

May 16, 2016

Quartz Hill Water District

2016 Water Financial Plan and Cost-of-Service Study Report



Prepared by: Urban Futures, Inc.

Quartz Hill Water District
2016 Water Financial Plan and Cost-of-Service Study Report

May 16, 2016

Mr. Chad Reed
General Manager
Quartz Hill Water District
5034 W Avenue L
Quartz Hill, CA 93536

Subject: 2016 Water Financial Plan and Cost-of-Service Study Report

Dear Mr. Reed,

Urban Futures, Inc. (UFI) is pleased to provide this Water Financial Plan and Cost-of-Service Study Report (Study) for Quartz Hill Water District (District) to develop a water budget rate structure that is based on appropriate cost-of-service principles and that best meets the goals and objectives of the District in providing water service to its customers.

The major objectives of the Study include the following:

- 1) Update rate levels that would generate sufficient net revenue to continue providing high-quality and resilient water service; and
- 2) Ensure through a formal and externally-provided study that the cost of serving each customer would most appropriately be reflected in the rates charged to that customer according to the requirements of California Proposition 218.

In so doing, the working group maintained particular focus on the objectives of affordability of water for essential use, revenue stability, and maintenance and development of critical capital components.

The report summarizes the methodology and the key findings related to the development and evaluation of the water budget rate structure for the District.

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

Sincerely,

Urban Futures, Inc.



James K. Lee
Principal, Utility Advisory Services

Table of Contents

I.	INTRODUCTION	5
A.	District Background	5
B.	Study Objectives	5
II.	FINANCIAL PLAN AND REVENUE REQUIREMENTS	7
A.	Projected Debt Service Coverage	7
B.	Projected Operating Financial Plan	7
C.	Projected Approach to Capital Improvement Plan	9
D.	Projected Reserve Balance	9
III.	WATER BUDGET AND TIER DEFINITIONS	10
A.	Development of Water Budget	10
1.	Residential Indoor Water Budget	10
2.	Residential Outdoor Water Budget	11
B.	Tier Definitions	13
1.	Essential Use	13
2.	Non-Essential Use	13
3.	Penalty Tiers	13
IV.	COST OF SERVICE ANALYSIS	14
A.	Cost of Service to be Allocated	14
1.	Functional Cost Components	15
2.	Allocation to Functional Cost Components	16
3.	Determination of Allocation Percentages	16
4.	Allocation of Operating Expenses	17
5.	Allocation of Plant Investment and Capital Costs	17
B.	Unit Cost of Service	18
C.	Allocation of Cost to Customer Classes	18
V.	DEVELOPMENT OF WATER RATE STRUCTURE	20
A.	Rate Design	20
B.	Cost Drivers	20
1.	Commodity Rate Components	20
2.	Fixed Charges Components	22

C.	Rates.....	23
1.	Equivalent Meters.....	23
VI.	CUSTOMER IMPACT ANALYSIS.....	25
A.	Average Monthly Bills	25
B.	Comparison of Peer Agencies	27

Listing of Tables

Table 1-	Study Goals & Policy Objectives.....	6
Table 2-	Proposed Rate Adjustments & Projected Debt Service Coverage	7
Table 3 -	Projected Operating Financial Plan Based on Proposed Rate Adjustments	8
Table 4 -	Projected CIP by Project Type	9
Table 5 -	Projected Reserve Fund Balance.....	9
Table 6 -	Indoor Water Budget Allotment	11
Table 7 -	Outdoor Water Budget Allotment	12
Table 8 -	Monthly Seasonal Adjustment based on ET & Plant Factor	12
Table 9 -	Peaking Factors	17
Table 10 -	Calculation of Peaking Allocation Factors.....	17
Table 11 -	Summary of Allocated Functions to Cost of Service & Customer Class	19
Table 12 -	Commodity Rate Components for Residential Customers	21
Table 13 -	Commodity Rate Components for Non-Residential Customers	22
Table 14 -	Fixed Rate Components for Residential Customers.....	22
Table 15 -	Fixed Rate Components for Non-Residential Customers.....	23
Table 16 -	Equivalent Meter Ratios.....	23
Table 17 -	Current & Proposed Residential Fixed/Consumption Charges	24
Table 18 -	Current & Proposed Non-Residential Fixed/Consumption Charges	24
Table 19 -	Bill Impact Distribution for Residential Customers.....	25
Table 20 -	Bill Impact Distribution for Non-Residential Customers.....	26
Table 21 -	Comparison of Average Residential Bill of Peer Agencies (20 ccf usage during study period)..	27

I. INTRODUCTION

Quartz Hill Water District (District) is governed by a five-member Board of Directors elected at large. The General Manager is the Chief Executive Officer and reports directly to the Board, executing the Board's policies and directives and providing the Board recommendations for all matters. The District was formed in 1954 with three wells and 5,000 gallons of storage. Over 62 years, the District has grown to serve approximately 20,500 residents and businesses in the City of Quartz Hill and adjacent unincorporated areas. The majority of the District's almost 6,000 customer accounts are for residential usage. Today, the District maintains 10 wells and over a half million feet of mains and has a storage capacity of nearly 14.5 million gallons.

A. District Background

The District currently has two sources of water – imported water and groundwater. Groundwater is sourced through the Antelope Valley Aquifer, and is considered the District's primary source of water. Imported water is typically used to the extent possible in order to manage the recharge of the finite aquifer supply. Imported water is sourced from the California State Water Project and is purchased through the regional retailer Antelope Valley-East Kern Water Agency (AVEK).

In 2009, the District became one of the State's first agencies to move from the traditional inclining tiers water rate structure to a water budget rate structure. The decision to move to an allocation-based rate structure was based on achieving both conservation of and efficient use of water by developing an individualized budget of water usage for each account. There were five tiers ranging from a 'conservation' tier to a 'wasteful' tier, and they were designed to send clear price signals to high-use customers that place undue burden on the District's water supply and the District's ability to meet State mandates such as the FY 2015 water reduction mandate for the District to cut usage by 36 percent. The rate structure consists of fixed service charges and variable usage/consumption charges which incorporate pass-through adjustments as applied by AVEK.

The 2009 water budget rate structure and its allocations and tiers were developed internally by the District and based on cost-of-service principles per generally accepted American Water Works Association (AWWA) guidelines to the extent possible. The structure supported the District's mission statement that the District "...will be a responsible overseer of the resources, assets, and natural environments entrusted to [the District] in order to provide a high quality water supply that is resilient, reliable, and supplied at a fair and equitable rate."

