

# Muir Beach Community Service District

## Water Service Cost Study

Completed by Mary Halley – Updated May 2019

The purpose of the MBCSD Water Service Cost Study is to comply with the California Constitution and the related Proposition 218 as needed to determine the full cost of service for the MBCSD water system.

*California Constitution Article XIII D, section 6 established procedural requirements for imposing new, or increasing existing, property related fees and charges. Water service fees have been determined to be property related fees within the meaning of Article XIII D.<sup>1</sup>*

Tiered rates are allowed under Prop 281, but the following must apply:

- (1) Revenues derived from the fee must not exceed the funds required to provide the property-related service;*
- (2) Revenues derived from the fee must not be used for any purpose other than that for which the fee is imposed;*
- (3) The amount of a fee imposed upon any parcel or person as an incident of property ownership must not exceed the proportional cost of the service attributable to the parcel;*
- (4) The fee may not be imposed for a service unless the service is actually used by, or immediately available to the owner of the property subject to the fee. **Fees based on potential or future use of a service are not permitted**, and stand-by charges must be classified as assessments subject to the ballot protest and proportionality requirements for assessments; and*
- (5) No fee or charge may be imposed for general governmental service, such as police, fire, ambulance, or libraries, where the service is available to the public in substantially the same manner as it is to property owners.*

Additionally, included under the California Constitution, is legislation that has been created based on the premise that water is a valuable resource in California and should be reasonably conserved and managed to protect this limited resource.

*California Constitution Article X, section 2 states that the waste and unreasonable use of water shall be prevented. This constitutional mandate shows the statewide responsibility to reasonably conserve and manage water. Article X, section 2 and other laws have historically played an important role in structuring water rates to encourage conservation in California. This includes tiered water rates. Water conservation through rate structure design has been expressly authorized by the State Legislature since 1993. Cal. Water Code § 375(b).<sup>2</sup>*

To adequately assess the MBCSD water cost of water service, this study will look at: Sources of Supply, Distribution, System Capacity, Consumption and Usage, Water Service Rates and Fees, Water Operations Budget, Water Cost of Service, and Water Conservation.

## Sources and Supply

MBCSD's water supplies are all locally sourced and drawn from two separate groundwater sites that lie within the approximate 8.8 square mile Redwood Creek watershed. These sources coupled with pumping capacities collectively provide MBCSD with access to an estimated available annual supply of 209.7 acre-feet but are reduced to a maximum annual yield of 50.60 acre feet based on current permit allowances. A summary of MBCSD's water sources divided between primary and backup as follows.

MBCSD's primary water source is a groundwater well lying on District owned land in Frank Valley that is otherwise dedicated as a public picnic area. This "2002 well" – which is drilled to a depth of 60 feet and powered by a submersible pump – draws down on underflow from the Redwood Creek; a tributary to the Pacific Ocean. The 2002 well's right to access underflow from Redwood Creek is secured through a post-1914 appropriative permit from the State Water Resources Control Board. The permit allows MBCSD to daily and annual maximum yields of 0.14 and 50.60 acre-feet, respectively. The rated capacity of the pump affixed to the 2002 well is 60 gallons per minute and translates to a potential maximum daily yield of 86,400 gallons or 0.27 acre-feet; a stand-alone amount that exceeds the daily 45,000-gallon permit threshold by nearly double.<sup>3</sup>

A second well – termed "2008 well" – is also utilized as a backup by MBCSD in Frank Valley to draw underflow from the Redwood Creek. The 2008 well is located within 100 feet of the 2002 well and is also drilled to approximately 60 feet in depth. The 2008 well is used when the 2002 well is shut down for maintenance or repair. The rated capacity of the pump affixed to the 2008 well is 40 gallons per minute and translates to a potential maximum daily yield of 57,600 gallons or 0.18 acre-feet; a stand-alone amount that exceeds the daily 45,000-gallon permit threshold by over one-fourth.<sup>3</sup>

MBCSD provides chlorine disinfectant treatment of the raw water extracted from either of its two well sites in Frank Valley through metered injection of liquid chlorine into its water main at a point housed in a small service building referred to as the "Muir Beach Pump House." MBCSD recently supplemented its chemical treatment process to now inject soluble silica at the wellhead, and prior to injection of chlorine, to militate against the effects of copper plumbing in residents' homes. The well pumps and treatment processes run nightly to replace daytime usage based on storage levels with MBCSD's initial pressure zone serving Seacape. The daily treatment capacity at the Muir Beach Pump House when both wells are in use is 100 gallons a minute and if run continuously results in a daily maximum total of 144,000 gallons or 0.44 acre-feet. This daily capacity exceeds the daily accessible yield available to MBCSD of 0.14 acre-feet. It also accommodates MBCSD's current peak-day demand of 0.12 acre-feet. (Note that both wells never run simultaneously).<sup>3</sup>

## Distribution

MBCSD's distribution system consists of approximately 2.5 miles of mains and overlays with two connected pressures zones termed "upper" and "lower" that jointly cover a 500 ft range in elevation between service connections.<sup>3</sup> The distribution system relies on gravity pressure for recharge from two MBCSD storage tanks that collectively hold 300,000 gallons or 0.93 acre-feet; an amount equaling 12.5 times the average day demand of 24,000. All water is pumped nightly from MBCSD's well site - which is required by the water diversion permit and takes advantage of off-peak electricity rates - that then runs through treatment and into the Lower Tank which in turn pumps to the Upper Tank to restore supplies from the previous day. There are no public pump stations connected to the distribution system. There are four residences located near the top of the water system with private pressure booster systems.

## System Capacity

MBCSD directly provides retail domestic water services through its own supply, treatment, storage, and distribution facilities. MBCSD does not need to purchase or store additional water to meet any of its current or higher usage levels.

MBCSD's plumbing and control systems preclude operation of both the 2002 and 2008 wells at the same time. The 2002 well is the main source and the 2008 well is the backup well. The second well cannot be attributed to higher usage as it cannot operate at the same time as the main well.

Existing treatment supplies adequately meet MBCSD's current peak-day demands and presently account for only 27.5% of available capacity. There is only one treatment facility which treats total water volume as it is being pumped from the well, so the cost of treatment is equal across all water usage levels with plenty of excess capacity.

