FINAL

COST OF SERVICE UPDATE

San Diego Public Utilities Department
Water Fund

PREPARED FOR

City of San Diego, CA

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Introduction

This report was prepared for the City of San Diego (City) Public Utilities Department (PUD) to document the update of a multi-year financial plan, cost of service analysis, and the design of rate structures for the PUD's Water Fund (Fund). The specific goals of the study were to:

- Review and evaluate existing policies and procedures affecting utility rates;
- Evaluate the adequacy of projected revenues under existing rates to meet projected revenue requirements;
- Develop a sound financial plan for the Water Fund covering a five-year study period for both ongoing operations and planned capital improvements;
- Allocate projected Fiscal Year 2015-2016 (FY 16) revenue requirements to the various customer classes in accordance with the respective service requirements; and
- Develop a suitable rate schedule that produces revenues adequate to meet financial needs of the utility system while recognizing customer costs of service and local and state legal and policy considerations. Specific elements being incorporated into the rate schedules and addressed in this report include the following:
    - Required consumption reductions in accordance with the Governor's mandate.
    - San Diego County Water Authority adopted FY 2016 rate increase and projected increases for FY 2017 through FY 2020, and any associated pass through increases.
    - Inclusion of the accelerated City's Pure Water Program.
- In addition, the rate schedules are guided by the rate setting cost of service requirements of California Constitution Article XIII D (Proposition 218) and Proposition 26.

This Cost of Service (COS) update reviews the cost of providing water service to the City's customers. To that end, the study examines the revenues generated by the Fund and makes recommendations for revenue adjustments, as needed. This study is a recalibration of the City's rates to reflect current financial and water supply/restriction conditions.

BACKGROUND

The City of San Diego is located in San Diego County and stretches to the United States and Mexico international border. The City is the largest city in San Diego County with a population of roughly 1.4 million (2013 US Census Bureau estimate). The City owns and operates two self-supporting enterprises (Water and Wastewater). Only the Water Fund is subject to this cost of service analysis.

The Water utility system provides service to residential, commercial and industrial customers as well as wholesale customers such as California-American Water Company. The City, through PUD, operates the Water utility system as a self-supporting enterprise, with revenues and expenditures accounted for separately from other enterprise and General Fund activities. The City and PUD principally protect the long-term interests of water customers with respect to rate pricing, service quality and reliability of essential services. To achieve this objective, the PUD must consider the need for Water to remain financially viable and able to provide reliable, safe and secure water services to its consumers in the long run. Promoting economic efficiency and long-term investment is consistent with the factors that the PUD must operate.

The Water Enterprise (Water) serves approximately 1.4 million residential, commercial, industrial, and wholesale customers by providing potable water. To serve its customers, Water obtains water from two primary sources: local water sources and purchased water supplies from the San Diego County Water Authority (CWA). CWA purchases include treated water delivered to the City's water distribution system and raw water transported to the City's water treatment plants. It is anticipated that in calendar year 2016, another water supply source will be made available and added to CWA's supply portfolio -- desalinated water from the Carlsbad Desalination Facility. Furthermore, the City is planning to implement its Pure Water program during the five-year study period which will help diversify the City's water supply resources.

The Water system operates in an area subject to strict regulatory oversight by Federal and State agencies such as the U.S. Environmental Protection Agency (USEPA), California Department of Public Health (DPH), and the Air Pollution Control District. The PUD must comply with a multitude of laws including, but not limited to, the Safe Drinking Water Act. Complying with these regulations and resulting mandates contributes to a large share of the cost burden on the system.

Changes since the Last Rate Case

The City's last utility rate case occurred in 2013. Since that time, a number of significant external and internal changes have occurred which have subsequently affected PUD's finances and operations. Fundamental to the development of the 2013 Rate Case were four assumptions:

1. Declining economic conditions as a result of the housing bubble burst in 2008;
2. Slowing of water sales due to customer reactions to water conservation messaging;
3. Delays in executing Water's capital project program; and
4. Purchased water cost increases in-line with historical averages.

Table 1 summarizes the major changes (affecting the 2016 rate case) to the assumptions underlying the former 2013 Rate Case.

Table 1 Major Changes to Former 2013 Rate Case Assumptions

2013 Rate Case Assumptions	Current Reality for FY 16 Rate Case
Housing bubble burst in 2008. The housing market was slowly recovering.	Housing and employment markets continue to recover.
Severe drought hit the nation's southwest region in 2009. As a result, water conservation messaging becomes the norm and agencies develop drought restrictions. Per capita consumption drops to lowest levels in a decade.	Drought conditions continue to worsen. As a result, the State of California is in a drought state of emergency which requires all Californians to significantly reduce water use. The State is requiring that the City of San Diego reduce total consumption by 16% by the Spring of 2016. Per capita consumption in San Diego continutes to decline thus impacting base revenue projections for the Water Utility.
The City experienced delays in executing its CIP. The financial market crash of late 2007 resulted in a tightening of lending activities and increased scrutiny on credit-worthiness.	The City is on target for the execution of its Water CIP. Lending activities are on the rise however increased scrutiny on credit-worthiness continues, particularly in light of potential revenue impacts due to drought conditions and reduced customer demand.
Since 2008, the effective rate that the City paid for purchased water from CWA (cost/acre-foot purchased) doubled. Infrastructure investments by both CWA and Metropolitan Water District of Southern California, restricted allocations from the Colorado River, and the Bay-Delta continued to drive costs up, while declining sales reflecting conservation efforts were driving down revenues.	The effective rate of purchased water continues to increase. Supply reliabilty improvements due to desalinated water availability in 2016 and future impacts of the Pure Water Program will continue to drive up costs in the short term.

Current Rate Case Focus

Scarcity in water supply continues to be a long-term concern to all water suppliers in Southern California, including the CWA. As a result, the price of water will continue to rise within San Diego County to meet future regional demands. Incorporated within this study, are three drivers of costs related to the Water Fund: 1) State-mandated water use restrictions, 2) CWA supply diversification efforts, and 3) the implementation of the San Diego Pure Water program.

The first major cost driver related to the 2016 Rate Case is the required consumption decrease mandated by the Governor's water use restriction declaration. California is experiencing one of the driest periods in its history. In 2015, Governor Jerry Brown declared a water use state of emergency and called for all Californians to significantly reduce water use. In response to this declaration, California established statewide emergency water conservation regulations. Consequently, the State is requiring that the City of San Diego reduce total consumption by 16 percent compared to calendar year (CY) 2013. Non-compliance with the mandate may result in fines as high as $10,000 per day.

Second, the CWA has begun diversifying its water supplies to reduce reliance on water imported from the Colorado River and Sacramento-San Joaquin Bay-Delta. Within the rate adjustments contained in this report are projected costs associated with supply diversification and reliability efforts. One of these strategies includes the Carlsbad Desalination Project, which is expected to be completed by the fall of 2015. Water Fund cost projections include the purchase of desalination water from this Carlsbad project once it becomes operational.

The third cost consideration is the proposed implementation of the Pure Water program which is a part of the City's overall Water Capital Improvement Program. As of fiscal year (FY) 2015, the City is moving forward with the development of its Pure Water San Diego Program (Pure Water). This program will provide the City with an additional water supply. The Pure Water program will incorporate water purification technology to produce one third of San Diego's drinking water supply locally by 2035, thus ensuring future water supply reliability well into the future.

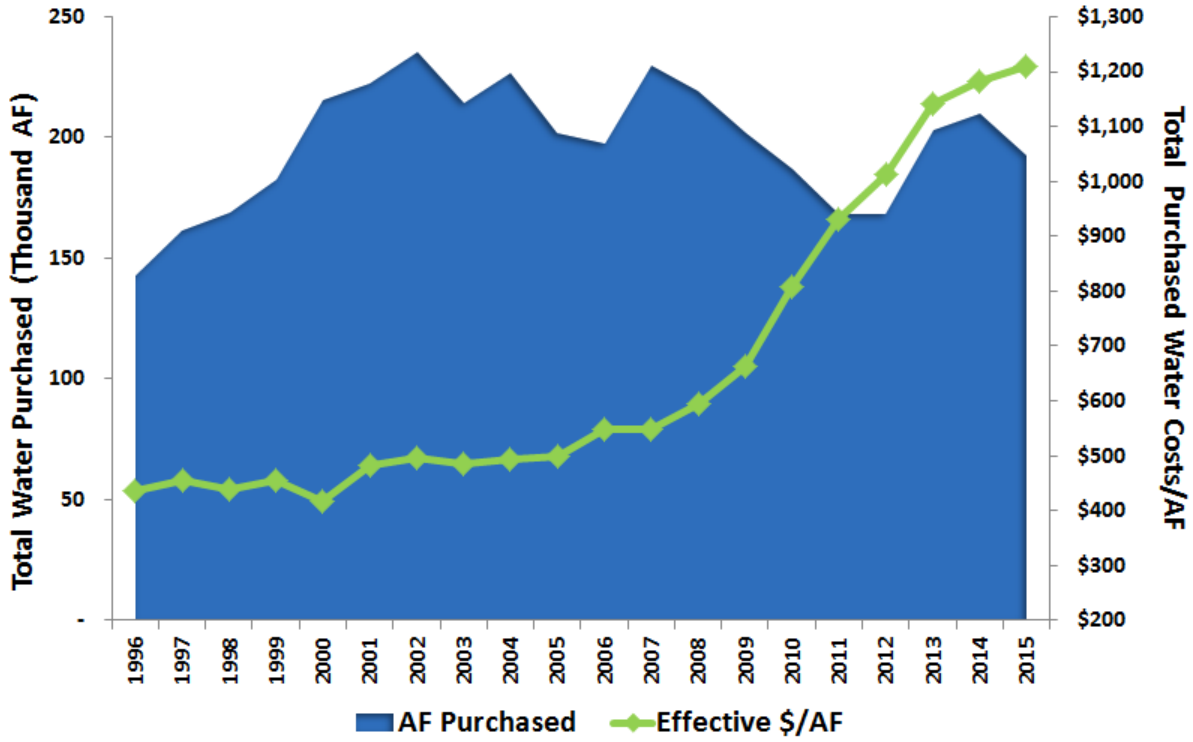
Water agencies across the state are implementing water conservation measures to comply with these regulations and working with customers to help reduce water use wherever possible to preserve this vital and limited resource. The City of San Diego makes conservation a priority and considers customers its greatest ally in building a sustainable future. Continued conservation ensures the region's water needs are met, now and in the future. However, a large part of the San Diego Water Utility's expenses do not vary based upon the quantity of water used by our customers. The proposed rates included in this study would assist the City to continue to generate sufficient revenues to operate, manage, and maintain its facilities and services, even in times of State-mandated water use restrictions.

City Water Supply Costs

The City's local water supply only provides about 10 to 15 percent of customer needs and the City purchases the vast majority of needed water from CWA. In FY 2016 and 2017, the City will not draw down local water supply as water levels are too low due to the on-going drought. As noted previously, infrastructure investments, ongoing State-mandated water use restrictions, and regulatory-imposed mandates put upward pressure on purchased water costs. Figure 1 illustrates the City's historical

effective rate paid for purchased water. The effective rate is the total amount paid to CWA divided by the total volume of water purchased in acre-feet (AF).

Figure 1. Historical Effective Rate Paid for Purchased Water



The 2016 Rate Case examines what actions the PUD should undertake to maintain the financial viability of the Water Enterprise in light of the results of the 2013 Rate Case, changing consumer demand in response to conservation awareness and State-mandated rationing, increasing purchased water costs, slow economic growth, regulatory requirements, and needed future large infrastructure investments.