B. Study Objectives

In 2015, the Board revisited the rate structure in order to:

- 3) Update rate levels that would generate sufficient net revenue to continue meeting the above mission statement; and
- 4) Ensure through a formal and externally-provided study that the cost of serving each customer would most appropriately be reflected in the rates charged to that customer according to the

requirements of California Proposition 218 (1996). The District engaged Urban Futures, Inc. (UFI) to assist in the analysis, and the following summarizes the working group’s study goals and policy objectives:

Table 1- Study Goals & Policy Objectives

Study Goals	Policy Objectives
Conform to legal requirements	Preserve “affordability for essential use”
Generate adequate revenues	Maintain “revenue stability”
Develop fair and defensible documentation	Maintain and develop critical capital components
Present concepts for easy understanding	

This report documents the revenue requirements for the District’s continued operation and high level of service delivery and the standards and studies used to develop the residential water budgets and non-residential inclining tier widths which were used as the basis to determine the proposed rates, implemented April 1, 2016.

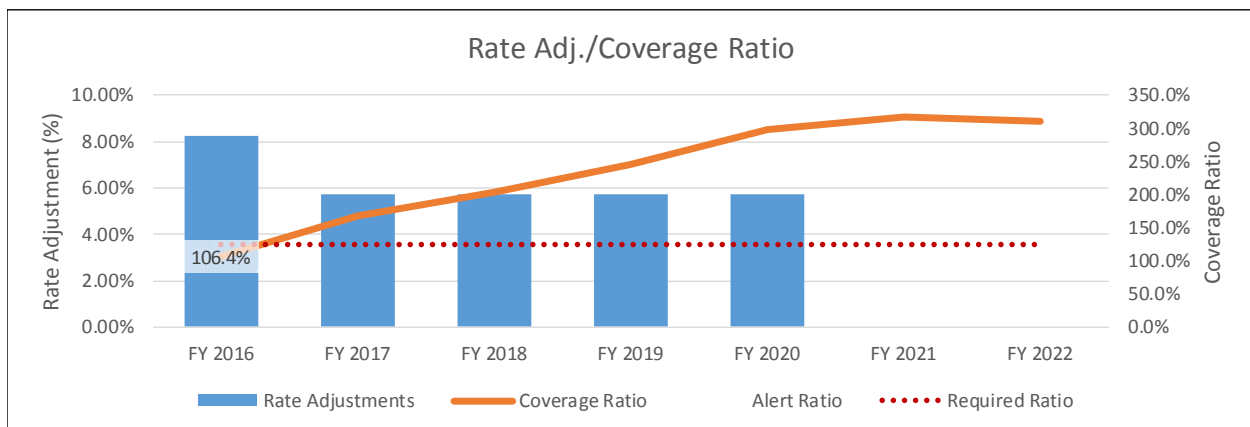
II. FINANCIAL PLAN AND REVENUE REQUIREMENTS

Based on the District’s fiscal year (FY) 2016 budget, UFI projected the revenues and expenditures over the next 15 years (7 years shown in the tables below). UFI used growth and inflation assumptions based on discussion with staff and consistent with industry standards and the District’s planning documents.

A. Projected Debt Service Coverage

The table below shows the proposed revenue adjustments for the water revenues over the planning period, represented by the blue bars. The analysis demonstrates that increases will be necessary to cover operating and capital expenditures over the planning period. The red line in the graph shows the required debt service target coverage of 125 percent. The proposed revenue adjustments will allow the District to meet its debt service coverage over the planning period, as shown by the orange line in the graph. The debt coverage ratio increases in FY 2016 and beyond as revenues are increasing at a higher rate than operating expenses and debt service payments to cover capital costs. In addition to meeting debt covenants and ensuring the availability of future debt as necessary, healthy coverage levels promote the District’s maintaining its favorable credit rating from Standard & Poor’s rating agency.

Table 2- Proposed Rate Adjustments & Projected Debt Service Coverage



B. Projected Operating Financial Plan

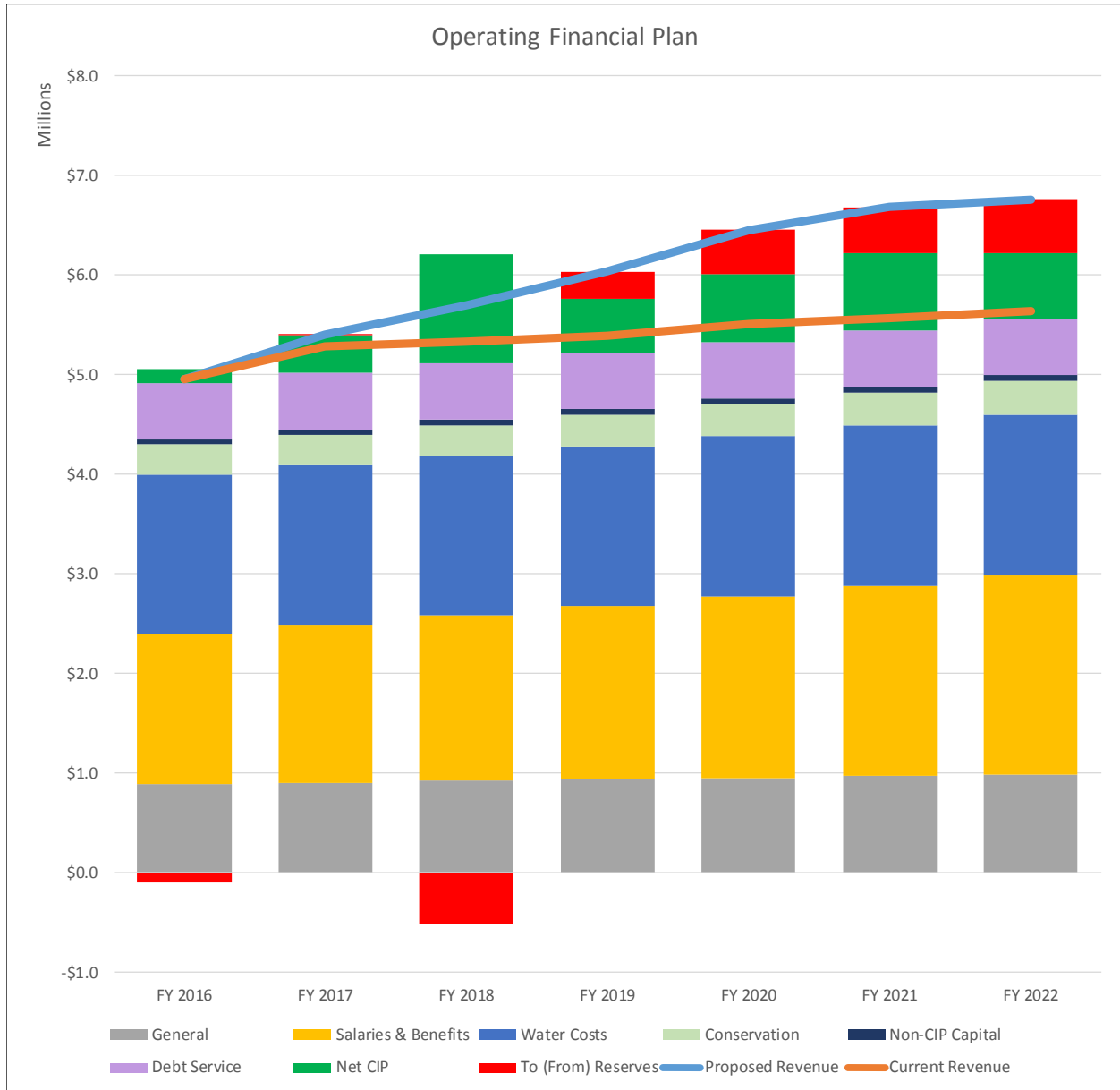
The next table shows the operating financial plan for the water utility. The projected operating financial plan is based on the proposed rate adjustments of 8.25% for FY 2016 (April 1 implementation) and 5.75% for FY 2017 through FY 2020.