All water testing is performed monthly for the entire system at the well site for both wells, along with one treated site deep within the distribution system. Testing costs apply the same to all usage levels.

Water supplies under normal conditions operate with excess available capacity relative to demand given that existing annual usage equals only 53.2% of the District's accessible and established sources. The MBCSD does not buy any additional water supplies to meet the demands of higher volume users.

MBCSD serves 160 active water service connections. It has 156 billing customers which are divided between 155 residential users and one commercial use at The Pelican Inn. There is currently only one set of water service rates for both residential and commercial customers.

Water from the upper zone can also serve the lower zone through three pressure reducing stations. This in effect, makes the cost of pumping water equal for both the upper and lower zones if both zones are served by the Upper tank. This also allows all water pumped to the Upper tank to be equally available to all customers if needed. The District serves 50% of its customers in the lower zone from the Lower tank thus saving the additional pumping costs to the Upper zone for customers served from the Lower tank. Although, all zones can be served by the Upper tank, the upper zone cannot be served by the Lower tank making the upper zone dependent on the additional pumping charges to the Upper tank which could be considered an elevation cost.

The electricity cost for pumping from the wells to the lower tank is about 2/3 of the total pumping cost and from the lower tank to the upper tank about 1/3 of the total electricity cost. The ability to serve all customers from the upper tank equally makes every gallon of excess storage capacity above the upper zone usage levels include 100% of pumping costs.

Existing storage supplies adequately meet current peak-day demand with the present high-day usage equaling 8.8% of the available capacity. No additional storage is needed to meet peak day demand of higher users during a normal pumping cycle, which can be made available to all users, but the high demand users increase the need for the 300,000-gallon storage capacity to meet continuous high-day demand if it out paces pumping capacity.

MBCSD's surplus storage capacity is critical to allow the District to mitigate its existing and projected supply deficits during peak demand usage in drought conditions. The existing storage capacity, notably, allows MBCSD to accommodate up to eight consecutive days of current peak day demands.

## Consumption and Usage

A summary of the last 12 months shows the highest usage to be 1,774,737 gallons for the bi-monthly billing period from May 17 – July 16, 2018, and the lowest usage being 1,095,031 gallons for the billing period Nov 17 – Jan 16, 2019, with the average usage of 1,430,246 gallons occurring in the billing period from Mar 17 – May 16, 2018.<sup>4</sup> The average annual usage per resident over the last 12 months billing periods is 32,803 gallons per person and the average daily per person use based on a population of 248 is 90 gallons per day.<sup>5</sup> *See Table 1: Worksheet Item 1) Most Current Bi-monthly Billings past 12 months.*

A summary of the total average consumption over the past three years (2016,2017, and 2018) equals 8,604,004 gallons annually or an average of 1,434,001 gallons per bi-monthly billing period. The average residential usage was 89% of total usage with commercial usage around 11% of total average usage. Average annual usage per resident was 31,021 gallons. Average daily use was 85 gallons per person. Average service fees paid by residential users was 87% of total fees paid and the commercial user paid 13% of total fees paid. *See Table 1 below: Worksheet Item 2) Past may billings.*

Table 1

MBCSD Water Consumption Worksheet							
1) Most Current Bi-monthly Billings past 12 months:							
Billing Date	Gals - Res	Gals - Com	Total Gals R+C	Avg. Res Use	Total Res Fees	Total Com Fees	Total Serv Fee
3/16/2018	1,237,684	77,568	1,315,252	7,985	\$14,781.89	\$1,129.11	\$15,911.00
5/16/2018	1,313,932	116,314	1,430,246	8,477	\$15,670.13	\$1,756.81	\$17,426.94
7/16/2018	1,619,976	154,761	1,774,737	10,451	\$19,368.83	\$2,379.65	\$21,748.48
9/16/2018	1,499,982	153,116	1,653,098	9,677	\$17,793.98	\$2,353.00	\$20,146.98
11/16/2018	1,473,121	132,620	1,605,741	9,504	\$17,213.49	\$2,020.96	\$19,234.45
1/16/2019	990,535	104,496	1,095,031	6,391	\$12,177.76	\$1,565.36	\$13,743.12
Total 12 mths	8,135,230	738,875	8,874,105		\$97,006.08	\$11,204.89	\$108,210.97
Avg. 12 mths	1,355,872	123,146	1,479,018	8,748	\$16,167.68	\$1,867.48	\$18,035.16
Avg % Total Users							
Avg p/user/p/yr	32,803						
Avg p/user/p/day	90						
2) Past May billings							
5/16/2016	1,390,011	188,272	1,578,283	8,968	\$17,304.40	\$2,922.53	\$20,226.93
5/16/2017	1,142,699	150,774	1,293,473	7,372	\$13,773.98	\$2,315.06	\$16,089.04
5/16/2018	1,313,932	116,314	1,430,246	8,477	\$15,670.13	\$1,756.81	\$17,426.94
Annual Avg. - 3 yrs	1,282,214	151,787	1,434,001	8,272	\$15,582.84	\$2,331.47	\$17,914.30
Avg % Total Users	89%	11%	100%		87%	13%	100%
Avg p/user/p/yr	31,021						
Avg p/user/p/day	85						
Note 1: the month of May seems to be most typical of average billing month							
Note 2: all averages were straight calculations not using statistical sampling or pulling out the outliers							
Note 3: 2019 US data has MB population at 248 persons (down 20% from a population of 310 in 2010)							

Tier 1 (base rate) includes 100% of all water users who consume water in the base rate before moving into higher tiers as their use increases. Currently those water users that use only the base rate (not consuming more than 4,500 gallons) remains constant as an average of 29% of users or 45 users.

Tier 2 (or currently those users using more than the base allotment of 4,500 gallons but less than 10,000 gallons per bi-monthly billing period) contains the majority of water users averaging between 40% - 47% of total water users. The variance in the individual numbers appears to be seasonal.

Tier 3 (users consuming between 10,001 – 30,000 gallons) has the most variability as to both the percentage of users and overall number of individual users per bi-monthly billing period. This seems to be strongly affected by two causal factors that contribute to this large variance. The first is that Tier 3 has the largest bracket of water allotment spanning from 10,001 to 30,000 gallons or 20,000 gallons per bi-monthly billing period (the bracket for Tier 1 is 4,500 gallons and Tier 2 includes approximately 5,500 gallons). The second factor is that most water users reaching the Tier 3 level are using it for landscaping (verses basic needs such as drinking, bathing, laundry, etc.) such that this type of water usage is much more susceptible to seasonal changes in rain, gardening, drought, and potential leaks.