PURPOSE

The purpose of this report is to present the findings obtained from Black & Veatch Corporation's (Black & Veatch's) study of Water rate structures and alternatives, financing, and capital needs. The study develops a financial plan that projects operating revenue, expenses and capital financing costs for the City's Water Enterprise Fund over a five-year planning period ending June 30, 2020. The plan considers future revenues under existing rates, operation and maintenance expense, principal and interest expense on debt, and capital improvement requirements. Black & Veatch made annual projections of the number of customers, water use, revenues, and expenditures based on historical data and estimates for the next five years.

SCOPE OF WORK

The City retained Black & Veatch in 2012 to update its cost of service and rate study for its Water and Wastewater enterprises and continued with the retainer for the current rate cases. Presented herein are

the results of a study of the Water Fund's projected revenues, revenue requirements, cost of service, and rates for service.

For purposes of this report, the study period is the five fiscal years beginning July 1, 2015 and ending June 30, 2020. Unless otherwise noted, references in this report to a specific year are for the City's year ending June 30. To avoid confusion between calendar and fiscal years, the term FY refers to the year beginning July 1 and ending June 30. Black & Veatch projected revenues and revenue requirements for the study period based on a review of historical factors and Water's operating and capital budgets and financial policies. The study of revenue requirements recognizes projected operation and maintenance (O&M) expenses, establishment and/or maintenance of reserve funds, and capital financing requirements. Capital financing requirements include payments on outstanding bond and loan issues as well as capital improvement expenditures met from annual revenues and available reserve funds. All figures are presented to the nearest hundred and totals may not foot due to rounding.

The Water Fund's costs of service were allocated to customer classes utilizing a cost causative approach endorsed by the American Water Works Association (AWWA) M1 rate setting manual. The allocation methodologies produce cost of service allocations recognizing the projected customer service requirements for the City. The design of proposed rates is in accordance with allocated cost of service and local policy considerations, such as reserve funding levels. Additionally, this study evaluates the extent to which the existing rate structure recovers revenues from customer classes in accordance with cost of service allocations.

OVERVIEW OF LEGAL AND INDUSTRY BEST PRACTICES FOR COST-OF-SERVICE STUDIES

Rate-setting procedures in California require that agencies responsible for imposing property-related charges must demonstrate a nexus between the cost of providing services and the services or benefits received. The state of California considers water and wastewater services as property-related fees and as such, subject to state constitutional and statutory requirements. Presented in the next few sections are brief summaries of the relevant laws governing this study.

Proposition 13

Government Code Section §50076, adopted in 1979 provides that "special taxes shall not include any fee which does not exceed the reasonable cost of providing the service or regulatory activity for which the fee is charged."

Proposition 218

California voters approved Proposition 218 in November 1996. This voter-approved initiative added Articles XIIIC and D to the California Constitution. Article XIID Section 2(e), is a definition of a "fee". Essentially, as defined by Proposition 218, a fee is "any levy other than an ad valorem tax, a special tax, or an assessment, imposed by an agency upon a parcel or upon a person as an incident of property ownership, including a user fee or charge for a property related service". Until 2006, sewer charges were considered property related services while water charge were not defined as property-related until the 2006 California Supreme Court decision in *Bighorn-Desert View Water Agency v. Verjil*. After this decision, water charges are now considered as property-related fees and any new or increased water

charges must comply with the substantive and procedural requirements of Proposition 218. The substantive requirements include:

- Revenues derived from the fee or charge cannot exceed the funds required to provide the property related service.
- Revenues derived from the fee or charge cannot be used for any other purpose other than for which the fee or charge was imposed for.
- A property-related fee or charge cannot exceed the proportional cost of service attributable to the parcel.

Assembly Bill 2882

The California legislature passed Assembly Bill (AB) 2882 in 2008 which amended the California Water Code (Sections 370 – 374) to provide criteria for establishing allocation-based conservation water pricing in support of California Constitution Article X, Section 2. Article X, Section 2 states that waste or unreasonable use of water shall be prevented. Allocation-based conservation water pricing allows for the design of water budget rate structures. Per AWWA M1, "a water-budget rate structure is a form of increasing block rates where the amount of water within the first block or blocks is based on the estimated, efficient water needs of the individual customer."

Under AB 2882, allocation-based rates can be employed if they meet the following criteria:

- Billing based on metered use.
- A base allocation (water amount) is established based on each customer's needs and property characteristics.
- A basic charge is imposed for all water used within the customer's base allocation.
- A conservation charge is imposed on all excess of the customer's base allocation.

Under AB 2882, tiered rates can be employed if they meet the following criteria:

- Conservation best management practices, conservation education, irrigation controls and other conservation devices, and other demand management measures.
- Water system retrofitting, dual plumbing and facilities for production, distribution, and all uses of recycled water and other alternative water supplies.
- Projects and programs for prevention, control, or treatment of the runoff of water from irrigation and other outdoor water uses. Incremental costs shall not include the costs of stormwater management systems and programs.
- Securing dry-year water supply arrangements.
- Procuring water supplies to satisfy increments of water use in excess of the basic use allocations for the customers of the public entity, including supply or capacity contracts for water supply rights or entitlements and related energy costs for water delivery.

Proposition 26

California voters approved Proposition 26 in November 2010. Included in the language of proposition, which amended California Constitution Article XIII C, Section 1, is a definition of "tax". Essentially, as

defined by Proposition 26, a tax is any "levy, charge, or exaction of any kind imposed by a local government" with specifically outlined exceptions. These exceptions are:

- A charge imposed for a specific benefit conferred or a privilege granted directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of conferring the benefit or granting the privilege, and
- A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of providing the service or product.

Proposition 26 establishes that the "…local government bears the burden of proving by a preponderance of the evidence that a levy, charge, or other exaction is not a tax, that the amount is no more than necessary to cover the reasonable costs of the governmental activity, and that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity."

Government Code Section §54999.7

Under this section, rate-setting activities by public agencies are directed to follow cost-of-service principles and states that fees for "…for public utility service, other than electricity or gas, shall not exceed the reasonable cost of providing the utility service." It also provides that these fees will be "established in consideration of service characteristics, demand patterns, and other relevant factors."

Generally Accepted Rate-Setting Standards

The American Water Works Association (AWWA) is the industry organization tasked with providing guidance on the operation and management of water utilities. AWWA has established a general set of principles used to guide the development of water rates. These principles were developed to provide a consistent approach and minimum standards to rate-setting procedures. It is important to note that AWWA observes that there is no prescribed single approach for establishing cost-based rates. Rather, agencies must exercise judgment to align rates and charges with local conditions and requirements, as well as applicable state law.

Black & Veatch has used the guidelines contained in the AWWA documents and followed the applicable State law, including Proposition 218, to conduct the analyses contained herein.

DISCLAIMER

In conducting our study, we reviewed the books, records, agreements, capital improvement programs, customer sales and financial projections of the Water Fund, as we deemed necessary to express our opinion of the operating results and projections. While we consider such books, records, documents, and projections to be reliable, Black & Veatch has not verified the accuracy of these documents.

The projections set forth in this report are intended as "forward-looking statements". In formulating these projections, Black & Veatch has made certain assumptions with respect to conditions, events, and circumstances that may occur in the future. The methodology utilized in performing the analyses follows generally accepted practices for such projections. Such assumptions and methodologies are reasonable and appropriate for the purpose for which they are used. While we believe the assumptions are

reasonable and the projection methodology valid, actual results may differ materially from those projected, as influenced by the conditions, events, and circumstances that actually occur. Such factors that may affect the Fund's ability to manage the system and meet water quality, and/or other regulatory or environmental requirements include the following: the City's ability to execute the capital improvement program as scheduled and within budget; regional climate, weather conditions, and future responses to water supply within the State of California affecting the demand for water; and adverse legislative, regulatory or legal decisions (including environmental laws and regulations).

Water Rate Study

REVENUE AND REVENUE REQUIREMENTS

To meet the costs associated with providing water service to its customers, the Water Fund derives revenue from a variety of sources including water user charges, other water sales, rental income, capacity fees, interest earned from the investment of available funds, meter installation fees, and other miscellaneous revenues. Black & Veatch used a combination of an analysis of historical and future system growth in terms of number of accounts and water consumption to project the level of future revenue generated in the study.

With revenue derived from the various sources, the Water Fund meets the cash requirements of operation and maintenance (O&M); principal, interest, and reserve payments on revenue bonds and State Revolving Fund (SRF) loans indebtedness; and recurring annual capital expenditures for replacements, system betterments, and extensions not debt financed. Operation and maintenance expenses are those expenditures necessary to maintain the system in good working order. Routine annual capital expenditures, which include equipment replacements, consist of recurring annual replacements, minor extensions, and betterments, which are normally revenue financed. Other capital costs include bond and loan covenant-required payments and cash financed capital improvements.

Customer and Water Usage Projections

To forecast revenue, customer bills and billed water sales volume need to be determined within Water's service area. Recent historical trends demonstrate a slight uptick of growth in water connections over the past few years as the economic and development conditions in the region continue to improve. For this 2016 rate case, Black & Veatch has assumed a nominal water connection growth rate of approximately 0.65% annually over the five-year study period. Table 2 illustrates the anticipated number of water connections during the study period.

Table 2 Projected Number of Water Connections

Line No.	Description	Fiscal Year Ending June 30, Projected				
		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
		(Connections)	(Connections)	(Connections)	(Connections)	(Connections)
1	Single Family	223,306	224,423	225,546	226,675	227,809
2	Other Domestics	29,359	29,947	30,547	31,159	31,782
3	Non-Residential [*]	15,320	15,397	15,475	15,553	15,631
4	Temp Construction	380	381	382	383	384
5	Irrigation	7,049	7,101	7,153	7,207	7,262
6	Fire Service	5,623	5,623	5,623	5,623	5,623
7	**Total Accounts**	**281,037**	**282,872**	**284,726**	**286,600**	**288,491**

Projected water sales volumes use projected number of customers, customer bills and historical water usage patterns per customer class. Table 3 illustrates the projected water billed volume in hundred cubic feet (HCF). One HCF is equivalent to 748 gallons. Black & Veatch obtained several years of detailed consumption data and thus historical patterns of customer water usage were determined. Using historical water usage as a benchmark, the projected water sales volumes increase slightly over the

study period as shown in Table 3. This projection is used to determine anticipated baseline rate revenues during the study period. Because of State-mandated water use restrictions, FY 2016 incorporated an immediate decrease in water consumption that slowly increases during the study period. This potential increase is addressed in the rate design section as any future consumption decreases will affect levels of rate revenues generated.

Table 3 Projected Billed Volume

Line No.	Description	Fiscal Year Ending June 30, Projected				
		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
		(HCF)	(HCF)	(HCF)	(HCF)	(HCF)
1	Single Family	24,100,457	24,220,959	24,342,064	24,463,774	24,586,093
2	Other Domestics	14,578,835	14,870,412	15,167,820	15,471,176	15,780,600
3	Non-Residential [*]	16,554,727	16,637,501	16,720,689	16,804,292	16,888,313
4	Temp Construction	221,122	221,564	222,007	222,451	222,896
5	Irrigation	9,090,405	9,158,583	9,227,272	9,296,477	9,366,201
6	**Total Water Usage (HCF)**	**64,545,546**	**65,109,019**	**65,679,852**	**66,258,170**	**66,844,103**
7	**Total Water Usage (AF)**	**148,176**	**149,470**	**150,780**	**152,108**	**153,453**

[*] Non-Residential customers include Commercial, Industrial, and Outside City.
HCF = hundred cubic feet, AF = Acre-Feet (1 AF = 435.6 HCF)

Revenue Projections

Water generates revenue primarily from water sales. Since revenue generated outside of water sales are not subject to rate increases, we have excluded them from this portion of the analysis. The cash flow portion of this report incorporates these additional revenue sources.