The light blue bars represent the current budgeted and projected O&M expenses. General, compensation (salaries and benefits), water supply, conservation programs, non-CIP capital, and net CIP are represented by various colored bars. Annual debt service payments are represented by the light purple bars. The red bars represent the positive or negative net income that will be drawn from or added to the District’s

Quartz Hill Water District
 2016 Water Financial Plan and Cost-of-Service Study Report

reserves. If rates remain at current levels, projected revenue will follow the orange line. The revenues with the proposed revenue adjustments over the next 7 years are demonstrated by the blue line.

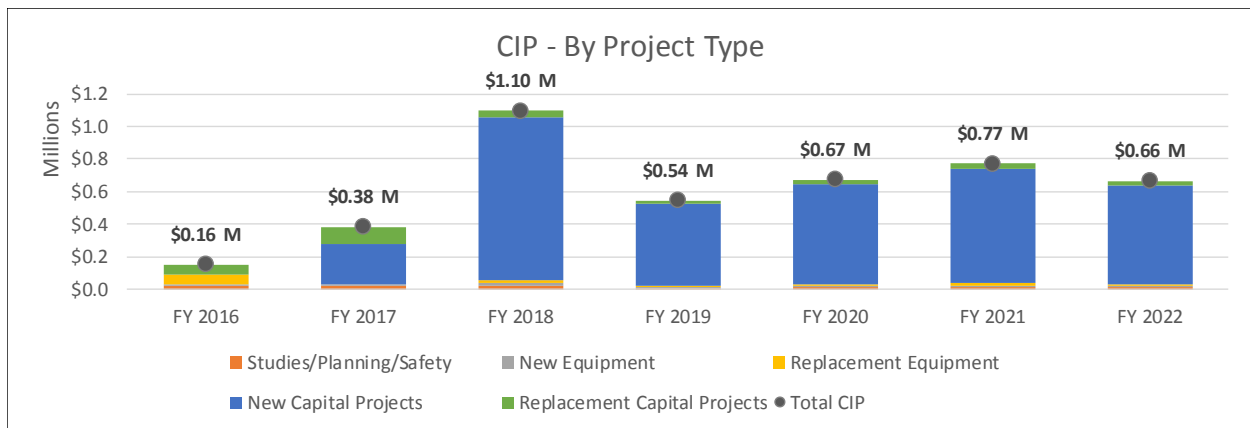
Table 3 - Projected Operating Financial Plan Based on Proposed Rate Adjustments



C. Projected Approach to Capital Improvement Plan

Table 4 shows the District’s budgeted capital improvement program (CIP) over the next seven years. In the financial plan, the District assumes that all capital costs will be rate funded, instead of using capital reserves or new debt service. Funding the capital costs through rates without additional debt is especially prudent for the District because the District’s capital costs are fairly manageable over the planning period, save a spike in FY 2018 for new capital. As it is anticipated that rates and reserves will provide the necessary cash to fund planned capital projects, this approach will save on interest costs and illustrates the value of building reserves through rates.

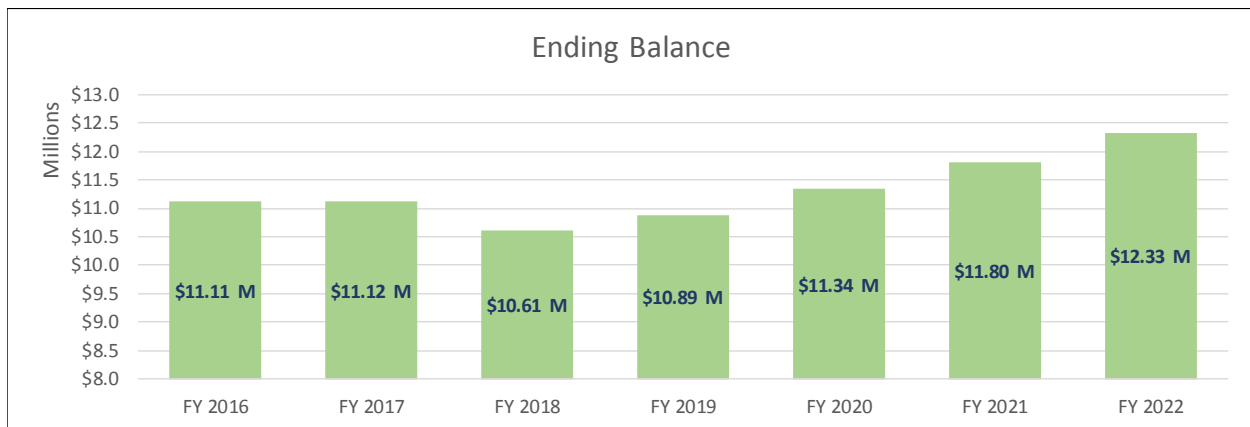
Table 4 - Projected CIP by Project Type



D. Projected Reserve Balance

The following table shows the District’s projected reserve fund balance over the next seven years. After two relatively static years in fund balance for FY 2016 and FY 2017 and a large draw of \$0.5 million in FY 2018 due to planned new capital, the District begins to rebuild its reserve balance from FY 2019 onward.

Table 5 - Projected Reserve Fund Balance



III. WATER BUDGET AND TIER DEFINITIONS

The following discussion of water budget tiers is related to the residential accounts that comprise over 95 percent of the District’s accounts and water usage. The working group determined that non-residential accounts would remain on the inclining tiers rate structure based primarily on: 1) maintaining the balance between conservation signals and ability to continue commercial activities as an ongoing concern; and 2) ensuring that the benefit of developing a water budget-based structure for non-residential customers could meet the cost rationale for developing a separate study. The existing inclining tiers structure already provides conservation signals, and the current study re-calibrated those tiers to ensure that the non-residential rates accurately reflect the cost of providing service. Non-residential customers represent approximately 3 percent of the District’s customer base, and the cost of developing an additional study for this group was deemed to exceed the public benefit of such a study.

A. Development of Water Budget

The American Water Works Association (AWWA) Journal defines water budget as “the quantity of water required for an efficient level of water use by that customer.”¹ To determine an efficient amount of water use, a water budget allocation must be calculated. The budget calculation has to account for the indoor and outdoor needs of the individual customer. Although water budget allocations and tiered rate structures are designed individually for residential and commercial water service accounts, there are many similarities among these unique customers.