Tier 4 has the smallest percentage of water users averaging between 2% - 3% of total connections and fluctuating between 2 – 9 individual connections. The minimal number of users that continually fall into the highest usage category is the one commercial enterprise and one residential customer with extensive irrigation usage. In the dryer summer months, the inclusion of additional high-water users is assumed to be due to increased landscaping use. *See Table 2 below: Water Users by Tier*

*Table 2*

<b>Water Users by Tier - 1/17/2018 -1/16/2019</b>					
<b>Billing Date</b>	<b>T1</b>	<b>T2</b>	<b>T3</b>	<b>T4</b>	<b>Total</b>
3/16/2018	49	66	37	4	156
5/16/2018	45	64	44	3	156
7/16/2018	40	55	52	9	156
9/16/2018	43	58	49	6	156
11/16/2018	42	58	50	6	156
1/16/2019	60	70	24	2	156
					156
Avg. 12 months	46	62	43	5	156
Avg % Total Users	29%	40%	28%	3%	100%
<b>Water Users by Tier - May 2016, 2017, and 2018</b>					
<b>Billing Date</b>					
5/16/2016	45	75	29	6	155
5/16/2017	45	82	27	2	156
5/16/2018	45	64	44	3	156
Annual Avg. - 3 years	45	74	33	4	156
Avg % Total Users	29%	47%	21%	2%	100%

The percentage of water usage does not necessarily correlate to the amount of fees collected at each usage level under the current tiered rate system. The chart below shows the amount of water usage and fees collected during the May 16<sup>th</sup> billing period for years 2016, 2017, and 2018. The May 16<sup>th</sup> billing period is being used, as it has demonstrated to be the most normalized month for both water usage and fees collected over a complete 12-month billing cycle. Based on this analysis, Tier 1 (only) has 29% of the users, consuming 7% of the water usage, and contributing 13% of the service fees. Tier 2 has 47% of the users, consuming 35% of the water usage, and provides 30% of the service fees. Tier 3 has 21% of the users, consuming 33% of the water usage, and provides 28% of the service fees. Lastly, Tier 4 (including the one commercial enterprise) has an average of 2% of the users, consuming 25% of the water usage, and provides 29% of the service fees. *See Table 3 below: Worksheet Item 3) Usage and Fees per Tier - May 2016, 2017, and 2018*

*Table 3*

3) Usage and Fees per Tier May of 2016, 2017, and 2018									
	Gallons-Res	Gallons-Com	Total Gallons	Total Fees	T1	T2	T3	T4	Total
<b>5/16/2016</b>			1,578,283	\$20,226.93	45	75	29	6	155
Tot Avg gal p/con									10,182
Gallons p/ Tier					108,242	514,860	387,367	567,814	1,578,283
Avg Gals p/ Tier					2,405	6,865	13,357	94,636	
Fees p/ Tier					\$2,246.40	\$5,375.51	\$4,171.02	\$8,434.00	\$20,226.93
Avg fee p/Tier					\$49.92	\$71.67	\$143.83	\$1,405.67	
Avg % of usage					7%	33%	25%	36%	100%
Avg % of fees					11%	27%	21%	42%	100%
					<b>T1</b>	<b>T2</b>	<b>T3</b>	<b>T4</b>	<b>Total</b>
<b>5/16/2017</b>	1,185,570	107,903	1,293,473	\$16,089.04	45	82	27	2	156
Tot Avg gal p/con									8,291
Gallons p/ Tier					95,269	563,932	392,564	241,708	1,293,473
Avg Gals p/ Tier					2,117	6,877	14,539	120,854	
Fees p/ Tier					\$2,246.40	\$5,886.81	\$4,295.12	\$3,660.71	\$16,089.04
Avg fee p/Tier					\$49.92	\$71.79	\$159.08	\$1,830.35	
Avg % of usage					7%	44%	30%	19%	100%
Avg % of fees					14%	37%	27%	23%	100%
					<b>T1</b>	<b>T2</b>	<b>T3</b>	<b>T4</b>	<b>Total</b>
<b>5/16/2018</b>	1,313,932	116,314	1,430,246	\$17,426.95	45	64	44	3	156
Tot Avg gal p/con									9,168
Gallons p/ Tier					106,458	443,168	627,990	252,630	1,430,246
Avg Gals p/ Tier					2,366	6,925	14,273	84,210	
Fees p/ Tier					\$2,246.40	\$4,622.43	\$6,847.95	\$3,710.17	\$17,426.95
Avg fee p/Tier					\$49.92	\$72.23	\$155.64	\$1,236.72	
Avg % of usage					7%	31%	44%	18%	100%
Avg % of fees					13%	27%	39%	21%	100%
Total Avg Gals bi-m			1,434,001						
Total Avg Fees bi-m				\$17,914.31					
Tot Avg Users p/tier					45	74	33	4	156
Tot Avg % of users					29%	47%	21%	2%	100%
Tot Avg % of usage					7%	35%	33%	25%	100%
Tot Avg % of fees					13%	30%	28%	29%	100%

The above analysis uses the current volumetric water service rate based on the bi-monthly meter readings for water usage. These service fees include a 25% surcharge, that is imbedded in the water rate fee structure, but does not include any calculation for the separate per parcel annual set Water Capital Improvement fee.

## Water Service Rates and Fees

Current water service fees are based on a four-tier water rate structure that was approved by the MBCSD Board of Directors back in 2010. The water service fee includes a 25% surcharge for water capital improvements and there is an additional annual water capital improvement fee of \$300 per residential connection and \$3,250 per commercial connection, as well as a \$6,500 new connection fee.

*See Table 4 below: Current rate chart*

*Table 4*

### Current MBCSD District Bi-monthly water rates:<sup>6</sup>

Tiers	Gallons	Charge
<b>Tier One</b>	0 to 4,500	\$ 49.92 Flat charge
<b>Tier Two</b>	4,500 to 10,000	\$ 0.92 per 100 gallons used, plus charge from prior tier
<b>Tier Three</b>	10,000 to 30,000	\$ 1.29 per 100 gallons used, plus charge from prior tier
<b>Tier Four</b>	30,000+	\$ 1.62 per 100 gallons used, plus charge from prior tier

#### Note

1. Rates **include** an assigned 25% surcharge by the District to be reserved for capital improvements at the direction of the Board of Directors.
2. Charges are calculated per gallon; rates are shown per 100 gallons for clarity only.