Water's user-charge sales are composed of two parts, a monthly service charge and a commodity charge. The monthly service charge is an amount based on meter size designed to recover fixed costs, which do not vary with the volume of water used by a customer such as meter reading, customer billing, and debt service. The commodity charge is an amount based on units of consumption measured by the number of HCF of water consumed during the billing cycle. Included in the commodity charge are the costs associated with water purchases. Table 4 summarizes the City's current water rates for all customer classes.

Table 4 Existing Rates (Effective January 1, 2015)

Service Charge ($/month)		Fire Service Charge ($/month)		Commodity Charge ($/HCF)	
Meter	Rate	Meter	Rate	Customer Class	Rate
3/4"	$20.31			Single Family [**]	
1"	$27.51	1"	$2.58	Tier 1 (0-4 HCF)	$3.90
1.5"	$43.96	1.5"	$2.58	Tier 2 (5-12 HCF)	$4.36
2"	$64.53	2"	$4.00	Tier 3 (13-18 HCF)	$6.23
3"	$112.86	3"	$15.50	Tier 4 (19+ HCF)	$8.77
4"	$181.75	4"	$19.82	Multi Family	$4.65
6"	$352.44	6"	$29.27	Non-Residential	$4.47
8"	$558.10	8"	$41.34	Construction	$4.95
10"	$798.72	10"	$53.41	Irrigation	$4.95
12"	$1,483.55	12"	$63.74		
16"	$2,580.72	16"	$103.35		

[*] Non-Residential customers include Commercial, Industrial, and Outside City.

[**] Bi-Monthly Tiers = 2x Monthy Tiers.

Table 5 incorporates the existing water rates, demonstrates water sales revenue increasing during the study period.

Table 5 Revenue under Existing Rates

Line No.	Description	Fiscal Year Ending June 30, Projected				
		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
		($)	($)	($)	($)	($)
1	Single Family	171,235,900	172,092,500	172,953,400	173,818,900	174,688,400
2	Other Domestics	79,247,500	80,834,700	82,453,800	84,104,700	85,787,600
3	Non-Residential [*]	82,134,900	82,545,300	82,957,800	83,372,200	83,788,400
4	Temp Construction	1,400,900	1,403,900	1,406,900	1,409,800	1,412,800
5	Irrigation	49,293,000	49,661,200	50,032,000	50,406,300	50,783,700
6	Fire Service	2,088,900	2,088,900	2,088,900	2,088,900	2,088,900
7	**Total Revenue**	**$385,401,100**	**$388,626,500**	**$391,892,800**	**$395,200,800**	**$398,549,800**

[*] Non-Residential customers include Commercial, Industrial, and Outside City.

Operation and Maintenance Projections

Summarized in Table 6 are Water's projected O&M expenditures. These expenditures include costs related to personnel, contract services, operating supplies, utilities, and general and administrative. The forecasted expenditures are based on Black & Veatch and City staff's expertise and knowledge. The figure box to the right summarizes key assumptions for inflation rates used in the O&M expense projections and applied to FY 2017-2020. Purchased water increases reflect adopted CY 2015 and CY 2016 CWA rates. The levels of adjustment illustrated above are consistent with recent increases seen throughout the area. Total O&M increases from $424.2 million in FY 2016 to

- *Personnel Services: 1%*
- *Operating Supplies: 3.5%*
- *Contracts: 3.5%*
- *IT Expenses: 0%*
- *Energy & Utilities: 9%*
- *Routine Capital: 0%*
- *Other Expenses: 0%*
- *Pure Water: 1%*

$486.0 million in FY 2020, due mainly to the increased cost of purchased water and water operations.

Table 6 Projected Operation and Maintenance Expenses

Line No.	Description	Fiscal Year Ending June 30, Projected				
		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
		($)	($)	($)	($)	($)
1	Finance & Information Technology	18,224,600	18,673,800	19,029,900	19,511,500	20,677,200
2	Employee Services & Quality Assurance	8,691,700	10,313,600	10,564,600	10,903,300	11,150,200
3	Customer Support Services	10,365,200	11,268,800	11,418,900	11,643,400	11,851,400
4	Long Range Planning	14,882,800	13,250,800	12,548,500	11,484,200	11,716,500
5	Engineering Program Management	9,224,400	8,096,500	7,419,800	6,227,200	5,064,500
6	Environmental Monitoring & Technical Services	6,514,500	6,708,300	6,555,500	6,758,800	6,884,500
7	Water Operations	86,882,200	93,657,400	98,365,300	100,252,500	103,803,300
8	Pure Water	1,341,500	1,265,000	1,256,100	1,311,500	1,333,500
9	Water Administration and Lakes	11,543,200	11,773,400	12,059,400	12,359,000	12,673,200
10	Water Supply	225,085,900	238,991,900	253,810,500	273,138,400	275,162,500
11	Administrative Services	33,947,300	25,916,900	25,777,400	25,263,300	25,704,700
12	**Subtotal O&M Expenses**	**426,703,300**	**439,916,400**	**458,805,900**	**478,853,100**	**486,021,500**
13	Less O&M Adjustments	(2,500,000)	0	0	0	0
14	**Total O&M Expenses**	**$424,203,300**	**$439,916,400**	**$458,805,900**	**$478,853,100**	**$486,021,500**

Capital Improvement Program

While O&M expenses cover day-to-day operations, Water incurs additional capital expenditures to repair and replace existing water assets. As a result, Water has developed a long-term Capital Improvement Program (CIP) that identifies future water system facility needs. The CIP shown in Table 7 summarizes the capital improvement projects by system category during the study period. As part of the financial plan analyses, starting in FY 2016, Black & Veatch applied an annual inflation allowance of 2.27 percent based on a recent 5-year Engineering News Record's (ENR's) historical average for Construction Cost Indices.

The CIP is a constantly evolving program and PUD staff review all projects on an annual basis. Consequently, projects may shift out in time or drop off the CIP if they become unnecessary. Conversely, PUD may add projects as the need arises. Black & Veatch suggests that the reader not construe the project categories listed in Table 7 as "set in stone", but rather as indicative of the nature of projects planned for execution over the study period. We note that the CIP project totals presented in Table 7 reflect capital expenditures (cash out the door) versus the budgeted (encumbered) values shown in the City's approved CIP. Furthermore, as part of the current rate case, Black & Veatch in discussions with PUD staff have applied a 35 to 40 percent discount rate to the CIP (expenditure) values to more closely align study period expenditure trend with historic levels.

Table 7 Capital Improvement Program

Line No.	Description	Fiscal Year Ending June 30, Projected				
		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
		($)	($)	($)	($)	($)
1	Groundwater Projects	92,900	116,500	1,506,200	7,657,300	1,950,500
2	Miscellaneous	9,570,600	18,928,500	13,487,500	192,500	353,600
3	Pipeline Projects	34,756,200	40,400,900	38,389,200	35,991,600	36,158,900
4	Pipeline - Transmission	20,088,300	24,530,300	25,264,900	33,282,700	36,838,300
5	Pump Stations	8,542,200	6,143,500	9,812,300	4,679,200	3,998,900
6	Storage Projects	5,315,700	24,193,900	21,016,100	24,372,500	28,850,400
7	Water Treatment Projects	2,331,100	46,000	0	86,100	474,200
8	Pure Water Program	23,085,200	60,069,200	29,676,000	14,696,100	226,831,600
9	**Total CIP (Inflated & Discounted)**	**103,782,200**	**174,428,800**	**139,152,200**	**120,958,000**	**335,456,400**

Black & Veatch notes that over the past few years, the City has implemented a number of business process changes including the following:

- Changes to the Municipal Code allowing for Multiple Award Construction Contracts (MACC) that accelerate the selection and award process for design build procurements,
- Increasing the task limits for Job Order Contracts, and
- Developing an order project cascade list to allow remaining CIP funds in a project at completion to move directly to a priority project.

The PUD expects to see the full effect of these changes during this current (FY 16) rate case.

The proposed CIP includes targeted levels for water main replacement – moving from completion of 17.7 miles of replacement in FY 14 to a baseline of 30 miles awarded in FY 15. PUD's target is 30+ miles awarded per year thereafter. As described in the 2007 and 2013 Rate Cases, Water is under a California Department of Public Health (DPH) compliance order. Of the proposed Water CIP, approximately $61.3 million is associated with DPH-dictated projects.

Capital Fund Financing

Table 8 presents a proposed financing plan for Water's CIP. Financing for the CIP comes from a combination of funds on hand, State Revolving Fund (SRF) loan proceeds, bond proceeds, grant monies, capacity fees, reserve fund transfers, and cash financing. PAYGO funding is cash receipts from operating revenues. In FY 14 and 15, the PUD cash funded its CIP program entirely from cash on hand and set aside revenues from operational savings. For this rate case period of five fiscal years (FY 16 to FY 20), capital fund financing takes into account grants, state loans, and capacity fee revenues which can fluctuate from year to year. The PUD will fund the remaining component of the CIP with bond financing and available cash on hand.

Additionally, PUD will transfer approximately $32 million from the Rate Stabilization Fund in FY16 to bolster its debt service coverage levels and to mitigate rate increases for ratepayers. For the 2016 Rate Case, it is anticipated that PUD will be issuing new debt and will combine any bond proceeds with PAYGO, Other Cash Financing, capacity fees, SFR proceeds, and Rate Stabilization monies to fund the CIP

expenses. The large projected expense increases in FY 2020 is due to the investment in the Pure Water program for future supply reliability.

Table 8 CIP Financing Plan

Line No.	Description	Fiscal Year Ending June 30, Projected				
		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
		($)	($)	($)	($)	($)
	Source of Funds					
1	Bond Proceeds	52,330,064	67,793,725	44,131,189	20,863,497	138,422,511
2	SRF Proceeds	24,542,056	83,758,316	78,474,426	79,341,074	148,214,362
3	Grants	1,675,080	2,938,660	2,054,785	2,467,429	30,595,227
4	Capacity Fees	15,000,000	12,000,000	12,000,000	12,000,000	12,000,000
5	PAYGO Funds	10,235,000	7,938,100	2,491,800	6,286,000	6,224,300
6	**Total Sources**	**$103,782,200**	**$174,428,800**	**$139,152,200**	**$120,958,000**	**$335,456,400**
	Use of Funds					
7	Capital Projects	103,782,200	174,428,800	139,152,200	120,958,000	335,456,400
8	**Total Uses**	**$103,782,200**	**$174,428,800**	**$139,152,200**	**$120,958,000**	**$335,456,400**

Water maintains several funds used to finance CIP projects as well as to separate the commingling of rate funds, bond proceeds and capacity fee funds. The capital funds revenue consists of developer capacity fees, transfers and financing proceeds from a combination of bonds and State Revolving Fund loans. For the study period, Water will continue to depend on rate and fee revenue, reserves and financing proceeds to execute planned CIP projects.

Operating Fund Financing

Tables 9 and 10 summarize the proposed operating financial plan for Water over the study period. This financial plan generates sufficient funds to cover short-term and long-term expenses. Sources of revenue include water sales under existing rates, additional revenues realized from proposed rate adjustments, miscellaneous revenue and interest earnings on available balances.

The projected water revenue under existing rates represents service and commodity charges at current rate levels that are subject to rate adjustments. Based on the existing revenue indicated, additional annual revenue adjustments are necessary to meet operating fund requirements and fiscal policy objectives. To allow water customers to monitor usage and plan for potential financial impact, PUD proposes to implement revenue adjustments effective January 1 of 2016, July 1 of 2016 and then July 1 of each fiscal year thereafter through FY 20. Any changes to the capital-financing policies and/or CIP may alter these results since the operating fund helps supplement funds for traditional repair and replacement projects. Line 7 illustrates the resulting dollar impact of the proposed revenue adjustments.

The suggested revenue adjustments for each fiscal year are shown on Lines 2 through 6. These adjustments reflect known and anticipated CWA water purchase cost increases, costs associated with Water's supply and delivery systems, and maintenance of appropriate debt service coverage levels necessary for Water's outstanding bonds and credit standing. Should the actual cost of any of these components be less than their projected cost, the excess revenues will be dedicated to water supply

projects such as the Pure Water program and water conservation programs. Black & Veatch notes that the CY 17 through CY 20 CWA water purchases cost increases are only estimates at this time.

