LONG BEACH
WATER DEPARTMENT

COST OF SERVICE AND RATE STUDY

Final Report / February 1, 2017

Long Beach Water

RAFTELIS
FINANCIAL CONSULTANTS, INC.

RAFTELIS
FINANCIAL CONSULTANTS, INC.

445 S. Figueroa Street
Suite 2270
Los Angeles, CA 90071

Phone 213 . 262 . 9300
Fax 213 . 262 . 9303

www.raftelis.com

February 1, 2017

Mr. Anatole Falagan
Assistant General Manager
Long Beach Water Department
1800 E. Wardlow Rd.
Long Beach, CA 90807 – 4994

Subject: Long Beach Water Department – Cost of Service and Rate Study Report

Dear Mr. Falagan,

Raftelis Financial Consultants, Inc. (RFC) is pleased to provide this Cost of Service and Rate Study Report (Report) for the Long Beach Water Department (LBWD or Department) to develop water, recycled water and sewer rates that are equitable and compliant with Proposition 218. In particular, this Report contains the following:

- Legal framework surrounding Proposition 218, particularly with respect to potable water and recycled water and sewer rates.
- Revisions to water rate structure.
- Recommended policy revisions.
- Cost of service analysis and development of water, recycled water and sewer rates that meet the Proposition 218 requirements.

The Report summarizes the key findings and results related to the revision of the water rate structure, development of water, recycled water and sewer rates and customer impact analyses for proposed rates.

It has been a pleasure working with you, and we thank you and the Department staff for the support provided during the course of this study.

Sincerely,
RAFTELIS FINANCIAL CONSULTANTS, INC.

Sanjay Gaur
Vice President

Khanh Phan
Senior Consultant

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GLOSSARY

Terms	Descriptions
AF	Acre foot / Acre feet
AWWA	American Water Works Association
CCF	Centum Cubic Feet = 100 cubic feet = 748 gallons
COS	Cost of Service
EFU	Equivalent Fire Unit
EMU	Equivalent Meter Unit
FY	Fiscal Year (October 1 - September 30)
GPCD	Gallons per capita per day
GPM	Gallons per minute
LBWD	Long Beach Water Department
LCC	Lakewood Country Club
LOC	Line of Credit
LW	Water supply from Lakewood
M1 Manual	*Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1, 6th edition* published by AWWA
MD	Max Day Peaking Factor
MFR	Multi-Family Residential
MGD	Million Gallons per Day
MH	Max Hour Peaking Factor
MWD	Metropolitan Water District of Southern California
O&M	Operations and Maintenance
RFC	Raftelis Financial Consultants, Inc.
RW	Recycled Water
SFR	Single Family Residential
WRD	Water Replenishment District of Southern California

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EXECUTIVE SUMMARY

1.1 - BACKGROUND OF THE STUDY

The Long Beach Water Department (LBWD or Department) maintains a system of water, sewer, and recycled water infrastructure that provides services to nearly 470,000 Long Beach residents. LBWD receives its potable water supply from two main sources: groundwater produced from the Central Groundwater Basin, regulated by the Water Replenishment District of Southern California (WRD) and purchases from the Metropolitan Water District of Southern California (MWD).

The current water and sewer rates were developed in a previous Rate Study conducted in March 1996 and updated annually across the board to account for rising operating and capital costs. Government Code 54999.7(c) requires that water and wastewater agencies must conduct a cost of service study a minimum of every 10 years. In early 2016, LBWD engaged Raftelis Financial Consultants (RFC) to conduct a Cost of Service and Rate Design for its Water and Sewer services.

The major objectives of the Study include the following:

1. Conduct cost of service analyses for Water, Recycled Water and Sewer services
2. Design an alternative rate structure to better align water supply costs with rates, and more equitably recover costs from customers
3. Conduct a sensitivity and impact analysis on proposed rates
4. Develop an administrative record that demonstrates nexus between LBWD's costs and rates to meet the requirements of Proposition 218.

This Cost of Service and Rate Design Report (Report) summarizes the key findings and results related to the revision of the water rate structure, development of water, recycled water and sewer rates and customer impact analyses for proposed rates.

1.2 - REVISION TO WATER RATE STRUCTURE AND OTHER POLICY RECOMMENDATIONS

RFC conducted a pricing objectives exercise wherein LBWD executive management ranked a number of pricing objectives. The top 10 pricing objectives are used as guiding principles for this Study.[1] Table 1-1 shows the proposed water rate structure, developed based on the pricing objectives and discussion with LBWD staff and the Board of Water Commission. Residential customers will maintain a 3-tier inclining rate structure, with tier definitions revised to better align with water supply availabilities. Non-residential use for both potable and recycled water

[1] *See Section 4 for details*

Table 1-1: Proposed Water Rate Structures

Customer Class	Current Rate Structure	Proposed to Evaluate	Why?
Residential (RES)	Inclining Tier	Revised Inclining 3-Tier	Current rate structure achieves the pricing objectives of the City
Irrigation (IRR)	Uniform	Uniform	Use water budget information to develop programs for customers
Industrial / Commercial	Uniform	Uniform	Programs are more effective in promoting conservation than pricing
Recycled Water (RW)	Uniform	Uniform	Use water budget information to develop programs for customers

Table 1-2: Proposed Residential Water Tier Definitions

	Current Tiers	Revised Tiers[2]	Basis
Tier 1	Single Family: 0 – 5 CCF Duplex: 0 – 2.5 CCF Multi Family: 0 – 2.5 CCF	**0 – 6 CCF**	Groundwater Availability → 6 CCF per DU
Tier 2	Single Family: 6 – 15 CCF Duplex: 2.6 – 13 CCF Multi-Family: 2.6 – 9 CCF	**7 – 13 CCF**	Lakewood & MWD Tier 1 Availability → 7 CCF per DU
Tier 3	Above Tier 2	**Above 13 CCF**	Next water supply source: MWD Tier 2

services, including commercial and irrigation use, will maintain uniform rates.

To better align residential usage tiers with available water supply, RFC proposes to define tier breakpoints by water supply source. Tier 1 includes the first 6 CCF per dwelling unit, which is based on available groundwater sources that are allocated equally to all LBWD customers. Tier 2 use encompasses the next 7 CCF per dwelling unit, which is based on the amount of available imported water from MWD and the water purchase agreement with City of Lakewood. Tier 3 includes all use above 13 CCF per dwelling unit, which can potentially be met using water supply from MWD at the MWD Tier 2 rate. Tier 3 is designed to send a stronger conservation signal regarding the true value of the source of water supply. Please refer to Section 4.2 for additional details.

LBWD will continue to maintain the Exemption Program for qualified customers to provide affordable water and sewer use for disadvantaged customers, based on direction from the Board of LBWD Water Commission and staff. The current program waives the sewer bills for qualified customers, and water use within Tier 1 is charged at lower Tier 1A rates. Based on available resources in the Water and Sewer Funds to support the Exemption program, RFC and LBWD staff recommend that Tier 1 water use be waived for qualifying customers (Tier 1A = $0/CCF) and each qualified bill have $5 bill credit per month to offset the impact from the changes in the program. LBWD may decide to review the continuation or adjustment of the bill credit in the future. However, they will pay sewer bills and other water charges at the same rate as other residential customers.

1.3 - PROPOSED WATER, RECYCLED WATER AND SEWER RATES

To calculate fair and equitable rates so that users pay in proportion to the cost of providing

[2] *Applied to All Residential Classes per Dwelling Unit*

Table 1-3: Proposed Water and Recycled Water Daily Service Charges

Meter Size	Billing & Customer Service	Services & Capacity	Proposed FY 2017	Proposed Daily FY 2017	Current Daily FY 2017	% Change
	A	B	C = A + B	D = C x 12 /365	E	F = D/E - 1
5/8" & 3/4"	$4.63	$12.09	$16.72	**$0.550**	$0.489	**12%**
1"	$4.63	$20.15	$24.78	**$0.815**	$0.736	**11%**
1 1/2"	$4.63	$40.30	$44.93	**$1.478**	$1.375	**7%**
2"	$4.63	$64.48	$69.11	**$2.273**	$2.037	**12%**
3"	$4.63	$141.05	$145.68	**$4.790**	$4.220	**14%**
4"	$4.63	$241.80	$246.43	**$8.102**	$6.677	**21%**
6"	$4.63	$544.05	$548.68	**$18.039**	$12.306	**47%**
8"	$4.63	$1,128.40	$1,133.03	**$37.251**	$19.315	**93%**
10"	$4.63	$1,692.60	$1,697.23	**$55.800**	$31.635	**76%**
12"	$4.63	$2,135.90	$2,140.53	**$70.374**	$38.662	**82%**
16"	$4.63	$3,143.40	$3,148.03	**$103.497**	$63.986	**62%**

service, RFC performed a cost allocation of the total FY 2017 revenue requirements, consistent with industry standards as outlined in the *M1 Manual*[3] as well as Proposition 218 requirements. A detailed cost of service analysis is included in Sections 6 and 7 of the Report.

1.3.1 - PROPOSED WATER AND RECYCLED WATER RATES

RFC performed a cost allocation of the total revenue requirements in order to calculate fair and equitable rates where users pay proportionately to their cost of providing service. This methodology is consistent with industry standards and in compliance with Proposition 218 requirements. Table 1-3 and Table 1-4 show the proposed water and recycled water daily service charges and private fireline daily service charges for FY 2017. A detailed cost of service analysis is included in Section 6 of the Report.

Proposition 218 requires a nexus between the rates and costs of providing service. To meet this requirement, RFC identified five different components of the quantity rates, including Water Supply, Delivery, Peaking Cost, Conservation and Revenue Offset. Table 1-5 shows the FY 2017 calculated rates for each rate component for all Water and Recycled Water customer classes. Table 1-6 summarizes the proposed Water and Recycled Water rate structure and corresponding water quantity rates for FY 2017.

1.3.2 - PROPOSED SEWER RATES

Based on the results of the cost of service analysis conducted for sewer services, Table 1-7 and Table 1-8 summarize the proposed daily sewer service charges and sewer volumetric rates for FY 2017. A detailed cost of service analysis and rate calculation is discussed in Section 7 of the Report.

Users will continue to pay daily sewer service charges, which vary by meter size, along with volumetric charges per 100 cubic feet (CCF) of water furnished.

[3] *"Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1," 6th edition published by AWWA*

Table 1-4: Proposed Private Fireline Daily Service Charges

Size	Billing & Customer Service	Private Fire Capacity	Proposed FY 2017	Proposed Daily FY 2017	Current Daily FY 2017	% Change
	A	B	C = A + B	D =C x 12 /365	E	F = D/E - 1
2"	$4.63	$5.25	$9.88	**$0.325**	$1.020	**-68%**
3"	$4.63	$15.25	$19.88	**$0.654**	$1.745	**-63%**
4"	$4.63	$32.50	$37.13	**$1.221**	$2.577	**-53%**
6"	$4.63	$94.40	$99.03	**$3.256**	$4.391	**-26%**
8"	$4.63	$201.18	$205.81	**$6.767**	$6.438	**5%**
10"	$4.63	$361.78	$366.41	**$12.047**	$8.709	**38%**
12"	$4.63	$584.38	$589.01	**$19.365**	$10.976	**76%**
16"	$4.63	$1,245.33	$1,249.96	**$41.095**	$16.094	**155%**

Table 1-5: Proposed Water and Recycled Water Quantity Rate Components

	Water Supply	Delivery	Peaking	Conservation	Revenue Offset	Proposed FY 2017
	A	B	C	D	E	F = A + B + C + D + E
Residential						
Tier IA	$1.055	$0.579	$0.361	$0.000	-$1.995	**$0.000**
Tier IB	$1.055	$0.579	$0.361	$0.000	-$0.074	**$1.921**
Tier II	$2.645	$0.579	$0.454	$0.000	$0.000	**$3.678**
Tier III	$2.907	$0.579	$0.651	$1.229	$0.000	**$5.366**
Non-Residential	$1.747	$0.579	$0.405	$0.127	$0.000	**$2.858**
RW						
Peaking	$0.000	$1.221	$0.638	$0.000	$0.000	**$1.859**
Non-Peaking	$0.000	$1.221	$0.357	$0.000	$0.000	**$1.578**
Interruptible	$0.000	$1.221	$0.357	$0.000	$0.000	**$1.578**

Table 1-6: Proposed Water and Recycled Water Quantity Rates ($ / CCF)

	Current Tier Widths[4]	Proposed Tier Widths	Current FY 2017 ($ / CCF)	Proposed FY 2017 ($ / CCF)
Residential				
Tier IA	5 CCF	6 CCF	**$1.427**	**$0.000**
Tier IB	5 CCF	6 CCF	**$2.569**	**$1.921**
Tier II	10 CCF	7 CCF	**$2.854**	**$3.678**
Tier III	Above 15 CCF	Above 13 CCF	**$4.281**	**$5.366**
Non-Residential			**$2.854**	**$2.858**
Recycled Water				
Peaking	Uniform	Uniform	**$1.998**	**$1.859**
Non-Peaking	Uniform	Uniform	**$1.427**	**$1.578**
Interruptible	Uniform	Uniform	**$1.427**	**$1.578**

Table 1-7: Proposed Sewer Daily Service Charges for FY 2017

	Billing & Customer Services	Sewer Services	Proposed FY 2017	Current	% Change
	A	B	C = A + B	D	E = C / D – 1
5/8" & 3/4"	$0.065	$0.181	**$0.246**	$0.281	-12.5%
1"	$0.065	$0.300	**$0.365**	$0.445	-18.0%
1 1/2"	$0.065	$0.892	**$0.957**	$0.811	18.0%
2"	$0.065	$1.584	**$1.649**	$1.177	40.1%
3"	$0.065	$3.777	**$3.842**	$2.435	57.8%
4"	$0.065	$5.493	**$5.558**	$3.856	44.1%
6"	$0.065	$15.417	**$15.482**	$7.104	117.9%
8"	$0.065	$16.347	**$16.412**	$11.159	47.1%
10"	$0.065	$25.340	**$25.405**	$18.255	39.2%
12"	$0.065	$31.977	**$32.042**	$22.315	43.6%
16"	$0.065	$47.060	**$47.125**	$36.514	29.1%

[4] Shown Single Family tiers only, Multi Family and Duplex accounts have different current tier widths (see Table 1-2)

Volumetric charges for residential customers are computed based on the average of actual water use during the winter billing periods. The average volume will be the cap volume of actual water use returning to sewer system on which the volumetric sewer rate is charged for the next twelve-month period beginning with May's billing period. Each year, the average volume will be recalculated for the following twelve-month period. For those residential customers with no previous history of use during the winter billing periods, the average volume of customers with the same meter size will be used.

1.3.3 - CUSTOMER IMPACT ANALYSIS

Before implementing any rate structure recommendations, it is important to understand how the proposed rate structure will impact the LBWD's customers. Customer impact analysis is a powerful tool which can be used to assist elected officials in making informed decisions. Table 1-9 summarizes the combined water and sewer impact analyses by customer class, based on the proposed rates and projected number of accounts and usage. The residential customer class will see very minimal impact (-0.45%) under proposed water and sewer rates, whereas non-residential and recycled water customer classes will see more impact from the proposed rates, which is 5.12% and 2.67% respectively.

Figure 1-1 shows the combined water and sewer bills of typical residential customers with 5/8" x ¾" meters for a 30-day monthly billing period with assumed maximum of 10 CCF billed sewer flows (aka sewer average volume) at various water consumption levels under current and proposed rate structure and rates. Users using 6 CCF per month will see $3.39 reduction (or -8.2%) in their monthly bill, whereas users with 12 CCF per month will see minor increase of $1.55 (or 2.6%). Residential users using 30 CCF or more per month will see greater impacts. The proposed rate structure and rates send a stronger conservation pricing signal while maintaining affordability for essential use, which are part of the top 10 pricing objectives ranked by LBWD.

Similarly, Figure 1-2 provides the sample combined water and sewer bills for residential customers that qualify for the exemption program. Low water users, using 6 CCF or less per month, will see $3.44 reduction (-13.9%) in their monthly bills, whereas customers using 20 CCF or more per month will see more impacts on their monthly water and sewer bills.

In summary, the rates calculated in this study for water, recycled water and sewer follow industry standard principles of equitable cost-of-service allocations, and are thus compliant with Proposition 218. The remainder of this report details the background information utilized by RFC in carrying out this study, along with thorough explanation of the cost-of-service analyses and consequent revisions to LBWD's rate structure.

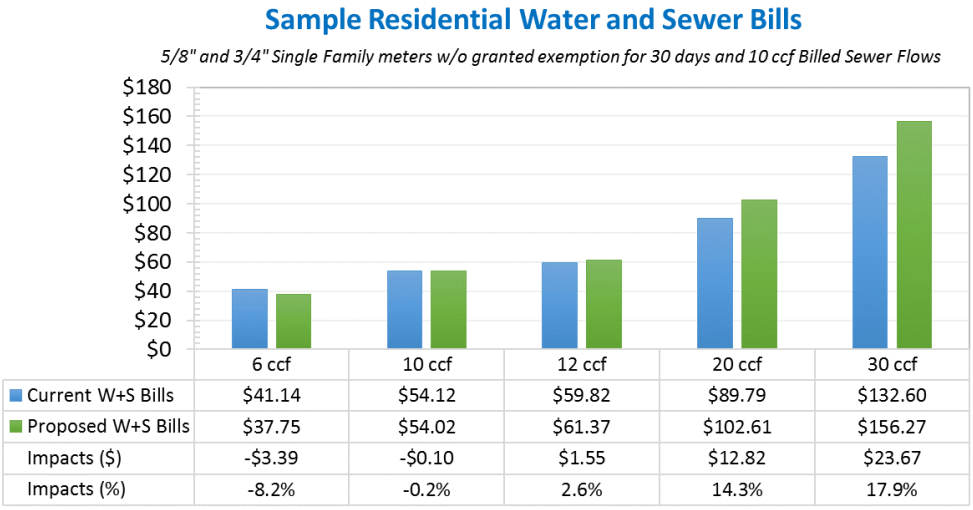
Table 1-8: Proposed Sewer Volumetric Rates for FY 2017

	Proposed FY 2017 Rates ($ / CCF)
Flow Based (1)	$0.284
Sewer Services (2)	$0.106
Sewer Volumetric Rates (1) +(2)	**$0.390**

Table 1-9: Combined Water & Sewer Customer Impact Analysis

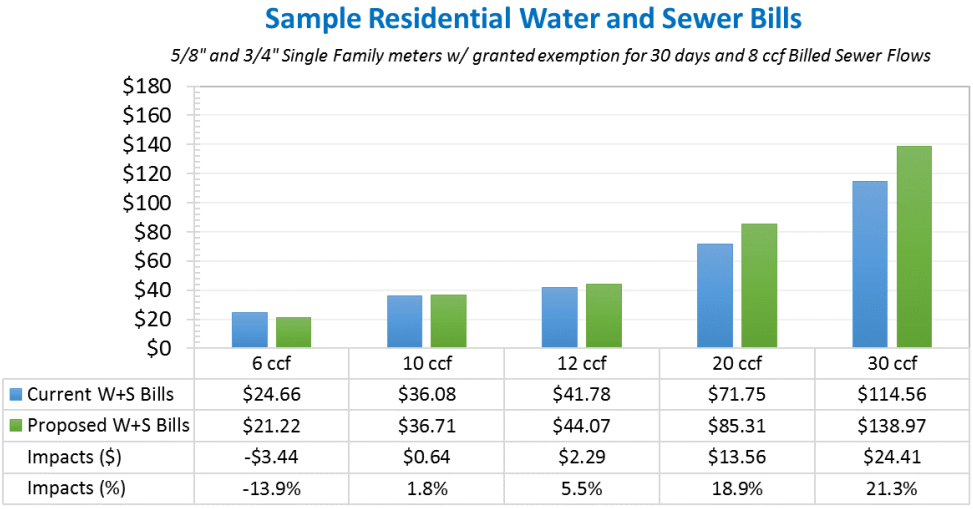
Customer Classes	Projected FY 2017 Revenues under Current Rates (A)	Projected FY 2017 Revenues under Proposed Rates (B)	% Impact (C = B/A-1)
Residential	$75,957,211	$75,613,197	-0.45%
Non-Residential	$27,890,715	$29,317,656	5.12%
Private Fire	$1,862,389	$1,606,747	-13.73%
RW	$3,599,285	$3,695,459	2.67%
Total Water & Sewer Revenues from Rates	**$109,309,601**	**$110,233,059**	**0.84%**

Figure 1-1: Sample Residential Combined Water and Sewer Bills



	6 ccf	10 ccf	12 ccf	20 ccf	30 ccf
Current W+S Bills	$41.14	$54.12	$59.82	$89.79	$132.60
Proposed W+S Bills	$37.75	$54.02	$61.37	$102.61	$156.27
Impacts ($)	-$3.39	-$0.10	$1.55	$12.82	$23.67
Impacts (%)	-8.2%	-0.2%	2.6%	14.3%	17.9%

Figure 1-2: Sample Exempted Residential Combined Water & Sewer Bills



	6 ccf	10 ccf	12 ccf	20 ccf	30 ccf
Current W+S Bills	$24.66	$36.08	$41.78	$71.75	$114.56
Proposed W+S Bills	$21.22	$36.71	$44.07	$85.31	$138.97
Impacts ($)	-$3.44	$0.64	$2.29	$13.56	$24.41
Impacts (%)	-13.9%	1.8%	5.5%	18.9%	21.3%

INTRODUCTION

2.1 - OVERVIEW OF LONG BEACH WATER DEPARTMENT

The Long Beach Water Department (LBWD or Department) maintains a system of water, recycled water and sewer infrastructure that provides services to nearly 470,000 Long Beach residents. LBWD receives its potable water supply from two main sources: groundwater and purchases from the Metropolitan Water District of Southern California (MWD). LBWD's Groundwater Treatment Plant, one of the largest in the nation, can produce up to 60 million gallons per day (MGD) of drinking water that is delivered through over 900 miles of transmission and distribution mains. LBWD meets a portion of its non-potable water demand through recycled water services. Recycled water is produced at the Long Beach Water Reclamation Plant which can treat up to 18 MGD of wastewater effluent. In addition, LBWD operates and maintains nearly 765 miles of sanitary sewer lines, which send over 40 MGD of wastewater flow to treatment plants operated by Los Angeles County. The remaining portion of the City's wastewater is delivered to the Long Beach Water Reclamation Plant.

2.2 - BACKGROUND OF THE STUDY

LBWD's Comprehensive Annual Financial Report (CAFR) for the year ending September 30, 2015, indicates that the Department's Water and Sewer Funds have low levels of long-term debt and very high debt service coverage. LBWD's water conservation efforts have been exceptionally effective at reducing per capita daily water use. Furthermore, through Governor's Brown Executive Order for Mandatory Conservation (Executive Order B-29-15), the State Water Resources Control Board draft water reduction target for the City of Long Beach is 16% below water usage in 2013. This target is significantly less than many other California municipalities; however, still a significant conservation measure to achieve given the current per capita water use of the City's customers.

The current water and sewer rates were developed in the previous Rate Study conducted in March 1996 and updated annually across the board to account for rising operating and capital costs. The current water rate structure contains both fixed service charges and quantity rates. The fixed daily service charge is based on meter size. Residential usage is billed using a three tier structure that varies by type, including residential, single family, duplex and multi-family. All non-residential usage (commercial, industrial, irrigation) is billed on a uniform

quantity rate. The three Recycled Water (RW) customer classes, including peaking, non-peaking and interruptible, are billed the same fixed daily service charges as regular water services and uniform rates which are set at a percentage of Tier II potable water rates. Sewer customers are also billed a daily sewer service charge based on meter size and a single uniform volumetric rate on all billed sewer flows regardless of customer class.

Government Code Section 54999 mandates that a cost of service analysis be done every 10 years to ensure that rates are equitable and fair to customers. In addition, Proposition 218 requires that utility rates cannot be "arbitrary and capricious," meaning that the rate-setting methodology must be sound and that there must be a nexus between the costs and the rates charged. The recent Orange County Superior Court ruling in the litigation between Capistrano Taxpayer Association (CTA) and the City of San Juan Capistrano reinforces the importance of administrative records to substantiate the nexus between the rates and the cost of providing water and sewer services.

In early 2016, LBWD engaged Raftelis Financial Consultants (RFC) to conduct a Cost of Service and Rate Design for its Water, Recycled Water and Sewer services that meet the requirements of Proposition 218.

The major objectives of the Study include the following:

1. Conduct cost of service analyses for Water, Recycled Water and Sewer services
2. Design an alternative rate structure to better align water supply costs with rates, and more equitably recover costs from customers
3. Conduct a sensitivity and impact analysis on proposed rates
4. Develop an administrative record that demonstrates nexus between LBWD's costs and rates to meet the requirements of Proposition 218.

This Cost of Service and Rate Design Report (Report) summarizes the key findings and results related to the revision of the water rate structure, development of water, recycled water and sewer rates and customer impact analyses for proposed rates.

2.3 - KEY INFORMATION USED IN THE STUDY

The Study utilized the following, but not limited to, key information provided by the Department:

1. Fiscal Year 2015 Consumption Data (October 2014 to September 2015) for all water, recycled water and sewer accounts served within the LBWD service area
   - Water data provided on July 9, 2016
   - Recycled water data provided on February 17, 2016
   - Sewer data provided on June 10, 2016
2. FY 2017 Operating Budget for Water and Sewer Funds provided on April 14, 2016
3. Debt Service Schedule for Outstanding Water Debts and Estimated Sewer Debt provided on June 24, 2016
4. 10-year CIP project cost estimates for FY 2017 – FY 2026 provided by LBWD on April 14, 2016 for Water Fund and Sewer Fund summarized by project type
5. Fixed Asset Balances provided by LBWD as of September 30, 2015 provided on February 18, 2016
6. Current water, recycled water and sewer rates effective on October 1, 2016
7. Peaking demand for max day and max hour provided on Feb 22, 2016
8. Fire flow requirements for the Water system provided on Oct 11, 2016
9. Reserve Policy Approved on August 18, 2016 (Board Policy 2016-34)
10. Beginning Water Reserve Balances as of Oct 1, 2015 (FY 2016) and Oct 1, 2016 (FY 2017) provided on April 27, 2016

2.4 - FY 2017 CURRENT REVENUES FROM WATER AND SEWER RATES

The current water and sewer rates were originally developed in the previous Rate Study conducted in March 1996 and updated annually across the board to account for rising operating and capital costs. The following sections detail the current rates and projected number of services and quantity sales for water and sewer services for FY 2017 to be used as part of the analysis.