The District's customers pay water bills based on a bi-monthly fixed service charge (Base Rate) for a fixed amount of usage per gallon and then a volumetric charge for amounts consumed above the Base Rate in three successive rate tiers based on usage as shown in Table 4. The District is required by its Water Diversion Permit to have tiered rates. The permit does not specify the number of tiers to be used, but the basis for the requirement is that there should be an incremental increase in the cost for water service as a given connection's water use increases, thus encouraging conservation.

#### *PERMIT FOR DIVERSION AND USE OF WATER - PERMIT 21085*

*A) Water Conservation Plan – A water conservation plan shall be developed by the District taking into consideration the flow and the condition of the fishery resources in Redwood Creek and the minimum instream flows (i.e., flow "thresholds") that will trigger appropriate water conservation measures by the District. The water conservation plan shall include the following elements:*

##### *1. Tiered rate structures<sup>7</sup>*

The challenge to the District is to both meet its permit requirements at the same time meeting the requirements of Prop 218 which specifically states that:

*(1) revenues derived from the fee must not exceed the funds required to provide the property related service; (2) the amount of a fee imposed upon any parcel or person as an incident of property ownership must not exceed the proportional cost of the service attributable to the parcel; (3) the fee may not be imposed for a service, unless the service is actually used by, or immediately available to, the owner of the property subject to the fee. A fee based on potential or future use of a service is not permitted and stand-by charges must be classified as assessments subject to the ballot protest and proportionality requirements for assessments.*

The District's water rates should be reviewed and evaluated on an annual basis, even if the District were to decide to budget out multiple years ahead, to determine if adequate revenues are being collected to pay for routine operations and maintenance costs and to provide funds for capital improvements. All revenues derived from the water services fees are used for operational costs associated with providing water service and are tracked separately from the General funds in the Annual budget<sup>8</sup>. *See Table 5 below: Water Department Operations Budget FY18/19*

Table 5

Water Department						
Water Revenue	Category		Jul2016-Jun2017		Jul2017-May2018	
			FY16/17 Budget	FY16/17 Actual	FY17/18 Budget	FY17/18 Actual
	Water Service Revenue	fv	77,000	89,718	80,000	88,266
	Water Service Revenue (Misc)	V	-	11,519	800	900
	Cap Impr Fee	F	50,000	50,350	50,000	26,888
	Cap Impr (25% of Service)	V	19,000	22,385	19,760	22,552
	Donations for Water	V	-	-		11,000
	Grants for Water	V	-	-		-
	<b>Water Revenue incl Cap Imp:</b>	fv	<b>146,000</b>	<b>173,972</b>	<b>150,560</b>	<b>149,606</b>
	Move Cap Impr to Reserves:	F	(50,000)	(50,350)	(50,000)	(26,888)
	Move 25% CPI Service to Reserves:	V	(19,000)	(22,385)	(19,760)	(22,552)
	Move Service Revenue (Misc) NPS					(23,193)
	<b>Water Cap Impr+ 25% CPI Revenues:</b>				<b>(69,760)</b>	<b>(49,440)</b>
	<b>Water Operations Revenue:</b>		<b>77,000</b>	<b>101,237</b>	<b>80,800</b>	<b>100,166</b>
	<b>Water Cap Impr Reserves:</b>				<b>69,760</b>	<b>49,440</b>
						<b>72,850</b>
Water Expense	Category		FY16/17 Budget		FY17/18 Budget	
			FY16/17 Actual	FY17/18 Actual	FY18/19 Budget	FY18/19 Actual
	<b>Gen Exp (Water 20% Specific*):</b>	F	79,712	69,522	44,390	35,673
	<b>Gen Exp (WCI 20% Specific*):</b>				44,390	35,674
	<b>Gen Exp (40% Specific*) Sub-Total:</b>		<b>79,712</b>	<b>69,522</b>	<b>88,780</b>	<b>71,347</b>
	<b>Dedicated Expenses:</b>					
	Bank Credit Card Fees (Customer)	V	3,400	3,284	3,300	3,729
	Bookkeeping (Water)	V	3,500	3,919	3,500	4,420
	Dues & Memberships (Water)	F	1,350	-	1,340	402
	Insurance (Water-G Liab+ % Umb)	F		-	6,000	-
	Health Insurance (WM)	F	2,500	2,553	-	-
	Legal Fees (Water)	V	8,000	15,836	2,000	1,425
	Payroll (Compromise - WM)	F	-	-	6,000	6,000
	Other Operating (Water)	V	-	7,464	4,000	290
	Water Management (Team)+WC	F	30,000	30,705	35,500	29,838
	Payroll Employer Taxes (Water)	F	2,500	2,266	-	-
	Permits & Fees (Water)	F	160	2,323	2,500	2,237
	Repairs & Maintenance (Water)	V	20,000	54,807	25,000	10,867
	Supplies (Water)	V	-	-	-	-
	Testing (Water)	V	2,300	5,316	5,000	1,955
	Treatment (Water)	V	8,000	8,433	6,000	596
	Vehicle Expense (WM)	F	1,900	1,350	-	-
	Utilities: Elec (Water)	V	8,000	8,917	10,000	9,315
	Utilities: Tel (Ooma)	F	875	1,052	-	-
	<b>Dedicated Expense Sub-Total:</b>		<b>92,485</b>	<b>148,225</b>	<b>110,140</b>	<b>71,074</b>
	<b>Water Operations Expense Total:</b>		<b>172,197</b>	<b>217,747</b>	<b>154,530</b>	<b>106,747</b>
	<b>Water Ops Balance (Prior to Unassigned Revenue):</b>		<b>(95,197)</b>	<b>(116,510)</b>	<b>(73,730)</b>	<b>(6,581)</b>
	<b>Water Capital Improvement (Balance to Reserves):</b>				<b>25,370</b>	<b>13,766</b>
<b>Notes:</b>	* \$23,193 included in Water Service Revenue (Misc) is for reimbursement of loan to NPS for Contact Tank installation - project costs are expected to be paid in June of 2018.					