Black & Veatch further notes that the indicated percentage revenue increases discussed above are overall revenue increases. The results of the cost of service analysis presented later in this report may indicate that rate increases may vary from this average for the various customer classes with some classes receiving a greater than average increase, while others receive a less than average increase or perhaps a decrease.

Table 9 Operating Fund Financing Plan – Part I: Revenues [+]

Line No.	Description			Fiscal Year Ending June 30, Projected				
				FY 2016	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**
				($)	($)	($)	($)	($)
	Revenue							
	Rate Revenue							
1	Revenue from Existing Rates			385,401,100	388,626,500	391,892,800	395,200,800	398,549,800
	Year	Months Effective	Rate Adjustment					
2	FY 2016	6	9.79%	18,865,400	38,046,500	38,366,300	38,690,200	39,018,000
3	FY 2017	12	6.90%		29,440,400	29,687,900	29,938,500	30,192,200
4	FY 2018	12	6.90%			31,736,300	32,004,200	32,275,400
5	FY 2019	12	5.00%				24,791,700	25,001,800
6	FY 2020	12	7.00%					36,752,600
7	Increased Revenue Due to Adjustments			18,865,400	67,486,900	99,790,500	125,424,600	163,240,000
8	Subtotal Rate Revenue			404,266,500	456,113,400	491,683,300	520,625,400	561,789,800
	Other Operating Revenue							
9	Cal Amercian Sales			16,127,800	18,045,100	19,290,200	20,254,700	21,672,500
10	Other Water Sales			10,531,400	13,687,000	13,462,000	13,187,000	12,887,000
11	Service Charges			1,080,000	1,080,000	1,080,000	1,080,000	1,080,000
12	New Water Services			2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
13	Contribution in Aid			146,000	0	0	0	0
14	Land and Building Rentals			6,429,400	5,480,700	5,495,600	5,550,400	5,606,300
15	Services Rendered Other Funds			6,902,000	6,802,000	6,702,000	6,702,000	6,702,000
16	Other Revenue			1,100,000	1,100,000	1,100,000	1,100,000	1,100,000
17	Subtotal Other Operating Revenue			44,816,600	48,694,800	49,629,800	50,374,100	51,547,800
	Non-Operating Revenue							
18	Damages Recovered			245,000	245,000	245,000	245,000	245,000
19	Sale of Land			0	0	0	0	0
20	Earnings on Investments			6,304,500	8,201,400	9,603,700	11,580,100	14,617,700
21	Subtotal Non-Operating Revenue			6,549,500	8,446,400	9,848,700	11,825,100	14,862,700
22	**Total Revenue**			**$455,632,600**	**$513,254,600**	**$551,161,800**	**$582,824,600**	**$628,200,300**

Table 10 Operating Fund Financing Plan – Part II: Revenue Requirements and Ending Balances [+]

Line No.	Description	Fiscal Year Ending June 30, Projected				
		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
		($)	($)	($)	($)	($)
	Revenue Requirements					
	Operating & Maintenance					
23	O&M Expenses	199,117,400	200,924,500	204,995,400	205,714,700	210,859,000
24	Water Supply	225,085,900	238,991,900	253,810,500	273,138,400	275,162,500
25	Subtotal O&M	424,203,300	439,916,400	458,805,900	478,853,100	486,021,500
	Debt Service					
26	Existing Revenue Bonds	59,860,700	61,847,100	61,839,800	61,844,000	61,833,500
27	Existing SRF Loans	5,724,300	6,577,800	8,665,300	9,743,400	12,944,100
28	Proposed Revenue Bonds	0	3,087,600	7,087,600	9,691,400	10,922,400
29	Proposed SRF Loans	0	533,200	1,846,100	2,465,400	2,730,600
30	Total Debt Service	65,585,000	72,045,700	79,438,800	83,744,200	88,430,600
	Transfers					
31	To CIP Fund (PAYGO)	10,235,000	7,938,100	2,491,800	6,286,000	6,224,300
32	To CIP Fund (Other Capital Financing) [*]	0	0	0	0	0
33	To Operating Reserve	7,143,800	346,600	780,700	137,900	986,600
34	To Capital Reserve	0	0	0	0	0
35	To Rate Stabilization Reserve	0	0	0	0	0
36	To Secondary Purchase Reserve	865,500	834,300	889,100	1,159,700	121,500
37	To Other Funds	0	3,445,306	3,445,305	0	0
38	Total Transfers	18,244,300	12,564,306	7,606,905	7,583,600	7,332,400
39	**Total Revenue Requirements**	**$508,032,600**	**$524,526,406**	**$545,851,605**	**$570,180,900**	**$581,784,500**
40	Net Annual Cash Balance	(52,400,000)	(11,271,806)	5,310,195	12,643,700	46,415,800
41	Beginning Fund Balance	260,405,345	208,005,345	196,733,539	202,043,734	214,687,434
42	**Net Cumulative Fund Balance**	**$208,005,345**	**$196,733,539**	**$202,043,734**	**$214,687,434**	**$261,103,234**
	Minimum Target Reserves Balances [**]					
43	Operating Reserve	38,186,900	38,533,500	39,314,200	39,452,100	40,438,700
44	Capital Reserve	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
45	Rate Stabilization Reserve	6,500,000	6,500,000	12,375,000	18,250,000	24,125,000
46	Secondary Purchase Reserve	13,505,200	14,339,500	15,228,600	16,388,300	16,509,800
47	Total Minimum Target Reserves	63,192,100	64,373,000	71,917,800	79,090,400	86,073,500
48	**Cumulative Fund Balance Less Reserves**	**$144,813,245**	**$132,360,539**	**$130,125,934**	**$135,597,034**	**$175,029,734**

[+] Amounts may not total due to rounding.
[*] Other Capital Financing consists of capital cash balance, transfers from operating and interest income, etc.
[**] Reserve targets are set by the City's Reserve Policy.

In addition to rate revenue, other operating and non-operating revenues contribute to the income of the Water Enterprise. Typically, these revenue sources are minimal and volatile. For the purposes of this report, the subtotal of miscellaneous revenues increase slightly in the revenue projections. Non-operating sources (Lines 18 through 21) include interest income, revenue from damages recovered, and sale of land, if any.

For the 2016 Rate Case, PUD expects to draw down available monies from the Rate Stabilization Reserve. Per City Reserve Policy, the purpose of the Rate Stabilization Reserve is to maintain the legal covenant ratios in accordance with the respective bond installment purchase agreements. The transfer of $32 million from the Rate Stabilization Reserve for FY 2016 is the maximum available and will help to ensure the Water Fund meets the legal covenant ratios. Without the use of the reserves, FY 2016

customer rates would have to be increased beyond the level proposed in this report. In this way, the use of the Rate Stabilization Reserve helps to minimize rate increases. The City anticipates replenishing the Rate Stabilization Reserve balance starting in FY 2018.

Line 22 of Table 9 shows total revenues for the study period. Within Table 10, Line 25 shows O&M expenses less anticipated O&M savings which matches the figure from Table 6. A summary of debt service on existing bond issues and SRF loans is on Lines 26 and 27, while Lines 28 and 29 show debt service from any proposed revenue bonds and SRF loans. Transfers to fund the CIP and other reserve accounts in accordance with the City's Reserve Policy occur on Lines 31 through 38. The total revenue requirements for the study period appear on Line 39.

Line 40 calculates the net annual cash balance for each year and the Net Cumulative fund balance shown on Line 42 for FY 16 is inclusive of reserve amounts. To obtain a true picture of the operating condition for Water, we subtract out these reserve amounts, as shown on Lines 43 through 47. Line 48 presents the net cumulative fund balance less reserves but including contractual obligations (encumbrances).

Black & Veatch notes that the figures presented in Tables 9 and 10 are based on Tables 2 through 8 and may not total due to rounding.

Summary of Revenues, Expenditures, and Obligations

To maintain financial viability as an enterprise fund, Water's annual revenues must be sufficient to satisfy three elements:

1. Adequate cash flow to cover O&M, capital and debt obligations
2. Meet debt service coverage (DSC) covenants
3. Maintain reserve funds

Long-term financial viability requires meeting all three elements. The need for revenue adjustments is either "cash flow" driven or "debt service coverage" driven depending on which of the first two elements creates the larger adjustment.

Table 11 summarizes Water's projected outstanding senior (parity) and subordinate debt obligations. Water's debt requirements have two separate DSC requirements. For senior or parity debt, the DSC is 1.2 times net utility revenues (1.2x); for aggregate debt, the DSC is 1.1x net revenues. Black & Veatch recommends that PUD consider using a 1.25x net revenues minimum target for aggregate debt instead of the 1.1x net revenues. Factors that bond Rating Agencies evaluate to determine the credit rating of a utility system include the system's financial profile, economic conditions, governance and management, operating profile, and legal provisions of bond documents. In recent years, the Rating Agencies have noted the pressure on Water's DSC and that continued lowering of the DSC could lower the system's financial profile, which could result in a negative rating action. Raising the minimum target to 1.25x net revenues in addition to implementing pass-through increases could help mitigate such negative credit implications.

Based on the analyses of revenues and revenue requirements, it is evident that Water is coverage-driven and needs revenue increases in order to meet revenue requirements, satisfy DSC covenants and replenish cash on hand to policy target levels.

Table 11 Estimated Debt Service Coverage on Existing Debt without Revenue Adjustments

Line No.	Description	Fiscal Year Ending June 30, Projected				
		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
		($)	($)	($)	($)	($)
	Debt Service Coverage Calculation					
	Operating Revenue					
1	Water Sales	430,925,700	487,845,500	524,435,500	554,067,100	596,349,300
2	Service Charges	1,080,000	1,080,000	1,080,000	1,080,000	1,080,000
3	New Water Services	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
4	Land and Building Rentals	6,429,400	5,480,700	5,495,600	5,550,400	5,606,300
5	Services Rendered Other Funds	6,902,000	6,802,000	6,702,000	6,702,000	6,702,000
6	Contributions in Aid of Construction	1,246,000	1,100,000	1,100,000	1,100,000	1,100,000
7	Total Operating Revenue	449,083,100	504,808,200	541,313,100	570,999,500	613,337,600
	Operating Expenses					
8	Department Expenses	199,117,400	200,924,500	204,995,400	205,714,700	210,859,000
9	Water Purchase	225,085,900	238,991,900	253,810,500	273,138,400	275,162,500
10	Total Operating Expenses	424,203,300	439,916,400	458,805,900	478,853,100	486,021,500
	Net Operating Revenue	24,879,800	64,891,800	82,507,200	92,146,400	127,316,100
11	Transfer (to)/from Rate Stabilization Fund	32,000,000	0	(5,875,000)	(5,875,000)	(5,875,000)
12	Transfer (to)/from Other Fund	0	(3,445,306)	(3,445,305)	0	0
13	Interest Income on Operating Funds	6,304,500	8,201,400	9,603,700	11,580,100	14,617,700
14	Interest Income on Debt Service Reserve Fund	1,366,300	1,429,800	1,496,500	1,535,200	1,586,000
15	Capacity Fee Proceeds	15,000,000	12,000,000	12,000,000	12,000,000	12,000,000
16	Grant Proceeds	1,675,100	2,938,700	2,054,800	2,467,400	30,595,200
17	Less: Senior Debt Service Reserve Fund Interest	(1,010,200)	(1,073,700)	(1,140,400)	(1,179,100)	(1,229,900)
18	**Total Net Adjusted System Revenues**	**80,215,500**	**$84,942,694**	**$97,201,495**	**$112,675,000**	**$179,010,100**
	Debt Service					
19	Adjusted Total Parity Debt Service	40,744,700	57,565,300	64,894,600	69,156,600	73,799,000
20	Total Aggregate Debt Service	68,347,350	72,045,675	79,438,825	83,744,175	88,430,625
	Senior Debt Service Coverage					
21	**Senior Debt Service Coverage without Revenue Adjustments**	**1.49**	**0.26**	**(0.10)**	**(0.25)**	**0.13**
22	**Senior Debt Service Cover with Revenue Adjustments**	**1.97**	**1.48**	**1.50**	**1.63**	**2.43**
	Aggregate Debt Service Coverage					
23	**Coverage without Revenue Adjustments**	**0.90**	**0.27**	**(0.02)**	**(0.20)**	**0.12**
24	**Coverage with Revenue Adjustments**	**1.19**	**1.24**	**1.28**	**1.36**	**2.04**

To meet DSC requirements for senior or aggregate debt in FY 2017 forward, revenue adjustments will be needed beginning in FY 2016 within the COS study for the operational and capital plans. To meet regulatory requirements and maintain the current level of service the City recommends continuing with planned CIP program.