2.4.1 - CURRENT WATER & RECYCLED WATER REVENUES FROM RATES

The current water rates were last approved in 2016 and made effective on October 1, 2016.

Table 2-1: Current Water Daily Service Charges and Projected FY 2017 Service Connections

Meter Size	Current Daily Service Charges	Projected FY 2017 Number of Service Connections				
		Residential	Non-Residential	Recycled Water	Private Fireline	Total Water Accounts
Water & RW						
5/8" x 3/4"	$0.489	66,668	2,567	1		**69,236**
1"	$0.736	9,647	1,558	2		**11,207**
1 1/2"	$1.375	3,031	1,202	12		**4,245**
2"	$2.037	801	1,831	37		**2,669**
3"	$4.220	120	373	17		**510**
4"	$6.677	34	140	23		**197**
6"	$12.306	31	69	16		**116**
8"	$19.315	10	53	7		**70**
10"	$31.635	0	20	1		**21**
12"	$38.662	1	3	0		**4**
16"	$63.986	0	0	0		**0**
Private Fireline						
2"	$1.020				61	**61**
3"	$1.745				51	**51**
4"	$2.577				351	**351**
6"	$4.391				415	**415**
8"	$6.438				261	**261**
10"	$8.709				55	**55**
12"	$10.976				3	**3**
16"	$16.094				2	**2**
Total Number of Water Service Connections		**80,343**	**7,816**	**116**	**1,199**	**88,275**

Water, recycled water, and private fireline services pay daily service charges based on meter size on monthly billing cycles, shown in Table 2-1. Table 2-1 also shows the projected number of service connections by customer class for FY 2017 provided by LBWD. Non-residential customers include industrial, commercial and irrigation services. Residential customers include single family residential, duplex and multi-family residential services. No account growth is assumed for FY 2017.

Water services also pay quantity rates, shown in Table 2-3, which consist of tiered rates for residential and uniform rates for non-residential, including commercial, irrigation and industrial services. Single family, duplex and multifamily residential services currently have different tier definitions per dwelling unit, shown in Table 2-2. In an effort to provide affordability for low income and/or disabled senior residents, LBWD utilizes a Tier IA discounted rate, which only applies to customers qualifying

Table 2-2: Current Residential Tier Definitions

Residential Monthly Tier Widths / DU	Single Family	Duplex	Multi Family
Tier IA	0 – 5.0 CCF	0 – 2.5 CCF	0 – 2.5 CCF
Tier IB	0 – 5.0 CCF	0 – 2.5 CCF	0 – 2.5 CCF
Tier II	6 – 15 CCF	2.6 – 13 CCF	2.6 – 9 CCF
Tier III	above 15 CCF	above 13 CCF	above 9 CCF

Table 2-3: Current Quantity Rates and Projected Water Sales for FY 2017

	Projected Water Sales Under Current Rate Structure (CCF)	Current Quantity Rates ($ / CCF)	FY 2017 Revenues from Quantity Rates
	A	B	C = A x B
Potable Water Services			
Residential (Tiered)	15,171,032		$43,310,974
Tier IA	72,510	$1.427	$103,472
Tier IB	6,426,453	$2.569	$16,509,558
Tier II	7,307,066	$2.854	$20,854,366
Tier III	1,365,003	$4.281	$5,843,578
Non-Residential (Uniform)	7,046,540	$2.854	$20,110,825
Total Potable Sales	**22,217,572 CCF**		**$63,421,799**
Recycled Water Services			
Peaking	1,071,512	$1.998	$2,140,881
Non-Peaking	414,249	$1.427	$591,133
Interruptible	292,914	$1.427	$417,988
Contract Rate	175,313	$1.141	$200,032
Total Recycled Water Sales	**1,953,988 CCF**		**$3,350,035**

for an exemption from the City's Utility Users Tax in accordance with Chapter 3.68 of the Long Beach Municipal Code. All other residential customers are billed using Tier IB, Tier II and Tier III water rates. Recycled water services are also billed using uniform quantity rates based on customer class (peaking, non-peaking and interruptible).

Table 2-3 shows the projected water sales for FY 2017 under the current rate structure for water and recycled water services along with the calculations for revenues from current quantity rates. On February 20, 1998, the County of Los Angeles and LBWD executed the First Amendment to Agreement WD-1604 regarding recycled water at Lakewood County Club (LCC). This amendment codifies

Table 2-4: FY 2017 Projected Revenues from Current Water Rates

Customer Classes	Service Charges	Quantity Rates	FY 2017 Revenues from Rates
	A	B (Table 2-3)	C = A + B
Residential	$17,099,090	$43,310,974	$60,410,064
Non-Residential	$4,713,896	$20,110,825	$24,824,721
Recycled Water	$249,250	$3,350,035	$3,599,285
Private Fireline	$1,862,389		$1,862,389
Total	**$23,924,625 (26.4%)**	**$66,771,834 (73.6%)**	**$90,696,459**

Daily service charge × number of accounts with 1" meter × 365 days of service
$0.736 × 2 accounts × 365 days = $537.28

the price for recycled water to LCC as the rate that LCC posts for sale of potable water to third parties under LCC's own water right. The current contract rate for LCC is shown in Table 2-3 and subject to the Agreement WD-1604 terms.

Table 2-4 summarizes the projected revenues from current rates for residential, non-residential, recycled water and private fireline services. Annual service charges revenues are calculated using current daily service charges and number of accounts (shown in Table 2-1) for 365 days of service for each meter size. For example, the revenue calculation for 1" recycled water meters is shown above.

This calculation is repeated for all meter sizes, customer classes and private fireline services to arrive at the total revenues from service charges for FY 2017, as shown in Table 2-4 column A. In FY 2017, LBWD projects to collect 26.4% of its revenues from rates from fixed service charges, or $23.92M of $90.70M in total revenue.

2.4.2 - CURRENT SEWER REVENUES FROM RATES

The charges for all sewer service consist of both a daily service charge by meter size and a volumetric rate per 100 cubic feet (CCF) of water furnished. The volumetric sewer rate does not apply to fire services. Volumetric sewer rates for residential customers (single family, duplex and multi-family) are computed based on the average of actual potable water use during the winter billing periods (December to March). The winter billing periods used is determined by the meter reading schedule for the account. The actual winter usage is divided by the number of winter days to obtain an average volume. The average volume is the base volume on which the volumetric sewer rate is charged for the next twelve-month period beginning with May's billing periods. Each year, the average volume is recalculated for the succeeding twelve-month periods. For those residential customers with no previous history of use during the winter billing periods, the average volume of customers with the same meter size will be used. For sewer customers who do not receive water services from the LBWD, volumetric sewer rate is based on the average volume for the customer's water service size.

Table 2-5 shows current sewer daily service charges along with FY 2017 projected sewer service connections by customer class and meter size. Similar to revenues from current rates calculated for water services, the calculation for 1" non-residential sewer meters are shown on the following page.

This calculation is repeated for all meter sizes and customer classes to arrive at the total sewer service

Daily service charge × number of accounts with 1" meter × 365 days of service
$0.445 × 1,089 accounts × 365 days = $176,880.83

charges revenues for FY 2017 as shown in Table 2-7 column A.

Table 2-6 shows the current volumetric sewer rates and projected billed sewer flows (CCF) along with the projected revenues from volumetric rates. Table 2-7 summarizes the projected revenues from current rates for residential and non-residential customers. In FY 2017, LBWD projects to collect 63.4% of its revenues from rates from fixed service charges, or $11.8M of $18.6M in total revenue.

Table 2-5: Current Sewer Daily Service Charges and Projected FY 2017 Service Connections

Meter Size	Current Sewer Daily Service Charges	Projected FY 2017 Number of Sewer Service Connections		
		Residential	Non-Residential[5]	Total Sewer Services
5/8" x 3/4"	$0.281	64,738	2,704	67,442
1"	$0.445	9,646	1,089	10,735
1 1/2"	$0.811	3,106	829	3,935
2"	$1.177	1,468	659	2,127
3"	$2.435	288	107	395
4"	$3.856	104	44	148
6"	$7.104	70	14	84
8"	$11.159	38	10	48
10"	$18.255	6	2	8
12"	$22.315	4	0	4
16"	$36.514	0	0	0
Total		**79,468**	**5,458**	**84,926**

Table 2-6: Current Volumetric Sewer Rate and Projected Billed Sewer Flows for FY 2017

Customer Classes	Billed Sewer Flows (CCF)	Volumetric Sewer Rate ($ / CCF)	FY 2017 Revenues from Volumetric Rates
	A	B	C = A x B
Residential	12,767,381	$0.390	$4,979,279
Non-Residential	4,707,404	$0.390	$1,835,888
Total	**17,474,785 CCF**	**$0.390**	**$6,815,166**

Table 2-7: FY 2017 Projected Revenues from Current Sewer Rates

Customer Classes	Service Charges	Quantity Rates	FY 2017 Revenues from Rates
Residential	$10,567,869	$4,979,279	$15,547,148
Non-Residential	$1,230,107	$1,835,888	$3,065,995
Total	**$11,797,976 (63.4%)**	**$6,815,166 (36.6%)**	**$18,613,142**

[5] *Non-Residential: Commercial, Industrial, Industrial Sewer only, Sewer only services*

LEGAL FRAMEWORK AND RATE SETTING METHODOLOGY

3.1 - CALIFORNIA CONSTITUTION - ARTICLE XIII D, SECTION 6 (PROPOSITION 218)

Proposition 218, reflected in the California Constitution as Article XIII D, was enacted in 1996 to ensure that rates and fees are reasonable and proportional to the cost of providing service. The principal requirements for fairness of the fees, as they relate to public water service, are as follows:

1. A property-related charge (such as water and recycled water rates) imposed by a public agency on a parcel shall not exceed the costs required to provide the property related service.
2. Revenues derived by the charge shall not be used for any purpose other than that for which the charge was imposed.
3. The amount of the charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
4. No charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.
5. A written notice of the proposed charge shall be mailed to the record owner of each parcel at least 45 days prior to the public hearing, when the agency considers all written protests against the charge.

As stated in AWWA's *Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1, 6th edition (M1 Manual)*, "water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers." Proposition 218 requires that water rates cannot be "arbitrary and capricious," meaning that the rate-setting methodology must be sound and that there must be a nexus between the costs and the rates charged. This study follows industry standard rate setting methodologies set forth by the *M1 Manual*, adhering to Proposition 218 requirements by developing rates that do not exceed the proportionate cost of

providing water services.

3.2 - CALIFORNIA CONSTITUTION - ARTICLE X, SECTION 2

Article X, Section 2 of the California Constitution (established in 1976) states the following:

"It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare."

Article X, Section 2 of the State Constitution institutes the need to preserve the State's water supplies and to discourage the wasteful or unreasonable use of water by encouraging conservation. As such, public agencies are constitutionally mandated to maximize the beneficial use of water, prevent waste, and encourage conservation.

In addition, Section 106 of the Water Code declares that the highest-priority use of water is for domestic purposes, with irrigation secondary. To meet the objectives of Article X, Section 2, Water Code Section 375 et seq., a water purveyor may utilize its water rate design to incentivize the efficient use of water. The agency may establish tiered rates, based on the availability of water from each source, to incentivize

customers to use water efficiently, so long as the rates also account for the proportional costs of water provision in compliance with Proposition 218.

TIERED RATES

"Inclining" tier rate structures (synonymous with "tiered" rates), when properly designed and differentiated by customer class, allow a water utility to send consistent price signals to customers. Tiered rates meet the requirements of Proposition 218 as long as the tiered rates reasonably reflect the proportionate cost of providing service to users in each tier.

3.3 - COST-BASED RATE-SETTING METHODOLOGY

As stated in the *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 goals and objectives of the utility, RFC carries out a detailed analysis in four major steps, as discussed below.

CALCULATE REVENUE REQUIREMENT

The rate-making process starts by determining the test year (rate setting year) revenue requirement, which for this study is FY 2017. The revenue requirement should sufficiently fund the utility's O&M, debt service, capital expenses, and target reserve balances based on a long-term financial plan.

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. Functionalize costs. Examples of functions are supply, treatment, transmission, distribution, storage, meter servicing, and customer billing and collection.
2. Allocate functionalized costs to cost causation components. Cost causation components include base, maximum day, maximum hour[6], conservation, public fire protection, meter service, and customer servicing and billing costs.
3. Distribute cost causation components, using 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 costs) and the peak rate at which it is consumed (peaking or capacity costs as identified by maximum day and maximum hour demands).[7] Peaking costs are costs that are incurred during peak times of consumption. There are additional costs associated with designing, constructing, operating and maintaining facilities to meet peak demands. These 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.

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 promoting water 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.

RATE ADOPTION

Rate adoption is the last step of the rate-making process to comply with Proposition 218. RFC documents the rate study results in this report to serve as the utility's administrative record and a public education tool about the proposed changes, the rationale and justifications behind the changes, and their anticipated financial impacts.

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[6] *Maximum day and maximum hour costs are collectively referred to as peaking costs or capacity costs.*

[7] *System capacity is the system's ability to supply water to all delivery points at the time when demanded. Coincident peaking factors are calculated for each customer class at the time of greatest system demand. The time of greatest demand is known as peak demand. Both the operating costs and capital asset related costs incurred to accommodate the peak flows are generally allocated to each customer class based upon the class's relative demands during the peak month, day, and hour event.*

REVISION TO WATER RATE STRUCTURES

4.1 - PRICING OBJECTIVES EXERCISE AND RESULTS

Each rate structure has its own strengths and weaknesses, and there is no perfect "one-size-fits-all" rate structure that addresses all pricing objectives. The key pricing objectives that are considered most important by a utility will work as a fundamental framework for the design and development of the appropriate rate structure for that utility. Currently, there are four common types of conservation rate structures: uniform, seasonal, inclining tiered and water budget-based tiered rates.

1. **A uniform rate structure** charges customers a uniform rate per unit of water consumed. This rate remains constant regardless of usage, and such a structure was developed to better reflect the costs of providing water services, such as treatment costs or pumping costs to customers while maintaining revenue stability, ease of administration, implementation, and understanding. However, uniform rates poorly address conservation needs and do not necessarily provide affordability for essential use.
2. **A seasonal rate structure** charges customers volumetric rates which vary based on the season. Normally, these rate structures provide a greater conservation incentive during the summer season when the demand for water is the greatest, while maintaining overall simplicity. However, because seasonal rates generally drive much of the utility's revenues during the peak season (which is often more volatile because of weather and economic conditions), revenues under seasonal rates tend to be more unstable. Also, seasonal rates may affect the affordability of water during the peak season for essential use. This type of rate structure is common in communities that are focused on reducing peak demand or summer water use.
3. **Inclining tiered rates** also charge volumetric rates, but the charge per unit of water increases as consumption increases. Inclining tiered rates may address conservation needs, while providing simplicity and ease of administration. Also, depending on the behavior of individual customers, inclining tiered rates may provide affordability for essential usage. However, inclining tiered rates can be disadvantageous to large water users which may have larger families or irrigation areas than the average customer.
4. **Water budget-based tiered rate structures** were developed as a tool for water resource management during the severe drought in the 1990s where each customer was given an allocation of water use based on an efficiency target for indoor and outdoor usage. The allocation target was then translated into an individualized tiered rate structure to promote water efficiency. Water budget rate structures can provide revenue stability, affordability for essential use, and equity in allocating different water supply sources. Challenges with this rate structure include high administrative and implementation costs. Many of these administrative and implementation costs are incurred to conduct a successful public outreach campaign to improve customer understanding and to encourage efficient use of water.

Table 4-1: Ranking Pricing Objectives and Policy Principles

Administration	Equity	Appropriate Funding Mechanisms	Rate Stability & Affordability	Promotes Efficiency / Conservation
• Customer Understanding • Easy to Implement • Easy to Administer	• Equitable in Allocating CIP Cost • Perceived to be Fair to the Public • Align Supply & Demand	• Revenue Stability • Revenue Sufficiency • Potential Funding Mechanism for Alt. Water Supply & Conservation Programs	• Rate Stability • Mitigate Customer Impact • Affordability for Essential Use	• Promotes Conservation • Tool for Drought Management Action Plan • Promotes Efficiency • Rewards Past Conservation Effort • Economic Development • Based on Individual Needs • Scientific Method

Table 4-2: Top 10 Pricing Objectives Ranked by LBWD Staff

Pricing Objectives	Rank
Revenue Sufficiency	1
Promotes Conservation	1
Fair to the Public	3
Easy to Administer	4
Rate Stability	4
Customer Understanding	4
Affordability for Essential Use	4
Enhance Revenue Stability	8
Mitigate Customer Impact	8
Provide Funding Mechanism for Recycling/ Conservation Program	8

To determine which rate structures to evaluate, RFC collaborated with LBWD staff and identified a list of pricing objectives (Table 4-1) that relate to LBWD's unique characteristics and needs. In March 2016, RFC requested direction from LBWD staff on the policy priorities that would drive the rate design process (refer to Appendix 9.1 for detailed descriptions of each policy principle and associated pricing objectives). The top 10 pricing objectives (shown in Table 4-2[8]) are used as rate design and rate-setting principles for the Study.

[8] *See Appendix 9.2 for details*

Table 4-3: Proposed Water Rate Structures

Customer Class	Current Rate Structure	Proposed to Evaluate	Why?
Residential (RES)	Inclining Tier	Revised Inclining 3-Tier	Current rate structure achieves the pricing objectives of the City
Irrigation (IRR)	Uniform	Uniform	Use water budget information to develop programs for customers
Industrial / Commercial	Uniform	Uniform	Programs are more effective in promoting conservation than pricing
Recycled Water (RW)	Uniform	Uniform	Use water budget information to develop programs for customers

4.2 - REVISION TO WATER RATE STRUCTURES

4.2.1 - PROPOSED WATER RATE STRUCTURE REVISIONS

Tiered Rates, when properly designed, allow a water utility to send consistent price incentives for conservation to customers. Due to heightened interest in water conservation, tiered rates have seen widespread use, especially in relatively water-scarce regions, such as the State of California. Promoting conservation, being easy to administer and for customers to understand and providing affordability for essential use are among the top ranked pricing objectives for LBWD. The current 3-tier inclining rate structure for residential customers achieves most of these pricing objectives. RFC recommends that LBWD retains uniform rates for non-residential uses and revises the current 3-tier rate structure to better align with the current water supply cost structure. For heterogeneous non-residential use, including irrigation, industrial, and commercial uses, conservation programs and water budgeting are more effective in promoting conservation than pricing. For irrigation and recycled water customers, LBWD staff suggested to use water budget information to develop programs for customers to achieve better efficiency and ultimately promote effective conservation.

4.2.2 - Allocation of Water Supply Sources and Tier Definitions

4.2.2.1 - Water Supply Sources

LBWD meets needs of its customers through a diverse portfolio of water resources, including local groundwater combined with imported supplies. Ownership of water rights, or Allowed Pumping Allocation (APA) in the Central Groundwater Basin allows LBWD to extract 32,692 AF groundwater through 31 active wells and pump to the Department groundwater treatment plant. The Department pays a pump assessment to the Water Replenishment District of Southern California (WRD), for water produced from the wells, in addition to electricity, maintenance and treatment costs at the treatment plant.

In September 25 2012, City of Long Beach entered a water purchase agreement (Agreement No WD-3039) with City of Lakewood for LBWD to purchase surplus water rights of 900 AF per year for up to four years from City of Lakewood at the inter-tie connection on Palo Verde Avenue, south of Carson street. The quantity of water flowing through the inter-tie connection facility from Lakewood to Long Beach shall be based on the reading taken from the inter-connection meter. The per acre-foot price of water purchase shall be Lakewood O&M costs plus replenishment assessment paid by Lakewood to the WRD plus a $100 premium.

The balance of water supply needed to meet the City's demand for potable (drinking) water is treated water purchased from MWD. MWD's water supplies originate from two sources: the Colorado River, via the 242-mile Colorado River Aqueduct and Northern California's Bay-Delta region, via the 441-mile California Aqueduct. LBWD has been a member of MWD since 1931.

Table 4-4: Potable Water Supply Sources

Water Supply Sources	Available for Purchase (AF)	Available for Sales (After 3.4% loss)	
	A	B = A / (1-3.4%)	C = B x 435.6
Groundwater	32,692 AF	31,617 AF	13,772,374 CCF
Lakewood	900 AF	870 AF	22,202,962 CCF
MWD Tier 1	51,804 AF	50,101 AF	
MWD Tier 2	No Limit	No Limit	No Limit

Table 4-5: Potable Water Supply Availability for Residential Use

	Descriptions	FY 2017	Notes
1	Dwelling Units (DU)	169,896 Units	Water Customer Data
2	Total Groundwater Availability	31,617 AF 13,772,374 CCF	After 3.4% water loss
3	**Groundwater Availability per Dwelling Unit**	**6 CCF / DU**	13,772,374 CCF / 169,896 DU /12 bills (round down to the nearest 1 CCF)
4	Lakewood / MWD Tier 1 Blend Availability for Residential Use	34,805 AF 15,161,056 CCF	After 3.4% water loss Residential Use = 68% of Total Usage
5	**Lakewood / MWD Tier 1 Blend Availability per Dwelling Unit**	**7 CCF / DU**	15,161,056 CCF / 169,896 DU / 12 bills (round down to the nearest 1 CCF)

LBWD can purchase up to 51,804 AF from MWD at MWD Tier 1 Full-service treated rate for potable demand within its service area.

Table 4-4 summarizes the available water for purchase by source and available water for sales to meet potable water needs within LBWD's service area after 3.4% of unaccounted water loss.

4.2.2.2 Residential Tier Revisions and Water Supply Allocation to Customer Classes

According to Article X of the California Constitution, water is a scarce resource and should be reserved to beneficial use to the fullest extent possible. Beneficial use by decreasing order of importance includes essential use for health and safety (most important water use), economic activities (commercial and industrial use) and outdoor activities or aesthetic use. In a limited water resource situation, water should be reserved to meet essential uses first before other beneficial uses.

Table 4-5 summarizes the allocation of water supply sources to residential use. There are 169,896 dwelling residential units within the LBWD service area, using approximately 68% of the LBWD's total annual consumption in FY 2016. If all available groundwater within APA (31,617 AF after 3.4% water loss) is equally distributed to all residential units, every residential dwelling unit is entitled to 6 CCF/ month of groundwater to use to meet their essential need for health and safety. 50,971 AF of Lakewood/MWD Tier 1 blend water (870 AF from Lakewood + 50,101AF from MWD Tier 1 after water loss) are allocated equally to residential (68% or 34,805 AF) and non-residential use based on FY 2016 sales. 34,805 AF of Lakewood / MWD Tier 1 blend water

Table 4-6: Proposed Residential Water Tier Definitions

	Current Tiers	Revised Tiers[9]	Basis
Tier 1	Single Family: 0 – 5 CCF Duplex: 0 – 2.5 CCF Multi Family: 0 – 2.5 CCF	**0 – 6 CCF**	Groundwater Availability → 6 CCF per DU
Tier 2	Single Family: 6 – 15 CCF Duplex: 2.6 – 13 CCF Multi-Family: 2.6 – 9 CCF	**7 – 13 CCF**	Lakewood & MWD Tier 1 Availability → 7 CCF per DU
Tier 3	Above Tier 2	**Above 13 CCF**	Next water supply source: MWD Tier 2

Table 4-7: Allocated Water Supply and Proposed Residential Tier Definitions

	Proposed Tier Widths	Residential Dwelling Units	Projected Potential Demand
	A	B	C = A x B x 12 bills /yr
Groundwater	6 CCF	169,896 Units	9,841,470 CCF[10]
Lakewood / MWD Tier 1 Blend	7 CCF	169,896 Units	14,271,264 CCF

allocating to all residential dwelling units yields approximately 7 CCF / dwelling unit for every monthly billing period.

To better align residential usage tiers with available water supply, RFC proposes to define tier breakpoints by water supply source. Tier 1 includes the first 6 CCF per dwelling unit, which is based on available groundwater sources that are allocated equally to all LBWD customers. Tier 2 use encompasses the next 7 CCF per dwelling unit, which is based on the amount of available imported water from MWD and the water purchase agreement with City of Lakewood. Tier 3 includes all use above 13 CCF per dwelling unit, which can potentially be met using water supply from MWD at the MWD Tier 2 rate. Tier 3 is designed to send a stronger conservation signal regarding the true value of the source of water supply. Table 4-6 summarizes the current and proposed tier definitions for residential customer classes.

Based on tier definitions and residential dwelling units, Table 4-7 estimates the projected potential demand for residential use for each water supply source. Based on FY 2015 residential usage data, projected usage consumed in the first 6 CCF per month, which is considered non-volatile and drought-proof, is approximately 80.45% of total potential demand. 9,841,470 CCF of groundwater are projected to meet residential Tier 1 use.

Table 4-8 shows the water supply allocation to customer classes. Residual unused groundwater (3.93 million CCF) is used to meet non-residential demand. 7.9 million CCF of Lakewood / MWD Tier 1 blend residual water from residential use is projected for non-residential demand.

