**$384,867**	**$0**	**$2,163,858**	**$0**	**$15,991,311**
% Allocation	53%	10%	11%	11%	2%	0%	14%	0%	100%

Table 3-13: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components (cont'd)

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Land								100%	100%
Well		100%							100%
Reservoir		43%	47%	0%	10%				100%
Distribution		22%	24%	44%	10%				100%
Transmission		43%	47%	0%	10%				100%
Buildings								100%	100%
Machinery & Equipment						100%			100%
Vehicles								100%	100%
Pumps		48%	52%						100%
Treatment Plant		48%	52%						100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Land	$0	$0	$0	$0	$0	$0	$0	$62,556	$62,556
Well	$0	$5,748,989	$0	$0	$0	$0	$0	$0	$5,748,989
Reservoir	$0	$5,259,657	$5,847,328	$0	$1,234,109	$0	$0	$0	$12,341,095
Distribution	$0	$11,802,296	$13,164,100	$24,058,527	$5,447,214	$0	$0	$0	$54,472,137
Transmission	$0	$0	$0	$0	$0	$0	$0	$0	$0
Buildings	$0	$0	$0	$0	$0	$0	$0	$819,421	$819,421
Machinery & Equipment	$0	$0	$0	$0	$0	$1,444,305	$0	$0	$1,444,305
Vehicles	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumps	$0	$1,370,190	$1,507,209	$0	$0	$0	$0	$0	$2,877,398
Treatment Plant	$0	$31,453,545	$34,598,899	$0	$0	$0	$0	$0	$66,052,444
TOTAL ASSETS	**$0**	**$55,634,676**	**$55,117,536**	**$24,058,527**	**$6,681,323**	**$1,444,305**	**$0**	**$881,977**	**$143,818,346**
% Allocation	0%	39%	38%	17%	5%	1%	0%	1%	100%

Table 3-15: Derivation of Cost Component Units

	Monthly Tiers (kgal)	Annual Use (kgal)	Average Daily Use (kgal/day)	Maximum Day Requirements Capacity Factor	Maximum Day Requirements Total Capacity (kgal/day)	Maximum Day Requirements Extra Capacity (kgal/day)	Maximum Hour Requirements Capacity Factor	Maximum Hour Requirements Total Capacity (kgal/day)	Maximum Hour Requirements Extra Capacity (kgal/day)	No. of Meters (Equiv.)	No. of Bills (No.)
Residential											
Tier 1	5	1,135,528	3,111	1.05	3,267	156	2.00	6,222	2,955		
Tier 2	14	999,560	2,739	1.65	4,519	1,780	3.14	8,607	4,088		
Tier 3	20	253,830	695	2.52	1,752	1,057	4.80	3,338	1,586		
Tier 4	21+	238,086	652	3.27	2,133	1,481	6.23	4,063	1,930		
Non-Residential											
Tier 1	5	49,202	135	1.15	155	20	2.19	295	140		
Tier 2	6+	660,789	1,810	2.09	3,784	1,973	3.98	7,207	3,423		
Hydrant		19,393	53	4.08	217	164	7.77	413	196		
TOTAL		**3,356,387**				**6,631**			**14,319**	**29,417**	**226,582**

Table 3-16: Unit Cost Calculation

	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Operating Expenses	$8,129,208	$1,533,993	$1,699,806	$1,644,860	$372,421	$0	$2,093,882	$0	$15,474,170
Capital Expenses	$0	$1,965,142	$1,946,876	$849,801	$235,999	$51,016	$0	$31,153	$5,079,988
Total Cost of Service	**$8,129,208**	**$3,499,135**	**$3,646,682**	**$2,494,661**	**$608,420**	**$51,016**	**$2,093,882**	**$31,153**	**$20,554,158**
Allocation of General Cost		$8,796	$9,166	$6,271	$1,529	$128	$5,263	($31,153)	$0
Allocation of Public Fire Protection Cost					($609,950)	$609,950			$0
Allocation of Peaking Cost to Meter			($2,193,509)	($1,500,559)		$3,694,068			$0
Total Adjusted Cost of Service	**$8,129,208**	**$3,507,930**	**$1,462,339**	**$1,000,373**	**$0**	**$4,355,162**	**$2,099,145**	**$0**	**$20,554,158**
Unit of Service	3,356,387	3,356,387	6,631	14,319		29,417	226,582		
Unit	kgal	kgal	kgal/day	kgal/day		equiv meters	bills		
Unit Cost	$2.42	$1.05	$220.55	$69.86		$12.34	$9.26		

Table 3-17: Allocation of Cost to Customer Class

	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Residential									
Tier 1	$2,750,261	$1,186,798	$34,306	$206,482					$4,177,847
Tier 2	$2,420,945	$1,044,690	$392,582	$285,619					$4,143,836
Tier 3	$614,780	$265,291	$233,128	$110,774					$1,223,974
Tier 4	$576,646	$248,835	$326,563	$134,827					$1,286,871
Non-Residential									
Tier 1	$119,167	$51,423	$4,459	$9,799					$184,848
Tier 2	$1,600,438	$690,624	$435,208	$239,169					$2,965,439
Hydrant	$46,971	$20,269	$36,092	$13,703					$117,035
Base Meters						$4,355,162	$2,099,145		$6,454,307
TOTAL	**$8,129,208**	**$3,507,930**	**$1,462,339**	**$1,000,373**	**$0**	**$4,355,162**	**$2,099,145**	**$0**	**$20,554,158**

Table 4-1: Projected Water Demand by Stage

Usage Data (kgal)	Monthly Tier	Proposed Rates	FY 2017	% Reduction	Stage 2 - up to 20%	% Reduction	Stage 3 - up to 35%	% Reduction	Stage 4 - up to 50%
Residential									
Tier 1	5	$2.49	1,135,528	0%	1,135,528	-3%	1,098,030	-6%	1,064,563
Tier 2	14	$4.96	999,560	-17%	831,514	-35%	652,011	-61%	390,587
Tier 3	20	$5.93	253,830	-54%	115,841	-81%	47,638	-97%	6,843
Tier 4	21+	$6.52	238,086	-73%	63,518	-91%	22,478	-99%	3,421
Subtotal Residential			**2,627,003**	**-18%**	**2,146,401**	**-31%**	**1,820,157**	**-44%**	**1,465,414**
Non-Residential									
Tier 1	5	$2.31	49,202	0%	49,202	0%	49,202	-1%	48,762
Tier 2	6+	$4.60	660,789	-25%	493,222	-39%	402,309	-56%	287,641
Subtotal Non-Residential			**709,991**	**-24%**	**542,424**	**-36%**	**451,510**	**-53%**	**336,403**
Hydrant		$6.04	19,393	0%	19,393	0%	19,393	0%	19,393
Total Potable Water			**3,356,387**		**2,708,218**		**2,291,061**		**1,821,210**
% Total Reduction					-19%		-32%		-46%