The revenue requirements of Water consist of system O&M expenses, routine capital outlay for minor expenditures on equipment not financed from bond proceeds, debt service requirements on existing and proposed bonded debt, and transfers to other funds. Moreover, the revenues generated should be sufficient to 1) mitigate the financial effects of State-mandated water use restrictions, 2) meet CWA water purchase increases, 3) meet reserve requirements and rate covenant requirements, and 4) provide adequate levels of working capital, including the Pure Water program.

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COST OF SERVICE ALLOCATIONS

The revenue requirements to be derived from rates and charges for water service are summarized in Lines 1 through 9 of Table 12. In analyzing the Water Fund's cost of service for allocation to customer classes, the annual revenue requirements for FY 16 are selected as the Test Year (TY) requirements to demonstrate the development of cost of service water rates. In determining the costs of service met by charges for water service, we use the figures presented in Tables 9 and 10 and deduct income received from other sources that are not subject to rate adjustments from the total revenue requirements. The adjustments section includes recognition that available cash is used (Line 10) and the addition of 6 months additional rate revenue from the revenue increase since it is effective for only 6 months (Line 11) of the fiscal year. As a result, the total cost of service to be recovered from rates is shown on Line 13, Column 5.

Table 12 Total Costs to be Recovered from Rates for TY 16

Line No. (1)	Description (2)	Operating Expense (3)	Capital Cost (4)	Total Cost (5)
		($)	($)	($)
	Revenue Requirements			
1	O&M Expenses	199,117,400		199,117,400
2	Water Supply	225,085,900	0	225,085,900
3	Debt Service	0	65,585,000	65,585,000
4	Transfers	8,009,300	10,235,000	18,244,300
5	Subtotal	$432,212,600	$75,820,000	$508,032,600
	Less Revenue Requirements Met from Other Sources			
6	Other Operating Revenue	44,816,600	0	44,816,600
7	Other Non-Operating Revenue	6,549,500	0	6,549,500
8	Transfers	0	0	0
9	Subtotal	$51,366,100	$0	$51,366,100
	Adjustments			
10	Adjustment for Annual Cash Balance	52,400,000	0	52,400,000
11	Adjustment to Annualize Rate Increase	(18,865,400)	0	(18,865,400)
12	Subtotal	$33,534,600	$0	$33,534,600
13	**COS to be Recovered from Rates**	**$347,311,900**	**$75,820,000**	**$423,131,900**

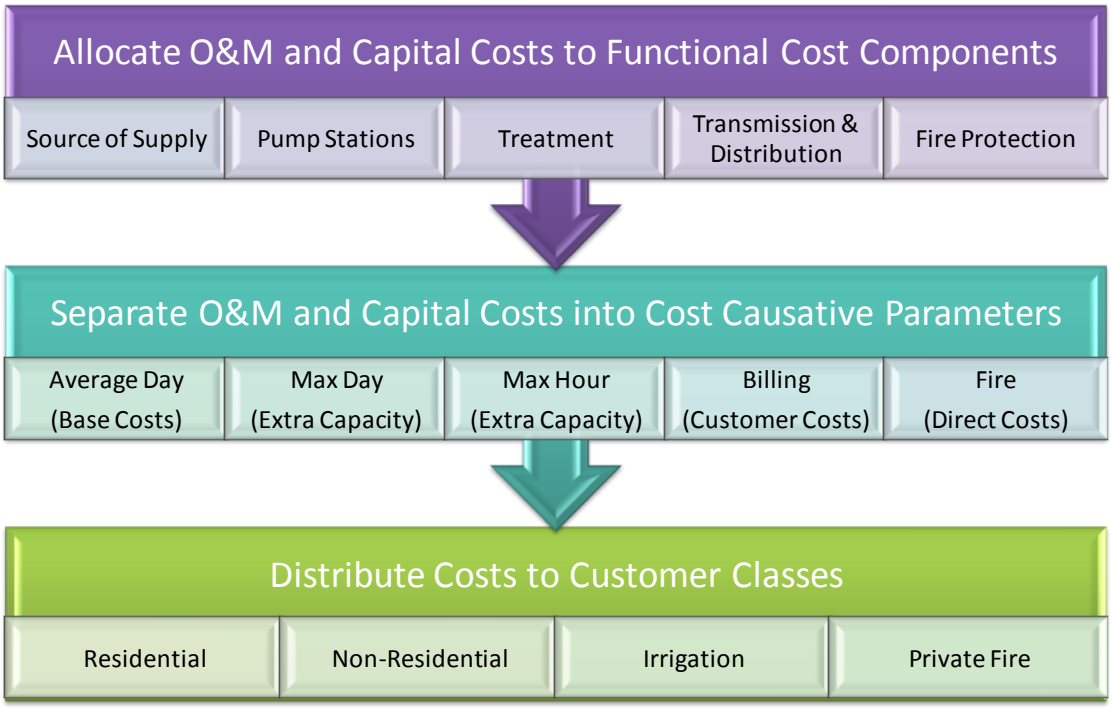
Functional Cost Components

In developing an equitable rate structure, we allocate revenue requirements to the various customer classifications according to the cost of service rendered. Allocations of these requirements to customer classes of Water should take into account water flow, the number of customers, and other relevant factors.

Customer classification occurs to reflect groups of customers with similar service requirements for whom a utility can serve at a similar cost. Each class represents a particular type of service requirement. For the purposes of the cost of service analysis, the customer classifications in this study include single family and multi-family residential, commercial, industrial, irrigation, outside City, construction, and private fire protection.

Figure 2 illustrates the general process for allocating costs of service to customer classes. The cost-of-service methodology first allocates costs to functional cost components, then to cost categories, and subsequently distributes the costs to customer classes. In this analysis, there are six primary cost categories: (1) base flow, or volume costs, (2) maximum day cost, (3) peak hour costs, (4) meter services, (5) customer and billing costs, and (6) fire protection.

Figure 2. General Cost of Service Allocation Methodology



Allocation to Cost Components

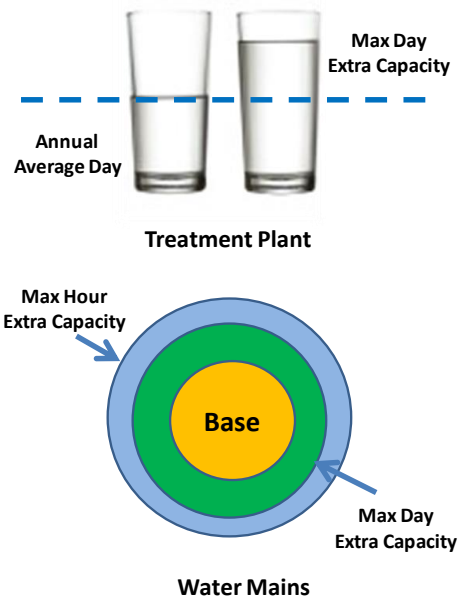
In this report, Black & Veatch analyzes the cost of providing water service by system function in order to properly allocate the costs to the various classes of customers and subsequently design rates. As a basis for allocating costs of service among customer classes, we have separated costs into the following four basic functional cost components: (1) "Base"; (2) "Extra Capacity"; (3) "Customer"; and (4) "Direct Assignment." In order to provide service to its customers at all times, PUD must be capable of not only providing the total amount of water used, but also meet peak or maximum rates of demand.

- Base costs include the purchase of water, regulatory fees, debt service costs, water treatment, energy, administration, and operating and maintenance costs of the System associated with service to customers to the extent required for a constant, or average annual rate of use.
- Extra Capacity costs represent those operating costs incurred in meeting demands in excess of average, and capital related costs for additional plant and system capacity beyond that required for the average rate of use.
- Customer costs are those elements that tend to vary in proportion to the number of customers connected to the system. These include meter reading, billing, collecting and accounting, and maintenance and capital costs associated with meters and services.

- Directly assigned costs are costs specifically identified as, those incurred to serve a specific customer group(s). The separation of costs of service into these principal categories facilitates allocating such costs to the various customer classes based on the respective service requirements of each class.

Similar to the 2007 and 2013 Rate Cases, this rate case also uses the base-extra capacity allocation method. Figure 3 illustrates some of the base-extra capacity concepts for water systems.

Figure 3. Water Cost of Service Concepts



Black & Veatch has allocated each element of cost to functional cost components using the parameter or parameters having the most significant influence on the magnitude of that element of cost. We allocate O&M and general and administrative (G&A) expense items directly to appropriate cost components, while the allocation of capital and replacement costs uses a detailed allocation of related capital investment. The separation of costs into functional components provides a means for distributing such costs to the various classes of customers based on their respective responsibilities for each particular type of service.

For volume-related cost allocations, the first step in determining the allocation percentages is to assign system peaking factors. The Base element is equal to the average daily demand (ADD) and assigned a value of 1.0. PUD's maximum day (Max Day) demand is estimated to be 1.50 times the ADD. Thus, the Max Day is assigned a value of 1.50. The maximum instantaneous usage is approximated by the maximum hourly (Max Hour) usage and is estimated to be 2.25 times the ADD. Thus, Max Hour is assigned a value of 2.25. These peaking factors are based on a combination of historic billing data and discussions with PUD staff.

Cost components that are solely Base-related, are allocated 100 percent to Base. Cost components that are designed to meet Max Day requirements, such as reservoirs, are allocated to Base and Max Day factors as follows:

Base = (1.0/1.50) x 100 = 66.7%
Max Day = (1.50 – 1.0)/1.50 x 100 = 33.3%

Cost components that are designed to meet Max Hour design requirements, such as Distribution, are allocated in a similar fashion, as follows:

Base = (1.0/2.25) x 100 = 44.4%
Max Day = (1.50 – 1.0)/2.25 x 100 = 22.2%
Max Hour = (2.25 – 1.50)/2.25 x 100 = 33.3%

Fire Protection

A direct cost to the water system is fire protection. Fire protection consists of those costs associated with having the capability to provide public (municipal fire hydrants) and private (individual fire sprinklers) fire suppression services. While a small amount of water is actually consumed for fire suppression and fire training, the water system is still designed to accommodate relatively large flows of water for short durations at suitable pressure. Therefore, when allocating O&M and capital expenses to the four basic functional costs factors, a pro rata share of O&M and capital expenses is directly assigned to the fire protection category.

Allocation of Operation and Maintenance Expenses

Table 13 summarizes the allocation percentages used in Table 14. Table 14 shows the allocation of O&M expense to cost functions. Where possible, percentage allocations use data gathered from employee time cards. O&M costs such as general and administrative expenses (G&A) are distributed to functional cost components based on the average of the other line item costs. A new line item for the impact of the Pure Water program has been added since the 2013 Rate Case. Because the program is a supply-driven one, the percentage allocations are assigned to base, extra capacity and fire protection functions. The total Test Year expense less funds available from other sources equal the net O&M expense recovered from rates. Line 17 of Table 14 presents a Net Test Year O&M expense of approximately $347 million.