[9] Applied to All Residential Classes per Dwelling Unit

[10] Based on FY 2015 Residential usage data, projected usage consumed in the first 6 CCF per month is approximately 80.45% of total potential demand (80.45% x 6 CCF x 12 bills x 169,896 DUs = 80.45% x 12,232,512 CCF = 9,841,470 CCF)

[11] 2016 Long Beach Water Rate Model Final.xlsm concluded in October 24, 2016

Table 4-8: Water Supply Allocation to Customer Classes

	Available for Sales	Residential (1st priority)	Non-Residential (Residual)
	A = Table 4-4 Column C	B = Table 4-7 Column C	C = A – B
Groundwater	13,772,374 CCF	9,841,470 CCF	3,930,904 CCF
Lakewood / MWD Tier 1 Blend	22,202,962 CCF	14,271,264 CCF	7,931,698 CCF

4.3 - USAGE ANALYSIS AND CUSTOMER CLASSES PEAKING FACTORS

As part of this study, RFC developed "2016 Long Beach Rate Model" (Model), a Microsoft Excel-based Model[11], to examine multiple rate structures and customer impacts resulting from various water costs, water supply and allocation of other water service related costs. As with any computer model, the value of the output is highly dependent on the inputs. The major inputs in the water usage analysis module of the Model include:

- Monthly water consumption records for FY 2015 (October 2014 to September 2015), serving as the baseline consumption behavior for rate structure evaluation.
- All water accounts: 80,343 residential accounts, 1,062 irrigation accounts and 6,714 commercial/industrial accounts along with 116 recycled water accounts. 1,199 private fireline services are not included.

The effects of expanding Tier I and reducing Tier II under the proposed residential tier revision to reflect available water supply sources for different water demand are observed in Figures 4-1 and 4-2. Figure 4-1 compares the residential bill distribution in current and proposed tiers. Under the proposed tier revision, 39.7% of residential bills only use Tier I, increased from 23.5% under current tiers. 37.9% of residential bills use up to Tier II (13 CCF / DU per month), decreased from 62.1% under current tiers. Figure 4-2 compares residential usage distribution in current and proposed tiers. Under proposed tier revision, 64.9% of residential usage consumed in Tier I, increased from 41.8% under current tiers. 24.8% of residential use in Tier II, decreased from 47.5% under current tiers. Tier III usage is projected to be approximately 10.3% of annual residential usage.

Figure 4-3 shows the monthly usage for all usage types throughout FY 2015. Tier I residential usage is relatively stable throughout the year, ranging from 717K CCF to 875K CCF. Tier II residential usage fluctuates more, from a low of 246K to a high of 421K CCF. Tier III residential usage fluctuates the most, with a range of 19K CCF to 250K CCF. Non-residential usage peaks more than Tier I usage but less than Tier II usage, ranging from 501K CCF to 672K CCF. October 2014 had the highest usage of the year, with 2.2 million CCF.

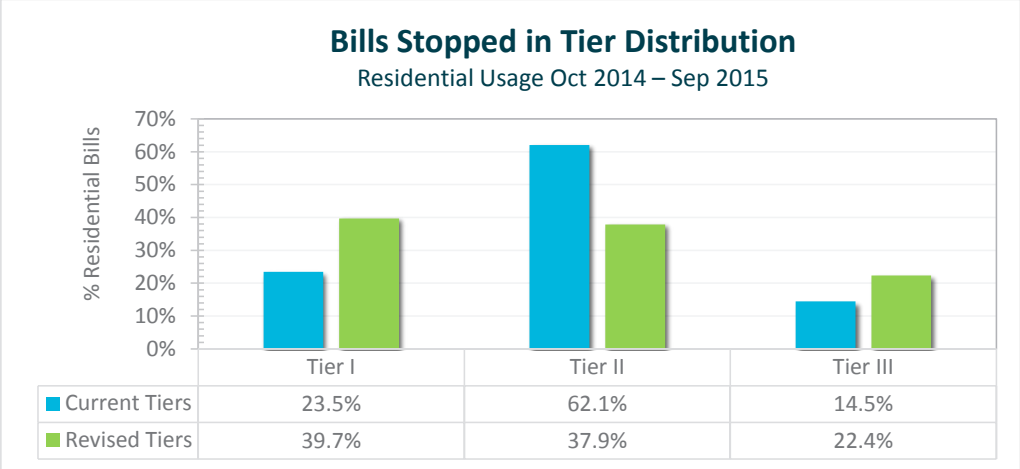
Peaking factors, which are ratios of max month usage over average month usage, are calculated for each usage type in Table 4-9. The overall potable water system has a peaking facto of 1.21, whereas max month (Oct 2014) usage is 21% higher than average month usage. Corresponding to the results observed in Figure 4-3, Tier I residential usage has the lowest peaking factor at 1.07, Tier III usage has the highest peaking factor of 1.92. Tier II usage peaking factor is at 1.34, higher than non-residential (1.20) and Tier I usage and lower than Tier III usage.

Recycled water usage of peaking customer class is mostly for outdoor irrigation, thus is the most volatile throughout the year varying with weather and seasonality of plant growth, as shown in Figure 4-4.

Similar to potable water peaking characteristic, Table 4-10 calculates the peaking factors for RW services. Peaking customers

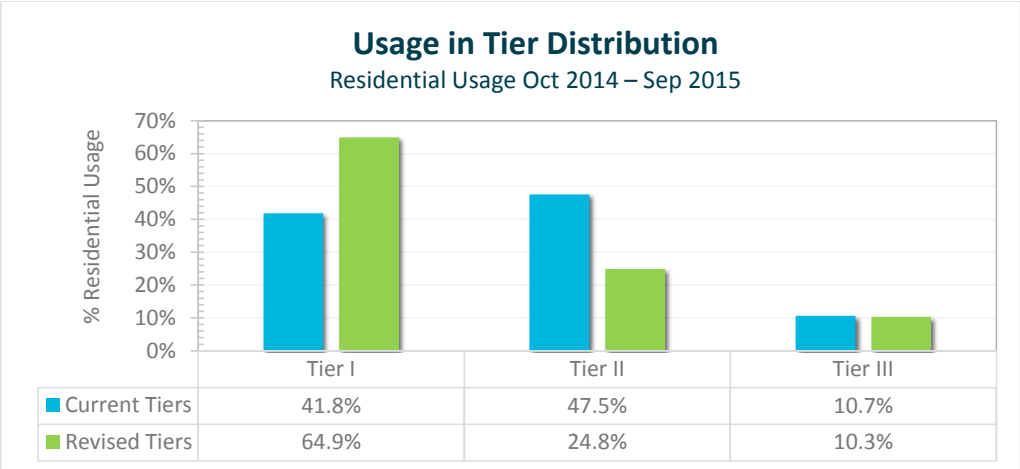
[11] *2016 Long Beach Water Rate Model Final.xlsm concluded in October 24, 2016*

Figure 4-1: FY 2015 Residential Bills Stopped in Tier Distribution



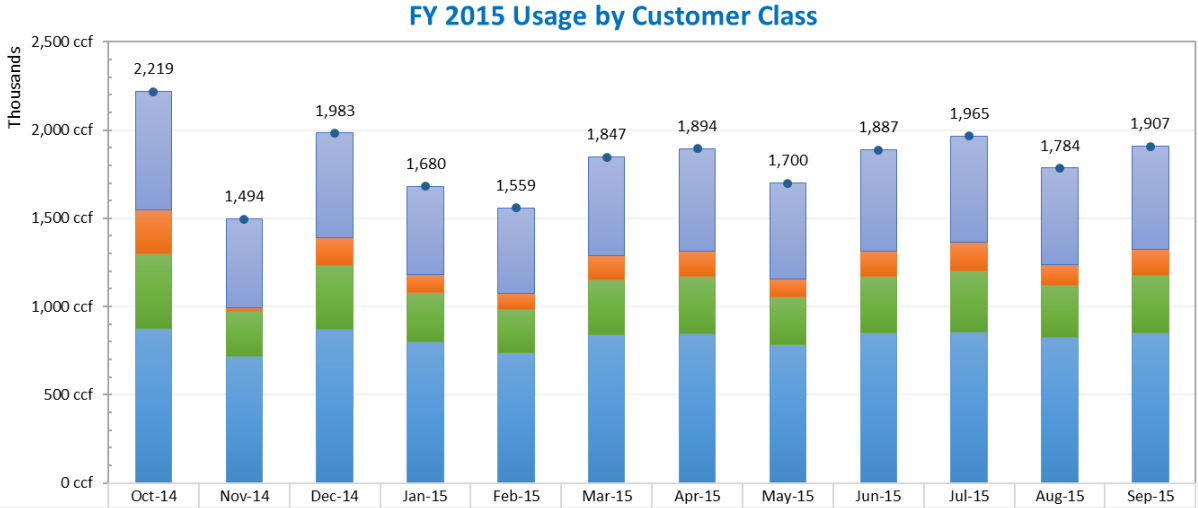
	Tier I	Tier II	Tier III
Current Tiers	23.5%	62.1%	14.5%
Revised Tiers	39.7%	37.9%	22.4%

Figure 4-2: FY 2015 Residential Usage in Tier Distribution



	Tier I	Tier II	Tier III
Current Tiers	41.8%	47.5%	10.7%
Revised Tiers	64.9%	24.8%	10.3%

Figure 4-3: FY 2015 Usage and Peaking Characteristics



	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
Non-Residential	672,364	501,300	591,085	499,725	486,392	561,161	583,274	543,391	570,761	603,399	547,733	586,093
Tier III	249,937	18,809	162,206	100,845	87,817	136,368	142,487	102,248	142,963	159,053	114,023	143,268
Tier II	421,159	257,162	361,233	281,080	245,915	310,897	323,049	271,173	323,659	348,282	296,023	329,906
Tier I	875,044	717,211	868,156	798,352	738,508	838,093	845,282	782,812	849,248	854,387	826,252	848,125
Total	2,218,504	1,494,482	1,982,680	1,680,002	1,558,632	1,846,519	1,894,092	1,699,624	1,886,631	1,965,121	1,784,031	1,907,392

Table 4-9: FY 2015 Potable Water Sales and Peaking Characteristics

Potable Sales	Max Month (Oct 2014)	Average Month for FY 2015	Peaking Factor
	A	B	C = A / B
Residential	**1,546,140**	**1,264,253**	**1.22**
Tier I	875,044	820,123	1.07
Tier II	421,159	314,128	1.34
Tier III	249,937	130,002	1.92
Non Residential	**672,364**	**562,223**	**1.20**
Total	**2,218,504**	**1,826,476**	**1.21**

Figure 4-4: FY 2015 RW Peaking Characteristics for Peaking Users

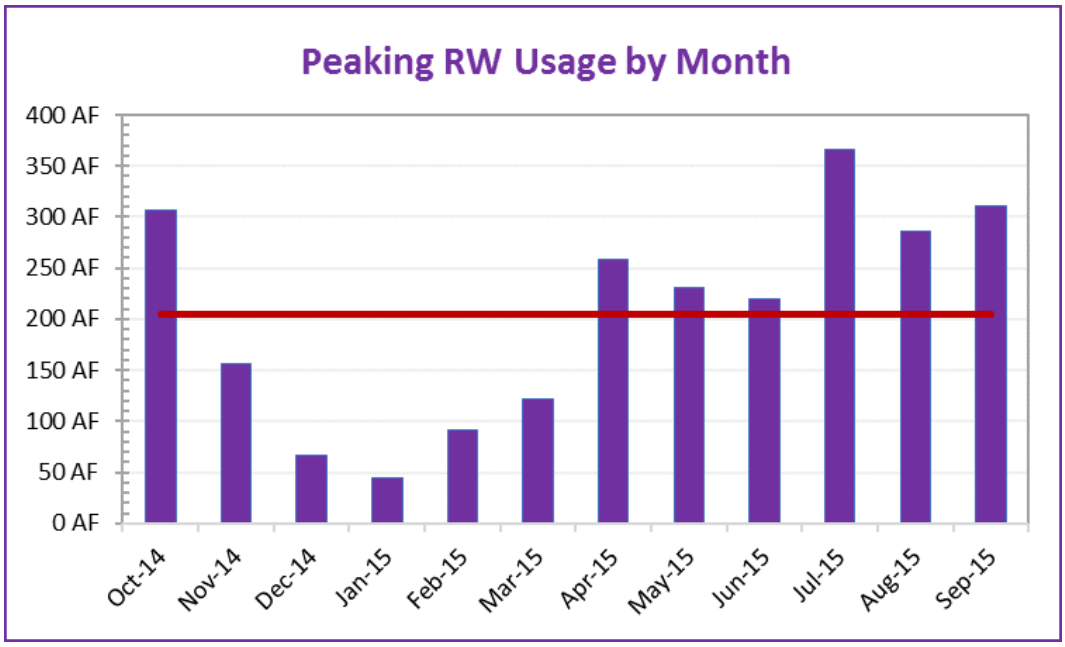


Table 4-10: FY 2015 Recycled Water Sales and Peaking Characteristics

Recycled Water Sales	Max Month (July 2015)	Average Month for FY 2015	Peaking Factor
Customer Class	A	B	C = A / B
Peaking	336 AF	205 AF	**1.79**
Non-Peaking			**1.00**
Interruptible			**1.00**

Table 4-11: Projected FY 2017 Potable Water Sales under Proposed Tier Definitions

	Potable Sales	Usage Distribution	FY 2017 Projected Sales Under Proposed Tiers (CCF)	Notes
		A	B	
1	**Residential**		**15,171,032**	*Table 2-3*
2	Tier IA	0.5%	82,306	*B1 x A2*
3	Tier IB	64.3%	9,759,164	*B1 x A3*
4	Tier II	24.8%	3,769,538	*B1 x A4*
5	Tier III	10.3%	1,560,024	*B1 x A5*
6	**Non Residential**		**7,046,540**	*Table 2-3*
7	**Total**		**22,217,572**	**[1] + [6]**

peak 1.79x in July 2015 compare to average month in FY 2015. Non-peaking and interruptible peaking factors are set at 1.00 by default. Non-peaking customers by definition have relatively flat consumption patterns throughout the year and LBWD shall have the right to reclassify the customers to peaking class from water consumption audits if peaking behavior is observed. Interruptible customers are the first customer group subject to interruption of service during shortage and/or peak usage exceeding the RW production.

Table 4-11 shows the projected FY 2017 water sales under proposed tier definitions using the usage distribution in tiers obtained from the water usage analysis for residential customers. The following information is used for the rate development in Section 6.2 of the Report.

EXEMPTION PROGRAM **REVISIONS**

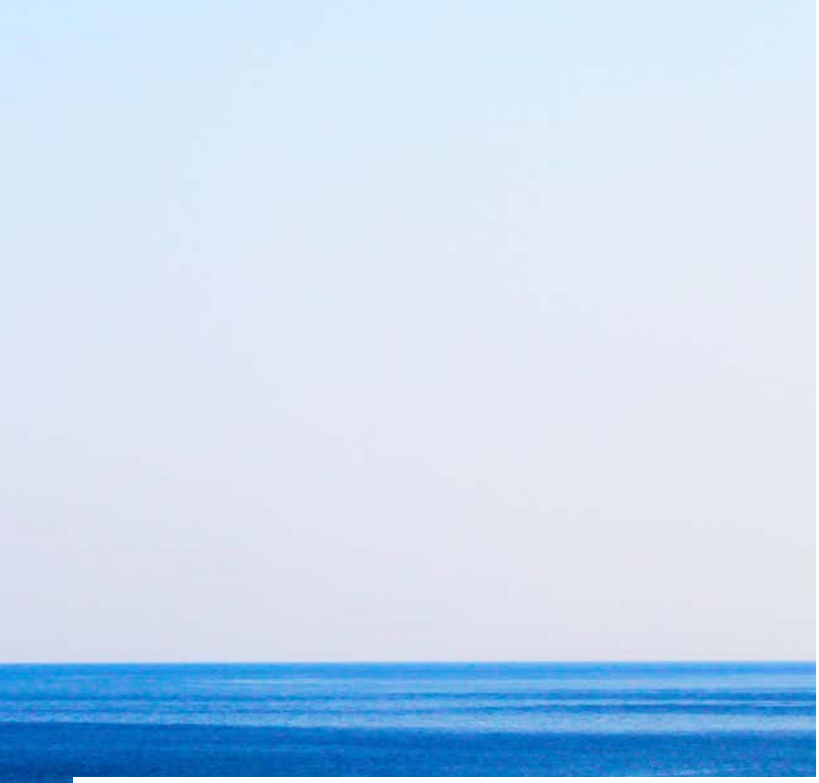
5.1 - CURRENT EXEMPTION PROGRAM FOR ELIGIBLE CUSTOMERS

In the current water rate resolution (Resolution No. WD-1357), residential customers who have been granted an exemption from the City's Utility Users Tax in accordance with Chapter 3.68 of the Long Beach Municipal Code, eligible customers or customers granted exemption, pay a discounted Tier IA rate (50% of Tier II rate) for their Tier I usage instead of Tier IB rate (90% of Tier II rate) and have their total sewer bill waived, including both daily sewer service charges and volumetric rates. Eligible customers from the Exemption Program include:

- Low income senior: customers must be at least 62 years of age and meet certain income requirements
- Low-Income Disabled: Customers who have a qualifying disability as defined in Section 223 of the Social Security Act (42 U.S.C. 423) and Section 102(b)(5) of the Developmentally Disabled Assistance and Bill of Rights Act [42 U.S.C. 6001(7)], and meet income requirements.

5.2 - RECOMMENDATIONS

The LBWD Board of Water Commission commits to continue the Exemption Program to provide affordability for essential water use for eligible customers in needs in conjunction with the City of Long Beach Utility Users Tax Exemption Program. Based on cost of service principles, cross subsidy between enterprises and customers are restricted and revenues from rates should not be used for any other purpose except



THE LBWD BOARD OF WATER COMMISSION COMMITS TO CONTINUE THE EXEMPTION PROGRAM TO **PROVIDE AFFORDABILITY FOR ESSENTIAL WATER USE** FOR ELIGIBLE CUSTOMERS IN NEEDS IN CONJUNCTION WITH THE CITY OF LONG BEACH UTILITY USERS TAX EXEMPTION PROGRAM.

Table 5-1: Rental Income Required to Support the Exemption Program for Water

		Unit $	Qualified Units	Total Rental Income Required for the Program
		A	B	C = A x B
1	Bill Credit	$5.00 / monthly bill	1,448 accounts or 17,376 bills	$86,880
2	Tier IA Revenue Offset	$1.995/CCF[12]	82,306 CCF[13]	$209,714
3	**Total**			**$296,594**

recovering the costs of providing the rendered services. Based on review of unrestricted and qualified funding sources available for the Exemption Program for Water and Sewer Funds, the Water Fund has rental income qualified to be used to support the Program whereas the Sewer Fund does not have any non-rate unrestricted revenues. RFC and LBWD staff recommend the following changes:

- Eligible customers will pay full sewer bills similar to all residential customers including daily sewer service charges and volumetric charges;
- Eligible customers will have their usage charge in Tier I waived (Tier IA = $0)
  - Eligible Users will pay daily water service charges and Tier II and Tier III usage rates like all residential customers
- Eligible customers will receive $5 credit on their water bills in FY 2017 to help transition from the old program. LBWD reserves the right to review the continuation or revision of this bill credit annually based on the projected rental income.

Table 5-1 illustrates the estimated rental income required to support the Exemption Program, based on 2017 projected sales in Tier IA and FY 2015 consumption profiles and number of water accounts qualified for the Exemption Program.

[12] Include water supply and delivery rate components. See Section 6.2 for water supply and delivery rates calculations.

[13] Estimated by FY 2015 Residential usage, 0.543% of Residential sales are eligible for Tier IA rate

WATER COST OF SERVICE AND RATES

6.1 - WATER COST OF SERVICE ANALYSIS

This Rate Study conforms to the principles set forth in the enabling statutes and the rates abide by the cost-of-service provisions of Proposition 218.

6.1.1 - PROPORTIONALITY

Demonstrating proportionality when calculating rates is a critical component of ensuring compliance with Proposition 218. For costs that are recovered through the agency's proposed fixed meter charge, the Study spread the costs either over all accounts or by meter size, depending on the type of expense. As such, customer classes and usage are not considered nor necessary for calculating each customer's fixed charge. Conversely, costs that are determined as variable are allocated among customer classes based on their demand on the system. As stated in the *M1 Manual*, the AWWA Rates and Charges Subcommittee agree with the Proposition 218 that "the costs of water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers." The agency's revenue requirements are, by definition, the cost of providing service. This cost is then used as the basis to develop unit costs for the water components and to allocate costs to the various customer classes in proportion to the water services rendered.

Individual customer demands vary depending on the nature of the use at the location where service is provided. For example, water service demand for a family residing in a typical single-family home is different than the water service demand for an irrigation customer, primarily due to peak use behavior which drives the need for and costs of sizing infrastructure to meet this demand. The concept of proportionality requires that cost allocations consider both the average quantity of water consumed (base) and the peak rate at which it is consumed (peaking). A water system is designed to meet peak demands. The additional costs associated with designing, constructing and maintaining facilities to meet these peak demands must be allocated to those customers whose usage requires facilities to upsize in response to peak demand.

In allocating the costs of service, the industry standard as promulgated by AWWA's *M1 Manual* is to group customers with similar system needs and demands into customer classes. Rates are then developed for each customer class, with each individual customer paying the customer class' average allocated cost of service.

Generally speaking, customers place the following demands on the water system and water supplies:

- The system capacity[14] (for treatment, storage, and distribution) that must be maintained to provide reliable service to all customers at all times
- The level of water efficiency as a collective group
- The number of customers requiring customer services such as bill processing, customer service support, and other administrative services

A customer class consists of a group of customers, with common characteristics, who share responsibility for certain costs incurred by the utility. Joint costs are proportionately shared among all customers in the system based

[14] *System capacity is the system's ability to supply water to all delivery points at the time when demanded. The time of greatest demand is known as peak demand.*

Figure 6-1: Cost of Service Process

on their service requirements; some specific costs, such as pumping charges, are borne by a subgroup of customers based on the characteristics of that group alone (i.e. elevation zone).

6.1.2 - WATER COST OF SERVICE ANALYSIS

A cost of service analysis distributes a utility's revenue requirements (costs) to each customer class. Figure 6-1 provides a general overview of a cost-of-service analysis. Each step shown below will be described in greater detail in the subsections below.

6.1.2.1 - Step 1 – Determine Revenue Requirement

In this Study, water rates are calculated for FY 2017 (known as the Test Year), by calculating water purchase costs and by using LBWD's FY 2017 budget. Test Year revenue requirements are used in the cost allocation process. According to Government Code 54999.7(c), LBWD should review the cost of service analysis at least once every five to ten years to ensure that the rates are consistent with the costs of providing service.

The revenue requirement determination is based upon the premise that the utility must generate annual revenues to meet O&M expenses, any debt service needs, reserve funding to achieve target levels, and capital investment needs. Revenues from sources other than water rates and charges (e.g. revenues from miscellaneous services) are deducted from the rate revenue requirement. FY 2017 revenues from rates to be recovered from the LBWD's water customers are calculated in Table 6-1. The Water Fund currently has 2 debts: Series 2010 Bonds and Series 2012 Bonds with total principal and interest payments in FY 2017 of $2.99M and $902K, respectively. Capital replacement projects estimated / budgeted by LBWD is $12.588M, of which $3.73M is estimated to be funded from capital reserves for FY 2017. Revenue requirements including O&M expenses, debt service and capital project expenditures, total to $98.2M. Other operating revenues include unmetered water sales from construction sales and water reimbursement of imported water purchase for Vander Lans facility.[15] Non-operating revenues include interest income, rental income, service connection, grants, other reimbursements, and other miscellaneous non-operating revenues. Other reimbursements include reimbursements received from MWD for the LBWD's Lawn-to-Garden Conservation Incentive Program and the reimbursement of the O&M costs of Vander Lans facility.[16] Grants are non-recur-

[15] Since Oct 1, 2005, LBWD through a contract with WRD has operated the Leo J. Vander Lans Advanced Water Treatment Facility, which enables WRD to use recycled water from the Long Beach Water Reclamation Plant to replace imported MWD water previously supplied to the Alamitos Barrier. In 2015, the Vander Lans facility expansion was completed, providing the operation flexibility to meet the needs of the barrier almost completely with recycled water and minimize imported water needs. The Alamitos Barrier is an engineered freshwater pressure ridge and seawater trough constructed to prevent seawater instruction into the Central Groundwater Basin of Los Angeles County and neighboring Orange County Groundwater Basin. (according the LBWD CAFR 2015)

[16] Includes 100% of labor costs, 75% of Power, chemical and other treatment reclaimed distribution costs incurred in the LBWD's Treatment Reclaimed Distribution cost center along with reimbursement from WRD of RW raw water used at the Vander Lans facility at $100/AF.

Table 6-1: Revenue Requirement from Water and Recycled Water Rates for FY 2017

	CURRENT REVENUE REQUIREMENTS	FY 2017	Sources / Notes
1	**REVENUE REQUIREMENTS**		
2	O&M Expenses	$85,471,436	*From Fund 310 Operating Budget*
3	Debt Service	$3,894,775	*Water debt service schedules for Series 2010 and 2012 Bonds*
4	Capital Replacement Projects	$12,588,000	*From Water Fund Project Cost Estimated provided by LBWD staff for FY 2017*
5	Reserve Funding	-$3,728,992	*Amount of reserve used to fund capital replacement projects for FY 2017*[17]
6	**SUBTOTAL REVENUE REQUIREMENTS**	**$98,225,219**	*Sum rows 2 to row 5*
7			
8	***Less Other Revenues***		
9	Other Operating Revenues	$1,094,927	*From Fund 310 Operating Budget*
10	**Non-Operating Revenues**		
11	Interest	$75,705	*From Fund 310 Operating Budget*
12	Rental Income	$1,024,900	*From Fund 310 Operating Budget*
13	Service Connection	$305,000	*From Fund 310 Operating Budget*
14	Grants	$750,000	*From Fund 310 Operating Budget*
15	Other Reimbursement	$4,224,488	*From Fund 310 Operating Budget*
16	Other Non-Operating Revenues	$53,740	*From Fund 310 Operating Budget*
17			
18	**SUBTOTAL NON-OPERATING REVENUES**	**$7,528,760**	*Sum rows 9 to row 14*
19			
20	**NET REVENUE REQUIREMENTS FROM RATES**	**$90,696,459**	***Row [6] – Row [18]***

ring cash receipts from qualifying federal programs. All non-rate revenues total $7.5M. Total revenue requirements from rates in FY 2017 are net at $90.7M as shown in Table 6-1, which is the same as revenues from current rates shown in Table 2-4.