The current FY2018/19 Budget estimated revenues for FY18/19 are projected to fall short of current costs by \$30,440 or by approximately 25%. The most recent MBCSD March 31, 2019 Budget vs. Actual shows that the District's Water Operations are tracking on target so that the current projected loss will likely be realized by the end of FY18/19 but shouldn't be greater than projected.



## Cost of Water Service

The District's water operation has two classification of costs: 1) Dedicated Water and 2) Allocated General. The Dedicated water costs, meaning costs strictly generated within the Water department, are divided up into two categories: 1) Fixed – a cost that exists whether one gallon of water is produced, and 2) Variable – a cost generated when a gallon of water is produced and thus fluctuates with the volume of production. The allocated expenses from General are administrative costs, needed to cover the full cost of management and administrative services that are performed by the District on behalf of the water operations, but are paid for by the General fund until allocated to the water operations. The percentage of allocation is based upon the estimated amount of the District Manager's time spent administering the water department. Currently the Water Department's allocation has been 40% of nine Board approved administrative costs, split between 20% Water Operations and 20% administering Water Capital Improvements. *See Table 6 below: Water Operation Expenses – Full Cost Breakout of Fixed, Variable, and Total Costs based on FY18/19 Budget*

Table 6

Water Operation Expenses - Full Cost Breakout of Fixed, Variable, and Total Costs					Total Annual	Comments
Expenses						
			p/cust/ p/yr	p/cust p/bm		
Fixed:						
Dedicated	\$56,530.00					based on current FY18/19 budget
Allocated Gen	\$41,080.00					20% Ops + 20% WCI =40% (FY18/19)
Depreciation	\$35,385.00					5 yr avg -incls LT liner + Sunset pipeline FY19/20
Water Due to Gen	\$2,300.00					\$2300 for 20 years(Due to Gen \$45,708)
Total Fixed:		\$135,295.00	\$867.28	\$144.55	\$135,295.00	
Variable:						
Repairs & Maint	\$25,000.00					
Utilities	\$10,200.00					
Treatment	\$5,000.00					
Water Manage Xt	\$3,570.00					extra hours usually due to repairs
Total Variable:		\$43,770.00			\$43,770.00	
			p/ gallon	p/100 gals		
Total Exp:		\$179,065.00			\$179,065.00	estimated for FY19/20
Cost p/gal - Variable			0.005087166	0.508716639	8,604,004	total avg. annual gals delivered (3yrs)
Cost p/gal - Total Exp			0.02081	2.081182203	0.0208118	cost p/gallon to breakeven for Ops
Previous	T1	T2	T3	T4		
1 Previous bi-monthly	\$49.92	\$71.67	\$196.17	\$1,405.67		
1 Prev Annual +WCI	\$599.52	\$730.02	\$1,477.02	\$8,734.02		
156 Total Prev Revenue	\$26,978.40	\$54,021.48	\$48,741.66	\$38,186.08	\$167,927.62	
156 Total Expenses					\$179,065.00	

To better understand how to determine the District's full (true) cost of service under Prop 218, we need to look at the differences between expenses and how they can be distributed to water rates and revenues.

**Fixed Costs:** All fixed costs are equally attributable to all water users and are based on the assumption that all water users benefit equally from a set of stationary system costs that are necessary to have the water immediately available to all users before even one gallon of water is produced or distributed. Even though a cost is fixed, that does not mean it will not change over time due to increased operating costs usually due to inflation. Included in *Table 6 below: Water Operation Expenses – Full Cost Breakout of Fixed, Variable, and Total Costs* are some fixed costs that have not previously been included in the District's Water Operations budget, but should be, to fully expense the true costs that exist in the current water department. Among these costs are the depreciation expense (estimated on a 5-year average for FY19/20 – the next budget to include the depreciation expense) and the debt owed from the Water Fund to the General Fund (which is currently in an account "Due to General") for expenses that

were paid by the General Fund for Water department costs. These costs are important to capture in the full cost of the system because they represent infrastructure costs not previously fully accounted for in the true cost of service. The District has never assigned a maturity date for this loan and there has never been any interest required, so for this study, we are recommending a 20-year payback period with no interest so as not to create any additional burden on any future water rate increase proposal.

**Variable Costs:** Conversely, the variable costs include just those items generated by the production of water and do not pass along to the customer until the water is delivered, so the cost becomes relative to the amount of usage. For the MBCSD water department, the variable costs represent only about 23% of the total costs at current usage levels while fixed costs represent about 77%. This is mainly because the District has a very small population (156 customers) which is comparatively small to most water districts and thus has fewer users to spread the overall infrastructure costs necessary to supply, distribute, and manage a water district. The MBCSD District has way more excess capacity than current users and has no way to expand or create new customers being surrounded by non-developable NPS park lands.

So, in determining the cost of service, both variable costs and many of the fixed costs can be allocated to the customer on a per gallon basis depending on use. There are several alternative methods to develop a system of water rates within the Prop 218 requirements that employ various cost distribution methods. The limitation for the MBCSD is that having a small scope of service puts restrictions on how many variable tiers can be created to spread the fixed costs and to incentivize conservation. Some methods can favor either the higher-end users or lower-end water users and create inequities in distribution of costs versus usage. The challenge for the District will be to find the most equitable system for allocating the true cost of service while maintaining some measure of conservation incentives built into the pricing structure.

**Depreciation Expense:** Currently the water operations budget does not include any depreciation expense or debt payment for the amount owed by the Water Fund to the General fund. The lack of depreciation expense in the budgeting process has been partially the result of not having the current depreciation numbers readily available, due to the lack of the most recent year's current public audit, and also, that the Water Capital Improvement (WCI) fee was intended to supplement any accumulated depreciation reserves that would normally be generated directly by a depreciation expense which is based on the useful-life of current equipment as it ages towards replacement. This WCI is a dedicated fund to be able to both maintain capital equipment and replace aging infrastructure. The fee originally was a Water Capital Improvement Tax, voted for in 2005 by a 2/3 majority of the District's voters, but then was adopted as a fee into the 2010 Water Rates Ordinance. The fee currently generates annual restricted revenues of \$50,350. The WCI along with the current 25% water service fee surcharge, together generate approximately \$72,850 annually. The WCI and 25% surcharge currently more than doubles what the most recent audited 2016 water depreciation expense of \$33,311 could generate towards future capital replacement. Depreciation expense of \$33,311 is projected to be approximately just under the average based on the most current 5 years with the inclusion of a projected depreciation expense of approximately \$43,678 for FY19/20. The depreciation expense for FY19/20 is projected to increase with the addition of \$3,700 for the Lower Tank liner and \$6,667 for the new Sunset Way waterline replacement, but being that the depreciation expense is always a fluctuating number – as new equipment is added and used equipment is deleted – it is best to use the most recent projected 5 year average of \$35,384 to capture a more accurate estimate for water rate calculations. Also, due to the fluctuating nature of the depreciation expense, along with it being based on historical costs, it is not likely that the District could depend solely on the accumulated depreciation for future purchases given inflationary cost factors. *See Table 7 below: MBCSD Depreciation Expense: FY 15/16 – FY19/20*