Table 13 O&M Allocation Percentage for TY 16

Description	Base	Extra Capacity		Customer		Fire Protection
	Base	Max. Day	Max. Hour	Meters	Cust/Bill.	
Finance & Information Technology	52.40%	17.50%	17.50%	5.30%	5.30%	2.00%
Employee Services & Quality Assurance	53.00%	25.00%	20.00%	0.00%	0.00%	2.00%
Customer Support Services	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Long Range Planning	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Engineering Program Management	46.50%	25.00%	25.00%	0.00%	0.00%	3.50%
Environmental Monitoring & Technical Services	66.67%	33.33%	0.00%	0.00%	0.00%	0.00%
Water Operations	49.00%	25.00%	20.00%	1.00%	0.00%	5.00%
Pure Water	53.00%	25.00%	20.00%	0.00%	0.00%	2.00%
Water Administration and Lakes	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Administrative Services	53.00%	25.00%	20.00%	0.00%	0.00%	2.00%
Water Supply	66.30%	0.00%	0.00%	19.57%	12.63%	1.50%

Table 14 Allocation of O&M Expenses to Functional Cost Components

Line No.	Description	Total Costs	Common to All Customers					Fire Protection
			Base	Extra Capacity		Customer		
			Base	Max. Day	Max. Hour	Meters	Billing	
		($)	($)	($)	($)	($)	($)	($)
	Operating Expenses							
1	Finance & Information Technology	17,998,600	9,431,200	3,149,800	3,149,800	953,900	953,900	360,000
2	Employee Services & Quality Assurance	8,583,900	4,549,400	2,146,000	1,716,800	0	0	171,700
3	Customer Support Services	10,236,700	0	0	0	0	10,236,700	0
4	Long Range Planning	14,698,300	14,698,300	0	0	0	0	0
5	Engineering Program Management	9,110,000	4,236,100	2,277,500	2,277,500	0	0	318,900
6	Environmental Monitoring & Technical Services	6,433,700	4,289,100	2,144,600	0	0	0	0
7	Water Operations	85,804,900	42,044,500	21,451,200	17,161,000	858,000	0	4,290,200
8	Pure Water	1,324,900	702,200	331,200	265,000	0	0	26,500
9	Water Administration and Lakes	11,400,100	11,400,100	0	0	0	0	0
10	Administrative Services	33,526,400	17,769,000	8,381,600	6,705,300	0	0	670,500
11	Water Supply	225,085,900	149,232,900	0	0	44,043,900	28,432,800	3,376,300
12	Total O&M Expenses	424,203,400	258,352,800	39,881,900	31,275,400	45,855,800	39,623,400	9,214,100
13	Transfers	8,009,300	3,924,500	2,002,300	1,601,900	80,100	0	400,500
14	**Total**	**$432,212,700**	**$262,277,300**	**$41,884,200**	**$32,877,300**	**$45,935,900**	**$39,623,400**	**$9,614,600**
	Less Other Revenue							
15	Miscellaneous Revenues	51,366,100	25,169,400	12,841,500	10,273,200	513,700	0	2,568,300
16	Other Adjustments	33,534,600	16,432,000	8,383,700	6,706,900	335,300	0	1,676,700
17	**Net Operating Expenses**	**$347,312,000**	**$220,675,900**	**$20,659,000**	**$15,897,200**	**$45,086,900**	**$39,623,400**	**$5,369,600**

Allocation of Capital Costs

The estimated investment in water system facilities serves as a proxy for the further distribution of capital-related costs to the various customer classes. Table 15 illustrates the allocation of estimated plant investment serving water customers for the Test Year. The total plant investment of just over $2 billion shown on Line 13 represents the estimated Test Year original cost less accumulated depreciation of plant in service. Line 14 represents the existing debt and transfers associated with Test Year 2016.

The allocation of specific items of investment to identified cost categories uses the basis previously described. For example, source of supply items correspond to flow (volume cost component) and then further delineated by whether the asset is common-to-all or primarily serves specific customers. Water treatment designs rely on treatment plant flow and are assigned to the volume cost function. Elements such as storage facilities serve to address system peaking needs, and as such have a peak hour cost component.

Units of Service

To establish the total cost responsibility of each class of service, Black & Veatch developed the unit costs of service for each cost function and assigned those costs to the customer classes based on the respective service requirements of each. Each customer class receives its share of base, maximum day and peak hour costs. The number of units of service required by each customer class provides a means for the proportionate distribution of costs previously allocated to respective cost categories. Table 16 summarizes the estimated units of service for the various customer classes.

The cost of service responsibility for base costs varies with the volume of water requirements and may be distributed to customer classes on that basis. Extra-capacity costs are those costs associated with meeting peak rates of water use, and are distributed to customer classes based on their respective system capacity requirements in excess of average requirement rates. Customer costs, which consist of meter related costs, billing, collection and accounting costs, are allocated based on the number of equivalent meters and bills. Private fire protection costs are allocated based on equivalent fire hydrants.

Table 16 shows the estimated units of service for the various customer classifications. Estimates of test year annual water consumption, shown in Column 1, are based on the projections of total water sales from Table 3. Average daily use of all water sales, which is simply Column 1 divided by 365 days, is presented in Column 2. Columns 3 through 8 represent the estimated maximum day and peak hour capacity factors for each customer class.

Table 15 Allocation of Net Capital Costs to Functional Cost Components

Line No.	Description	Total Costs	Common to All Customers					Fire Protection
			Base	Extra Capacity		Customer		
			Base	Max. Day	Max. Hour	Meters	Billing	
		($)	($)	($)	($)	($)	($)	($)
	Plant Assets							
1	Source of Supply	139,961,100	139,961,100	0	0	0	0	0
2	Pumping	41,246,400	27,497,600	13,748,800	0	0	0	0
3	Treatment	520,542,700	347,028,500	173,514,200	0	0	0	0
4	Transmission & Distribution	1,192,994,300	530,219,700	265,109,800	397,664,800	0	0	0
5	Meters & Service	39,852,900	0	0	0	39,852,900	0	0
6	Hydrants	3,321,100	0	0	0	0	0	3,321,100
7	Customer Billing	0	0	0	0	0	0	0
8	General Plant	28,821,800	16,013,900	6,722,300	6,036,200	0	0	49,400
9	Recycled Water	34,119,200	15,164,100	7,582,000	11,373,100	0	0	0
10	**Total Plant Assets**	**2,000,859,500**	**1,075,884,900**	**466,677,100**	**415,074,100**	**39,852,900**	**0**	**3,370,500**
	Less Other Revenue							
11	Miscellaneous Revenues	0	0	0	0	0	0	0
12	Other Adjustments	0	0	0	0	0	0	0
13	**Net Capital Expenses**	**$2,000,859,500**	**$1,075,884,900**	**$466,677,100**	**$415,074,100**	**$39,852,900**	**$0**	**$3,370,500**
14	**Capital Cost Allocation**	**$75,820,000**	**$40,468,400**	**$17,638,200**	**$15,837,800**	**$1,746,000**	**$0**	**$129,600**

Table 16 Units of Service for TY 16

Line No.	Description	Consumption		Maximum Day			Maximum Hour			Customer		Fire Protection
		Annual	Avg. Day	Factor	Total	Extra	Factor	Total	Extra	Meters	Billing	
	Column Reference	(1)	(2) = (1)/365	(3)	(4) = (3) x (2)	(5) = (4) - (2)	(6)	(7) = (6) X (2)	(8) = (7) - (4)	(9)	(10)	(12)
	Units of Measure	(HCF)	(HCF/day)		(HCF/day)	(HCF/day)		(HCF/day)	(HCF/day)	(EMs)	(Bills)	(EHs)
1	Single Family	24,100,457	66,029	175%	115,550	49,521	325%	214,593	99,043	237,405	2,679,672	0
2	Other Domestics	14,578,835	39,942	185%	73,893	33,951	335%	133,806	59,913	64,210	352,308	0
3	Non-Residential [*]	16,554,727	45,355	200%	90,711	45,355	270%	122,460	31,749	50,989	183,840	0
4	Temp Construction	221,122	606	225%	1,363	757	425%	2,575	1,212	2,117	4,560	0
5	Irrigation	9,090,405	24,905	200%	49,810	24,905	420%	104,602	54,791	28,157	84,588	0
6	Subtotal	64,545,546	176,837		331,327	154,490		578,035	246,708	382,878	3,304,968	
	Fire Service											
7	Public Fire	0	0		1,247	1,247		5,985	4,738	0	0	25,060
8	Subtotal	0	0		1,247	1,247		5,985	4,738	0	0	25,060
9	**Total Water System**	**64,545,546**	**176,837**		**332,574**	**155,737**		**584,020**	**251,446**	**382,878**	**3,304,968**	**25,060**

In the overall rate-setting process, there is a need to establish a base level of cost for which the cost of all customers can be measured. Customer-related meter and service costs are allocated based on the number of equivalent ⅝" and ¾" meters because these meter sizes are the most prevalent meter sizes found in many water utilities. Included in the development of meter cost ratios is the direct cost of the various categories of labor involved in the installation, fringe benefit related overheads and other appropriate administrative overheads applicable to the labor costs, all direct materials and supplies costs, and the cost of equipment used in the installation.

Meter Size	Capacity Meter Ratio	Fire Hydrant Ratio
5/8", 3/4"	1.00	
1"	1.70	0.01
1.5"	3.30	0.03
2"	5.30	0.06
3"	10.00	0.16
4"	16.70	0.34
6"	33.30	1.00
8"	53.30	2.13
10"	76.70	3.83
12"	143.30	6.19
16"	250.00	13.19

Generally, equivalent meter cost ratios should be used when assigning elements of costs specifically related to meters among the various sizes of meters used by the customer in the system. PUD's most prevalent meter size is ¾" and therefore is considered equal to one-meter equivalent. All larger meters are given a meter equivalent ratio based on hydraulic capacity, as illustrated in the box to the right. Thus, a 6-inch meter is the equivalent of thirty-three ¾" meters based on hydraulic capacity. The equivalent number of meters and services shown in the third column from the end of Table 16 were estimated using AWWA standard meter flow rate equivalencies as adjusted to set ⅝" and ¾" meters to an equivalency of 1.0. The equivalent number of private fire connections shown in the last column of Table 16 were estimated using AWWA standard meter flow rate equivalencies with 6" fire protection connections assigned an equivalency of 1.0. All public fire hydrants are assumed to be a 6" connection.

Customer billing and accounting costs are distributed to classes based on number of bills for each customer class. The final column presents direct charges for fire protection and these costs are allocated using equivalent hydrant ratios summarized in the box above.

In accordance with M1 standards and typical engineering design, the provision of the maximum hour component addresses peak system needs, in addition to those posed by fire protection requirements. To the extent possible, actual system and billing data by customer class is used to derive maximum day and maximum hour capacity factors. For the purposes of this analysis, peak factors were obtained from the City's Water Facilities Master Plan, January 2011, and from the City Engineering Department. As noted previously, these data sources yielded a maximum day to average day, or base, demand ratio of 1.50 and a maximum hour ratio of 2.25. These ratios are within the ranges typically experienced by other utilities across the nation.

Cost of Service Allocations

Costs of service are allocated to the customer classes by application of unit costs of service to respective service requirements. Unit costs of service are based upon the total costs previously allocated to functional components and the total number of applicable units of service. Dividing the costs allocated to functional cost components by the respective total units of service requirements develops unit costs of operation and maintenance expense, and net capital costs.

Unit Costs of Service

Table 17 presents total Test Year O&M expense (Table 14) and net capital costs (Table 15) allocated to functional cost components.