6.1.2.2 - Step 2 – Functionalize Costs and Allocate Functionalized Costs to Cost Causation Categories

To derive the cost to serve each customer class, costs first need to be functionalized. This step involves the arrangement of overall costs into various functions. The water utility costs are categorized into the following functions:

- **Potable water supply** – direct water supply costs to produce potable water before distributing to customers, including power costs for treatment and pumping from groundwater wells, chemical costs, water pump tax from WRD, and costs of purchasing water from City

[17] *This is amount reserve needed to be used in FY 2017 to fully fund capital expenditures under the revenues from current rates.*

of Lakewood and MWD

- **Production Plant and Source of Supply** – operating and capital costs associated with production facilities to produce water
- **Treatment** – costs associated with treating water to potable water standards, excluding power and chemical costs
- **Transmission** – costs associated with transporting water from the point of treatment through a major trunk to locations within the distribution systems
- **Distribution** – costs associated with the smaller local service distribution mains transporting water to specific locations within the service area
- **Storage** – costs associated with water storage within the distribution or transmission systems
- **Pumping** – cost associated with pumping water from the treatment facilities to the transmission and distribution systems
- **Fire protection** – costs associated with installing and maintaining fire hydrants
- **Meter service** – costs associated with providing customer water meters and associated with testing and replacements
- **General & Administrative** – represents all other costs that do not serve a specific function
- **Billing and customer service** – billing costs including meter reading, billing and collection costs associated with preparing a water customer bill and processing funds received from water users. Customer service costs include costs associated with administering customer accounts such as processing complaints, responding to customer inquiries, performing

Table 6-2: FY 2016 Functionalized O&M Costs

Functions	FY 2017 O&M Costs
Potable Water Supply	$36,596,215
Production Plant	$4,798,328
Treatment	$7,824,925
Transmission (T)	$8,692,558
Distribution (D)	$1,779,447
Meter Services	$2,095,742
Gen & Admin	$14,370,962
Billing	$1,390,162
Customer Service	$2,453,301
Conservation	$2,807,270
Capitalized Costs	-$800,000
RW Average Demand	$3,462,526
Total	**$85,471,436**

Table 6-3: FY 2016 Functionalized Fixed Asset Values

Functions	FY 2017 Replacement Costs for Fixed Asset As of 9/30/2015
Source of Supply	$37,740,655
Treatment	$125,392,118
Transmission (T)	$26,711,702
Distribution (D)	$278,090,268
Storage	$70,008,952
Pumping	$3,402,747
Fire Protection	$20,053,958
Meter Services	$102,178,335
Gen & Admin	$133,371,142
Billing	
Customer Service	$1,630,089
Conservation	
RW Storage	$371,216
RW Distribution	$77,970,327
Total	**$876,921,507**

rereads, etc.

- **Conservation** – costs associated with conservation programs and services offered to LBWD customers
- **Capitalized costs** – capitalized interest expenses of debt service financing capital replacement projects
- **RW average demand** – costs associated with meeting average day RW demands

Working closely with LBWD staff, RFC reviewed and functionalized LBWD's O&M expenses and asset list for the water and recycled water systems. Table 6-2 summarizes the functionalized O&M costs for LBWD for Water Fund (Fund 310) for test year FY 2017. Table 6-3 shows the fixed asset values of the Water Fund using replacement costs. To reduce rate variability from year to year, allocation of fixed assets to cost causations is used for the approximation of long-term cost of capital to be used for allocating capital related costs of the revenue requirements. Replacement costs, escalated from original costs to current dollars using Engineering News Record – Construction Cost Index (ENR CCI) of Los Angeles, consider changes in the value of money over time, and thus provide more consistent allocation of costs.

RFC used the Base-Extra Capacity method, as described in the AWWA *M1 Manual*, which consists of a number of cost causation components. Functionalization of costs allows for better allocation of costs to the cost causation components, which include:

- **Water Supply Costs** are direct costs incurred to produce or purchase water
- **Base Costs** are the operating and capital costs of the water system associated with serving customers at a constant, or average, rate of use.
- **Extra Capacity Costs** or peaking costs represent the costs incurred to meet customer peak demands for water in

excess of average day usage. Total extra capacity costs are subdivided into costs associated with maximum day and maximum hour demands. The maximum day demand is the maximum amount of water used in a single day in a year. The maximum hour **(Max Hour)** demand is the maximum usage in an hour on the maximum usage day **(Max Day)**. Various facilities are designed to meet customer peaking needs. For example, transmission lines or reservoirs (storage) are designed to meet Max Day requirements. Both have to be designed larger than they would be if the same amount of water were being used at a constant rate throughout the year. The cost associated with constructing a larger line or reservoir is based on system wide peaking factors. For example, if the Max Day factor is 2.0, then certain system facilities have to be designed at least twice as large as required to meet average daily demand. In this case, half of the cost would be allocated to Base (or average day demand) and the other half allocated to Max Day. The calculation of the Max Hour and Max Day demands is explained below.

- **Customer Service Related Costs** include such costs as meter reading, billing, collecting, and customer accounting.
- **Meter Costs** or meter service costs include maintenance and capital costs associated with servicing meters. These costs are assigned based on meter size or equivalent meter capacity.
- **Fire Protection** includes proportional costs to provide fire protection capacity
- **Conservation** includes costs associated with conservation programs and service offered for LBWD customers
- **Revenue Offset** includes non-rate revenues that can be used to provide affordability for essential use and other affordability programs

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[18] 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 COS analyses.

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. The system-wide peaking factors are used to derive the cost component allocation bases (i.e., percentages). Functionalized expenses are then allocated to the cost causation 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.

The base demand is assigned a value of 1.0, which signifies no peaking demands. The Max Day and Max Hour values shown in Table 6-4 and Table 6-5 are calculated by dividing the max day or max hour demand in million gallons per day (MGD) by the average demand in million gallons per day. The max day peaking factor of 1.40 means that the system delivers 1.40 times the amount of water it does during an average day.

To determine the relative proportion of costs to assign to Supply, Base Delivery, Maximum Day, and Maximum Hour, allocations are calculated based on these factors. Cost components that are solely related to providing average day demand (ADD), are allocated entirely to Base Fixed. Cost components that are designed to meet Max Day peaks, such as reservoirs and transmission facilities, are allocated to both Base and Max Day factors.

The Max Day factor of the LBWD's system is 1.40, which means that Max Day demand is expected to be 140 percent of the average day capacity. Calculating the Max Day allocation of functional costs to the cost causation components results in the equation at the top of the following page.

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

Table 6-4: Potable Water System Peaking Demand

	Potable Water	Calendar Year 2014	Peaking Factors	Notes
1	Average Day Demand	51.27 MGD	1.00	[1] / [1]
2	Max Day Demand	71.96 MGD	1.40	[2] / [1]
3	Peak Hour Demand	127.49 MGD	2.49	[3] / [1]

Table 6-5: Recycled Water System Peaking Demand

	Recycled Water	Calendar Year 2014	Peaking Factors	Notes
1	Average Day Demand	5.28 MGD	1.00	[1] / [1]
2	Max Day Demand	13.30 MGD	2.52	[2] / [1]
3	Peak Hour Demand	25.87 MGD	4.90	[3] / [1]

$$\text{Base Fixed Allocation} = \frac{\text{Base Fixed}}{\text{Max Day}} = \frac{1}{1.40} \approx 71.2\%$$

$$\text{Max Day Allocation} = 1 - \text{Base/Max Day} \approx 28.8\%$$

Facilities designed for Max Hour peaks, such as distribution system facilities, are allocated similarly. The Max Hour factor is 3.38, so Max Hour facilities are designed to provide 338 percent of the average day capacity. The allocation of Max Hour facilities is shown below.

The results of the allocation are presented below. These percentages are then applied to the operating and capital improvement expenses to allocate costs amongst Base, Max Day, and Max Hour cost components. The factors shown below are taken from Table 6-4 and Table 6-5 above.

Water system infrastructure is designed to meet peak demand plus fire protection. To appropriately allocate cost to cost causation categories for functional costs which have fire protection function, such as storage, distribution, pumping, fire protection requirement is needed. Based on fire demand estimates provided by LBWD staff shown in Table 6-7, 20.7% of the water system capacity is reserved for

$$\text{Base Fixed Allocation} = \frac{\text{Base}}{\text{Max Hour}} = \frac{1}{2.49} \approx 40.2\%$$

$$\text{Max Day Allocation} = \frac{\text{Max Day - Base}}{\text{Max Hour}} = \frac{1.40 - 1.00}{2.49} \approx 16.2\%$$

$$\text{Max Hour Allocation} = 1 - 40.2\% - 16.2\% \approx 43.6\%$$

Table 6-6: Allocation of Extra Capacity Functional Costs to Cost Categories

Functional Cost	2014 Production	Peaking Factors	Base Fixed Allocation	Max Day Allocation	Max Hour Allocation	RW Base Fixed	RW Max Day	RW Max Hour
Water								
Average Day	51.27 MGD	1.00	100.0%					
Max Day	71.96 MGD	1.40	71.2%	28.8%				
Peak Hour	127.49 MGD	2.49	40.2%	16.2%	43.6%			
Recycled Water								
Average Day	5.28 MGD	1.00				100.0%		
Max Day	13.30 MGD	2.52				39.7%	60.3%	
Peak Hour	25.87 MGD	4.90				20.4%	31.0%	48.6%

Table 6-7: Fire Protection Requirements

	Potable Water		Notes
1	Fire Demand	18.81 MGD	*Estimated for population of 500,000[19] - see Appendix 9.4 for details*
2	Max Day Demand	71.96 MGD	*Table 6-4*
3	Fire Protection %	20.7%	*[1] / [2]*

fire protection demand. Therefore, storage, transmission, and distribution costs will have 20.7% allocated to fire protection cost categories.

Table 6-8 summarizes the allocation of functional water costs to cost causation categories. All treated groundwater (61.7%) and purchased water (38.3%) are blended in storage tanks to be used for all water needs including fire protection. Groundwater requires pumping, whereas purchased water does not incur any pumping costs. Thus 61.7% of water in storage tanks has pumping and treatment costs, that is also used for fire protection (20.7% of the system costs), thus 12.8% of pumping and treatment costs are allocated to fire protection. 79.3% of storage and transmission costs are used to meet max day potable demand, or 56.5% for base fixed (71.2% of 79.3%) and 22.8% for max day (28.8% of 79.3%). Similarly, 79.3% of distribution costs are used to meet max hour demand, or 31.9% for base fixed, 12.9% for max day and 34.5% for max hour.

Similarly, Table 6-9 summarizes the allocation of RW functional costs to RW supply, RW base fixed, RW max day and RW max hour cost causation categories.

Using the allocation factors from Table 6-8 and functional costs from Table 6-2, Table 6-10 summarizes the allocation of FY 2017 O&M expenses to cost categories and allocation percentage for operating related costs. Similarly, Table 6-11 summarizes the allocation of Water Fund fixed asset values (by replacement costs as of September 30, 2015) to cost categories and allocation percentage for capital related costs.

[19] *Using formulas by American Insurance Association, as provided by LBWD Staff*

Table 6-8: Allocation of Water Functional Costs to Cost Categories

Functions	Water Supply	Base Fixed	Max Day	Max Hour	Billing & CS	Meters & Services	Conser-vation	G&A	Fire Protection
Potable Supply	100.0%								
Production Plant		100.0%							
Storage		56.5%	22.8%	0.0%					20.7%
Pumping		62.1%	25.1%	0.0%					12.8%
Treatment		62.1%	25.1%	0.0%					12.8%
Transmission (T)		56.5%	22.8%	0.0%					20.7%
Distribution (D)		31.9%	12.9%	34.5%					20.7%
Source of Supply		100.0%	0.0%	0.0%					
Fire Protection									100%
Meter Services						100.0%			
Gen & Admin								100%	
Billing					100.0%				
Customer Service					100.0%				
Conservation							100%		

Table 6-9: Allocation of Recycled Water Functional Costs to Cost Categories

RW Functions	RW Supply	RW Base Fixed	RW Max Day	RW Max Hour
RW Average Demand		100.0%		
RW Supply	100.0%			
RW Storage		39.7%	60.3%	0.0%
RW Pumping		20.4%	31.0%	48.6%
RW Treatment		39.7%	60.3%	0.0%
RW Distribution		20.4%	31.0%	48.6%

Table 6-10: Results of O&M Cost Allocations

Cost Categories	FY 2017 O&M	Allocation Factors
Water Supply	$36,596,215	42.8%
Base Fixed	$14,898,581	17.4%
Max Day	$4,089,850	4.8%
Max Hour	$526,822	0.6%
Billing & Customer Service	$3,841,976	4.5%
Meters & Services	$2,002,527	2.3%
Conservation	$2,807,270	3.3%
Rev Offsets	$0	0.0%
General	$14,249,290	16.7%
Fire Protection	$3,067,850	3.6%
RW Supply	$0	0.0%
RW Base Fixed	$3,447,874	4.0%
RW Max Day	-$22,256	0.0%
RW Max Hour	-$34,562	0.0%
Total	**$85,471,436**	**100.0%**

Table 6-11: Results of Asset Value Cost Allocations

Cost Categories	RC Asset Value	Allocation Factors
Water Supply	$0	0.0%
Base Fixed	$261,041,906	29.8%
Max Day	$90,113,183	10.3%
Max Hour	$96,020,998	10.9%
Billing & Customer Service	$1,630,089	0.2%
Meters & Services	$102,178,335	11.7%
Conservation	$0	0.0%
Rev Offsets	$0	0.0%
General	$133,371,142	15.2%
Fire Protection	$114,224,311	13.0%
RW Supply	$0	0.0%
RW Base Fixed	$16,060,912	1.8%
RW Max Day	$24,395,551	2.8%
RW Max Hour	$37,885,079	4.3%
Total	**$876,921,507**	

6.1.2.3 - Step 3 – Allocation of Revenue Requirements to Cost Causation Categories

Table 6-12 shows the total revenue requirement for each cost category defined in Table 6-1. Note that debt service, capital replacement, reserve funding, and certain non-operating revenues are considered capital revenue requirements.

Table 6-13 details the result of allocating the various revenue requirements to the aforementioned cost categories. For more detailed calculations, see Appendix 9.8.

General costs are reallocated to all cost categories, excluding water supply, conservation and revenue offsets, are shown in Table 6-14.

Table 6-15 lists and illustrates the calculation of fire capacity for public and private fire protection. According to the *M1 Manual*, fire capacity is equal the port size to the power of 2.63. 6" fire hydrants include two 2-inch and one 4-inch ports with 50.70 equivalent fire capacity, whereas 8" fire hydrants include two 2-inch and one 6-inch ports with equivalent fire capacity of 123.69. The fire protection

Table 6-12: Revenue Requirements and Allocation Factors

	CURRENT REVENUE REQUIREMENTS	FY 2017	Allocation Factors
1	**REVENUE REQUIREMENTS**		
2	O&M Expenses	$85,471,436	*Table 6-10*
3	Debt Service	$3,894,775	*Table* 6-11
4	Capital Replacement Projects	$12,588,000	*Table* 6-11
5	Reserve Funding	-$3,728,992	*Table* 6-11
6	**SUBTOTAL REVENUE REQUIREMENTS**	**$98,225,219**	
7			
8	***Less Other Revenues***		
9	Other Operating Revenues	$1,094,927	*100% to General*
10	**Non-Operating Revenues**		
11	Interest	$75,705	*100% to General*
12	Rental Income	$1,024,900	*100% to Revenue Offset*
13	Service Connection	$305,000	*Table* 6-11
14	Grants	$750,000	*Table* 6-11
15	Other Reimbursement	$4,224,488	*100% to General*
16	Other Non-Operating Revenues	$53,740	*100% to General*
17			
18	**SUBTOTAL NON-OPERATING REVENUES**	**$7,528,760**	
19			
20	**NET REVENUE REQUIREMENTS FROM RATES**	**$90,696,459**	

Table 6-13: Net Revenues from Rates Allocated to Cost Causation Categories

	Cost Categories	FY 2017 Net Revenues from Rates
1	Water Supply	$36,596,215
2	Base Fixed	$18,381,073
3	Max Day	$5,292,026
4	Max Hour	$1,807,813
5	Billing & Customer Service	$3,863,722
6	Meters & Services	$3,365,662
7	Conservation	$2,807,270
8	Rev Offsets	-$1,024,900
9	General	$10,579,700
10	Fire Protection	$4,591,686
11	RW Supply	$0
12	RW Base Fixed	$3,662,139
13	RW Max Day	$303,199
14	RW Max Hour	$470,853
15	**Total**	**$90,696,459**

Table 6-14: General Cost Reallocation

	Cost Categories	FY 2017 Net Revenues from Rates	General Cost Reallocation		
			Net Rev	%	Allocated
		A	B	C = B / B15	D = A9 x C
1	Water Supply	$36,596,215	N/A		
2	Base Fixed	$18,381,073	$18,381,073	49.5%	$5,235,118
3	Max Day	$5,292,026	$5,292,026	14.2%	$1,507,223
4	Max Hour	$1,807,813	$1,807,813	4.9%	$514,884
5	Billing & Customer Service	$3,863,722	$3,863,722	10.4%	$1,100,428
6	Meters & Services	$3,365,662	$3,365,662	9.1%	$958,575
7	Conservation	$2,807,270	N/A		
8	Rev Offsets	-$1,024,900	N/A		
9	General	$10,579,700	N/A		
10	Fire Protection	$4,591,686	N/A		
11	RW Supply	$0	N/A		
12	RW Base Fixed	$3,662,139	$3,662,139	9.9%	$1,043,015
13	RW Max Day	$303,199	$303,199	0.8%	$86,354
14	RW Max Hour	$470,853	$470,853	1.3%	$134,104
15	**Total**	**$90,696,459**	**$37,146,488**	**100%**	**$10,579,700**

Table 6-15: FY 2017 Fire Protection Capacity

	Port Size (inch)	Fire Capacity by Port Size[20]	6" Fire Hydrant (2 x 2-in + 1x4-in)	8" Fire Hydrant (2 x 2-in + 1 x 6-in)	# of Private Fireline	Private Fireline Fire Capacity
	A	B	C	D	E	F = B x E
1	2	6.19	12.38	12.38	61	378
2	3	17.98			51	917
3	4	38.32	38.32		351	13,450
4	6	111.31		111.31	415	46,194
5	8	237.21			261	61,911
6	10	426.58			55	23,462
7	12	689.04			3	2,067
8	16	1,468.37			2	2,937
9		**Fire Capacity**	**50.70**	**123.69**	**1,199**	**151,315**
10		Public Fire Hydrants	6,888	3		
11		Public Fire Demand	349,220	372		
12		Private Fire Hydrants	490			
13		Private Fire Capacity[21]	24,843			**151,315**
14		**Total Fire Capacity [11] + [13]**	**374,063**	**371**		**151,315**

system includes 6,888 6" public fire hydrants and three 8" public fire hydrants, 490 6" private fire hydrants and 1,199 private fire-line services with varied port size. Total public fire protection capacity is equal to 349,592 equivalent units and private fire protection capacity is equal to 176,518 equivalent units as shown in Table 6-16. About 66.5% of fire protection for LBWD's water system is reserved for public fire protection, which is reallocated to all benefiting customers within the service area (shown in Table 6-17) and the remaining 33.5% of fire protection costs represents the private fire protection costs, to be paid for by customers who have a private fire service meter. Public fire protection (i.e. hydrants) costs are related to the capacity of water system that is allocated to providing fire protection, not the actual costs of putting out fires.

Table 6-18 summarizes the results from Table 6-13, Table 6-14 and Table 6-17 to show the revenues from rates after general and public fire protection cost reallocation. Table 6-19 shows the summary of revenue requirements by cost categories to be recovered from water and RW rates.

6.1.2.4 - Step 4 – Cost Allocations to Rate Components

According to the *M1 Manual*, the cost-of-service approach to setting water rates results in the proportionate distribution of costs to each customer or

[20] *AWWA M1 Manual, Fire Demand = Port Size^2.63*

[21] *Private Fire Hydrant Demand = 490 6-in hydrants x 50.70 = 24,843*

Table 6-16: Public and Private Fire Protection Capacity

	Fire Capacity (Table 6-15)	% of Total Fire Capacity	Notes
Public Fire	349,592	66.5%	6,888 6-in x 50.70 + 3 8-in x 123.69
Private Fire	176,518	33.5%	Sum Row 13 in Table 6-15
Total Fire Capacity	**525,750**		

Table 6-17: Public Protection Cost Reallocation

	Cost Categories	FY 2017 Net Revenues from Rates	Public Protection Cost Reallocation		
			Net Rev	%	Allocated
		A	*B*	*C = B / B15*	*D = 66.5% xA10 x C*
1	Water Supply	$36,596,215	N/A		
2	Base Fixed	$18,381,073	$18,381,073	84.5%	$2,580,660
3	Max Day	$5,292,026	N/A		
4	Max Hour	$1,807,813	N/A		
5	Billing & Customer Service	$3,863,722	N/A		
6	Meters & Services	$3,365,662	$3,365,662	15.5%	$472,531
7	Conservation	$2,807,270	N/A		
8	Rev Offsets	-$1,024,900	N/A		
9	General	$10,579,700	N/A		
10	Fire Protection	$4,591,686	N/A		
11	RW Supply	$0	N/A		
12	RW Base Fixed	$3,662,139	N/A		
13	RW Max Day	$303,199	N/A		
14	RW Max Hour	$470,853	N/A		
15	**Total**	**$90,696,459**	**$21,746,735**	**100%**	**$3,053,191**[22]

[22] *66.49% of $4.59M*

Table 6-18: Reallocated Revenue Requirements

	Cost Categories	FY 2017 Net Revenues from Rates	General Cost Reallocation	Public Fire Protection Reallocation	Reallocated Net Revenues from Rates
		A	*B (Table 6-14)*	*C (Table 6-17)*	*D = A +B + C*
1	Water Supply	$36,596,215			$36,596,215
2	Base Fixed	$18,381,073	$5,235,118	$2,580,660	$26,196,851
3	Max Day	$5,292,026	$1,507,223		$6,799,249
4	Max Hour	$1,807,813	$514,884		$2,322,697
5	Billing & Customer Service	$3,863,722	$1,100,428		$4,964,150
6	Meters & Services	$3,365,662	$958,575	$472,531	$4,796,767
7	Conservation	$2,807,270			$2,807,270
8	Rev Offsets	-$1,024,900			-$1,024,900
9	General	$10,579,700	-$10,579,700		$0
10	Fire Protection	$4,591,686		-$3,055,191	$1,538,496
11	RW Supply	$0			$0
12	RW Base Fixed	$3,662,139	$1,043,015		$4,705,153
13	RW Max Day	$303,199	$86,354		$389,553
14	RW Max Hour	$470,853	$134,104		$604,957
15	**Total**	**$90,696,459**			**$90,696,459**

Table 6-19: FY 2017 Revenue Requirements by Cost Category

	Cost Categories	FY 2017
	A	*B (Table 6-18)*
1	Water Supply	$36,596,215
2	Potable Base Fixed	$26,196,851
3	RW Base Fixed	$4,705,153
4	Potable Peaking (Max Day + Max Hour)	$9,121,946
5	RW Peaking (RW Max Day + RW Max Hour)	$994,510
6	Billing & Customer Service	$4,964,150
7	Meters & Services	$4,796,767
8	Conservation	$2,807,270
9	Rev Offsets	-$1,024,900
10	Private Fire Services	$1,538,496
11	**Total**	**$90,696,459**

Table 6-20: Cost Allocations to Rate Components

	Cost Categories	FY 2017	Daily Service Charges	Water Quantity Rates	RW Quantity Rates
	A	B (Table 6-19)	C	D	E
1	Water Supply	$36,596,215		$36,596,215	
2	Potable Base Fixed	$26,196,851	$13,334,197	$12,862,654	
3	RW Base Fixed	$4,705,153	$2,394,923		$2,310,230
4	Potable Peaking	$9,121,946		$9,121,946	
5	RW Peaking	$994,510			$994,510
6	Billing & Customer Service	$4,964,150	$4,964,150		
7	Meters & Services	$4,796,767	$4,796,767		
8	Conservation	$2,807,270		$2,807,270	
9	Rev Offsets	-$1,024,900		-$1,024,900	
10	Private Fire Services	$1,538,496	$1,538,496		
11	**Total**	**$90,696,459**	**$27,028,533**	**$60,363,185**	**$3,304,741**

customer class based on the proportional costs that each class incurs. A dual set of fees—fixed and variable—is an extension of this cost causation theory. The components of water system costs (Table 6-19) are recovered through either daily service charges, water quantity rates, RW quantity rates or a combination of the three. As shown in Table 6-20, the entirety of water supply costs is recovered from water quantity rates along with potable peaking costs, conservation program costs and revenue offsets. RW peaking costs are calculated under the RW peaking rate component of RW quantity rates. Billing and customer service along with meters and services costs are fixed service costs thus should be collected from daily service charges. Private fire services costs will be paid for by customers who have a private fire service meter under private fireline daily service charges. To provide revenue stability for LBWD, a portion of the potable and RW base fixed costs is allocated to daily service charges in order to collect approximately 30% of revenues from the fixed charges, increased from 26.4% at current rates. The remaining potable base fixed and RW base fixed costs are collected in the water and RW quantity rates, respectively. Table 6-21, Table 6-22 and Table 6-23 are derived from Table 6-20 based on rate components for fixed charges, water quantity rates and RW quantity rates.

The fixed service charges consist of three components: billing and customer service, services & capacity and private fire demand totaling $27M in FY 2017 (Table 6-21), increased from $23.9M from current rates.