1. Residential Indoor Water Budget

The indoor water budget (IWB) is determined by a customer’s household size and a standard consumption per person. Quartz Hill’s planned IWB formula is as follows:

$$IWB = \frac{GPCD \times \text{Household Size} \times \text{Days of Service} \times DF_{\text{indoor}}}{748}$$

Where:

- GPCD – Gallons per capita per day. The standard consumption per person per month will be set at 46.7 gpcd, based on the historical average usage of 1,200 gallons per month. This meets the Water Conservation Act of 2010 (SBx7-7) threshold of efficient indoor residential usage of 55 gpcd.
- Household Size – Number of residents. The default value for single-family household size will be based on California Department of Finance Statistics which is 3 persons.
- Days of Service – The number of days of service is based on the 30/360 convention and will be 30 days per month.

¹ Source: American Water Works Association Journal, May 2008, Volume 100, Number 5.

Quartz Hill Water District

2016 Water Financial Plan and Cost-of-Service Study Report

- DF_{indoor} – Indoor drought factor. The indoor drought factor will be set at 100 percent, representing the full water budget allotment, based on the 46.7 gpcd residential allotment already representing a conservation-oriented threshold.

Indoor allotments are fixed at the same allocation each month throughout the year based on no change in consumption patterns according to season. The allotment can vary based on an adjustment application being submitted by the customer and granted by the District. The additional allotment is 33.3 gpcd for each additional full-time adult (1,000 gallons per month) and 16.7 gpcd for each additional child for childcare facilities (500 gallons per month). The lower allotment for each additional person is based on the expectation that they will not incur additional fixed usage needs such as a dishwasher.

Table 6 - Indoor Water Budget Allotment

Indoor Allotment Per Person	Gallons/Mo.	GPCD
First 3 Persons	4,200	46.7
Addtl. Person	1,000	33.3
Addtl. Child for Childcare	500	16.7

For illustrative purposes, the following indoor water budget calculations for two different customers are provided.

- Customer #1: Average household with 3 persons and no adjustment application.

$$IWB_1 = \frac{46.7 \text{ gpcd} \times 3 \text{ persons} \times 30 \text{ days} \times 100\%}{748} = 5.62 \text{ ccf}$$

- Customer #2: Adjustment application submitted and granted for two additional full-time occupants.

$$IWB_2 = \frac{[(46.7 \text{ gpcd} \times 3 \text{ persons}) + (33.3 \text{ gpcd} \times 2 \text{ addtl. persons})] \times 100\%}{748} = 8.29 \text{ ccf}$$

2. Residential Outdoor Water Budget

The outdoor water budget (OWB) is calculated using three components: lot size, local weather data, and an efficiency adjustment factor. Lot size was determined on an individual basis by mapping each customer’s area with Geographic Information System (GIS) technology. The weather data is the monthly reference of EvapoTranspiration (ET). ET is the measurement of water lost to evaporation and used by a reference plant material (transpiration). Plant Factor is a State-legislated efficiency standard in the form of a coefficient that adjusts the outdoor water budget value based on the crop types and irrigation efficiency.

The formula to calculate an annual outdoor water budget is as follows:

$$OWB = \frac{\text{Lot Size sq. ft.} \times \text{EvapoTranspiration Rate} \times \text{Plant Factor}}{748}$$

Where:

- Lot size is the square footage as measured by GIS for each customer.

Table 7 - Outdoor Water Budget Allotment

Outdoor Allotment Per Sq. Ft.	Gallons/Sq. Ft./ Year	Gallons/ Year
First 5,000 sq. ft.	19	95,000
Next 9,000 sq. ft.	17	127,500
Sq. footage over 14,000 sq. ft.	14	Varies

- ET is measured in inches of water during the billing period based on historical weather data acquired from California Irrigation Management Information System (CIMIS). The historical data is an average taken from the two CIMIS weather stations closest to the District – Lancaster and Palmdale. Because this factor is a measure of transpiration and hotter weather effects greater transpiration, this factor varies through the year, increasing with the hotter months.
- Plant Factor is the coefficient that indicates the amount of water per square inch necessary to maintain a plant, taking into consideration plant type, plant density, and microclimate. The plant factor used was for a warm-season grass.
- Net seasonal adjustment represents the combined ET and plant factor, and the seasonal adjustment for each month is shown below:

Table 8 - Monthly Seasonal Adjustment based on ET & Plant Factor

Seasonal Adjustment By Month												
Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0.03	0.04	0.07	0.09	0.11	0.13	0.15	0.14	0.10	0.07	0.04	0.03	1.00

For illustrative purposes, the following outdoor water budget calculations for two different customers are provided.

- Customer #1 – Single-family: Lot Size = 4,500 sq. ft.; the seasonal adjustment for January = 0.03:

$$OWB_1 = \frac{(4,500 \text{ sq. ft.} \times 19 \text{ gallons}) \times 0.03}{748} = 3.43 \text{ ccf}$$

- Customer #2 – Single-family: Lot Size = 8,000 sq. ft.; the seasonal adjustment for April = 0.09:

$$OWB_2 = \frac{[(5,000 \text{ sq. ft.} \times 19 \text{ gallons}) + (3,000 \text{ sq. ft.} \times 17 \text{ gallons})] \times 0.09}{748} = 17.57 \text{ ccf}$$

B. Tier Definitions

The tier definitions are tailored to the unique consumption patterns of the District’s customers and based on the District’s policy decisions. The recommended tier definitions are based on cost-of-service-based financial modeling, customer impact analysis using actual customer data, and efficiency standards written into California laws, codes and ordinances.

1. Essential Use

Essential use is represented by the indoor water budget and is assigned to define Tier 1 width. Tier 1 width will vary from customer to customer based on the number of people that live in the home. Indoor water use is considered essential for health, safety, and sanitary purposes. The District has determined that at the time of the study, a portion of the demand for essential indoor water can be met through groundwater with the balance supplied from imported water through AVEK. The combination of local and imported supplies determines the unit cost of water in the District’s first tier (Tier 1) of the water budget rate structure.

2. Non-Essential Use

Non-essential use is represented by the outdoor water budget and is assigned to define Tier 2 width. Tier 2 width will be determined individually for every customer through the outdoor budget formula described earlier in this report. Maintaining healthy landscape at an efficient water use level is considered non-essential water relative to health and safety, yet it is important to communities in the arid west. The District has determined that non-essential outdoor water can be met through imported water. All groundwater was allocated toward supporting Tier 1 essential use. Because outdoor water is considered non-essential, Tier 2 will fund a portion (25%) of the District’s conservation and efficiency programs.

3. Penalty Tiers

Tiers 1 (“essential”) and 2 (“non-essential”) together make up the customer’s total water budget. Tiers 3 (“inefficient”) and 4 (“unsustainable”) represent penalty tiers. Tier 3 is defined as 130% of total water budget, and Tier 4 is defined as any usage greater than 130% of water budget. Tiers 3 and 4 will fund 25% and 50% of the District’s conservation/efficiency programs, respectively.