Distribution of Costs of Service to Customer Classes

The customer class responsibility for service is obtained by applying the unit costs of service to the number of units for which the customer class is responsible. Table 18 illustrates this process, in which the unit costs of service are applied to the customer class units of service.

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Table 17 Unit Costs of Service for TY 16

Line No.	Description	Total Costs	Common to All Customers					Fire Protection
			Base	Extra Capacity		Customer		
			Base	Max. Day	Max. Hour	Meters	Cust/Bill.	
		($)	($)	($)	($)	($)	($)	($)
	Unit Cost of Service							
1	Net Operating Expense	347,311,900	220,675,800	20,659,000	15,897,200	45,086,900	39,623,400	5,369,600
2	Capital Costs	75,820,000	40,468,400	17,638,200	15,837,800	1,746,000	0	129,600
3	Total Cost of Service	$423,131,900	$261,144,200	$38,297,200	$31,735,000	$46,832,900	$39,623,400	$5,499,200
4	Units of Service (Total)		64,545,546	156,094	252,804	382,878	3,372,444	32,242
5	Cost per Unit		$4.05	$245.35	$125.53	$122.32	$11.75	$170.56
6	per Unit		HCF	HCF/Day	HCF/Day	EM	Bill	EH

Table 18 Allocation of COS to Customer Classes

Line No.	Description	Total Costs	Common to All Customers					Fire Protection
			Base	Extra Capacity		Customer		
			Base	Max. Day	Max. Hour	Meters	Cust/Bill.	
		($)	($)	($)	($)	($)	($)	($)
			HCF	HCF/Day	HCF/Day	EM	Bill	EH
1	Cost per Unit		$4.05	$245.35	$125.53	$122.32	$11.75	$170.56
	Single Family							
2	Units		24,100,457	49,521	99,043	237,405	2,679,672	0
3	Allocation of COS	182,613,600	97,507,800	12,149,900	12,433,000	29,039,000	31,483,900	0
	Other Domestics							
4	Units		14,578,835	33,951	59,913	64,210	352,308	0
5	Allocation of COS	86,828,400	58,984,400	8,329,700	7,521,000	7,854,000	4,139,300	0
	Non-Residential [*]							
6	Units		16,554,727	45,355	31,749	50,989	183,840	0
7	Allocation of COS	90,488,700	66,978,600	11,127,800	3,985,500	6,236,800	2,160,000	0
	Temp Construction							
8	Units		221,122	757	1,212	2,117	4,560	0
9	Allocation of COS	1,545,100	894,600	185,800	152,100	259,000	53,600	0
	Irrigation							
10	Units		9,090,405	24,905	54,791	28,157	84,588	0
11	Allocation of COS	54,205,200	36,778,800	6,110,400	6,878,100	3,444,100	993,800	0
	Public Fire							
12	Units		0	1,247	4,738	0	0	25,060
13	Allocation of COS	5,174,900	0	305,900	594,800	0	0	4,274,200
	Private Fire							
14	Units		0	357	1,358	0	67,476	7,182
15	Allocation of COS	2,276,000	0	87,700	170,500	0	792,800	1,225,000
16	**TOTAL COS**	**$423,131,900**	**$261,144,200**	**$38,297,200**	**$31,735,000**	**$46,832,900**	**$39,623,400**	**$5,499,200**

[*] Non-Residential customers include Commercial, Industrial, and Outside City.

Adequacy of Existing Rates to Meet Costs of Service

Presented in Table 19 is a comparison of the allocated costs of service and revenues under existing rates for the system in total. For the Water Enterprise, public fire protection provides a general benefit to all customers, and thus, is allocated to all customers in Column 2. Adjusted allocated costs of service are shown in Column 3. The last column in the table indicates the approximate adjustment to customer class rate levels necessary to recover 100 percent of the allocated costs of service.

Table 19 Comparison of Adjusted COS with Revenues under Existing Rates

Line No.	Description	Allocated COS ($)	Public Fire Allocation ($)	Adjusted COS ($)	Rev Under Existing Rates	Indicated Rev Increase (%)
	Column Reference	(1)	(2)	(3)	(4)	(5)
1	Single Family	182,613,600	2,625,500	185,239,100	171,235,900	8.18%
2	Other Domestics	86,828,400	1,248,400	88,076,800	79,247,500	11.14%
3	Non-Residential [*]	90,488,700	1,301,000	91,789,700	82,134,900	11.75%
4	Construction	1,545,100	0	1,545,100	1,400,900	10.29%
5	Irrigation	54,205,200	0	54,205,200	49,293,000	9.97%
6	Subtotal	415,681,000	5,174,900	420,855,900	383,312,200	9.79%
7	Public Fire	5,174,900	(5,174,900)	0	0	0.00%
8	Private Fire	2,276,000	0	2,276,000	2,088,900	8.96%
9	Subtotal	7,450,900	(5,174,900)	2,276,000	2,088,900	8.96%
10	**Total Water System**	**$423,131,900**	**$0**	**$423,131,900**	**$385,401,100**	**9.79%**

[*] Non-Residential customers include Commercial, Industrial, and Outside City.

PROPOSED RATE ADJUSTMENTS

The initial consideration in the derivation of water rate schedules for utility service is the establishment of equitable charges to the customers commensurate with the cost of providing that service. While the cost of service allocations to customer classes should not be construed as literal or exact determinations, they offer a guide to the necessity for, and the extent of, rate adjustments. Practical considerations sometimes modify rate adjustments by taking into account additional factors such as the extent of change from previous rate levels, existing contracts, and past local policies and practices.

Existing Rates

A summary of existing water rates was presented earlier in Table 4. The existing rates consist of a service charge, which varies by customer class and meter size, and a separate commodity charge for each customer class applicable to each hundred cubic feet of billed water sales. The commodity charge incorporates a tier structure for single-family residential customers while all other classes are charged a uniform rate regardless of water consumption.

Proposed Rate Options

The cost of service analysis described in the preceding sections of this report provides a basis for the design of rates. It is important to note that the COS analysis represents current conditions and as discussed earlier in this report, current conditions are different from those present during the 2013 Rate Case. The rate schedules (shown in Tables 20, 22, and 23) take into consideration City policies and these different conditions. At the request of the City, Black & Veatch examined several rate options to best meet these policies and conditions, particularly to address the impacts of water conservation and customer demand, and State-mandated water use restrictions.

Design of Base Fee

The meter charge or base fee (as shown in Table 20) and the fire protection charge (Table 23), reflect the estimated cost of service rate. Both tables include the allocated cost of billing, meter service, and some elements of water supply (fixed costs charged by CWA). As described previously, the meter charges also reflect the recommendation of applying hydraulic capacity ratios to the meter sizes noted from the last rate case and per water industry standards. Because the City does not charge fire departments for public fire hydrant service, the industry standard for recovering this cost is via the meters and services component of the water user charge. Black & Veatch has reflected the cost of public fire protection in the proposed meter charges.

Table 20 Proposed Meter Rates

Meter Size	Meter Charge					
		Proposed Rates				
	Existing Rates	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Effective Date		1/1/2016	7/1/2016	7/1/2017	7/1/2018	7/1/2019
	($/monthly)	($/monthly)	($/monthly)	($/monthly)	($/monthly)	($/monthly)
5/8", 3/4"	20.31	22.26	24.75	26.05	27.56	29.46
1"	27.51	29.50	32.84	34.61	36.67	39.36
1.5"	43.96	46.04	51.33	54.18	57.49	62.01
2"	64.53	66.72	74.43	78.64	83.52	90.31
3"	112.86	115.32	128.74	136.13	144.70	156.83
4"	181.75	184.59	206.15	218.08	231.90	251.66
6"	352.44	356.23	397.94	421.11	447.97	486.60
8"	558.10	563.03	629.02	665.74	708.28	769.65
10"	798.72	804.98	899.38	951.95	1,012.86	1,100.83
12"	1,483.55	1,493.60	1,668.87	1,766.54	1,879.71	2,043.42
16"	2,580.72	2,596.85	2,901.66	3,071.61	3,268.50	3,553.53

Design of Volumetric Charges

Any proposed rate structure should provide for full cost recovery. However, in addition to this fundamental requirement, the design of water rate structures should also meet the following objectives:

- Mitigate revenue volatility
- Promote water conservation
- Minimize excessive customer bill impacts

Consequently, water rate design must balance financial management, long-range planning, and public policy considerations.

Since the 2007 rate case, Southern California has experienced severe drought conditions. In response, the State has issued statewide mandated water use restrictions. Also, consumer awareness regarding the need to conserve water is very high. Moreover, the increased use of water-efficient devices (toilets, dishwashers, washers, etc.) has helped customers conserve. To provide an incentive for those who conserve, the rate structure designed in 2013 for single-family residential customers includes a fourth tier.

The tier breakpoints reflect general usage patterns of San Diego's single-family residential customers as well as rate setting industry standards and AWWA household usage survey data. AWWA survey data indicate that typical indoor residential water consumption is roughly 50 to 60 gallons per person per day. Depending on typical residential family sizes of 2 to 3 persons per household, approximate monthly residential water use can range from 3,000 gallons per month to over 5,000 gallons per month (or 4 HCF to 7 HCF per month). Because water resource supply in San Diego is limited and expensive, it is reasonable to base the Tier 1 breakpoint at 4 HCF (1 HCF = 748 gallons) per month. This range serves to recognize water efficiency within this customer class.

The Tier 2 breakpoint is set at 12 HCF per month to reflect typical single-family customer water consumption. The bill tabulation analysis performed as part of the COS indicates that approximately

50 percent of billed usage for this class is about 12 HCF of water use. This average amount reasonably serves as the Tier 2 breakpoint. The breakpoint between Tiers 3 and 4, at 18 HCF, represents an outdoor irrigation or landscape allowance for this customer class. Single-family residential use beyond 18 HCF per month would represent high use for this class.

The pricing differentials between tiers are based on factors similar to the maximum day and peak hour peaking factors described earlier in this report as well as City water conservation program costs and local and non-local water supply costs. For the study period, non-local water supply costs, such as imported water and desalinated water supplies, also include expenses related to distribution and administration costs. In addition, changing the mix of water supplies through the tiers also contributes to the differentials. Black & Veatch has utilized a combination of these factors as well as peak demand considerations in setting the proposed tiers.

For the study period, the units of water included in Tier 1 are priced at the lowest rate since it represents the City's least expensive source of water – local supply. As water consumption increases beyond the base tier, water supplies to meet this demand lead to greater investments by the City in alternate sources of supply, yet at much higher costs per acre foot. The use of peaking factors reasonably represents the relationship between higher water consumption and increasing water supply costs. As a check on the reasonableness of proposed pricing differentials for the tiers, Black & Veatch estimated the cost of local water and the cost of treated Tier I CWA water. These figures only reflect treatment costs and do not include such expenses as distribution and pumping. Roughly speaking, the cost of treated Tier I CWA water, which is the most expensive water that the City purchases is roughly 4 to 5 times the cost of local supply. Thus, Black & Veatch has limited the pricing differential between Tier 1 and Tier 4 to less than these figures.

In addition to the above considerations, mitigating revenue volatility during the summer irrigation season is also a priority. To address this concern, Black & Veatch used the following cost recovery allocation to guide cost recovery by tier. Table 21 is an illustrative example of the allocation used and shows that the first two tiers recover the majority of base demand costs, which represent the majority of costs for the single-family residential class. Tiers 3 and 4 primarily recover maximum hour costs, which reflect peaking (typically irrigation) demands. Table 22 presents the proposed commodity rates.