Table 7

MBCSD Depreciation Expense: FY 15/16 - FY 19/20 - 5 Years						
	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	5-Yr Avg.
	Audited	Non-audit	Non-audit	Non-audit	Non-audit	
<b>Depreciation Expense</b>	\$ 33,311	\$ 33,311	\$ 33,311	\$ 33,311	\$ 43,678	\$35,384.40

**Capital Improvement Project Costs:** Another component of the water system costs is infrastructure related. These costs can be incorporated into the operating budget or planned for separately through fees or taxes. But no matter how the costs are incorporated into the financial planning, they must be accounted for in the full costing of the water service. Capital improvement costs can be similar to a fixed cost, but usually are asset specific and may include the before mentioned depreciation expense, infrastructure debt, or short-term reserves for more specific capital improvement purposes. This can also be considered a “capacity” cost for the necessary infrastructure that allows water to be immediately available for use. According to the District’s 20-Year Plan for Water System Capital Improvements 1997-2016, a major portion of the Lower Zone water lines and infrastructure are currently passed their useful life and will need replacing within 1-5 years. This project is planned for summer 2019, and will completely deplete current WCI reserves, so the District will need to consider how to replace those reserves for future infrastructure projects. The Lower Water Tank will need replacement in 10 years according to the 2018 Water System Review by MOE Engineering<sup>9</sup>, paid for by a grant from the County of Marin, but for capital planning purposes in a damp coastal environment, that life-expectancy could realize. *See excerpt below from MOE Engineering 2018 Water System Review*

*“o The Redwood Lower Tank should be considered for replacement at the expiration of its new liner (in 10-15 years) or as funds become available because of its seismic vulnerability. In 2018 dollars, the replacement cost is estimated at \$250,000.”<sup>9</sup>*

The approximate future cost of the Lower Tank replacement is currently estimated at closer to \$400,000 with inflation in 10-years. Because Prop 218 requires current infrastructure planning to be within 5 years, this could be incrementally divided into 2 five-year phases of \$200,000 which would require \$40,000 p/year to be saved in a Lower Water tank Reserve Fund. The next major piping infrastructure project due for replacement within the required 2 – 5 years, according to the related 2018 Piping Inventory Sheet from the same MOE Water system Review, is 1300 ft. of piping on Charlotte’s Way.<sup>10</sup>

*See Table 8 below: excerpt from MBCSD Piping Asset Inventory*

Table 8

Muir Beach Community Service District Piping Asset Inventory											
	Function	Size	Type	Zone & Location	install	length, ft	Miles	percent of system	Estimated Life	Remaining Life	Replacement Cost
1	Trans	4	CICL	Corrected for replacement - Net	1965	5250	1.0	23%	75	22.00	\$ 1,312,500
7	Distr	4	PVC	High - Seascape Subdivision Charlotte's Way	1970	1300	0.2	6%	50	2.00	\$ 325,000
8	Distr	4	PVC 900	High - Seascape Subdivision Starbuck Extension	1993	270	0.1	1%	100	75.00	\$ 67,500
9	Distr	4	PVC	Low - Bello Beach Subdivision Corrected for replacement - Net	1971	6800	1.3	29%	50	3.00	\$ 1,700,000

The report estimates a cost of \$325,000 but based on the current realized work estimate for the Sunset Way waterline project which came in at 15% of the projected estimate, I would recommend budgeting to save \$32,250 over 5-years in a Pipe & Equipment Reserve, which would be \$8,450 annually.

Additionally the main CICL Transmission line is not due for replacement for another 22 years, but there are sections that will need to be replaced sooner that lie between Redwood creek and Frank Valley Road that will need to be replaced sooner do to location and vulnerability. This project could be reasonably expect to done within the next 5 years so an additional \$89,250 should be scheduled to be accumulated over the next five years at \$17,850 annually in Pipe and Equipment Reserves. *See Table 9 below: Capital Improvement Projects FY19/20 – FY23/24*

Table 9

Capital Improvement Projects FY19/20 - FY23/24 - 5 years										
Project	Cost	Years	Annual CIP	FY 19/20	FY 20/21	FY 21/22	FY 22/23	FY 23/24	Reserves LT Reserves	Reserves Pipe & Equip
LT Replacement - Phase 1	\$ 200,000	5	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 200,000	
Char Way pipeline - Ph 1	\$ 42,250	5	\$ 8,450	\$ 8,450	\$ 8,450	\$ 8,450	\$ 8,450	\$ 8,450		\$ 42,250
FVR Trans line - Phase 1	\$ 89,250	5	\$ 17,850	\$ 17,850	\$ 17,850	\$ 17,850	\$ 17,850	\$ 17,850		\$ 89,250
Total Annual Reserves			\$ 66,300	\$ 66,300	\$ 66,300	\$ 66,300	\$ 66,300	\$ 66,300		\$ 331,500

**Water Capital Improvement Fees:** Under Prop 218, the District's current WCI fee will no longer be legally allowable to be incorporated into any new water rate ordinance as a savings mechanism without being based on a debt payment or line-item project calculation. The District will either need to incorporate the infrastructure and Capital Improvement costs through a set of reserves and capacity charges or as a Special tax by a 2/3 voter approved ballot measure. A Special Tax can allow for quite a bit of 'flexibility' in designing the requirements of a Water Capital Improvement tax (amount, purpose, sliding scale fees, etc.) because it requires approval by 2/3 of the voters (which is a high bar to achieve), but at the same time it is 'inflexible' as the District would have to go back to the voters and go through the ballot measure process each time the District needs to make any changes. (November 2019 is the next general election in which a ballot measure can be submitted as of the writing of this study.) Using the two CIP Reserves as outlined above, this would increase CIP over WCI funds by 12% and meet Prop 218 requirements. *See Table 10 below: Projected CIP Reserves FY19/20 – FY23/24*