Non-essential use is represented by the outdoor water budget and is assigned to define Tier 2 width. Tier 2 width

IV. COST OF SERVICE ANALYSIS

The District's customer classifications and the revenue requirements reviewed and finalized through the operating and capital cash flow analysis provide the basis for performing the cost of service analysis. This section of the report discusses the allocation of operating and capital costs to the appropriate parameters consistent with industry standards and the determination of unit costs.

The cost of service analysis shown in this section is consistent with the Base-Extra Capacity method, as defined in the American Water Works Association (AWWA) M1 Manual, Principles of Water Rates, Fees and Charges, that is common for setting rates at retail agencies. Following this industry standard methodology is acceptable to courts for meeting the requirements of Proposition 218 which established a stringent requirement for increasing water rates in California. Proposition 218, the "Right to Vote on Taxes Act," was passed by voters in November 1996. It amended the California Constitution and is codified in Articles XIII C and XIII D. Proposition 218 was initially passed to close perceived loopholes in the restrictions on property taxes imposed by Proposition 13. It requires that:

- Revenues derived from the fee may not exceed the funds required to provide the service;
- The amount of the fee may not exceed the proportional cost of the service attributable to the parcel upon which the fee is imposed; and
- The fee may not be imposed unless the service is actually used by, or immediately available to, the owner of the property.

Proposition 218 also introduced procedural requirements prescribing that a local agency must give advance written notice to the owner of each parcel upon which a fee or charge is proposed for imposition. A public hearing on the proposed fee increase must be held at least 45 days after providing such notice. If a majority of owners of the identified parcels submit written protests to the fee, the agency may not impose the fee.

A. Cost of Service to be Allocated

The total utility revenue requirements net of revenue credits from miscellaneous sources, is 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. The concept of proportionate allocation to customer classes requires that allocations should take into consideration not only the average quantity of water used but also the peak rate at which it is consumed. The water system is designed to handle peak demands. The costs associated with design and construction of facilities used to meet peak demands need to be allocated so that peaking costs can be recovered appropriately. In this study, water rates were calculated for FY 2016, and accordingly FY 2016 is defined as the Test Year. Test Year revenue requirements are used in the cost allocation process. Subsequent years' revenue adjustments are incremental and the rates adjustments for future years are based on the respective revenue increments. The District should review the cost of service analysis at least every five years to ensure that the rates are consistent with the costs of providing service.

The annual revenue requirements or costs of service to be recovered from commodity charges include operations and maintenance (O&M) expenses and capital costs. O&M expenses include costs directly related to the supply, treatment, and distribution of water as well as routine maintenance of system facilities. This maintenance is often referred to as routine capital and represents the annual recurring capital outlay for minor system improvements and purchases of materials and supplies.

The total FY 2016 cost of service to be recovered from the District's water customers is estimated at approximately \$4.7 million. Approximately \$4.0 million of this total is for operating costs (net of a contra expense of \$0.7 million for unrestricted revenues) and the remaining \$0.7 million is for existing debt service and planning for capital projects. Planned capital expenditure in FY 2016 is approximately \$155,000, while existing debt service is \$569,050.

The cost of service analysis is based upon the premise that the utility must generate annual revenues adequate to meet the estimated annual revenue requirements. As part of the cost of service analysis, revenues from sources other than water rates and charges (e.g. revenues from miscellaneous services) are deducted from the appropriate cost elements. Additional deductions are made to reflect interest income and other non-operating income during FY 2016. Adjustments are also made to account for cash balances to ensure adequate collection of revenue and to determine annual revenues needed from rates.

To allocate the cost of service among the different customer classes, costs first need to be allocated to the appropriate water cost components. The following section describes the allocation of the operating and capital costs of service to the appropriate parameters of the water system.

1. Functional Cost Components

The total cost of water service is analyzed by system function in order to equitably distribute costs of service to the various classes of customers. For this analysis, water utility costs of service are assigned under the Base-Extra Capacity method to three basic functional cost components: base costs, extra capacity or peaking costs, and customer-service related costs. This method is consistent with the M1 Manual, referenced earlier, and is widely used in the water industry to design rates for retail customers.

Base Costs – Base costs are those operating and capital costs of the water system associated with serving customers at a constant average rate of use. Supply costs are typically considered to be based on average usage.

Extra Capacity Costs – Extra capacity or peaking costs represent those 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 (Max Day) day. Different facilities are designed to meet different peaking characteristics. For example, transmission lines are designed to meet Max Day requirements. Transmission lines have to be designed larger than they would be if the same annual

amount of water were being used at a constant rate throughout the year. The cost associated with constructing a larger line is based on the “overdesign” and is proportioned on the Max Day factor. For example, if the Max Day factor is 2.0, then the line has to be designed twice as large as required to meet just the average usage conditions. In this case half of the cost would be allocated to Base or average 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 – Customer service costs include customer-related and meter-related costs. Customer costs include such costs as meter reading, billing, collecting, and accounting. Meter service costs include maintenance and capital costs associated with meters and a portion of the capacity related costs. These costs are assigned based on meter size or equivalent meter capacity.

The allocation of costs of service into these principal components provides the means for determining the costs to the various customer classes on the basis of their respective base, extra capacity and customer requirements for service.

2. Allocation to Functional Cost Components

The water utility is comprised of various facilities that are designed and operated to fulfill a given function. In order to provide adequate service to its customers at all times, the utility must be capable of not only providing the total water demand, but also supplying water to meet peak or maximum water use needs. Functional cost components are determined by designating various expenses to their specific purpose.

3. Determination of Allocation Percentages

To determine how costs should be allocated to average and peak (Max Day and Max Hour) demands, the allocation percentages are derived from actual historical data and assigned to each cost component. Customer service related costs are allocated 100 percent to the customer service component. Costs related to meter maintenance are allocated to meter service component. These two components are included in the fixed monthly service charges.

To calculate volume-related cost allocation, first system peaking factors are determined. Peaking factors are based on the District’s usage characteristics. The Base or Average Demand is the average of the month-on-month use over the maximum month’s usage, and Base Demand is assigned a value of 1.90. Per California Code of Regulations (CCR) Title 22, Section 64554, the factor of 1.5x can be applied to the District’s Max Day demand and Max Hour demand for a value of 2.85 and 4.28, respectively. The system peaking as derived above are shown in the table below.

Table 9 - Peaking Factors

System Peaking Factors	
	Peaking Factors
Base	1.90
Max Day	2.85
Max Hour	4.28

Next, the relative proportion of costs assigned to Base, Max Day and Max Hour are used to calculate cost components. Cost components solely related to providing average day demand, such as supply sources, are allocated 100 percent to Base. Cost components that are designed to meet Max Day peaks, such as reservoirs and transmission facilities, are allocated both Base and Max Day factors. Cost components designed for Max Hour peaks, such as distribution system facilities, are allocated similarly. The results of the allocation are presented in the table below.