Water quantity rates are comprised of water supply costs, delivery, peaking, conservation and revenue offset rate components (Table 6-22). The water supply rate recovers direct water supply costs. The delivery rate collects the remaining water system fixed cost to deliver water to end users. The peaking rate collects the peaking costs of potable water system. The conservation rate reflects the conservation program costs from upper tiers to promote conservation from large users. The revenue offset rate is used to provide affordability for essential use. A portion of rental income is used to provide

Table 6-21: FY 2017 Fixed Service Charges Revenue Requirements

	Rate Components	Cost Categories	FY 2017	
	A	*B*	*C (Table 6-20)*	*D*
1	**Billing & Customer Service**	Billing & CS	$4,964,150	$4,964,150
2	**Services & Capacity**	Potable Base Fixed	$13,334,197	$20,525,887
3		RW Base Fixed	$2,394,923	
4		Meters & Services	$4,796,767	
5	**Private Fire Capacity**	Private Fire Services	$1,538,496	$1,538,496
6	**Total**	**29.8% Fixed**	**$27,028,533**	**$27,028,533**
7	**Current**	**26.4% Fixed**	**$23,924,625**	

Table 6-22: FY 2017 Water Quantity Rate Revenue Requirements

	Rate Components	Cost Categories	FY 2017
	A	*B*	*C (Table 6-20)*
1	**Water Supply**	Water Supply	$36,596,215
2	**Delivery**	Potable Base Fixed	$12,862,654
3	**Peaking**	Potable Peaking	$9,121,946
4	**Conservation**	Conservation	$2,807,270
5	**Revenue Offset**	Revenue Offset	-$1,024,900
6	**Total**	**66.6%**	**$60,363,185**
7	**Current**	**69.9%**	**$63,421,799**

Table 6-23: FY 2017 Recycled Water Quantity Rate Revenue Requirements

	Rate Components	Cost Categories	FY 2017
	A	*B*	*C (Table 6-20)*
1	**Delivery**	RW Base Fixed	$2,310,230
2	**Peaking**	RW Peaking	$994,510
3	**Total**	**3.6% of Total Rev Req**	**$3,304,741**
4	**Current**	**3.7% of Total Rev Req**	**$3,350,035**

funding for the Exemption program as discussion in Section 5. The remaining rental income is reserved to provide affordability for Tier I, which represents basic and essential usage. As more water system costs are recovered through fixed charges (increased from $23.9M to $27M), less revenue is collected through water quantity rates (decrease from $63.4M to $60.4M).

RW quantity rates include two rate components, RW peaking and delivery rates, which recover $3.30M, a slight decrease from the current revenue of $3.35M, as shown in Table 6-23.

6.2 - DEVELOPMENT OF PROPOSED WATER RATES

6.2.1 - PROPOSED FIXED SERVICE CHARGES

There are three components that comprise the daily service charges: billing & customer service, services & capacity, and private fire services. This charge recognizes the fact that even when a customer does not use any water, LBWD incurs fixed costs in connection with the maintenance of the meters, the ability or readiness to serve each connection, and/or the billing services provided to each connection.

The services and capacity component collects capacity related costs. Capacity related costs can be allocated to the daily 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 "AWWA Meter Ratio" column D of Table 6-24. The ratios depict the potential flow through each meter size compared to the flow through a ¾" meter, which is the base meter size for this Study. For example, the flow through a 2" meter is approximately 5.33 times that of a ¾" meter. Similarly, according to AWWA *M1 Manual*, 3-inch fireline has 2.90 times more fire capacity than 2-inch fireline, as derived and noted in Table 6-25.

Table 6-24: AWWA Meter Capacity Ratios

Meter Size	Meter Types	AWWA Max Capacity[23]	AWWA Meter Ratios
A	*B*	*C*	*D = C / 30 gpm*
5/8" x 3/4"	Displacement	30 gpm	1.00
1"	Displacement	50 gpm	1.67
1 1/2"	Displacement	100 gpm	3.33
2"	Displacement	160 gpm	5.33
3"	Compound Type Class II	350 gpm	11.67
4"	Compound Type Class II	600 gpm	20.00
6"	Compound Type Class II	1,350 gpm	45.00
8"	Turbine Class II	2,800 gpm	93.33
10"	Turbine Class II	4,200 gpm	140.00
12"	Turbine Class II	5,300 gpm	176.67
16"	Turbine Class II	7,800 gpm	260.00

Table 6-25: Fire Protection Capacity Ratios

Port Size (inch)	Fire Protection Capacity by Port Size[24]	Fire Protection Capacity Ratio
A	B	C = B /6.19
2	6.19	1.00
3	17.98	2.90
4	38.32	6.19
6	111.31	17.98
8	237.21	38.32
10	426.58	68.91
12	689.04	111.31
16	1,468.37	237.21

[23] Safe maximum operating capacity (AWWA M1 Manual Exhibit B, Table B-1)

[24] AWWA M1 Manual, Fire Capacity = Port Size^2.63

Table 6-26 summarizes the projected number of water and RW accounts and private fireline services in FY 2017 and illustrates the calculations for equivalent units of service for each fixed service charge component. LBWD bills customer on monthly basis, thus 89,475 (88,275 +1,199) accounts are equivalent to 1,073,688 monthly bills. The billing and customer service component recovers costs associated with meter reading, customer billing and collection, and 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 for a larger meter.

Table 6-27 illustrates the development of unit service charges (line 4) for each charge component by dividing the revenue requirements (from Table 6-20) to the number of equivalent bills/meters per year (from Table 6-26).

The monthly fixed service charges for water and RW services for FY 2017 are shown in Table 6-28 along with daily service charges and comparison with current daily service charges (columns F & G). The services and capacity component for all larger meters with a meter ratio larger than 1 is scaled up using the AWWA capacity ratios shown in the "Services and Capacity Meter Ratios" column A of Table 6-28. For example, the 2" meter has a meter ratio of 5.33 and therefore has a meter capacity component

Table 6-26: Units of Services for Fixed Charges Components

Meter Size	# of Water & RW Accts	# of Private Fireline	Meter Ratios			Units of Service (EMU / yr)		
			Billing & CS	Services & Capacity	Private Fire Capacity	Billing & CS	Services & Capacity	Private Fire Capacity
	A	*B*	*C*	*D*	*E*	*F = (A+B)xCx12*	*G = A x D x 12*	*H=BxEx12*
5/8" x 3/4"	69,236		1.00	1.00		830,832	830,832	0
1"	11,207		1.00	1.67		134,484	224,140	0
1 1/2"	4,245		1.00	3.33		50,940	169,800	0
2"	2,669	61	1.00	5.33	1.00	32,760	170,816	732
3"	510	51	1.00	11.67	2.90	6,732	71,400	1,778
4"	197	351	1.00	20.00	6.19	6,576	47,280	26,073
6"	116	415	1.00	45.00	17.98	6,372	62,640	89,548
8"	70	261	1.00	93.33	38.32	3,972	78,400	120,016
10"	21	55	1.00	140.00	68.91	912	35,280	45,482
12"	4	3	1.00	176.67	111.31	84	8,480	4,007
16"	0	2	1.00	260.00	237.21	24	0	5,693
Total	**88,275**	**1,199**				**1,073,688**	**1,699,068**	**293,329**

Table 6-27: Development of Unit Fixed Service Charges

		Billing & CS	Services & Capacity	Private Fire Capacity	Notes
1	Revenue Requirements	$4,964,150	$20,525,887	$1,538,496	*Table 6-20*
2	Units of Service	1,073,688	1,699,068	293,329	*Table 6-26*
3		monthly bills / yr	EMU / yr	EMU / yr	
4	**Unit Cost of Service**	**$4.63**	**$12.09**	**$5.25**	***[1] / [2] rounded up to $0.01***

of $64.48 ($12.09 x 5.33, rounded to the nearest $0.01). Daily service charges (column E) are calculated using monthly service charges (column D) multiplied by 12 monthly billing periods divided by 365 days per year. The proposed daily service charge for 5/8"x3/4" meters is $0.550, 12% increase from current charge at $0.489.

Similarly, Table 6-29 shows the development of the daily service charges for private fireline services. The charges include billing and customer service (column B), which is uniform for all connection sizes, and private fire capacity (column C) components varied by connection size (column A). Fireline services with connection sizes of 6" or less will see decrease in the service charges whereas larger connections will see increasing impact.

Table 6-28: Proposed Daily Service Charges for Water and Recycled Water Services

Meter Size	Services & Capacity Meter Ratios	Monthly Fixed Charges			Proposed Daily FY 2017	Current Daily FY 2017	% Change
		Billing & CS	Services & Capacity[25]	Proposed FY 2017			
	A (Table 6-24)	*B*	*C =A x 12.09*	*D =B+ C*	*E =D x 12 /365*	*F*	*G =E/F - 1*
5/8" x 3/4"	1.00	$4.63	$12.09	$16.72	**$0.550**	$0.489	**12%**
1"	1.67	$4.63	$20.15	$24.78	**$0.815**	$0.736	**11%**
1 1/2"	3.33	$4.63	$40.30	$44.93	**$1.478**	$1.375	**7%**
2"	5.33	$4.63	$64.48	$69.11	**$2.273**	$2.037	**12%**
3"	11.67	$4.63	$141.05	$145.68	**$4.790**	$4.220	**14%**
4"	20.00	$4.63	$241.80	$246.43	**$8.102**	$6.677	**21%**
6"	45.00	$4.63	$544.05	$548.68	**$18.039**	$12.306	**47%**
8"	93.33	$4.63	$1,128.40	$1,133.03	**$37.251**	$19.315	**93%**
10"	140.00	$4.63	$1,692.60	$1,697.23	**$55.800**	$31.635	**76%**
12"	176.67	$4.63	$2,135.90	$2,140.53	**$70.374**	$38.662	**82%**
16"	260.00	$4.63	$3,143.40	$3,148.03	**$103.497**	$63.986	**62%**

Table 6-29: Proposed Daily Service Charges for Private Fireline Services

Size	Fire Capacity Meter Ratio	Monthly Fixed Charge			Proposed Daily FY 2017	Current Daily FY 2017	% Change
		Billing & Customer Service	Private Fire Capacity	Proposed FY 2017			
	A (Table 6-25)	B	C = A x $5.25	D = B + C	E = D x 12 /365	F	G = E/F - 1
2"	1.00	$4.63	$5.25	$9.88	**$0.325**	$1.020	**-68%**
3"	2.90	$4.63	$15.25	$19.88	**$0.654**	$1.745	**-63%**
4"	6.19	$4.63	$32.50	$37.13	**$1.221**	$2.577	**-53%**
6"	17.98	$4.63	$94.40	$99.03	**$3.256**	$4.391	**-26%**
8"	38.32	$4.63	$201.18	$205.81	**$6.767**	$6.438	**5%**
10"	68.91	$4.63	$361.78	$366.41	**$12.047**	$8.709	**38%**
12"	111.31	$4.63	$584.38	$589.01	**$19.365**	$10.976	**76%**
16"	237.21	$4.63	$1,245.33	$1,249.96	**$41.095**	$16.094	**155%**

[29] *Rounded to $0.01*

6.2.2 - PROPOSED WATER AND RECYCLED WATER QUANTITY RATES

6.2.2.1 - Proposed Water Quantity Rates

Water quantity rates are comprised of water supply costs, delivery, peaking, conservation and revenue offset rate components (Table 6-30).

Proposition 218 does not specify the type of rate structure as long as the rates justify the cost of serving customers. Table 6-31 summarizes the rationale used to justify water quantity rates. Water supply rates are determined by allocating water supply sources (discussed in Section 4.2.2). The delivery rate is a uniform cost recovery for all usage types. The peaking rate is allocated to customer classes and tier usage using proportional peaking factors (discussed in Section 4.3). The conservation rate is allocated uniformly to all customer classes, however, residential classes have conservation costs collected in Tier III to promote conservation from large usage. A portion of rental income is used to provide funding for the Exemption program as discussion in Section 5. The remaining rental income is reserved to provide affordability for Tier I, which represents basic and essential usage.

Table 6-30: Water Quantity Rate Component Descriptions

Water Quantity Rate Components	Descriptions
Water Supply	Recovering Water Supply Related Costs (Fixed & Variable)
Delivery	Recovering remaining fixed costs of delivering water to customers
Peaking	Recovering peaking costs
Conservation	Recovering conservation program related costs
Revenue Offset	Using Rental income (unrestricted revenues) to provide affordability for essential use

Table 6-31: Water Quantity Rate Components Framework

	Water Supply	Delivery	Peaking	Conservation	Revenue Offset
Note	Water supply source allocation	Uniform for all usage	Proportional to Peaking factors	Usage allocation	Rental income for affordable essential use
Residential					
Tier IA	Groundwater	x	x		xxx
Tier IB	Groundwater	x	x		x
Tier II	Blended LW + MWD Tier 1	x	xx		
Tier III	MWD Tier 2	x	xxx	xx	
Non-Residential	Blended GW + LW + MWD	x	xxx	x	

6.2.2.1.1 - Water Supply Rates

Table 6-32 shows the availability of LBWD water supply sources and their associated variable rates. $294/AF or $0.70 / CCF represents the water pump tax assessed by WRD for every unit of groundwater pumped from groundwater wells within LBWD service area within 32,692AF groundwater rights (discussed in Section 4.2.2). The blended rate of Lakewood and MWD Tier 1 water is $2.29 / CCF (shown in the Lakewood/MWD Tier 1 Blended Unit Rate Calculation equation).

Non-residential blended water supply rate is the weighted average rates of available water supply sources allocated for non-residential customer classes (shown in the Non-Residential Blended Water Supply Rate Calculation equation and Table 6-33).

Table 6-32: Water Supply Sources – Quantity and Unit Cost Information

Water Supply Sources	Available for Purchase (AF)	Available for Sales (After 3.4% loss)	Unit Cost[26]	Unit Rate[27] (with 3.4% loss)	
	A	B = A / (1+3.4%)	C	D = C / 435.6 / (1+3.4%)	
Groundwater	32,692 AF	31,617 AF	$ 294 / AF	$0.700 / CCF	$0.700 / CCF
Lakewood	900 AF	870 AF	$ 573 / AF	$1.362 / CCF	$2.290 / CCF
MWD Tier 1	51,804 AF	50,101 AF	$970 / AF	$2.306 / CCF	
MWD Tier 2			$1,074 / AF	$2.552 / CCF	$2.552 / CCF

Lakewood/MWD Tier 1 Blended Unit Rate Calculation

$$\text{Lakewood / MWD Tier 1 Blend Unit Rate} = \frac{900 * \$1.362 + 51{,}804 \times \$2.306}{(900 + 51{,}804)} = \$2.290/CCF$$

Table 6-33: Non-Residential Blended Water Supply Rates

Non-Residential	Unit Rate	FY 2017	
Non-Residential Projected Sales		**7,046,540 CCF**	**16,177 AF**
Groundwater ($0.699 /CCF)	$0.700/ CCF	3,930,904 CCF	9,024 AF
Lakewood ($1.361 /CCF)	$1.362 / CCF	135,446 CCF	311 AF
MWD Tier 1 ($2.304 /CCF)	$2.306/ CCF	2,980,190 CCF	6,842 AF
Blended Rate (Weighted Average)	**$1.392/ CCF**		

Non-Residential Blended Water Supply Rate Calculation

$$\text{Non-Residential Blended Rate} = \frac{3{,}930{,}904 * \$0.70 + 135{,}446 * \$1.362 + 2{,}980{,}190 \times \$2.306}{7{,}046{,}540} = \$1.392$$

[26] *Weighted average cost for Fiscal Year (See Appendix for Details)*

[27] *May have rounding errors*

All other direct water supply costs include power costs for pumping and treatment, chemical costs and MWD fixed costs such as Readiness-to-Serve (RTS) and capacity charges, documented in the Fund 310 Operating Budget provided to RFC by LBWD staff. Table 6-34 calculates the uniform unit rate to be applied to water supply rates for all usage.

Table 6-35 summarizes the all-in water supply rates for all usage types. Residential Tier I demand is met by groundwater; thus the Tier I water supply rate ($1.055/CCF) reflects the groundwater unit variable rate ($0.70/CCF) plus the other water supply rate ($0.355/CCF). If all residential usage exceeds Tier II, LBWD will have to buy the next marginal water supply source,

Table 6-34: Other Water Supply Unit Rate

	Other Water Supply Costs	FY 2017	Notes
1	Power - Treatment	$1,918,074	*From Fund 310 Operating Budget*
2	Power - Pumping	$1,809,114	*From Fund 310 Operating Budget*
3	Chemical	$1,511,640	*From Fund 310 Operating Budget*
4	MWD Fixed Costs (RTS & Capacity Charges)	$2,646,020	*From Fund 310 Operating Budget*
5	**Total Other Water Supply Costs**	**$7,884,847**	*Sum of [1] to [4]*
6	Projected Sales for FY 2017	22,217,572 CCF	*Table 4-11*
7	**Unit Rate**	**$0.355/CCF**	**[5] / [6]**

Table 6-35: FY 2017 Water Supply Rates

	Water Supply Sources	Variable Water Supply Rates	Other Water Supply Rates	All-in Water Supply Rates	Projected Sales
	A *(Table 4-6)*	B	C	D = B + C	E *(Table 4-11)*
Residential					
Tier I	Groundwater	$0.700	$0.355	**$1.055 / CCF**	9,841,470 CCF
Tier II	Lakewood MWD Tier 1	$2.290	$0.355	**$2.645 / CCF**	3,769,538 CCF
Tier III	MWD Tier 2	$2.552	$0.355	**$2.907 / CCF**	1,560,024 CCF
Non-Residential	Blended	$1.392	$0.355	**$1.747 / CCF**	7,046,540 CCF

MWD Tier 2, at higher variable rate, $2.552/CCF, plus other water supply rates. Non-residential water supply rate is $1.747/CCF, which is derived from the $1.392/CCF blended variable unit rate (shown in Table 6-33) and the other water supply unit rate ($0.355/CCF).

6.2.2.1.2 - Delivery Rates

The delivery rate is a uniform rate that is applied to all usage (22,217,572 CCF) to recover remaining potable base fixed costs (from Table 6-22), as shown in Table 6-36.

6.2.2.1.3 - Peaking Rates

Peaking costs are recovered from users based on their respective peaking characteristics determined in Table 4-9. Table 6-37 shows the equivalent peaking usage units for each usage type with respect to the corresponding peaking factors.

Table 6-36: Development of Water Delivery Rate

		Delivery Rate	Notes
1	Revenue Requirements	$12,862,654	*Table 6-22*
2	Units of Service	22,217,572 CCF	*Table 4-11*
3	**Unit Cost of Service**	**$0.579**	***[1] / [2] rounded up to $0.001***

Table 6-38 illustrates the development of water peaking rates for each usage type. Peaking costs for the potable water system ($9.12M from Table 6-22) are divided by equivalent peaking usage to derive to $0.338/CCF for the peaking unit cost of service. The peaking unit cost is then multiplied to the peaking factors of each usage type to derive the respective peaking rates. The calculated rates are rounded up to the nearest $0.001/CCF.

6.2.2.1.4 - Conservation Rates

Similarly, conservation rates are calculated for residential and non-residential classes in Table 6-39. Residential Tier III users will be the focus of the conservation program, thus residential conservation program costs ($1.916M) are recovered from Tier III users only. Table 6-40 shows the conservation rates for all usage types.

6.2.2.1.5 - Revenue Offsets

As discussed in Section 5, rental

Table 6-37: Equivalent Peaking Usage Units

	Potable Sales	Peaking Factors	FY 2017 Projected Sales (CCF)	Equivalent Peaking Usage (CCF)
		A (Table 4-9)	*B (Table 4-11)*	*C = A x B*
1	**Residential**	**1.22**	**15,171,032**	**18,553,680**
2	Tier IA	1.07	82,306	87,818
3	Tier IB	1.07	9,759,164	10,412,710
4	Tier II	1.34	3,769,538	5,053,908
5	Tier III	1.92	1,560,024	2,999,244
6	**Non Residential**	**1.20**	**7,046,540**	**8,426,974**
7	**Total ([1] + [6])**	**1.21**	**22,217,572**	**26,980,654**

Table 6-38: Development of Water Peaking Rate

		Peaking Factors	Peaking Rate	Notes
		A	B	
1	Revenue Requirements		$9,121,946	*Table 6-22*
2	Units of Service		26,980,654 CCF	*Table 6-37*
3	**Unit Cost of Service**		**$0.338**	***[1] / [2]***
4	**Residential**			
5	Tier IA	1.07	$0.361	*[B3] x[A5] rounded up to $0.001*
6	Tier IB	1.07	$0.361	*[B3] x[A6] rounded up to $0.001*
7	Tier II	1.34	$0.454	*[B3] x[A7] rounded up to $0.001*
8	Tier III	1.92	$0.651	*[B3] x[A8] rounded up to $0.001*
9	**Non-Residential**	1.20	$0.405	*[B3] x[A9] rounded up to $0.001*

income will be used first to fund the exemption program to provide a waiver for Tier I usage (Tier IA = $0/CCF) for qualified customers. The true cost of providing water service for Tier I usage before any revenue offset is $1.995 comprised of water supply, delivery and peaking rates, as shown in Table 6-41. Table 6-42 shows step-by-step calculations of the revenue offsets applicable to Tier IB usage using remaining of rental income after funding the exemption program to provide some rate incentive and affordability for basic and essential usage.

Table 6-43 shows the revenue offset rates for each usage type.

6.2.2.1.6 - Proposed Water Quantity Rates

The various water quantity rate components from Table 6-35, Table 6-38, Table 6-40 and Table 6-43 for each usage type are combined for each customer class in Table 6-44. Table 6-45 summarizes the FY 2017 proposed water quantity rates for all water usage

Table 6-39: Development of Conservation Rates

		Projected Sales (CCF)	Conservation Rate	Notes
		A	B	
1	Revenue Requirements		$2,807,270	*Table 6-22*
2	Units of Service		22,217,572 CCF	*Table 4-11*
3	**Unit Cost of Service**		**$0.127**	***[1] / [2] rounded up to $0.001***
4	Residential	15,171,032 (68.3%)	$1,916,914	*68.3% x [B1]*
5	Non-Residential	7,046,540 (31.7%)	$890,356	*31.7% x [B1]*
6	**Unit Conservation Rate**			
7	Residential	Tier III = 1,560,024	$1.229 / CCF	*[B4]/[A7] rounded up to $0.001*
8	Non-Residential	All = 7,046,540	$0.127 / CCF	*[B5]/[A8] rounded up to $0.001*

Table 6-40: FY 2017 Proposed Conservation Rates

		Conservation Rate ($/CCF)
1	**Residential**	
2	Tier IA	$0.000
3	Tier IB	$0.000
4	Tier II	$0.000
5	Tier III	$1.229
6	**Non Residential**	**$0.127**

Table 6-41: Tier IA Costs

Components	Tier IA Costs	Notes
Water Supply	$1.055	*Table 6-35*
Delivery	$0.579	*Table 6-36*
Peaking	$0.361	*Table 6-38*
Conservation	$0.000	*Table 6-39*
Total	**$1.995**	

Table 6-42: Development of Revenue Offset Rates

		Revenue Offset Rate	Notes
1	Rental Income	-$1,024,900	*Table 6-22*
2	**Uses for Exemption Program**		
3	$5/month Bill Credit	-$86,880	*1,448 qualified accounts x $5 x 12 bills/yr*
4	Offsetting All Tier IA Costs	-$209,714	*-$1.995(Table 6-41) x 82,306 CCF (Tier IA)*
5	**Remaining Rental Income**	**-$728,306**	***[1] – [3] – [4]***
6	Units of Service	9,759,164 CCF	*Table 4-11 Tier IB only*
7	**Unit Cost of Service**	**-$0.074**	***[5]/[6] rounded down to $0.001***

Table 6-43: FY 2017 Proposed Revenue Offset Rates

		Revenue Offset Rates ($/CCF)	Notes
1	**Residential**		
2	Tier IA	-$1.995	*Table 6-41*
3	Tier IB	-$0.074	*Table 6-42*
4	Tier II	$0.000	
5	Tier III	$0.000	
6	**Non Residential**	$0.000	

Table 6-44: Proposed Water Quantity Rate Components

	Water Supply	Delivery	Peaking	Conservation	Revenue Offset	Proposed FY 2017
	A (Table 6-35)	*B (Table 6-36)*	*C (Table 6-38)*	*D (Table 6-39)*	*E (Table 6-43)*	*F = A + B + C + D + E*
Residential						
Tier IA	$1.055	$0.579	$0.361	$0.000	-$1.995	**$0.000**
Tier IB	$1.055	$0.579	$0.361	$0.000	-$0.074	**$1.921**
Tier II	$2.645	$0.579	$0.454	$0.000	$0.000	**$3.678**
Tier III	$2.907	$0.579	$0.651	$1.229	$0.000	**$5.366**
Non-Residential	$1.747	$0.579	$0.405	$0.127	$0.000	**$2.858**

Table 6-45: FY 2017 Proposed Water Quantity Rates

	Current Tier Widths[28]	Proposed Tier Widths	Current FY 2017 ($ / CCF)	Proposed FY 2017 ($ / CCF)
Residential				
Tier IA	0 – 5 CCF	0 – 6 CCF	**$1.427**	**$0.000**
Tier IB	0 – 5 CCF	0 – 6 CCF	**$2.569**	**$1.921**
Tier II	6 – 15 CCF	7 – 13 CCF	**$2.854**	**$3.678**
Tier III	Above 15 CCF	Above 13 CCF	**$4.281**	**$5.366**
Non-Residential			**$2.854**	**$2.858**

Table 6-46: FY 2017 Projected Recycled Water Sales and Peaking Characteristics

Recycled Water Services	Projected Water Sales (CCF)	Peaking Factors	Equivalent Peaking Usage
	A (Table 2-3)	*B (Table 4-10)*	*C = A x B*
Peaking	1,071,512	1.79	1,912,920
Non-Peaking	414,249	1.00	414,249
Interruptible	292,914	1.00	292,914
Contract Rates[29]	175,313	N/A	N/A
Total Non-Contract Recycled Water Sales	**1,778,675 CCF**		**2,620,083**

types. Current and proposed tier definitions are also shown for relative comparison.

6.2.2.2 - Recycled Water Rates

Similar to potable water quantity rates, RW peaking rates are calculated using the respective peaking factors for different RW services: peaking, non-peaking, interruptible and contract rates. Equivalent peaking usage for RW services is calculated in Table 6-46.