Table 10

Projected CIP Reserves FY19/20 - FY23/24 - 5 years										
Project	Cost	Years	Annual CIP	FY 19/20	FY 20/21	FY 21/22	FY 22/23	FY 23/24	Reserves LT Reserves	Reserves Pipe & Equip
LT Replacement - Phase 1	\$ 200,000	5	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 200,000	
Charlotte's Way pipeline	\$ 42,250	5	\$ 8,450	\$ 8,450	\$ 8,450	\$ 8,450	\$ 8,450	\$ 8,450		\$ 42,250
FVR Trans line - Phase 1	\$ 89,250	5	\$ 17,850	\$ 17,850	\$ 17,850	\$ 17,850	\$ 17,850	\$ 17,850		\$ 89,250
Depreciation Expense										
Total Annual CIP Reserves			\$ 66,300	\$ 66,300	\$ 66,300	\$ 66,300	\$ 66,300	\$ 66,300		
Total CIP Reserves - 5Yrs									\$ 200,000	\$ 131,500
Total LT + P&E Reserves										\$ 331,500
Current WCI Fee			\$ 49,750	\$ 49,750	\$ 49,750	\$ 49,750	\$ 49,750	\$ 49,750		\$ 248,750
Change	Change		\$ 16,550							\$ 82,750
Percentage increase			33%							33%

## Water Rate Structures under Prop 218

The following are examples of water rate pricing structures all conform to Prop 218 requirements and will be based on the current FY 2019/20 Draft-Budget. *See Table 11 below: Water Department Operations Budget FY19/20*

Table 11

Water Department			Jul2017-June2018		Jul2018-Apr2019	
Water Revenue	Category	FY17/18 Budget	FY17/18 Actual	FY18/19 Budget	FY18/19 Actual	FY19/20 Budget
	Water Service Fee Revenue	fv 80,000	88,266	90,000	69,592	187,900
	Water Conservation Discount					(57,000)
	Meter Reading Fee + Bookkpg	F				7,400
	Water Service Revenue (Misc)	V 800	900	23,593	355	300
	Water Service Fee Net Revenue					138,600
	Water Cap Impr (Meter Charge)	F 50,000	50,296	50,350	26,658	68,000
	Cap Impr (25% of Service)	19,760	22,552	22,500	17,286	
	Interest Income	V			1,478	
	Grants/Donations for Water	V	11,000	-	8,850	-
	<b>Water Revenue incl Cap Imp:</b>	fv 150,560	173,014	186,443	124,219	206,600
	Move Cap Impr to Reserves:	F (50,000)	(50,296)	(50,350)	(26,658)	(68,000)
	Move 25% CPI Service to Reserves:	V (19,760)	(22,552)	(22,500)	(17,286)	
	Move Service Revenue (Misc) NPS			(23,193)		
	<b>Water Cap Impr+ 25% CPI Reveues:</b>	(69,760)	(72,848)	(96,043)	(43,944)	(68,000)
	<b>Water Operations Revenue:</b>	80,800	100,166	90,400	80,275	138,600
	<b>Water Cap Impr Reserves:</b>	69,760	72,848	72,850	43,944	68,000
Water Expense	Category	FY17/18 Budget	FY17/18 Actual	FY18/19 Budget	FY18/19 Actual	FY19/20 Budget
	<b>Gen Exp (Water 20% Specific*):</b>	F 44,390	29,618	20,540	16,337	-
	<b>Gen Exp (WCI 20% Specific*):</b>	44,390	29,618	20,540	16,337	-
	<b>Gen Exp (40% Specific*) Sub-Total:</b>	88,780	59,235	41,080	32,674	44,440
	<b>Dedicated Expenses:</b>					
	Bank Credit Card Fees (Customer)	V 3,300	3,730	4,400	3,289	4,400
	Bookkeeping (Water)	V 3,500	4,505	5,000	3,188	5,000
	Depreciation Expense					-
	Debt (Due to GF-20 years/no int)					2,600
	Dues & Memberships (Water)	F 1,340	402	1,360		400
	Grant Spending	V			8,850	
	Insurance (Water-G Liab+ % Umb)	F 6,000	-	2,000	2,002	2,000
	Legal Fees (Water)	V 2,000	1,425	2,000	2,263	2,000
	Other Operating (Water)	V 4,000	290	1,000	277	410
	Payroll (Water Sub-Contractors)	V		2,780	2,780	-
	Payroll (Compromise - WM)	F 6,000	6,000	6,000	5,000	5,000
	Payroll (Other Water Salaries)	F		2,500	960	500
	Water Management (Team)+WC	F 35,500	32,443	30,370	22,247	32,340
	Payroll Employer Taxes (Water)	F -	-	2,450	1,660	2,300
	Permits & Fees (Water)	F 2,500	2,237	1,360	966	1,360
	Repairs & Maintenance (Water)	V 25,000	13,564	25,000	3,888	15,000
	Supplies (Water)	V -	-	-	-	-
	Testing (Water) Full panel year	V 5,000	2,053	2,000	2,313	3,600
	Treatment (Water)	V 6,000	4,869	5,000	433	5,000
	Utilities: Elec (Water)	V 10,000	10,519	10,200	8,848	11,700
	Utilities: Tel (Ooma)	F -	-	160	36	250
	<b>Dedicated Expense Sub-Total:</b>	110,140	82,037	103,580	69,000	93,860
	<b>Water Operations Expense Total:</b>	154,530	111,655	124,120	85,337	138,300
	<b>Water Conservation Reserve (Beginning Balance):</b>					57,000
	<b>Water Conservation Discount (Balance to Reserve):</b>					\$ (57,000)
	<b>Water Conservation Reserve (Ending Balance):</b>					\$ -
	<b>Water Ops Balance (Unassigned Revenue):</b>	(73,730)	(11,489)	(33,720)	(5,062)	300
	<b>Water Capital Improvement (Balance to Reserves):</b>	25,370	43,230	52,310	27,607	68,000
	<b>Depreciation Expense (Balance to WCI Reserves):</b>					-
	<b>Water Capital Improvement (Reserves):</b>					178,730
	<b>Water Capital Improvement (SWP) Spending:</b>					(213,326)
	<b>Water Capital Improvement (Reserves):</b>					33,404
<b>Notes:</b>	Meter Reading charge \$2400 + Water bookkeeping \$5000 = \$7400					