Table 10 - Calculation of Peaking Allocation Factors

Calculation of Allocation Factors			
	Base	Max Day	Max Hour
Facilities Designed for Base	100%		
Facilities Designed for MaxDay	56%	44%	
Facilities Designed for MaxHour	23%	42%	33%

These percentages are then applied to the operating and capital improvement costs amongst Base, Max Day, and Max Hour parameters for cost of service calculations, which is explained in detail in the following sections.

4. Allocation of Operating Expenses

Projected net operating expenses for FY 2016 are allocated to cost components on the basis of the design criteria of the facilities. Water supply costs are allocated to base; storage and reservoir costs are allocated to max day; distribution system costs are allocated to max hour; transmission costs are allocated to max day; billing and customer service costs are allocated to customer service, etc.

Administration and general expenses are related to total system operations and cannot specifically be allocated to individual functions such as storage or distribution, etc. These expenses are therefore allocated in the same proportion as all the remaining operating expenses. The resulting allocation of operation and maintenance expense serves as the basis for allocating the FY 2016 cost of service revenue requirements to the base, extra capacity and customer costs functions.

5. Allocation of Plant Investment and Capital Costs

Capital costs include capital improvements financed from annual revenues, debt service and other sources. Capital costs related to specific facilities will vary significantly from year to year. Allocating these

costs based on the functions of these specific facilities would cause the rates to the different customer classes to change from year to year. A reasonable method of assigning capital costs to functional components, widely practiced in the industry, is to allocate such costs on the basis of net plant investment recognizing that over a period of time these allocations will provide costs to be passed on to customers equitably.

Net plant investment is represented by the total replacement cost of water utility facilities less accumulated depreciation. The estimated fiscal year net plant investment in water facilities consists of net plant in service as of June 30, 2015, the latest assets data available.

Costs are allocated based on the design criteria of each facility. For example, treatment facilities are allocated to Max Day since these facilities are designed to handle the maximum day demand. The investment in general plant, i.e. general investments not classified as any particular function such as storage, treatment, distribution, etc., is allocated to each cost component on the basis of all other investments.

B. Unit Cost of Service

In order to allocate costs of service to the different customer classes, unit costs of service need to be developed for each cost component. The unit costs of service are developed by dividing the total annual costs allocated to each parameter by the total annual service units of the respective component.

The consumption-related cost components are based on consumption units of one hundred cubic feet or HCF (about 748 gallons). Customer service related cost components are based on number of accounts and meter related costs are based on equivalent meters.

C. Allocation of Cost to Customer Classes

The unit cost of each of the cost categories is then applied to the projected FY 2016 usage and units of each customer class to derive customer class costs. The District's residential class is responsible for approximately 87 percent of the total cost of service. The non-residential class is responsible for approximately 13 percent of the annual cost of service. A summary of the above steps is shown in the table below.

Quartz Hill Water District
2016 Water Financial Plan and Cost-of-Service Study Report

Table 11 - Summary of Allocated Functions to Cost of Service & Customer Class

										87%	13%	
Allocated Functions to Cost of Service and Customer Class												
	Wells Supply	AVEK Supply	Trans.	Dist.	Storage	Pumping	Meters	Fire Protec.	Billing	Allocation of Costs	Allocation to Residential	Allocation to Non-Residential
Wells Supply	100%									\$333,201	\$289,600	\$43,601
AVEK Supply		100%								\$1,672,743	\$1,453,856	\$218,888
Conservation										\$300,000	\$260,743	\$39,257
Base			56%	24%	24%	56%				\$1,077,055	\$936,117	\$140,939
Max Day			44%	42%	42%	44%				\$1,156,339	\$1,002,782	\$153,557
Max Hour				34%	34%					\$420,415	\$364,586	\$55,829
Customer									100%	\$151,758	\$147,053	\$4,705
Meter							100%			\$162,982	\$146,823	\$16,160
Public Fire Protection								100%		\$0	\$0	\$0
Unrestricted Revenues										(\$565,369)	(\$491,387)	(\$73,982)
Totals:	100%	100%	100%	100%	100%	100%	100%	100%	100%	\$4,709,125	\$4,110,172	\$598,954

Once the customer class cost responsibility is determined, the next step is to design customer water rates to recover the revenues required from each customer class, which is discussed in the next section.

V. DEVELOPMENT OF WATER RATE STRUCTURE

The revenue requirements and cost of service analysis described in the preceding sections of this report allocate the costs equitably amongst the different customer classes. Rate design is the process of developing rate schedules for each customer class such that the annual cost of service determined for each customer class is equitably recovered from the customers in that class. In this study, the focus of rate design is on the development of rate schedules for the District’s residential and non-residential customers.

A. Rate Design

Proposition 218 requires a nexus (justification) between the rates charged to customers and the costs of providing service; the rate structure should be designed to ensure that customers pay their proportionate share of costs. In addition, rate structures should be easy to understand, simple to administer, meet the District’s stated objectives and comply with regulatory requirements. To meet this requirement, the District:

- Identified three different rate components of the commodity rate, including Water Supply, Delivery Costs, and Conservation Programs;
- Eliminated the prior Tier 0 or “conservation” tier with the understanding that a subsidized tier does not best reflect the cost of providing service;
- Reduced the number of tiers from 5 to 4 based on ease of customer understanding and for increased defensibility of tier definitions in the absence of alternative sources of water supply such as recycled water; and
- Combined all residential meters – ¾” and 1” – based on the recognition that the two different meter sizes do not present a material difference in base and peaking loads on the water system.

B. Cost Drivers

1. Commodity Rate Components

As mentioned above, the study identified three different rate components of the commodity rate, including Water Supply, Delivery Costs, and Conservation Programs;

The District’s lowest cost water supply is local groundwater at \$117/acre-foot(AF). The entirety of this water supply will be applied to Tier 1 “essential” use in order to support the policy goal of providing affordability for essential indoor usage for health and safety. Because the safe threshold for annual draw from the District’s aquifers does not meet all of Tier 1 demand, the costlier imported water will need to supplement demand. Imported water from AVEK is budgeted at \$485/AF. The remaining volume of imported water is allocated between Tiers 2, 3, and 4 according to the proportionate expected share of usage in those tiers based on historical usage data.

In addition to the water supply costs, the District incurs approximately \$4.7 million net in operations and maintenance expenses to deliver water services to end-users. The District’s revenue requirements must

Quartz Hill Water District

2016 Water Financial Plan and Cost-of-Service Study Report

be recovered by the monthly fixed system charges and the District's delivery cost component in the usage rates. The ultimate goal of the water budget rate structure is to eliminate inefficient and unsustainable usage (Tiers 3 and 4) while maintaining revenue stability. To ensure financial sufficiency and revenue stability, half of the District's unrecovered delivery costs (base costs not including peaking costs will be recovered only from the efficient usage.