On February 20, 1998, the County of Los Angeles and LBWD executed the First Amendment to Agreement WD-1604 regarding recycled water at Lakewood County Club (LCC). The amendment details the method of determining the price for recycled water to LCC, that being the rate the LCC posts for sale of potable water to third parties under LCC's own water right. The current contract rate for LCC is shown in Table 2-3 and subject to the Agreement WD-1604 terms, thus is not subject the cost of service analysis of this Rate Study.

Table 6-47 illustrates the development of delivery and peaking rates for RW services after adjusted for contract RW revenues. Delivery (69.9%) and peaking (30.1%) revenue requirements for non-contract RW services are $2.170M and $0.934M, respec-

[28] *Shown tier widths per dwelling unit for single family customers only, duplex and multi-family customers have different tier definitions*

[29] *Agreement WD-1604 between LBWD and LCC*

tively, adjusted for the projected revenues from contract sales. The revenue requirements are divided by units of service from Table 6-46 to determine the average unit RW rates. The resulting unit RW peaking rates are then multiplied by the corresponding peaking factors (Table 6-46) to derive the RW peaking rates.

Table 6-48 summarizes the proposed RW quantity rates by rate components for FY 2017 by customer class. The resulting RW rates are approximately 55-65% of proposed non-residential potable water rates.

Table 6-47: FY 2017 Recycled Water Quantity Rate Revenue Requirements

	Rate Components	Delivery	Peaking	Notes
	A	*B (Table 6-23)*	*C (Table 6-23)*	*D*
1	**Revenue Requirements**	$2,310,230	$994,510	
2		69.9%	30.1%	
3	**Contract RW Revenues**	$139,836	$60,197	*$1.141 x 175,313 CCF*
4	**Non-Contract RW Revenue Requirements**	**$2,170,395**	**$934,314**	***[1]-[3]***
5	Units of Service	1,778,675 CCF	2,620,083 CCF	*Table 6-46*
7	**Unit RW Rates**	**$1.221 / CCF**	**$0.357 / CCF**	*[4]/[5] rounded up to $0.001*
8	Peaking	$1.221	$0.638	*Peaking = $0.360 x 1.79*
9	Non-Peaking / Interruptible	$1.221	$0.357	

Table 6-48: Proposed Recycled Water Quantity Rates

	Delivery	Peaking	Proposed FY 2017	Current Rate	% of Non-Residential Water Rate
	A (Table 6-47)	***B (Table 6-47)***	***C = A + B***	***D***	***E = C / $2.858***
Peaking	$1.221	$0.638	**$1.859**	$1.998	65%
Non-Peaking	$1.221	$0.357	**$1.578**	$1.427	55%
Interruptible	$1.221	$0.357	**$1.578**	$1.427	55%

SEWER
COST OF SERVICE AND RATES

On February 1988, the Department assumed the responsibility of the various functions of the City's sanitary sewer system, including operations and maintenance. The Department operates and maintains nearly 765 miles of sanitary sewer lines, safely and expeditiously delivering over 40 million gallons per day to Los Angeles County Sanitation Districts facilities located on the north and south sides of the City of Long Beach.

This section of the Report discusses the allocation of O&M expenses and capital costs to the appropriate parameters consistent with industry standards, the determination of unit costs, and calculation of costs by customer class.

To allocate the cost of service among the different customer classes, the costs first need to be allocated to the appropriate sewer parameters. The following sections describe the allocation of the operating and capital costs of service to the appropriate parameters of the sewer system.

The total cost of sewer service is analyzed by system function in order to equitably distribute costs of service to the various classes of customers. For this analysis, the sewer utility costs of service are consistent with the guidelines for allocating costs detailed in the Water Environment Federation (WEF) Manual of Practice No. 27, Financing and Charges for Wastewater Systems, 2004.

Steps for COS analysis for sewer collection services:

- **Step 1:** Determine revenue requirements
- **Step 2:** Functionalize operating and capital costs and allocate functionalized costs to cost causation categories
- **Step 3:** Allocate costs to customer classes and rate components

7.1 - SEWER COST OF SERVICE ANALYSIS

7.1.1 - STEP 1 – DETERMINE REVENUE REQUIREMENTS

In this Study, sewer rates are calculated for FY 2017 (known as the Test Year) by using the LBWD's FY 2017 budget. Test Year revenue requirements are used in the cost allocation process. According to Government Code 54999.7(c), LBWD should review the cost of service analysis at least once every five to ten years to ensure that the rates are consistent with the costs of providing service.

The revenue requirement determination is based upon the premise that the utility must generate annual revenues to meet O&M expenses, any debt service needs, reserve funding to achieve target levels, and capital investment needs. Revenues from sources other than sewer rates and charges (e.g. revenues from miscellaneous services) are deducted from the rate revenue requirement. FY 2017 revenues from rates to be recovered from the LBWD's sewer customers are calculated in Table 7-1. The Sewer Fund currently has no debt but the Department is in the process of refinancing $11M line of credit (LOC) into long-term debt. LBWD staff provided RFC with the estimated debt payment schedule for the refinance to be used for the Study. The estimated debt payment for the refinanced debt in FY 2017 is equal to $637.5K. Capital replacement projects estimated / budgeted by LBWD total $3.794M, of which $1.229M is estimated to be funded from capital reserves for FY 2017. Total revenue requirements including O&M expenses, debt service and capital project expenditures are $19.1M. Other revenues include interest income, service connection, other operating revenues and other miscellaneous non-operating revenues. These non-rate revenues are equal to $486.5K. Total revenue requirements from rates in FY 2017 are $18.6M as shown in Table 7-1, the same as revenues from current rates shown in Table 2-5.

7.1.2 - STEP 2 – FUNCTIONALIZE COSTS AND ALLOCATE FUNCTIONALIZED COSTS TO COST CAUSATION CATEGORIES

To derive the cost to serve each customer class, the costs first need to be functionalized. This step involves the arrangement of overall costs into various functions. The sewer collection utility costs are categorized into the following functions:

- Pumping costs associated with pumping sewer to the treatment facilities
- Collection costs representing the costs to operate and maintain the sewer collection systems, including all the sewer lines
- General & administrative costs representing all other costs that do not serve a specific function
- Billing and customer service costs including meter reading, billing and collection costs associated with preparing a water customer bill and processing funds received from water users. Customer service costs include costs associated with administering customer accounts such as processing complaints, responding to customer inquiries, performing rereads, etc.
- Sewer services costs associated with providing reliable sewer service

Table 7-1: Revenue Requirement from Sewer Rates for FY 2017

		FY 2017	Notes
1	**REVENUE REQUIREMENTS**		
2	O&M Expenses	$15,897,097	*From Fund 311 Operating Budget provided by LBWD staff*
3	Debt Service	$637,500	*Sewer debt service estimates for the refinance of $11M Line of Credit*
4	Capital replacement projects	$3,794,000	*From Sewer Fund Project Cost Estimated provided by LBWD staff for FY 2017*
5	Reserve Funding	-$1,228,983	*Amount of reserve used to fund capital replacement projects for FY 2017*
6	**SUBTOTAL REVENUE REQUIREMENTS**	**$19,099,614**	*Sum rows 2 to row 5*
7			
8	***Less Other Revenues***		
9	Other Operating Revenues	$4,350	*From Fund 311 Operating Budget provided by LBWD staff*
10	Non-Operating Revenues		
11	Interest	$40,722	*From Fund 311 Operating Budget provided by LBWD staff*
12	Service Connection	$350,000	*From Fund 311 Operating Budget provided by LBWD staff*
13	Other Reimbursement	$5,000	*From Fund 311 Operating Budget provided by LBWD staff*
14	Other Non-Operating Revenues	$86,400	*From Fund 311 Operating Budget provided by LBWD staff*
15	**SUBTOTAL NON-OPERATING REVENUES**	**$486,472**	*Sum rows 9 to row 14*
16			
17	**NET REVENUE REQUIREMENTS FROM RATES**	**$18,613,142**	***Row [6] – Row [15]***

The functionalization of costs allows for better allocation of the functionalized costs to the cost causation components, which include:

- Flow
- Billing & customer service
- Meters & services
- General and administrative

Collection system costs and pumping costs are allocated entirely to flow since the collection system is designed to handle sewer flow. Table 7-2 shows the different allocations to the cost causation categories of each function.

Working closely with LBWD staff, RFC reviewed and functionalized LBWD's O&M expenses and asset list for its sewer system. Using the allocation factors from Table 7-2 for the operating budget for the Sewer Fund (Fund 311, provided by LBWD staff), Table 7-3 summarizes the allocation of FY 2017 O&M expenses to cost categories and allocation percentage for operating related costs.

Table 7-4 shows the fixed asset values of the Sewer Fund using replacement costs by sewer asset type as of September 30, 2015. To reduce rate variability from year to year, allocation of fixed assets to cost causations is used for the approximation of long-term cost

Table 7-2: Allocations of Functionalized Sewer Costs to Cost Causation Categories

Functions	Flow	Billing & Customer Service	Meters & Services	G&A
Pumping	100.0%			
Collection	100.0%			
General & Administrative (G&A)				100.0%
Billing		100.0%		
Customer Service		100.0%		
Sewer Services			100.0%	

Table 7-3: Results of Sewer Operating Expenses Allocation (Excluding Debt Service)

O&M Expenses	Functions	FY 2017	Flow	Billing & CS	Meters & Services	General
Finance G&A (Sewer)						
Billing & Collection Div Charge	Billing	$377,595	$0	$377,595	$0	$0
Call Center Srv Charge	Customer Service	$1,612,525	$0	$1,612,525	$0	$0
Other Finance G&A (Sewer)	G&A	$7,065,296	$0	$0	$0	$7,065,296
Sewer Collection	Collection	$1,389,173	$1,389,173	$0	$0	$0
Sewer Line/Main Breaks	Sewer Services	$1,572,200	$0	$0	$1,572,200	$0
Sewer Ops Admin	Sewer Services	$3,447,663	$0	$0	$3,447,663	$0
Sewer Pump Stations						
Power	Pumping	$102,146	$102,146	$0	$0	$0
Other Sewer Pump Stations	Pumping	$380,500	$380,500	$0	$0	$0
Less Capitalized Interest	Sewer Capital	-$50,000	-$49,059	-$20	$0	-$921
Total Sewer O&M Expenses		**$15,897,097**	**$1,822,760**	**$1,990,100**	**$5,019,863**	**$7,064,375**
			11.5%	**12.5%**	**31.6%**	**44.4%**

Table 7-4: Results of Sewer Capital Cost Allocation

Descriptions	Functions	Replacement Costs[30]	Flow	Billing & Customer Service	Meters & Services	G&A
Major Class D5 -- WATER DEPT DISTRIBUTION SYSTEMS	Collection	**$12,312**	$12,312			
Major Class B5 -- WATER DEPT BUILDING & FACILITIES	Collection	**$317,663,887**	$317,663,887			
Major Class E5 -- OFFICE EQUIPMENT, FURNITURE & FIXTURES	Customer Service	**$131,201**		$131,201		
Major Class M5 -- WATER DEPT MACHINERY, EQUIPMENT	Pumping	**$536,725**	$536,725			
Major Class V5 -- WATER DEPT GENERAL PLANT EQUIPMENT	G&A	**$5,974,313**				$5,974,313
Total		**$324,318,438**	**$318,212,924**	**$131,201**	**$0**	**$5,974,313**
Sewer Capital Cost Allocation %			**98.12%**	**0.04%**	**0.00%**	**1.84%**

of capital to be used for allocating capital related costs of the revenue requirements. Replacements costs, obtained by inflating original costs to current dollars using the Engineering News Record – Construction Cost Index (ENR CCI) of Los Angeles, consider changes in the value of money over time, and thus provide more consistent allocation of costs.

Net revenues from rates are allocated to cost causation categories and summarized in Table 7-5. Debt service, capital replacement projects, reserve funding are considered capital costs, and thus corresponding costs are allocated using the allocation factors shown in Table 7-4. The O&M expenses allocation is from Table 7-3. All other revenues are allocated to general and administrative categories.

7.1.3 - STEP 3 – COST ALLOCATIONS TO RATE COMPONENTS

Table 7-6 summarizes the $18.6M sewer revenue requirements for FY 2017 by cost causation categories and its allocation to different rate components of the sewer rates. Sewer rates consist of fixed and variable rate components to help achieve revenue stability. Sewer daily service charges should recover 100% of billing and customer service costs and meters and services costs along with a portion of the general & administrative costs. The remaining costs should be recovered in sewer volumetric rates.

[30] *Escalated from Original Costs as of September 30, 2015 to 2015 dollars using Engineering News Resources Construction Cost Indices (ENR CCI) of Los Angeles*

Table 7-5: Allocations of Revenue Requirements to Cost Causation Categories

	FY 2017 (Table 7-1)	Flow	Billing & Customer Service	Meters & Services	G&A
REVENUE REQUIREMENTS					
O&M Expenses (from Table 7-3)	$15,897,097	$1,822,760	$1,990,100	$5,019,863	$7,064,375
Debt Service[31]	$637,500	$625,499	$258	$0	$11,743
Capital Replacement Projects[32]	$3,794,000	$3,722,575	$1,535	$0	$69,890
Reserve Funding[33]	-$1,228,983	-$1,205,847	-$497	$0	-$22,639
SUBTOTAL REVENUE REQUIREMENTS	**$19,099,614**	**$4,964,987**	**$1,991,395**	**$5,019,863**	**$7,123,369**
Less Other Revenues					
Other Operating Revenues	$4,350	$0	$0	$0	$4,350
Non-Operating Revenues					
Interest	$40,722	$0	$0	$0	$40,722
Service Connection	$350,000	$0	$0	$0	$350,000
Other Reimbursement	$5,000	$0	$0	$0	$5,000
Other Non-Operating Revenues	$86,400	$0	$0	$0	$86,400
SUBTOTAL NON-OPERATING REVENUES	**$486,472**	**$0**	**$0**	**$0**	**$486,472**
NET REVENUE REQUIREMENTS FROM SEWER RATES	**$18,613,142**	**$4,964,987**	**$1,991,395**	**$5,019,863**	**$6,636,897**

Table 7-6: Cost Allocation to Sewer Rate Components

Cost Categories	FY 2017	Sewer Service Charges		Sewer Volumetric Rates	
		Billing & Customer Service	Sewer Services	Flow Based	G&A Services
Flow	$4,964,987			$4,964,987	
Billing & Customer Service	$1,991,395	$1,991,395			
Meters & Services	$5,019,863		$5,019,863		
General & Administrative (G&A) Costs	$6,636,897		$4,786,718		$1,850,179
Total Cost of Service	**$18,613,142**	**$1,991,395**	**$9,806,581**	**$4,964,987**	**$1,850,179**

[31] *Using Sewer Capital Allocation Factors in Table 7-4*

[32] *Using Sewer Capital Allocation Factors in Table 7-4*

[33] *Using Sewer Capital Allocation Factors in Table 7-4*

Table 7-7: Sewer Equivalent Meter Units (EMUs)

	FY 2017 # of Accounts	Daily Winter Average (CCF/day)	Winter Usage Ratios	Equiv Meter Units (EMUs)	# of Bills per Year
	A (Table 2-5)	*B*	*C = B / 0.3*	*D = A x C x 12*	*E = A x 12 bills*
5/8" x 3/4"	67,442	0.303	1.00	809,304	809,304
1"	10,735	0.502	1.66	213,377	128,820
1 1/2"	3,935	1.492	4.92	232,532	47,220
2"	2,127	2.651	8.75	223,328	25,524
3"	395	6.321	20.86	98,899	4,740
4"	148	9.194	30.35	53,898	1,776
6"	84	25.803	85.17	85,853	1,008
8"	48	27.360	90.31	52,019	576
10"	8	42.413	140.00	13,440	96
12"	4	53.521	176.67	8,480	48
16"	0	78.767	260.00	0	0
Total	**84,926**			**1,791,131**	**1,019,112**

7.2 - DEVELOPMENT OF PROPOSED SEWER RATES

7.2.1 - PROPOSED SEWER SERVICE CHARGES

There are two components that comprise the daily service charges: billing & customer service and meters & services. This charge recognizes the fact that even when a customer does not discharge any sewage, LBWD incurs fixed costs due to the maintenance of the sewer systems, the ability or readiness to serve each connection, and/or the billing services provided to each connection.

Table 7-7 summarizes the projected number of sewer accounts in FY 2017 and illustrates the calculations for equivalent units of service for each fixed service charge component. LBWD bills its customers on a monthly basis, thus 84,926 accounts are equivalent to 1,019,112 monthly bills. The billing and customer service component recovers costs associated with meter reading, customer billing and collection, and 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 for a larger meter.

The services component collects sewer service capacity related costs. Capacity related costs can be allocated to and collected through the daily 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 daily winter average as proxy to estimate indoor usage and return to sewage. The daily winter average is the average usage in winter (Dec 2014 to March 2015) for each meter size. The ratios depict the potential flow through each meter size compared to the flow through a ¾" meter, which is the base meter size for this Study (Table 7-7 column C). For example, the flow through a 2" meter is approximately 8.75 times that of a ¾" meter. Currently, there are very few accounts with meter size greater than 8". Thus, the daily winter average is extrapolated using AWWA ratios and ¾" daily winter average usage.

Table 7-8: Proposed Sewer Daily Unit Service Charge

		Billing & Customer Service	Sewer Services	Notes
		A	B	
1	Revenue Requirements	$1,991,395	$9,806,581	*Table* 7-6
2	Units of Service	1,019,112	1,791,131	*Table* 7-7
3		monthly bills / year	monthly EMUs / year	
4	Unit Cost of Service	$1.955	$5.476	*[1] / [2] rounded up to $0.001*
5	**Daily Unit Cost of Service**	**$0.0650**	**$0.1810**	***[4] x 12 bills / 365 days, rounded up to $0.001***

Table 7-8 illustrates the development of unit service charges (line 4 for monthly and line 5 for daily) for each charge component by dividing the revenue requirements (from Table 7-6) to the number of equivalent bills/meters per year (from Table 7-7).

The monthly fixed service charges for sewer services for FY 2017 are shown in Table 7-9 along with daily service charges and comparison with current daily service charges (columns E & F). The sewer services component for all larger meters with a meter ratio larger than 1 is scaled up using the Winter Usage Ratio shown in the "Winter Usage Ratio" column A of Table 7-9. For example, the 2" meter has a meter ratio of 8.75 and therefore has a sewer services component of $1.584 per month ($0.181 x 8.75, rounded up to the nearest $0.001). The proposed daily sewer service charge for 5/8"x3/4" meters is $0.246, a 12.5% decrease from current charge at $0.281.

7.2.2 - PROPOSED VOLUMETRIC SEWER RATES

Volumetric sewer rates include flow based and G&A services components. Table 7-10 illustrates the development of unit volumetric rate (line 4) for each rate component by dividing the revenue requirements (from Table 7-6) to the projected billed sewer flows (from Table 2-6).

The sewer volumetric rates for FY 2017 is $0.390/CCF of billed sewer flows (Table 7-11). It is the same as the current unit sewer volumetric rate. The average sewer volume for residential customers (single family, duplex and multi-family) are computed based on the average of actual potable water use during the winter billing periods (December to March). The winter billing periods used is determined by the meter reading schedule for the account. The actual winter usage is divided by the number of winter days to obtain an average volume. The average volume will be the cap volume of actual water use returning to sewer system on which the volumetric sewer rate is charged for the next twelve-month period beginning with May's billing periods. Each year, the average volume is recalculated for the following twelve-month period. For residential customers with no previous history of use during the winter billing periods, the average volume for the customer's meter size will be used. For sewer customers who do not receive water services from the LBWD, the volumetric sewer rate is based on the average volume for the customer's water service size.

VOLUMETRIC SEWER RATES INCLUDE FLOW BASED AND G&A SERVICES COMPONENTS.

Table 7-9: Proposed Sewer Daily Service Charges

	Winter Usage Ratios	Billing & Customer Services	Sewer Services	Proposed	Current	% Change
	A (Table 7-7, C)	B (Table 7-8, A5)	C A x (Table 7-8, B5)	D = B + C	E	F = D / E – 1
5/8" x 3/4"	1.00	$0.065	$0.181	**$0.246**	$0.281	-12.5%
1"	1.66	$0.065	$0.300	**$0.365**	$0.445	-18.0%
1 1/2"	4.92	$0.065	$0.892	**$0.957**	$0.811	18.0%
2"	8.75	$0.065	$1.584	**$1.649**	$1.177	40.1%
3"	20.86	$0.065	$3.777	**$3.842**	$2.435	57.8%
4"	30.35	$0.065	$5.493	**$5.558**	$3.856	44.1%
6"	85.17	$0.065	$15.417	**$15.482**	$7.104	117.9%
8"	90.31	$0.065	$16.347	**$16.412**	$11.159	47.1%
10"	140.00	$0.065	$25.340	**$25.405**	$18.255	39.2%
12"	176.67	$0.065	$31.977	**$32.042**	$22.315	43.6%
16"	260.00	$0.065	$47.060	**$47.125**	$36.514	29.1%

Table 7-10: Proposed Sewer Unit Volumetric Rate

		Flow Based	G&A Services	Notes
		A	B	
1	Revenue Requirements	$4,964,987	$1,850,179	*Table* 7-6
2	Units of Service	17,474,785	17,474,785	*Table 2-6*
3		CCF / Yr	CCF / Yr	
4	**Unit Cost of Service**	**$0.284 / CCF**	**$0.106 / CCF**	***[1] / [2] rounded to $0.001***

Table 7-11: Proposed Sewer Volumetric Rates

	Proposed FY 2017 Rates ($ / CCF)
Flow Based (1)	$0.284
G&A Services (2)	$0.106
Sewer Volumetric Rates (1) +(2)	**$0.390 / CCF**

CUSTOMER IMPACT ANALYSIS

Before implementing any rate structure recommendations, it is important to understand how the proposed rate structure would impact the LBWD's customers. Customer impact analysis is a powerful tool which can be used to assist elected officials in making informed decisions. RFC conducted a series of customer impact analyses for all of LBWD's water, RW and sewer customers. The results of the analyses are included and discussed in the subsequent subsections.

8.1 - WATER CUSTOMER IMPACT ANALYSIS

Table 8-1 illustrates the water customer impacts by customer class if the proposed FY 2017 water rates are adopted. The analysis utilizes the projected usage by tiers by customer class, the projected number of accounts by meter size by customer class and the current and proposed rates for FY 2017. As a whole customer class, residential customers will pay slightly less under the proposed rates, resulting in a reduction of 0.33%. Private fire-lines will see the most reduction under proposed rates. RW customers will pay slightly more than current rates, with an increase of 1.81%, whereas non-residential will see the most increase from the current rates, resulting in a 4.78% increase.

Figure 8-1 summarizes the customer impact for residential water customers, including single family, duplex and multi-family customers. RFC utilized the FY 2015 consumption database provided for the Study for residential customers to calculate the monthly water bills under the current rates and under the proposed rates to calculate the monthly bill impacts for each and every residential customer. The results are summarized by residential customer class. Under the proposed tier definitions, duplex and multi-family customers will have a larger Tier I allotment than the current tier structure. As a result, most duplex and multi-family

Table 8-1: Water Customer Impact Analysis

Customer Classes	Projected FY 2017 Revenues under Current Rates	Projected FY 2017 Revenues under Proposed Rates[34]	% Impact
Residential	$60.41M	$60.21M	-0.33%
Non-Residential	$24.82M	$26.01M	4.78%
Private Fireline	$1.86M	$1.61M	-13.73%
Recycled Water	$3.60M	$3.66M	1.81%
Total Water Revenues from Rates	**$90.70M**	**$91.49M**	

[34] *Proposed rates are rounded, thus projected revenues under proposed rates slightly deviate from actual revenue requirements. In addition, the water supply rates are based on potential water demand to hedge LBWD from selling expensive water at loss.*

Figure 8-1: Residential Water Customer Bill Impact Summary

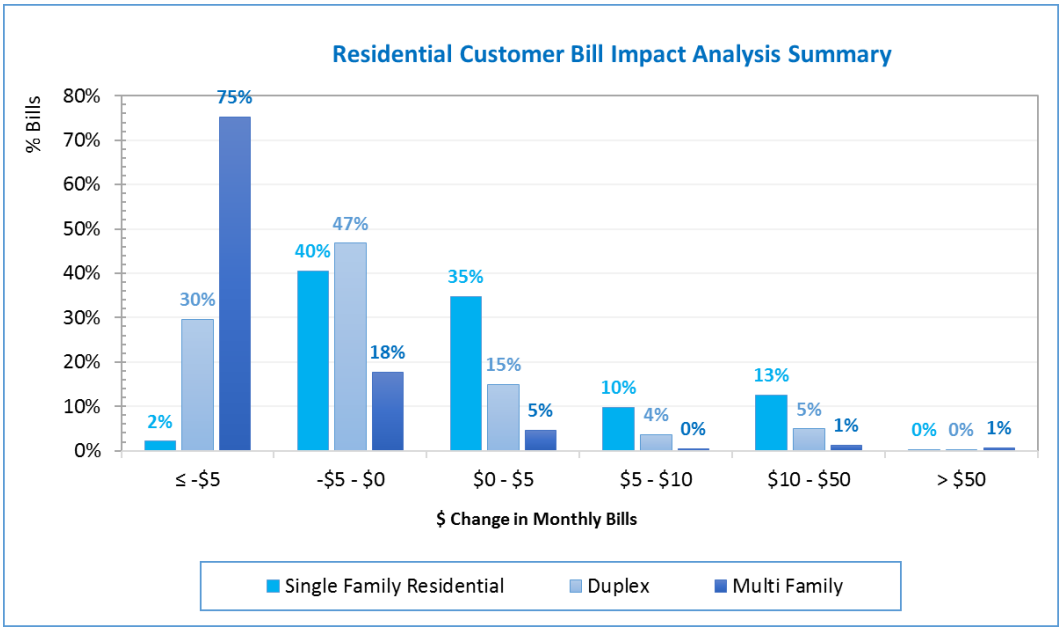
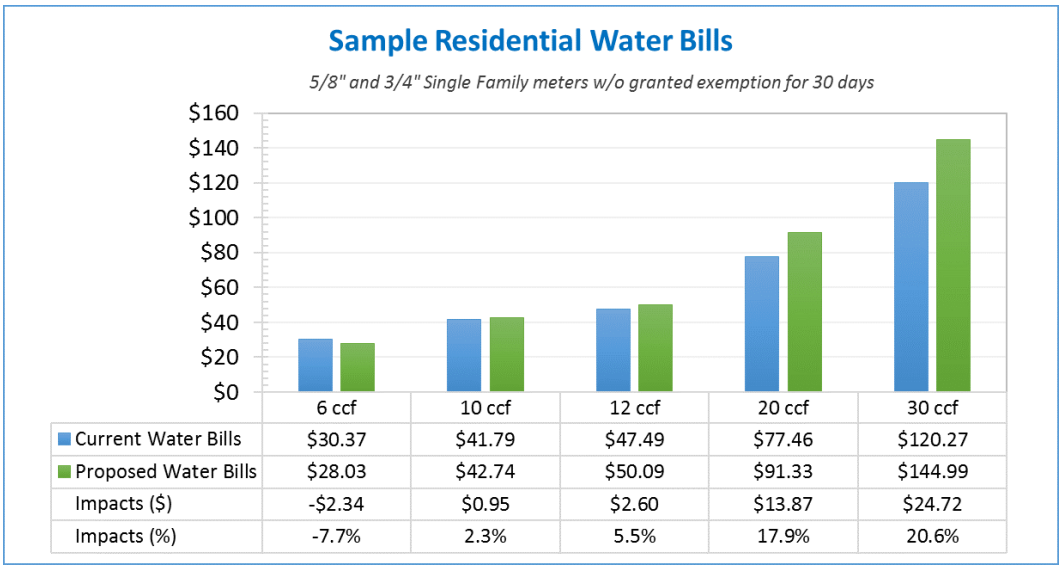


Figure 8-2: Sample Single Family Residential Water Bills



	6 ccf	10 ccf	12 ccf	20 ccf	30 ccf
Current Water Bills	$30.37	$41.79	$47.49	$77.46	$120.27
Proposed Water Bills	$28.03	$42.74	$50.09	$91.33	$144.99
Impacts ($)	-$2.34	$0.95	$2.60	$13.87	$24.72
Impacts (%)	-7.7%	2.3%	5.5%	17.9%	20.6%

customers will see a reduction in their bills. 30% of duplex customers and 75% of multi-family customers will see more than a $5 decrease in their monthly bills, and 47% of duplex customers and 18% of multi-family customers will see a small decrease (less than $5) in their monthly bills. 42% (2+40) of single family residential bills will see a reduction under the proposed rates, 35% will see minor increases of $5 or less and 13% will see moderate impacts of $10-50 increase in monthly bills. Very small numbers (less than 1%) of single family, duplex and multifamily bills will see a monthly bill increase larger than $50.