Table 21 Volumetric Cost Recovery over Tiers

Description	Percentage of Cost Recovery in				
	Tier 1	Tier 2	Tier 3	Tier 4	Total
Base Demand Costs	40%	50%	10%	0%	100%
Maximum Day Costs	15%	45%	30%	10%	100%
Maximum Hour Costs			30%	70%	100%

Table 22 Proposed Commodity Rates

Class	Commodity Rate					
		Proposed Rates				
	Existing Rates	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Effective Date		1/1/2016	7/1/2016	7/1/2017	7/1/2018	7/1/2019
	$/hcf	$/hcf	$/hcf	$/hcf	$/hcf	$/hcf
Single Family						
Tier 1 (0-4 HCF)	3.896	4.240	4.443	4.770	5.042	5.385
Tier 2 (5-12 HCF)	4.364	4.754	4.976	5.342	5.647	6.031
Tier 3 (13-18 HCF)	6.234	6.791	7.108	7.632	8.067	8.616
Tier 4 (19+ HCF)	8.766	9.550	9.996	10.732	11.344	12.117
Other Domestics	4.650	5.125	5.365	5.763	6.091	6.515
Non Residential	4.470	5.020	5.243	5.622	5.941	6.333
Construction	4.947	6.023	6.316	6.795	7.183	7.727
Irrigation	4.947	5.666	5.941	6.390	6.755	7.256

In Table 22, the proposed commodity rates are shown with accuracy to 3 decimal places for consistency with the level of accuracy used for rate entry and customer bill calculation in the Public Utilities Customer Care Solutions billing system.

Design of Private Fire Protection

The design of private fire protection connection charges is essentially the same as that for the base fee. The difference is that for private fire connections, the industry standard is to designate the 6” diameter connection as having a flow equivalency of 1.0.

Table 23 Proposed Fire Line Rates

Fire Line Size	Fire Protection					
		Proposed Rates				
	Existing Rates	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Effective Date		1/1/2016	7/1/2016	7/1/2017	7/1/2018	7/1/2019
	($/monthly)	($/monthly)	($/monthly)	($/monthly)	($/monthly)	($/monthly)
1"	2.58	2.82	3.23	3.62	3.85	4.43
1.5"	2.58	2.82	3.23	3.62	3.85	4.43
2"	4.00	4.37	5.01	5.61	5.97	6.87
3"	15.50	16.92	19.38	21.72	23.10	26.58
4"	19.82	21.63	24.77	27.77	29.53	33.98
6"	29.27	31.95	36.60	41.01	43.62	50.19
8"	41.34	45.12	51.68	57.92	61.60	70.88
10"	53.41	58.29	66.76	74.83	79.58	91.57
12"	63.74	69.57	79.68	89.31	94.98	109.29
16"	103.35	112.80	129.20	144.80	154.00	177.20
20"	128.67	140.44	160.85	180.27	191.73	220.61

Revenue Sufficiency

Presented in Table 24 is a comparison of Test Year allocated cost of service with revenues for the proposed rate schedule. Test year costs of service are obtained from Table 19 and the proposed rates recover essentially 100 percent of the total cost of service.

Table 24 Revenues under Proposed Rate Schedule for TY 16

Line No	Description	Adjusted Cost of Service	Rev Under Proposed Rates	Percent Recovery
		($)	($)	(%)
1	Single Family	185,239,100	185,239,100	100%
2	Other domestics	88,076,800	88,076,800	100%
3	Non-Residential [*]	91,789,700	91,789,700	100%
4	Construction	1,545,100	1,545,100	100%
5	Irrigation	54,205,200	54,205,200	100%
6	Subtotal	420,855,900	420,855,900	100%
	Fire Service			
7	Private Fire	2,276,000	2,280,000	100%
8	Subtotal	2,276,000	2,280,000	100%
9	**Total Water System**	**$423,131,900**	**$423,135,900**	**100%**

[*] Non-Residential customers include Commercial, Industrial, and Outside City.

Comparison of Typical Bills

While the rate structure proposed above recover essentially 100 percent of the necessary costs of service for each customer class, Black & Veatch believes it is important to review the impact of any revenue adjustment and rate structure change on typical bills. Figures 4 through 7 illustrate a comparison of a typical bi-monthly bill for a single-family residential customer at water consumption levels of 6 HCF, 12 HCF, 30 HCF, and 44 HCF for the proposed rate schedules, which include the impact of drought.

Figure 4. Single-Family Residential Bi-Monthly Typical Bill for ¾" Meter and Using 6 HCF – Rates Effective 1/1/2016

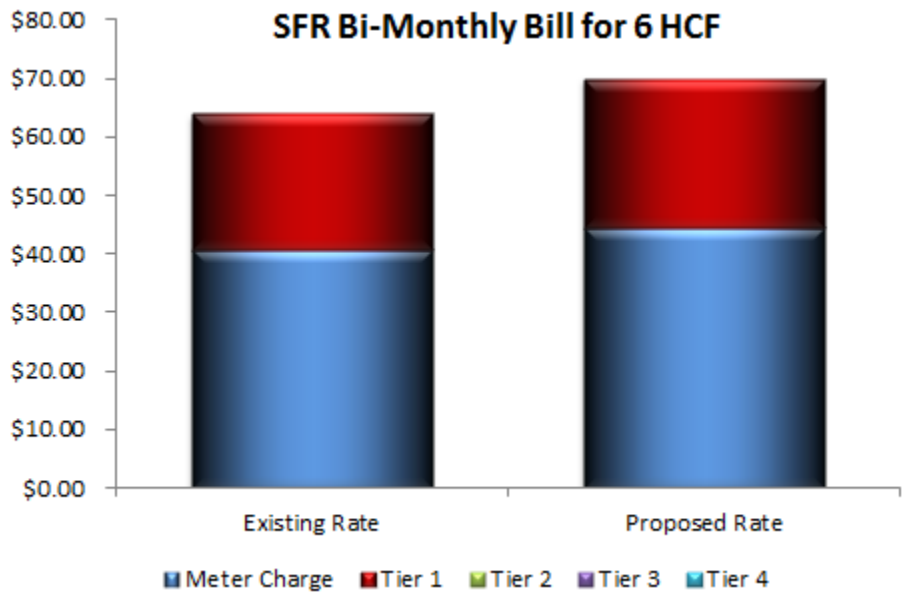

Figure 5. Single-Family Residential Bi-Monthly Typical Bill for ¾" Meter and Using 12 HCF - Rates Effective 1/1/2016

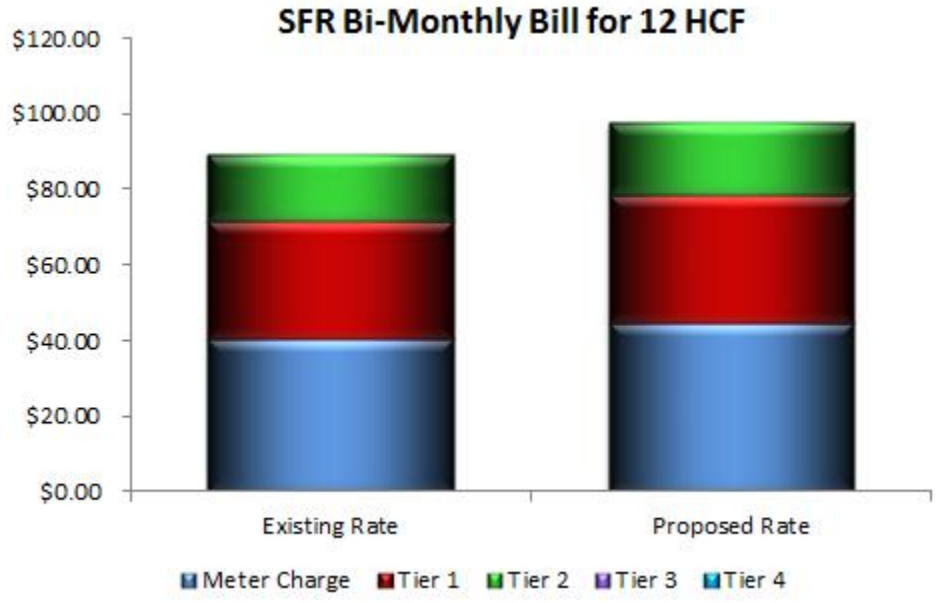

Figure 6. Single-Family Residential Bi-Monthly Typical Bill for ¾" Meter and Using 30 HCF - Rates Effective 1/1/2016

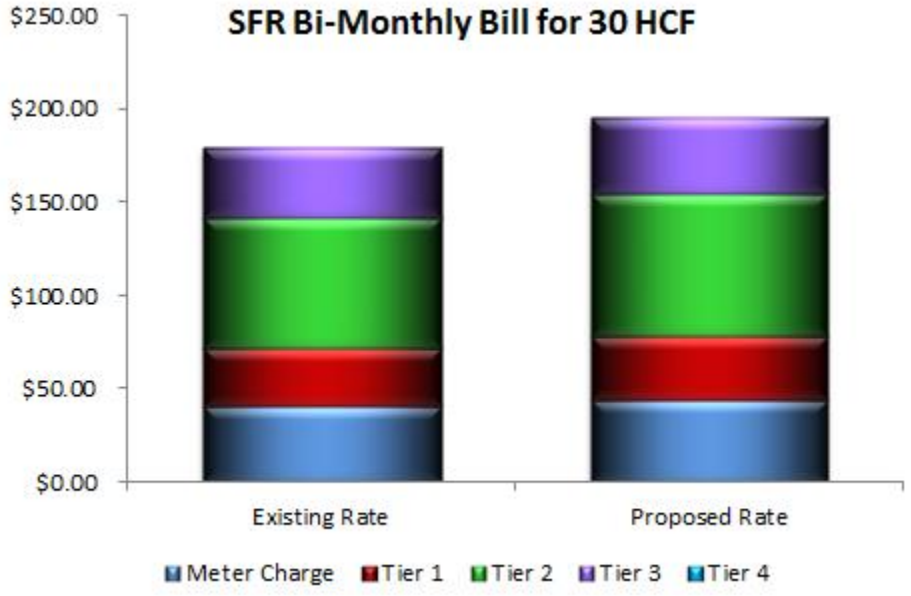
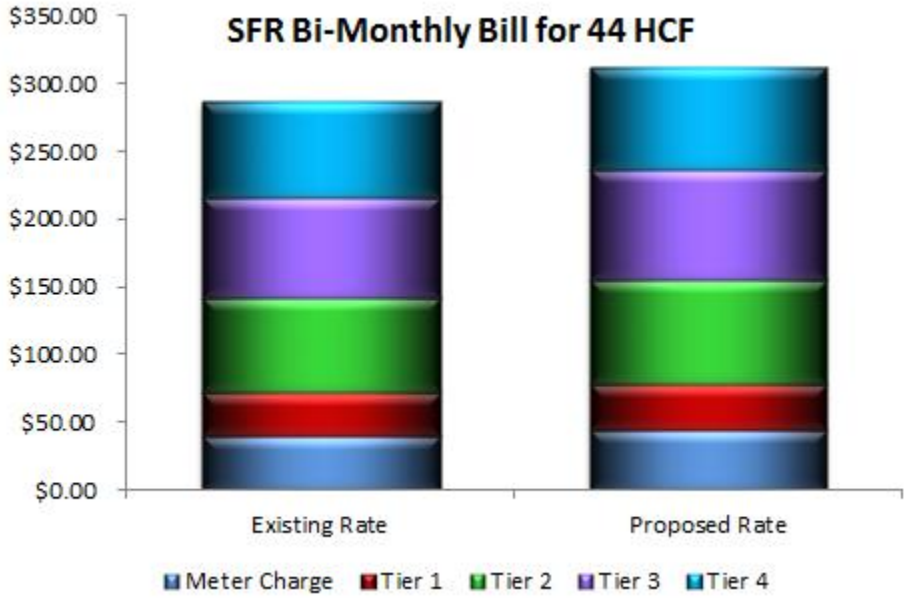
Figure 7. Single-Family Residential Bi-Monthly Typical Bill for ¾" Meter and Using 44 HCF - Rates Effective 1/1/2016