Unrestricted Revenues (a contra expense) represents a mitigating factor to reduce the costs for "essential" use, and half of this contra expense is applied to decrease the Tier 1 unit costs, thereby balancing the two principles of revenue stability versus affordability for essential use.

The ultimate goal of the water budget rate structure is to eliminate inefficient usage (Tier 3, Tier 4 and Tier 5), while maintaining revenue stability. To assist customers in using water efficiently, Quartz Hill Water District employs staff to administer customer programs, evaluation consultants to provide on-site assistance for customers, and provides direct install programs and financial rebates to customers electing to perform efficiency upgrades.

The District has historically supported conservation and efficiency programs including a rebate program to encourage conservation amongst District customers. The District will maintain conservation-oriented programs and employ studies focused on increasing efficient and alternative uses of water. Efficiency program costs will be funded by the "non-essential" and "penalty" charges from Tiers 2, 3, and 4, with the bulk of cost concentrated in the penalty-only tiers. Only customers who use water other than designated as affordable for essential use will pay the higher tiered rates. This is consistent with the District's policy to create a conservation pricing structure. A summary of rate components for the commodity charges is shown in the table below.

Table 12 - Commodity Rate Components for Residential Customers

Commodity Rate Components - Residential				
	Tier 1	Tier 2	Tier 3	Tier 4
Groundwater	\$0.45			
Imported Water	\$0.23	\$1.25	\$1.25	\$1.25
Conservation Programs		\$0.07	\$1.15	\$3.45
Delivery	\$0.73	\$0.05	\$0.32	\$0.32
Unrestricted Revenues	(\$0.38)	(\$0.03)	(\$0.17)	(\$0.17)
Total:	\$1.02	\$1.35	\$2.56	\$4.86

Table 13 - Commodity Rate Components for Non-Residential Customers

Commodity Rate Components - Non-Residential			
	Tier 1	Tier 2	Tier 3
Groundwater	\$0.55	\$0.55	\$0.03
Imported Water			\$1.18
Conservation Programs	\$0.12	\$0.11	\$0.17
Delivery	\$0.87	\$0.56	\$0.75
Unrestricted Revenues	(\$0.46)		(\$0.32)
Total:	\$1.08	\$1.22	\$1.81

2. Fixed Charges Components

A fixed or service charge is a cost recovery mechanism that is generally included in the rate structure to recover some of the fixed costs including customer related costs, meter costs, and a portion of the capacity related cost to provide a stable source of revenue independent of water consumption.

Customer-related costs are fixed expenditures that relate to operational support activities including meter reading, accounting, billing, customer service, and administrative and technical support. The customer related costs are essentially common-to-all customers and are reasonably uniform across the different customer classes and meter sizes. Capacity-related costs such as meter maintenance and a portion of the peaking costs are based on the hydraulic capacity of the meters. Since facilities are designed to meet peaking requirements, UFI has assigned a portion of the costs related to peaking to the service charge. Increasing the fixed charge tends to reduce the variable rates and incentive for conservation, but provides a mechanism for recovering a portion of the fixed costs and ensures a stable source of customer revenues for the utility. This rate design seeks an appropriate balance between these pricing objectives. A summary of rate components for the commodity charges is shown in the table below.

Table 14 - Fixed Rate Components for Residential Customers

Fixed Rate Components - Residential			
	Meter Charge (per equivalent unit)	Customer Charge	Total
Delivery	\$5.70		\$5.70
Max Day	\$14.53		\$14.53
Max Hour	\$5.28		\$5.28
Customer Service		\$2.13	\$2.13
Meter Maintenance	\$2.13		\$2.13
Unrestricted Revenues	(\$2.99)		(\$2.99)
	\$24.65	\$2.13	\$26.78

Table 15 - Fixed Rate Components for Non-Residential Customers

Fixed Rate Components - Non-Residential	
	Meter Charge (per equivalent unit)
Delivery	\$0.00
Max Day	\$14.15
Max Hour	\$7.35
Customer Service	
Meter Maintenance	\$2.13
	\$23.63

C. Rates

1. Equivalent Meters

A water system is designed to meet peak demands and a customer’s peak demand is proportional to the size of the meter and, more specifically, its hydraulic capacity. To allocate peaking/capacity related costs appropriately, the concept of “equivalent meters” is utilized. Equivalent meters are calculated by comparing the capacity of all meters in the system to a base meter, generally, the smallest meter in the system, or a meter size with the most meters in the system. The capacity ratio is calculated using the meter capacities in gallons per minute (gpm) provided in the AWWA M22 Manual. By using equivalent meters instead of a straight meter count, the analysis reflects the fact that larger meters impose larger demands, are more expensive to install, maintain, and replace than smaller meters and use a greater capacity in the system. Equivalent meters are used in calculating meter service costs. The equivalent meter ratios used for this study are shown in the table below.

Table 16 - Equivalent Meter Ratios

Equivalent Meter Ratios	
Meter Size	Meter Ratio
3/4"	1.0
1"	1.0
1.5"	3.3
2"	5.3
3"	11.7
4"	20.0
6"	41.7
8"	60.0

The proposed rates for all meter sizes, inclusive of adjustments through the study period of FY 2020, are shown in the table below.

Quartz Hill Water District
 2016 Water Financial Plan and Cost-of-Service Study Report

Table 17 - Current & Proposed Residential Fixed/Consumption Charges

RESIDENTIAL FIXED CHARGES		Proposed Adjustments				
		8.25%	5.75%	5.75%	5.75%	5.75%
Existing		Proposed Adjustments				
Meter	Current	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
3/4"	\$23.13	\$26.78	\$28.32	\$29.95	\$31.67	\$33.49
1"	\$33.29	\$26.78	\$28.32	\$29.95	\$31.67	\$33.49

RESIDENTIAL CONSUMPTION CHARGES		Proposed Adjustments				
		8.25%	5.75%	5.75%	5.75%	5.75%
Existing		Proposed Adjustments				
Tier	Current	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
0	\$0.98					
1	\$1.04	\$1.02	\$1.08	\$1.14	\$1.21	\$1.28
2	\$1.56	\$1.35	\$1.42	\$1.51	\$1.59	\$1.68
3	\$2.60	\$2.56	\$2.71	\$2.86	\$3.03	\$3.20
4	\$3.64	\$4.86	\$5.14	\$5.43	\$5.75	\$6.08