Figure 8-2 illustrates the customer impact for a typical single family residential water customer, with a 5/8”x3/4” meter, using different levels of water in a 30-day billing period. Customers using 6 CCF or less per month will see a reduction ($2.34 or 7.7%) from their current bill. Average customers using between 10-12 CCF will see a minor increase in their bills ($0.95 - $2.60), whereas large water users, using 20 CCF or more, will notice more significant increases in their monthly bills.

Figure 8-3: Non-Residential Water Customer Bill Impact Summary

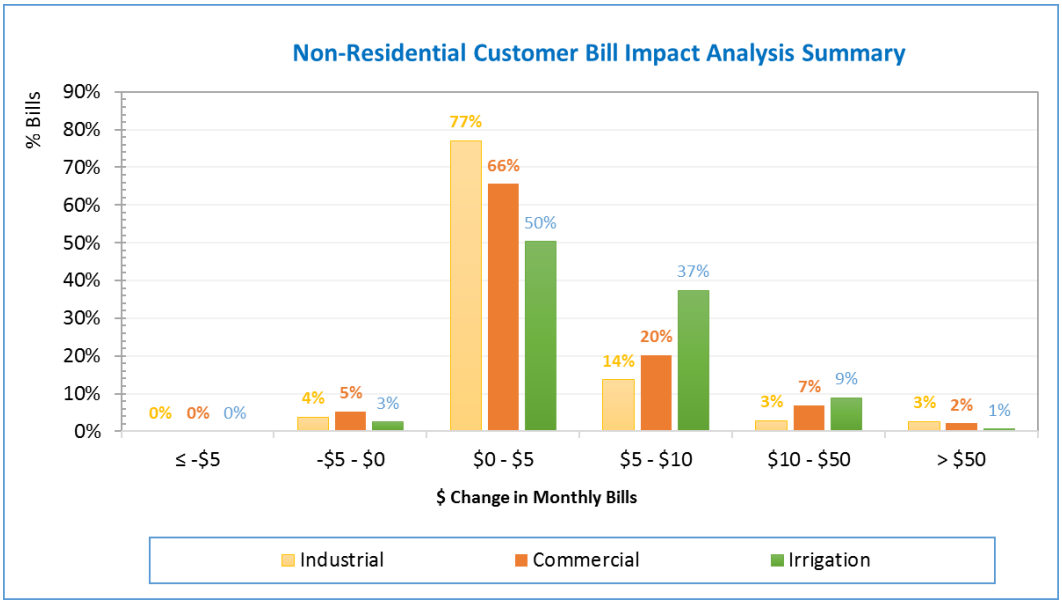
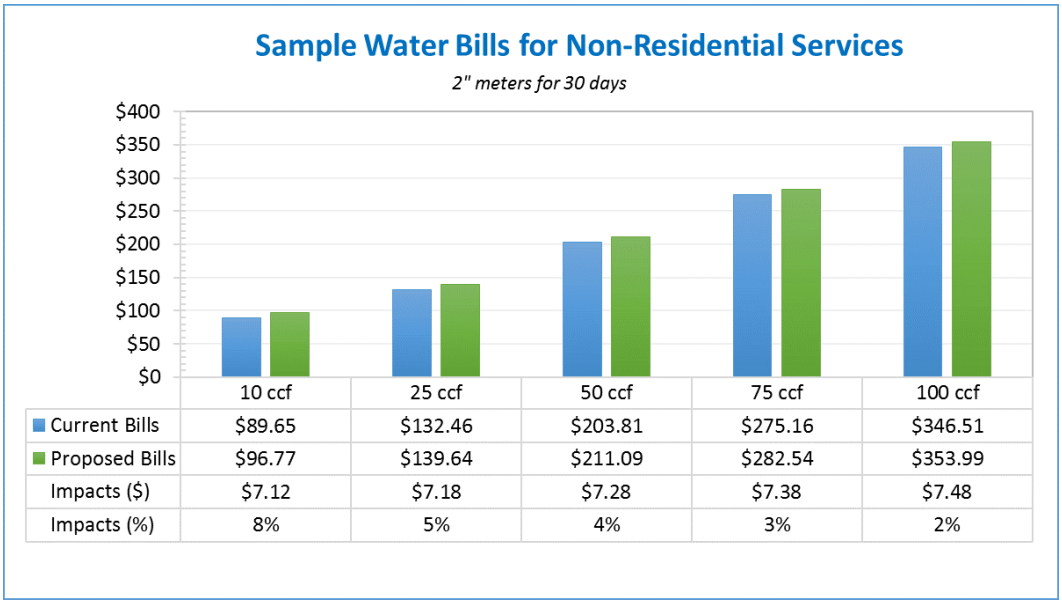


Figure 8-4: Sample Non-Residential Water Bills



	10 ccf	25 ccf	50 ccf	75 ccf	100 ccf
Current Bills	$89.65	$132.46	$203.81	$275.16	$346.51
Proposed Bills	$96.77	$139.64	$211.09	$282.54	$353.99
Impacts ($)	$7.12	$7.18	$7.28	$7.38	$7.48
Impacts (%)	8%	5%	4%	3%	2%

The proposed rates send stronger conservation signals to a targeted group of customers while maintaining affordability for essential use, which is reflected in usage of 10 CCF or less per month.

Similarly, Figure 8-3 and Figure 8-4 show the results of the customer impact analyses for non-residential customers, industrial, commercial and irrigation services. The majority of non-residential customers will see an increase of less than $10 per month and very small number of industrial (3%), commercial (2%) and irrigation (1%) customers will see increases of more than $50.

Sample bills for non-residential water customers with 2" meters at various level of water usage are calculated in Figure 8-4. The main driver for the non-residential bill impacts is the increase of daily water service charges.

Figure 8-5 shows the RW customer bill impact summary. Similar to the potable water customer impact analyses shown above, RFC utilized the provided RW monthly consumption database to calculate the monthly bill impact for

Figure 8-5: Recycled Water Customer Bill Impact Summary

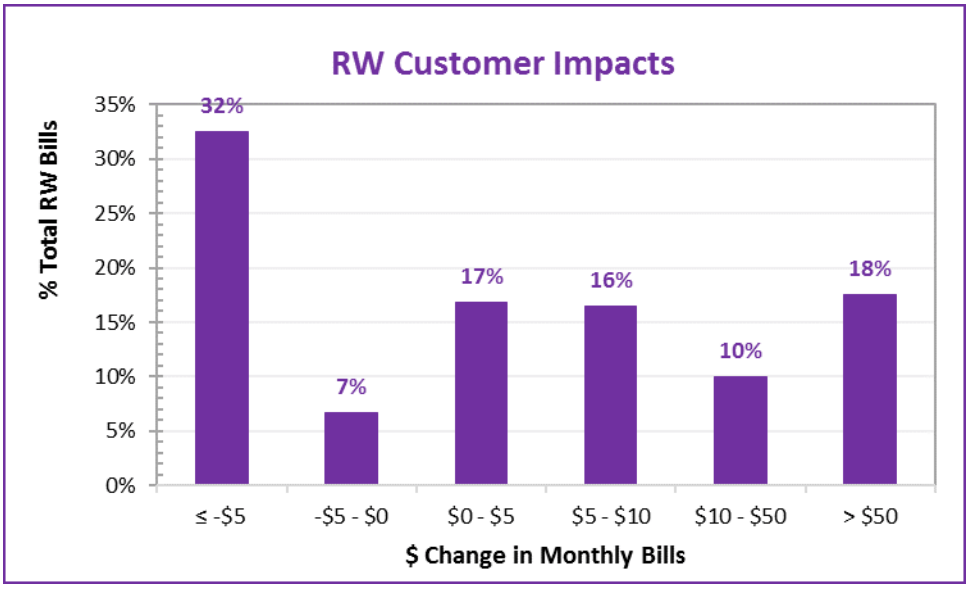


Table 8-2: Sewer Customer Impact Analysis

Customer Classes	Projected FY 2017 Revenues under Current Rates	Projected FY 2017 Revenues under Proposed Rates[35]	% Impact
Residential	$15.55M	$15.38M	-1.04%
Non-Residential	$3.07M	$3.31M	7.86%
Total Sewer Revenues from Rates	**$18.62M**	**$18.69M**	**0.43%**

every RW bill in FY 2015. Under the proposed rates, 39% (32+7) of RW bills will see a reduction. Another 33% (17+16) of RW bills will see moderate increases (less than $10) and approximately 18% of RW bills will see increases of more than 50%.

8.2 - SEWER CUSTOMER IMPACT ANALYSIS

Similar to water customer impact analyses, Table 8-2 and Figure 8-6 summarize the customer impact analyses for sewer services under the proposed rates. Residential customers will pay slightly less under the proposed rates (reduction of 1.04%), whereas non-residential customers will see larger increases. The majority (13.9%+81.1%) of residential bills will see a reduction in the bills, and approximately 5% (3.6%+1.1%+0.2%+0.1%) of residential bills will see some increases, as shown in Figure 8-6. More non-residential bills will see monthly bill increases (12.2% + 17.7% + 5.9% + 1.5%).

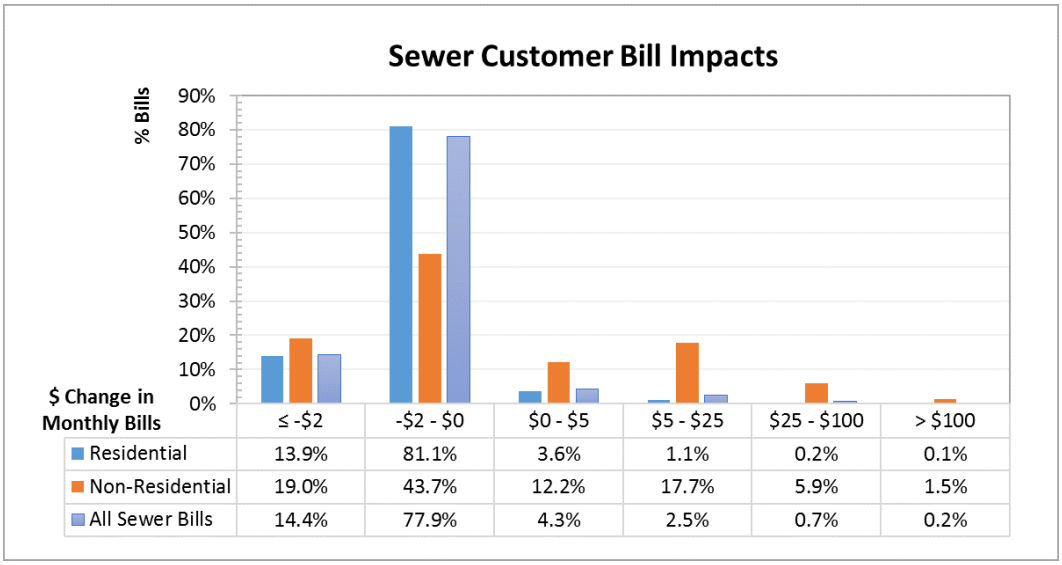
Figure 8-7 shows the bill impacts of a single family residential sewer customer with 5/8"x3/4" meters with different average volume (or billed sewer flows based on winter average volume as discussed in Section 7.2.2). The reduction of $1.05 is entirely due to the reduction of daily sewer service charges.

8.3 - COMBINED WATER & SEWER CUSTOMER IMPACT ANALYSIS

Table 8-3 summarizes the projected customer impacts for combined water and sewer services under the proposed rates for FY 2017. Projected revenues under proposed rates ($75.60M) from residential bills will be slightly less than under current rates ($75.96M).

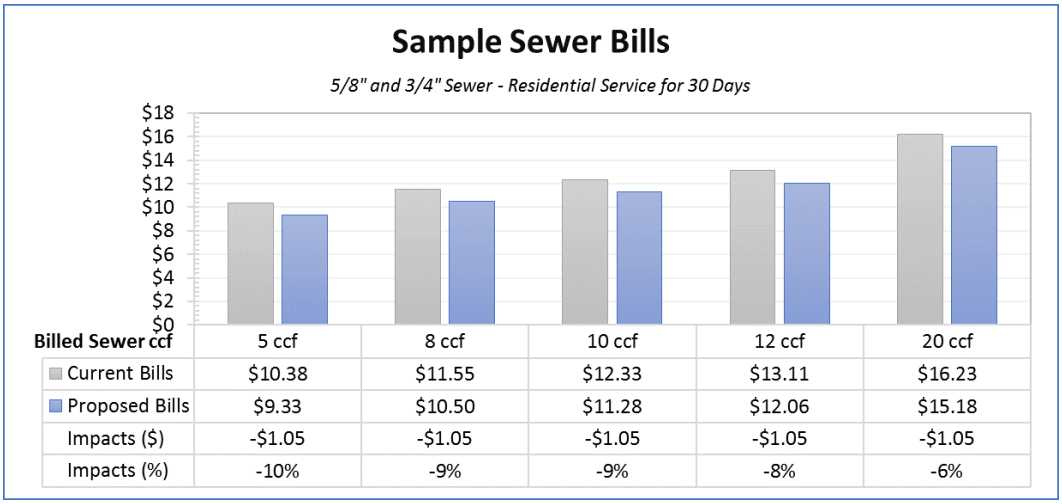
[35] *Calculated rates are rounded, thus projected revenues are not 100% matched with revenue requirements, or revenues from current rates although there is no proposed revenue adjustment.*

Figure 8-6: Sewer Customer Bill Impact Summary



$ Change in Monthly Bills	≤ -$2	-$2 - $0	$0 - $5	$5 - $25	$25 - $100	> $100
Residential	13.9%	81.1%	3.6%	1.1%	0.2%	0.1%
Non-Residential	19.0%	43.7%	12.2%	17.7%	5.9%	1.5%
All Sewer Bills	14.4%	77.9%	4.3%	2.5%	0.7%	0.2%

Figure 8-7: Sample Single Family Residential Sewer Bills

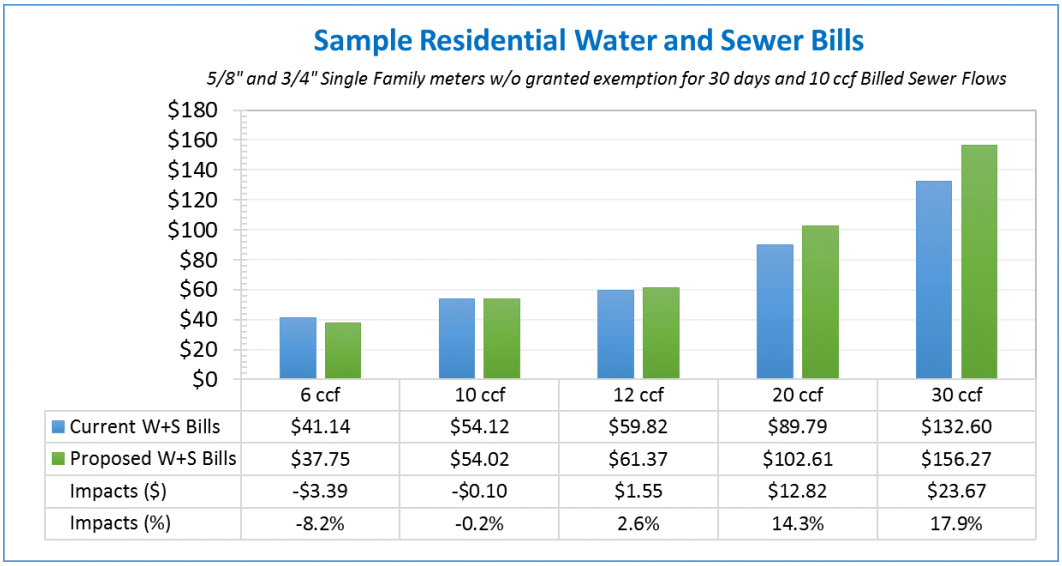


Billed Sewer ccf	5 ccf	8 ccf	10 ccf	12 ccf	20 ccf
Current Bills	$10.38	$11.55	$12.33	$13.11	$16.23
Proposed Bills	$9.33	$10.50	$11.28	$12.06	$15.18
Impacts ($)	-$1.05	-$1.05	-$1.05	-$1.05	-$1.05
Impacts (%)	-10%	-9%	-9%	-8%	-6%

Table 8-3: Combined Water & Sewer Customer Impact Analysis

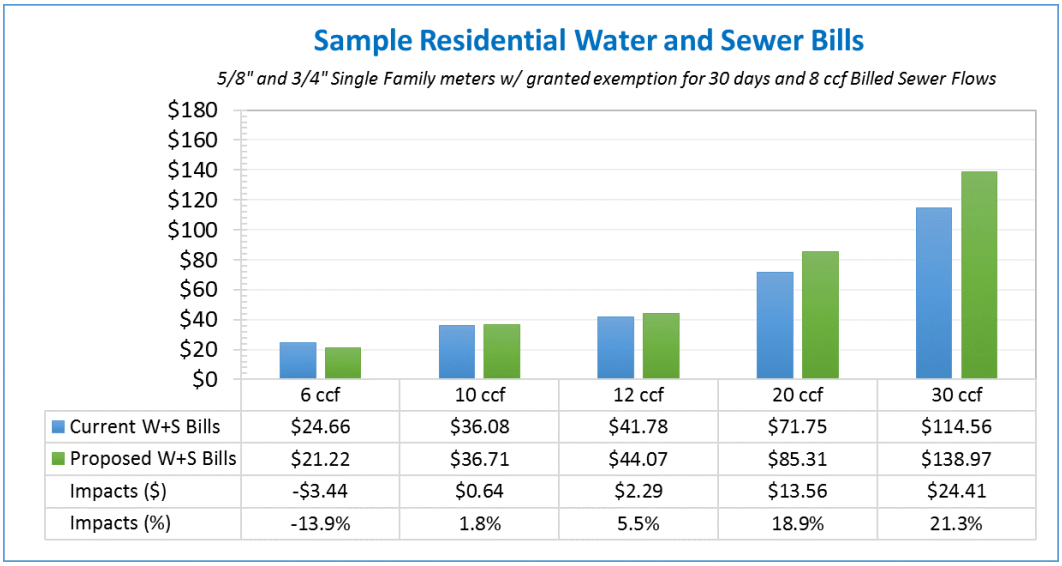
Customer Classes	Projected FY 2017 Revenues under Current Rates	Projected FY 2017 Revenues under Proposed Rates	% Impact
Residential	$75.96M	$75.60M	-0.47%
Non-Residential	$27.89M	$29.32M	5.12%
Private Fire	$1.86M	$1.61M	-13.73%
RW	$3.60M	$3.66M	1.81%
Total Water & Sewer Revenues from Rates	**$109.31M**	**$110.19M**	**0.80%**

Figure 8-8: Sample Residential Combined Water and Sewer Bills



	6 ccf	10 ccf	12 ccf	20 ccf	30 ccf
Current W+S Bills	$41.14	$54.12	$59.82	$89.79	$132.60
Proposed W+S Bills	$37.75	$54.02	$61.37	$102.61	$156.27
Impacts ($)	-$3.39	-$0.10	$1.55	$12.82	$23.67
Impacts (%)	-8.2%	-0.2%	2.6%	14.3%	17.9%

Figure 8-9: Sample Exempted Residential Combined Water & Sewer Bills



	6 ccf	10 ccf	12 ccf	20 ccf	30 ccf
Current W+S Bills	$24.66	$36.08	$41.78	$71.75	$114.56
Proposed W+S Bills	$21.22	$36.71	$44.07	$85.31	$138.97
Impacts ($)	-$3.44	$0.64	$2.29	$13.56	$24.41
Impacts (%)	-13.9%	1.8%	5.5%	18.9%	21.3%

Figure 8-8 illustrates the combined customer impact for a typical single family residential customer, with 5/8"x3/4" meter, using different levels of water in a 30-day billing period and maximum of 10 CCF of billed sewer volume. Customers using 6 CCF or less per month will see a reduction ($3.39 or 8.2%) from their current bill. Average customers using 10 CCF will see almost no change in their monthly bill (-$0.10), whereas large water users, using 20 CCF or more, will notice more significant increases in their monthly bills. The proposed rates send a stronger conservation signal to a targeted group of customers while maintaining affordability for essential usage of 10 CCF or less per month.

Figure 8-9 analyzes the impact of the recommended changes to the exemption program (discussed in Section 5). 5/8"x3/4" single family meters with granted exemptions for 30 days with maximum 8 CCF of billed sewer volume using 6 CCF (Tier I) to 10 CCF (average FY 2015 monthly usage) of water will see reductions or very minimal changes in their monthly bills. The same customers using more than 20 CCF will see more impacts. The results confirm that the proposed rates address the following pricing objectives: promoting conservation and providing affordability for essential use.

APPENDICES

9.1 - APPENDIX 1 – PRICING OBJECTIVES DESCRIPTIONS

Policy Objective 1 – Administration

Policy Statement: The LBWD recognizes the advantages of providing a rate structure that is easily understood by the LBWD's customers and can easily be implemented and administered by staff with the current billing software, in order to maintain costs at current levels.

Discussion: This principle highlights the importance of keeping rate structures and the process of administering them as simple as practicable. Customer education and clarity of customer bills should be considered as part of this principle.

Advantages of the Policy Objective: Creating rates that are easy for customers to understand will minimize rate-related customer service issues. If customers understand the basis of their bills, they will have a greater ability to comprehend their billing, how usage will affect their bill, and conclude that it is fair.

Disadvantage of the Policy Objective: Simplifying the rate structure does not always provide a maximum degree of fairness and equity. However, from the customer perspective, rates that are simple to understand may be more important than creating a complicated rate structure that achieves a higher degree of equity.

Supporting Pricing Objectives:

Customer Understanding - The ability for the rate structure to be explained in a manner that can be understood by customers and other stakeholders can have important impacts on the ability to build acceptance of rate adjustments.

Easy to Implement - Implementing a new rate structure merits careful consideration, as rate structure implementation may require upfront (one-time) costs for data gathering or billing system changes.

Easy to Administer - An easy-to-administer rate structure decreases the ongoing costs of administering the structure, made up predominantly of additional staffing costs.

Policy Objective 2 – Equity

Policy Statement: In compliance with the State Constitution (Article XIII D, commonly referred to as Proposition 218) and governing State Law, rates should be cost-based, fairly apportioned among customers, and account for the substantive provisions of law through a sound, technically defensible methodology.

Discussion: This principle highlights the importance to the LBWD of customers' perceptions of fairness and equity, while also recognizing that equity is determined on the basis of water customer classes, rather than each individual customer. Rates should generally be perceived by the LBWD's customers as fair, reasonable, and equitable for all customers.

Advantages of the Policy Objective: An advantage of this principle is that it reinforces the LBWD's priority of treating all customers fairly. It also underscores the importance of "LBWD-wide" fairness and equity as opposed to appeasing one customer class or stakeholder group. Also, it acknowledges the practical reality that rates cannot be custom tailored to each individual customer.

Disadvantages of the Policy Objective: This principle ultimately does not clearly define the terms "fair and equitable" and will still require the LBWD to apply its discretion and judgment.

Supporting Pricing Objectives:

Equitable in Allocating CIP Costs – This objective states that a rate structure achieves equity by allocating the cost of capital (infrastructure) to each customer class based on each class' consumption patterns and peaking characteristics.

Fair to the Public – This objective recognizes the relevance of the public's perception of how equitable a rate structure is and that managing that perception sometimes calls for informing/educating the public and other stakeholders.

Align Supply and Demand (Equity in Allocating Water Resource Costs) – This objective states that a rate structure achieves equity by reflecting the makeup of the demands on the LBWD's water supply in terms of allocating costs of service to each customer class and the price each customer pays for it.

Policy Objective 3 – Appropriate Funding Mechanisms

Policy Statement: The LBWD recognizes the advantages of increased revenue sufficiency and stability as enabled by incorporating additional funding mechanisms or cost components into the rate structure.

Discussion: This principle highlights the importance of the utility ensuring adequate revenue generation for achieving a self-sustaining utility. Revenues must be adequate to satisfy salaries, operations and maintenance, as well as, new and existing capital needs. Revenue generation should also be predictable to maintain favorable credit ratings (borrowing terms for future capital funding).

Advantages of the Policy Objective: The good financial practice of ensuring revenue sufficiency and stability begets additional gains in financial health and better credit ratings which result in lower interest expense associated with borrowing to cover capital infrastructure costs.

Disadvantages of the Policy Objective: While pursuing a rate structure that promotes revenue stability and allows special-project funding is advantageous, setting rates too high may impose too great of a financial burden on users and may encourage the utility to be less fiscally responsible with operating and capital programs. In addition, the public may perceive the need as unnecessary.

Supporting Pricing Objectives:

Enhance Revenue Stability – The ability of the rate structure to generate stable and predictable revenues from year to year can be an important consideration, particularly with regard to maintaining a good credit rating for borrowing money to address infrastructure needs when needed or desired. It should be recognized that certain types of rate structures are more effective at maintaining revenue stability than others.

Provide Funding Mechanism for Recycling / Conservation Programs – The rate structure should provide a funding mechanism to the recycling / conservation programs of the LBWD, and in so doing, also determine the allocation of the programs' costs among customers and their associated rates.

Ensure Revenue Sufficiency – The ability of the rate structure to generate sufficient revenues from year to year can be an important consideration, particularly with regard to maintaining a good credit rating for borrowing money to address infrastructure needs when needed or desired. It should be recognized that certain types of rate structures are more effective at achieving and maintaining revenue sufficiency than others under different situation.

Policy Objective 4 – Rate Stability & Affordability

Policy Statement: The LBWD recognizes the importance of establishing rates that generate adequate revenues from year-to-year, regardless of weather or consumption characteristics. Large and unexpected year-to-year rate increases impose financial hardships on customers and may call into question the LBWD's revenue management, fiscal responsibility, and rate equity.

Discussion: Rates are best when predictable over time, which requires a balance between generating sufficient revenue for utility operations, funding capital improvements, and maintaining customer support for required rate adjustments.

Advantages of the Policy Objective: The principle attempts to stabilize the cash flow of the LBWD and improve customer support to rate adjustments through proper revenue management of the LBWD.

Disadvantages of the Policy Objective: It is difficult to define "stable", as this term has different meanings for different people. Certain customers may construe stable to mean no increases from year-to-year.

Supporting Pricing Objectives:

Rate Stability - This objective aims to minimize rate increases. Careful capital and financial planning may help ensure rate stability and avoid erratic changes in rates and charges from one year to the next. Also, a steady or consistent program of smaller annual rate adjustments is generally recognized as preferable when compared to significantly larger increases every three or four years. Note: This objective is not to be confused with Revenue Stability, detailed under Policy Objective 3.

Mitigate Customer Impact - Any new rate structure may result in different impacts to different customers. This objective recognizes these impacts and aim to minimize them.

Affordability for Essential Use - This objective addresses the importance of maintaining the price of water for essential use - i.e., that which is used for health and safety - at the lowest cost possible while considering the needs of the utility, industry practice, and regulatory conditions.

Policy Objective 5: Promotes Efficiency / Conservation

Policy Statement: The value of water as a limited resource should be reflected in the rates, and the LBWD's rate structure should discourage wasteful use and encourage efficient use of water resources.

Discussion: This principle is intended to recognize the limited resources of the LBWD and the State, as well as the environmental impact of generating new water resources. The LBWD's rates should encourage the efficient use of water. This principle is intended to encourage efficient use of limited resources by pricing water, as a commodity, roughly equal to its true cost.

Advantages of the Policy Objective: This principle recognizes the multiple uses of our natural resources and makes a positive statement to all customers and outside parties that the LBWD encourages the efficient use of its limited resources.

Disadvantages of the Policy Objective: Some customers may believe this principle necessarily implies adoption of aggressive conservation-based rates such as multi-tiered rates.

Supporting Pricing Objectives:

Promotes Conservation - The objective of water conservation is to reduce water usage and achieve savings over the year.

Tool for Drought Management Action Plan - This objective encourages the LBWD to remain committed to a drought management plan that allows a mechanism to allocate both water and drought penalty rates during drought conditions.

Promotes Efficiency - The objective of water efficiency includes development of benchmark standards associated with the appropriate amount of water usage for indoor and outdoor needs based on local characteristics of the LBWD. Standards are set on an individual customer basis and on indoor and outdoor use parameters.

Rewards Past Conservation Effort - This objective recognizes and rewards customers for past conservation effort, such as converting to xeriscape and artificial turf.

Based on Individual Needs - This objective would strive to have tier allocations based on individual household characteristics

9.2 - APPENDIX 2 – PRICING OBJECTIVES RANKING SUMMARY

Pricing Objectives	Rank #1	Rank #2	Rank #3	Total Score
Policy Objective: Administration				
Customer Understanding	Most Important (4)	Very Important (3)	Very Important (3)	**10**
Easy to Implement	Important (2)	Important (2)	Important (2)	**6**
Easy to Administer	Very Important (3)	Most Important (4)	Most Important (4)	**11**
Policy Objective: Equity				
Equitable in Allocating CIP Cost	Important (2)	Important (2)	Important (2)	**6**
Fair to the Public	Most Important (4)	Most Important (4)	Most Important (4)	**12**
Align Supply & Demand	Least Important (1)	Very Important (3)	Important (2)	**6**
Policy Objective: Appropriate Funding Mechanisms				
Enhance Revenue Stability	Important (2)	Very Important (3)	Very Important (3)	**8**
Provide Funding Mechanism for Recycling/ Conservation Program	Very Important (3)	Important (2)	Important (2)	**7**
Revenue Sufficiency	Most Important (4)	Most Important (4)	Most Important (4)	**12**
Policy Objective: Rate Stability & Affordability				
Rate Stability	Very Important (3)	Most Important (4)	Most Important (4)	**11**
Mitigate Customer Impact	Very Important (3)	Important (2)	Very Important (3)	**8**
Affordability for Essential Use	Most Important (4)	Very Important (3)	Very Important (3)	**10**
Policy Objective: Promotes Efficiency / Conservation				
Promotes Conservation	Most Important (4)	Most Important (4)	Most Important (4)	**12**
Tool for Drought Management Action Plan	Least Important (1)	Very Important (3)	Important (2)	**6**
Promotes Efficiency	Very Important (3)	Important (2)	Important (2)	**7**
Rewards Past Conservation Effort	Important (2)	Important (2)	Important (2)	**6**
Economic Development	Least Important (1)	Important (2)	Least Important (1)	**4**
Based on Individual Needs	Least Important (1)	Least Important (1)	Least Important (1)	**3**

Pricing Objectives	Total Score	Rank
Fair to the Public	12	1
Revenue Sufficiency	12	1
Promotes Conservation	12	1
Easy to Administer	11	4
Rate Stability	11	4
Customer Understanding	10	6
Affordability for Essential Use	10	6
Enhance Revenue Stability	8	8
Mitigate Customer Impact	8	8
Provide Funding Mechanism for Recycling/ Conservation Program	7	10
Promotes Efficiency	7	10
Easy to Implement	6	12
Equitable in Allocating CIP Cost	6	12
Align Supply & Demand	6	12
Tool for Drought Management Action Plan	6	12
Rewards Past Conservation Effort	6	12
Economic Development	4	17
Based on Individual Needs	3	18

9.3 - APPENDIX 3 – WATER SUPPLY COST INFORMATION

	FY 2017	Weighted Average FY 2017 Unit Cost
Projected Potable Water Sales	51,005 AF	
Water Loss	3.40%	
Available Annual Domestic Supply (in AF)		
Groundwater (WRD)	32,692 AF	$294 /AF
Lakewood Interconnect	900 AF	$573 /AF
MWD Tier 1	51,804 AF	$970 /AF

Groundwater Assessment	FY 2017	Notes
Groundwater (WRD) Pumped Quantity (%)	32,692 AF	
Oct - Jun	70%	*Estimated by LBWD Staff*
Jul - Sep	30%	*Estimated by LBWD Staff*
Groundwater Assessment ($/AF)		
Oct - Jun	$293 /AF	*Provided by LBWD Staff*
Jul - Sep	$297 /AF	*Provided by LBWD Staff*
Groundwater Assessment FY 2017 ($/AF)	**$294 /AF**	***70% x $293 + 30% x $297***

MWD Variable Rates	FY 2017	Notes
MWD Purchased Before Jan 1 (%)	24%	*Estimated by LBWD Staff*
MWD Purchased After Jan 1	76%	
MWD Tier 1		
Oct - Dec	$942 /AF	*Published by MWD – Treated Full Service Tier 1 effective Jan 2016*
Jan - Sep	$979 /AF	*Published by MWD – Treated Full Service Tier 1 effective Jan 2017*
MWD Tier 2		
Oct - Dec	$1,076 /AF	*Published by MWD – Treated Full Service Tier 2 effective Jan 2016*
Jan - Sep	$1,073 /AF	*Published by MWD – Treated Full Service Tier 2 effective Jan 2017*
MWD Tier 1 FY 2017 Unit Cost	**$970 /AF**	*24% x $942 + 76% x $979*
MWD Tier 2 FY 2017 Unit Cost	**$1,074 /AF**	*24% x $1,076 + 76% x $1,073*

9.4 - APPENDIX 4 – FIRE FLOW REQUIREMENTS

American Insurance Association (AIA)
Fire Protection Capacity Calculation Based on Populations

Q=1020*SQRT(P)*(1-0.01*SQRT(P))
T=Q/1000

Q=fire protection rate (gpm)
P=populatoin (1,000's)
T=duration (hours), rounded to nearest hour

For a population of 500,000

Q=	17,708	gpm
T=	18	hours
NFF=	18,814,169	gallons

9.5 - APPENDIX 5 – WATER FINANCIAL PLAN PROFORMA

Water Financial Plan Proforma shown below is prepared in the "2016 Long Beach Rate Model Final.xlsm" concluded in Oct 24, 2016 using the information provided by LBWD Staff including:

1. Budget for Fiscal Year 2017 for Revenues and Expenses for Water Fund
2. Water Capital Replacement Projects Expenditures for FY 2016 and FY 2017 as part of the 10-year CIP project cost estimates
3. Current Debt Service Schedule payable by Water Fund including Series 1997 Bonds, Series 2010 Bonds and Series 2012 Bonds
4. Reserve Policy Approved on August 18, 2016 (Board Policy 2016-34)
5. Beginning Water Reserve Balances as of Oct 1, 2015 (FY 2016) and Oct 1, 2016 (FY 2017)

		FY 2016	FY 2017
	New Rates Effective Date	Oct	Oct
	Projected Potable Water Production (w/ loss)	52,739 AF	52,739 AF
	Projected RW Sales	4,486 AF	4,486 AF
REVENUES			
	OPERATING REVENUES		
	Revenues from Current Rates	$87,199,472	$90,696,459
	Potable	***$83,738,823***	***$87,097,174***
	Daily Service Charge	$22,761,353	$23,675,375
	Quantitative Charge	$60,977,470	$63,421,799
	RW	***$3,460,649***	***$3,599,285***
	Daily Service Charge	$239,670	$249,250
	Quantitative Charge	$3,220,980	$3,350,035
	Revenue Adjustments	$0	$0
	Revenues from Rates	***$87,199,472***	***$90,696,459***
	Other Revenues		
	Other Operating Revenues	$245,905	$1,094,927
	Non-Operating Revenues		
	Interest	$122,000	$75,705
	Rental	$1,085,993	$1,024,900
	Service Connection	$225,000	$305,000
	Grants	$0	$750,000
	Other Reimbursement	$5,839,150	$4,224,488
	Other Non-Operating Revenues	$53,740	$53,740
	Subtotal Other Revenues	***$7,571,788***	***$7,528,760***
TOTAL REVENUES		**$94,771,260**	**$98,225,219**
O&M EXPENSES			
	Potable - Operating	**$83,418,682**	**$81,896,318**
	Salary Savings	-$1,000,000	-$1,800,000
	Power - Treatment	$1,866,849	$1,918,074
	Power - Pumping	$1,840,066	$1,809,114
	Water Purchases - Customer Demand	$21,475,338	$21,739,401
	Water Purchases - Seawater Barrier	$2,003,497	$821,829
	Water Pump Tax	$9,349,912	$9,617,986
	Chemical	$1,879,407	$1,511,640
	Other O&M Expenses	$46,003,613	$46,278,274
	Reclaimed - Operating	**$3,174,711**	**$3,575,118**
	Power	$2,086,121	$2,014,511
	Chemical	$512,636	$435,117
	Other Treatment Reclaimed Dist	$427,509	$1,012,898
	Other Reclaimed O&M Expenses	$916,446	$912,592
	Less Capitalized Interest	-$768,000	-$800,000
TOTAL O&M EXPENSES		**$86,593,393**	**$85,471,436**
NET REVENUES		**$8,177,867**	**$12,753,783**
DEBT SERVICE		**$3,894,325**	**$3,894,775**
	Current Debt Service	$3,894,325	$3,894,775
	Series 1997 Bonds	*$0*	*$0*
	Series 2010 Bonds	*$2,990,125*	*$2,992,525*
	Series 2012 Bonds	*$904,200*	*$902,250*
CAPITAL REPLACEMENT PROJECTS		**$13,447,000**	**$12,588,000**
NET CASH CHANGES		**-$9,163,458**	**-$3,728,992**
BEGINNING WATER FUND BALANCES		**$24,573,060**	**$17,043,347**
ENDING WATER FUND BALANCES		**$15,409,602**	**$13,314,355**
TARGET WATER FUND BALANCES		**$34,858,271**	**$34,839,994**
	Operations 25.0% of O&M	$21,648,348	$21,367,859
	Rate Stabiliza 5.0% of Vol. Rev	$3,209,922	$3,472,135
	Emergency 0.0% % Asset Values by OCLD	$0	$0
	Capital 100.0% 3-yr Index CIP	$10,000,000	$10,000,000

9.6 - APPENDIX 6 – SEWER FINANCIAL PLAN PROFORMA

Sewer Financial Plan Proforma shown below is prepared in the "2016 Long Beach Rate Model Final.xlsm" concluded in Oct 24, 2016 using the information provided by LBWD Staff including:

1. Budget for Fiscal Year 2017 for Revenues and Expenses for Sewer Funds
2. Capital Replacement Projects Expenditures for FY 2016 and FY 2017
3. Estimated Debt Schedule to be issued in FY 2017 to refinance $11M Line of Credit (LOC) used for capital expenditures incurred
4. Reserve Policy Approved on August 18, 2016 (Board Policy 2016-34)
5. Beginning Sewer Reserve Balances as of Oct 1, 2015 (FY 2016) and Oct 1, 2016 (FY 2017)

		FY 2016	FY 2017
	New Rates Effective Date	Oct	Oct
	Projected Sewer Volumetric Sales	40,117 AF	40,117 AF
REVENUES			
	OPERATING REVENUES		
	Revenues from Current Rates	$17,893,433	$18,613,142
	Daily Sewer Rate	$11,340,389	$11,797,976
	Volumetric Sewer Rate	$6,553,044	$6,815,166
	Revenue Adjustments	$0	$0
	Revenues from Rates	***$17,893,433***	***$18,613,142***
	Other Revenues		
	Other Operating Revenues	$4,350	$4,350
	Non-Operating Revenues		
	Interest	$15,000	$40,722
	Service Connection	$350,000	$350,000
	Other Reimbursement	$5,000	$5,000
	Other Non-Operating Revenues	$86,400	$86,400
	Subtotal Other Revenues	***$460,750***	***$486,472***
TOTAL REVENUES		**$18,354,183**	**$19,099,614**
O&M EXPENSES			
	Finance G&A (Sewer) w/o Debt Service	$9,057,038	$9,055,416
	Sewer Collection	$1,024,268	$1,389,173
	Sewer Line/Main Breaks	$1,679,400	$1,572,200
	Sewer Ops Admin	$3,302,716	$3,447,663
	Sewer Pump Stations		
	Power	$102,146	$102,146
	Other Sewer Pump Stations	$260,500	$380,500
	Less Capitalized Interest	-$49,000	-$50,000
TOTAL O&M EXPENSES		**$15,377,068**	**$15,897,097**
NET REVENUES		**$2,977,115**	**$3,202,517**
DEBT SERVICE		**$127,847**	**$637,500**
	Sewer LOC Interest Expenses	$127,847	$0
	Current Debt Service	$0	$637,500
	Proposed Debt Service	$0	$0
NEW DEBT / SRF LOAN			
	Debt Issues	$0	$11,765,353
	Issuance Costs	$0	$0
	Debt Service Reserve	$0	$765,353
	Debt Proceeds to Pay Off LOC Principal	$0	$11,000,000
	Debt Proceeds to Sewer Fund	$0	$0
	Line of Credit Borrow	$0	$0
	LOC Principal Balance	$11,000,000	$0
	LOC Principal Payment	$0	$11,000,000
CAPITAL REPLACEMENT PROJECTS		$3,774,000	$3,794,000
NET CASH CHANGES		**-$924,732**	**-$463,630**
BEGINNING SEWER FUND BALANCES		**$10,059,572**	**$8,779,222**
ENDING SEWER FUND BALANCES		**$9,134,840**	**$8,315,592**
TARGET SEWER FUND BALANCES		**$9,171,919**	**$9,328,663**
Operations	25% of O&M	$3,844,267	$3,974,274
Rate Stabilization	5% of Vol. Rev	$327,652	$354,389
Emergency	0% % Asset Values by OCLD	$0	$0
Capital	100% 3-yr Index CIP	$5,000,000	$5,000,000

9.7 - APPENDIX 7 – ALLOCATIONS OF WATER O&M EXPENSES (DETAILS)

FY 2017 O&M expenses for Potable – Operating and RW – Operating are assigned into functions. Below are excerpts from the "2016 Long Beach Rate Model Final.xlsm" concluded in Oct 24, 2016.

O&M Expenses, excluding Debt Service	Functions	FY 2017
POTABLE - OPERATING		
Bottling Plant	Gen & Admin	$118,868
Business Accounting		
Debt Service		
Business Accounting w/o Debt Service	Billing	$995,298
Business Admin	Gen & Admin	$983,177
Commission	Gen & Admin	$95,609
Communication	Customer Service	$517,268
Conservation	Conservation	$2,807,270
Development	Gen & Admin	$282,201
Emergency Breaks	Distribution (D)	$794,443
Emergency Prep	Gen & Admin	$1,019,828
Eng - Admin	Production Plant	$622,302
Facilities Mgmt	Production Plant	$1,528,438
Finance G&A (Water)		
Salary Savings	Gen & Admin	-$1,800,000
Debt Service		
Billing & Collection Div Charge - Interfund	Billing	$394,864
Call Center Srv Charge - Interfund	Customer Service	$1,936,033
Other Finance G&A (Water)	Gen & Admin	$6,031,583
Fleet Services	Production Plant	$1,613,627
GIS	Distribution (D)	$756,304
Main Construction	Transmission (T)	$8,692,558
Meter/Backflow	Meter Services	$2,095,742
MIS	Gen & Admin	$1,381,398
Public Affairs	Gen & Admin	$2,590,709
Safety	Gen & Admin	$297,883
Sewer Collections	Gen & Admin	$0
Support Admin	Gen & Admin	$27,386
Telemetry	Treatment	$708,172
Treatment Ops		
Power - Treatment	Potable Supply	$1,918,074
Power - Pumping	Potable Supply	$1,809,114
Water Purchases - Customer Demand	Potable Supply	$21,739,401
Water Purchases - Seawater Barrier	Gen & Admin	$821,829
Water Pump Tax	Potable Supply	$9,617,986
Chemical	Potable Supply	$1,511,640
Other Treatment Ops	Treatment	$5,649,598
Valve Ops	Distribution (D)	$228,700
Warehouse	Production Plant	$531,699
Water Ops Admin	Production Plant	$502,262
Water Quality	Treatment	$1,467,155
Water Resources	Gen & Admin	$1,607,898
Subtotal Water O&M, excl. Debt Service		**$81,896,318**

O&M Expenses, excluding Debt Service	Functions	FY 2017
RECLAIMED - OPERATING		
Reclaimed - Development	RW Avg Demand	$0
Reclaimed - Facilities Mgmt	RW Avg Demand	$0
Reclaimed - Finance G&A (Water)	Gen & Admin	$850,000
Reclaimed - Main Construction	RW Distribution	$0
Reclaimed - Meter/Backflow	Gen & Admin	$0
Treatment Reclaimed Dist		
Labor	RW Reimburs. Costs	$0
Power	RW Reimburs. Costs	$2,014,511
Chemical	RW Reimburs. Costs	$435,117
Other Treatment Reclaimed Dist	RW Reimburs. Costs	$1,012,898
Reclaimed - Valve Ops	RW Distribution	$0
Reclaimed - Water Resources	Gen & Admin	$62,592
Subtotal RW O&M		**$4,375,118**
		TRUE
Less Capitalized Interest	Capital Costs	-$800,000
Total Water / RW O&M Expenses, excl. Debt Service		**$85,471,436**
	TRUE	TRUE

9.8 - APPENDIX 8 – WATER REVENUE REQUIREMENT ALLOCATION TO COST CATEGORIES

Allocations of water revenue requirement to cost categories are documented in the "2016 Long Beach Rate Model Final.xlsm" concluded in Oct 24, 2016. Below is excerpt from the Model.

CURRENT REVENUE REQUIREMENTS	FY 2017	Water Supply	Base Fixed	Max Day	Max Hour	Billing & CS	Meters & Services	RW Supply	RW Base Fixed	RW Max Day	RW Max Hour	Conservation	Rev Offsets	General	Fire Protection	Total
REVENUE REQUIREMENTS																
O&M Expenses	$85,471,436	$36,596,215	$14,898,581	$4,089,850	$526,822	$3,841,976	$2,002,527	$0	$3,447,874	-$22,256	-$34,562	$2,807,270	$0	$14,249,290	$3,067,850	**$85,471,436**
Debt Service	$3,894,775	$0	$1,159,396	$400,230	$426,469	$7,240	$453,817	$0	$71,333	$108,351	$168,263	$0	$0	$592,357	$507,318	**$3,894,775**
Rate Funded CIP	$12,588,000	$0	$3,747,195	$1,293,553	$1,378,359	$23,400	$1,466,746	$0	$230,551	$350,192	$543,831	$0	$0	$1,914,511	$1,639,663	**$12,588,000**
Reserve Funding w/o Revenue Adjustment	-$3,728,992	$0	-$1,110,046	-$383,194	-$408,317	-$6,932	-$434,500	$0	-$68,297	-$103,739	-$161,101	$0	$0	-$567,143	-$485,724	**-$3,728,992**
SUBTOTAL REVENUE REQUIREMENTS	**$98,225,219**	**$36,596,215**	**$18,695,126**	**$5,400,439**	**$1,923,333**	**$3,865,683**	**$3,488,589**	**$0**	**$3,681,461**	**$332,549**	**$516,432**	**$2,807,270**	**$0**	**$16,189,015**	**$4,729,107**	**$98,225,219**
Less Other Revenues																
Passthrough Water Supply & Power Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Other Operating Revenues	$1,094,927	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,094,927	$0	**$1,094,927**
Non-Operating Revenues																
Interest	$75,705	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$75,705	$0	**$75,705**
Rental	$1,024,900	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,024,900	$0	$0	**$1,024,900**
Service Connection	$305,000	$0	$90,792	$31,342	$33,397	$567	$35,538	$0	$5,586	$8,485	$13,177	$0	$0	$46,388	$39,728	**$305,000**
Grants	$750,000	$0	$223,260	$77,071	$82,123	$1,394	$87,390	$0	$13,736	$20,865	$32,402	$0	$0	$114,068	$97,692	**$750,000**
Other Reimbursement	$4,224,488	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,224,488	$0	**$4,224,488**
In-lieu Water Replenishment Reimbursement	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Other Non-Operating Revenues	$53,740	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$53,740	$0	**$53,740**
SUBTOTAL NON-OPERATING REVENUES	**$7,528,760**	**$0**	**$314,052**	**$108,413**	**$115,520**	**$1,961**	**$122,928**	**$0**	**$19,322**	**$29,350**	**$45,578**	**$0**	**$1,024,900**	**$5,609,315**	**$137,420**	**$7,528,760**
NET REVENUE REQUIREMENTS FROM CURRENT RATES	**$90,696,459**	**$36,596,215**	**$18,381,073**	**$5,292,026**	**$1,807,813**	**$3,863,722**	**$3,365,662**	**$0**	**$3,662,139**	**$303,199**	**$470,853**	**$2,807,270**	**-$1,024,900**	**$10,579,700**	**$4,591,686**	**$90,696,459**
General Cost Allocation Factors			49.5%	14.2%	4.9%	10.4%	9.1%		9.9%	0.8%	1.3%					
Reallocation of General Costs			$5,235,118	$1,507,223	$514,884	$1,100,428	$958,575		$1,043,015	$86,354	$134,104			-$10,579,700		**$0**
Public Fire Protection Cost Allocation Factors			85%				15%									
Reallocation of Public Fire Protection Costs			$2,580,659.81				$472,531								-$3,053,191	
NET ADJUSTED REV REQMT FROM CURRENT RATES	**$90,696,459**	**$36,596,215**	**$26,196,851**	**$6,799,249**	**$2,322,697**	**$4,964,150**	**$4,796,767**	**$0**	**$4,705,153**	**$389,553**	**$604,957**	**$2,807,270**	**-$1,024,900**	**$0**	**$1,538,496**	**$90,696,459**