Table 18 - Current & Proposed Non-Residential Fixed/Consumption Charges

NON-RESIDENTIAL FIXED CHARGES		Proposed Adjustments				
		8.25%	5.75%	5.75%	5.75%	5.75%
Existing		Proposed Adjustments				
Meter	Current	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
3/4"	\$23.13	\$23.63	\$24.99	\$26.42	\$27.94	\$29.55
1"	\$33.29	\$23.63	\$24.99	\$26.42	\$27.94	\$29.55
1.5"	\$45.41	\$78.76	\$83.28	\$88.07	\$93.14	\$98.49
2"	\$66.62	\$126.01	\$133.26	\$140.92	\$149.02	\$157.59
3"	\$98.46	\$275.68	\$291.53	\$308.29	\$326.02	\$344.77
4"	\$193.98	\$472.58	\$499.75	\$528.49	\$558.88	\$591.01
6"	\$363.78	\$984.55	\$1,041.16	\$1,101.03	\$1,164.34	\$1,231.29
8"	\$576.03	\$1,417.74	\$1,499.26	\$1,585.47	\$1,676.63	\$1,773.04

NON-RES. CONSUMPTION CHARGES		Proposed Adjustments				
		8.25%	5.75%	5.75%	5.75%	5.75%
Existing		Proposed Adjustments				
Tier	Current	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
1	\$1.15	\$1.08	\$1.15	\$1.21	\$1.28	\$1.36
2	\$1.54	\$1.22	\$1.29	\$1.36	\$1.44	\$1.52
3	\$1.90	\$1.81	\$1.91	\$2.02	\$2.14	\$2.26

VI. CUSTOMER IMPACT ANALYSIS

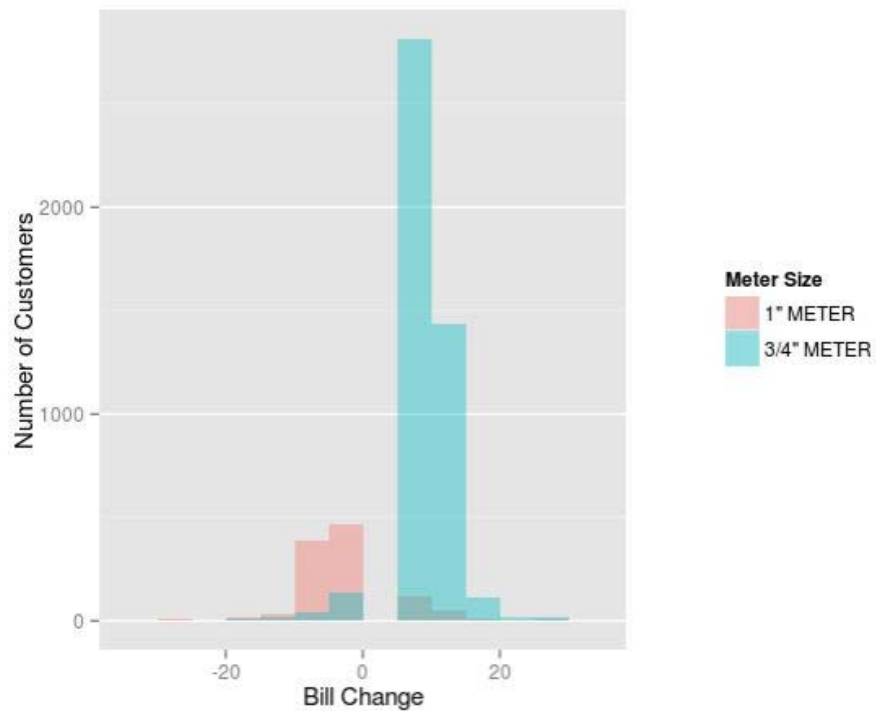
With the implementation of rate structure recommendations, it is important to understand how the proposed rate structure would impact water customers.

A. Average Monthly Bills

The District’s residential customer impacts will vary based on: 1) the combination of both ¾” and 1” residential meters; 2) the reduction of tiers from 5 to 4; and 3) the re-calibrated allocation of costs of providing water service.

Based on combining residential meters, it was expected that the average monthly bill for ¾” residential customers would increase and the average monthly bill for 1” residential customers would decrease, and the below table reflects that trend.

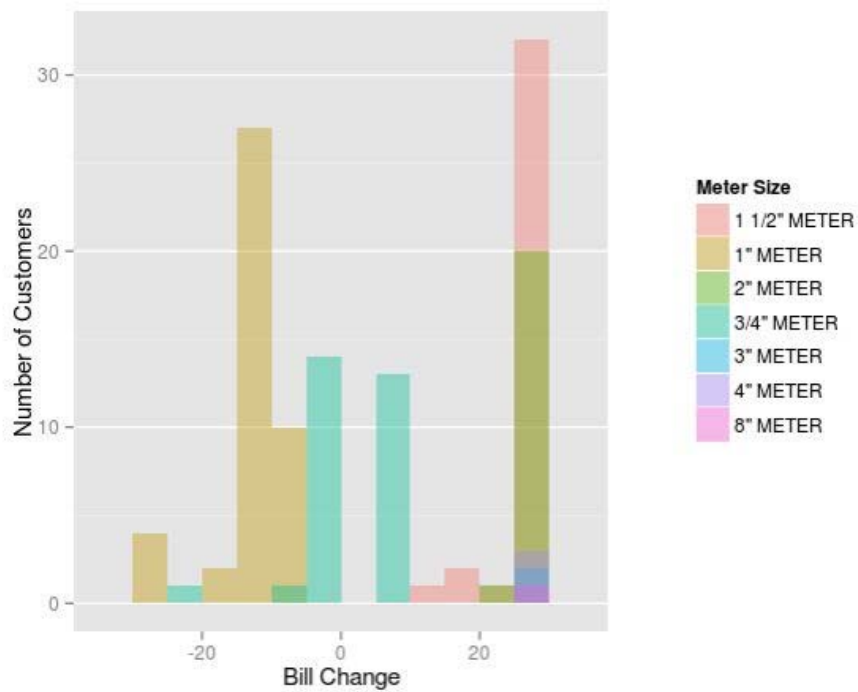
Table 19 - Bill Impact Distribution for Residential Customers



For FY 2016, the majority of 1” customers whose FY 2015 average monthly bill was \$53.85 are projected to see a decrease in average bill because the cost-of-service determination of fixed cost outweighs the 8.25% proposed adjustment for the consumption rates. While the majority of ¾” customers whose FY 2015 average monthly bill was \$43.70 are projected to see an increase in average bill, the majority of those customers are projected to see an estimated increase of less than \$10. The weighted average customer impact is an average bill of \$51.93.

Non-residential customers remained on an inclining tiers rate structure and retained the number of historical tiers. Impacts for non-residential customers are not as homogenous as those for residential customers, as their usage can vary widely among customers. The below table reflects that expectation and also a significant change in average monthly bill based the re-calibrated allocation of costs of providing water service.

Table 20 - Bill Impact Distribution for Non-Residential Customers



B. Comparison of Peer Agencies

Before the study, the District’s average monthly bills based on 20 ccf of usage were the lowest in the region. Upon implementation of the cost-of-service-based rates and FY 2016 rate adjustments, the District’s customer bills will remain among the lowest in the region.

Table 21 - Comparison of Average Residential Bill of Peer Agencies (20 ccf usage during study period)