All the examples include the assumption that the District will include an annual CIP Reserve of \$66,300, whether included in a capacity charge or volumetric fee, which will increase total Capital Improvement revenues by 33%. All examples generate the same revenues but result in varying pricing inequities, when transitioning from the District's current rate structure, and also create varying degrees of water conservation incentives. The Water Department's budget will still include the General allocations based on 40% of nine Board approved administrative costs. *See Table 12 below: Water Operation Expenses – Full Cost Breakout of Fixed, Variable, and Total Costs based on FY19/20 Budget*

Table 12

Water Operation Expenses - Full Cost Breakout of Fixed, Variable, and Total Costs						Total Annual	Comments
Expenses				p/cust/ p/yr	p/cust p/bm		
Fixed:	Dedicated	\$56,060.00					based on draft FY19/20 budget
	Allocated Gen	\$44,440.00					20% Ops + 20% WCI =40% (FY19
	Depreciation					\$ 33,000.00	5 yr avg -incls LT liner + Sunset p
	WF Debt - Due to GF	\$2,600.00					\$2600 for 20 years(Due to Gen \$
	Discount Reserve			\$660.90	\$110.15		Conservation Discount Reserve
	FY20/21 CPI - F	*					
	Total Fixed:		\$103,100.00			\$103,100.00	
Variable:	Repairs & Maint	\$15,000.00 *					
	Utilities	\$11,860.00 *					
	Treatment	\$5,000.00 *					extra hours usually due to repair
	Water Manage Xt	\$3,340.00 *					
	FY20/21 CPI - V	*					
	Total Variable:		\$35,200.00			\$35,200.00	
				p/ gallon	p/100 gals	\$138,300.00	estimated for FY19/20
Total Exp:			\$138,300.00			8,604,004	total avg. annual gals delivered
	Cost p/gal - Variable			\$0.0041	\$ 0.41	0.0160739	cost p/gallon to breakeven for O
	Cost p/gal - Total Exp			\$ 0.0161	\$ 1.61		
Previous		T1	T2	T3	T4		
	1 Previous bi-monthly	\$49.92	\$71.67	\$196.17	\$1,405.67	\$19,646.27	total service fee p/bm
	1 Prev Annual +WCI	\$599.52	\$730.02	\$1,477.02	\$8,734.02	\$117,877.62	total service fee p/yr
	156 Total Prev Revenue	\$26,978.40	\$54,021.48	\$48,741.66	\$38,186.08	\$167,927.62	
	156 Total Expenses					\$49,750.00	previous WCI fee
				\$86,927.74	\$10,211.04	\$108,211.00	annual service fees - last 12 year

**Example 1)** A single payer system (where all the total estimated annual costs both fixed and variable are divided up equally between all users) penalizes the lowest water users, does not provide for any incentive to conserve, and would result in greatly under charging the highest water users on a per gallon basis. *See Table 13*

Table 13

Example 1	Total Estimate Fixed + Variable Expenses in a Single Rate Fee						
		T1	T2	T3	T4	Total	
3 Yr Avg		45	74	33	4	156	
Annual	Total Fix + Var Exp	\$ 59,019.23	\$ 97,053.85	\$ 43,280.77	\$ 5,246.15		
Annual p/c	Single payer	\$1,311.54	\$1,311.54	\$1,311.54	\$1,311.54	\$204,600.00	Ops \$138,300 + Infr \$66,300
Bi-monthly	Installment payment	\$ 218.59	\$ 218.59	\$ 218.59	\$ 218.59	\$1,311.54	
156	Total bi-monthly	\$9,836.54	\$16,175.64	\$7,213.46	\$874.36	\$34,100.00	
156	Total annually	\$59,019.23	\$97,053.85	\$43,280.77	\$5,246.15	\$204,600.00	total operating + infrastructure J
	1 % increase p/c p/yr	119%	80%	-11%	-85%		
156	% increase total p/yr	119%	80%	-11%	-86%		
Previous		T1	T2	T3	T4		
	1 Previous bi-monthly	\$49.92	\$71.67	\$196.17	\$1,405.67		
	1 Prev Annual +WCI	\$599.52	\$730.02	\$1,477.02	\$8,734.02		
156	Total Prev Revenue	\$26,978.40	\$54,021.48	\$48,741.66	\$38,186.08		

**Example 2)** Prop 218 allows for the distribution of costs to be based on the District's storage capacity and its ability to meet its lower service capacity with just the Lower Tank verses the need for the Upper Tank to meet the higher users needs. Based on this division, the Lower Storage Tank has a 100,000-gallon capacity and the Upper storage Tank has a 200,000-gallon capacity. Using this distribution of cost method, the total estimated annual costs are divided equally by thirds attributable to each 100,000 gallons storage capacity, then relatedly, to each tier at 100,000-gallons per tier. The Lower Tank would meet the needs of the Tier 1 users and the Upper Tank would service Tier 2 and then Tiers 3 and 4 combined into one Tier 3. This costing methods, while attributing a higher increase in costs to the higher users, still provides no water conservation incentive having no volumetric base. *See Table 14*

*Table 14*

<b>Example 2 Total Expenses divided between Upper Tank (2/3) and Lower Tank (1/3)</b>						
	Total Expenses	T1	T2	T3 + T4	T4	
3 yr Avg		45	74	37		\$204,600.00
	Lower Storage Tank	\$68,200.00				100,000 gals
	Upper Storage Tank		\$68,200.00	\$68,200.00		200,000 gals
						total estimated expenses
1 Bi-monthly		\$72.86	\$102.40	\$307.21		100,000 gals
1 plus Tier 1			\$72.86	\$72.86		100,000 gals
1 plus Tier 2				\$102.40		100,000 gals
1 Total bi-monthly		\$72.86	\$175.27	\$482.47		300,000 gals
1 Annually		\$437.18	\$1,051.59	\$2,894.84		300,000 gals
156 Annually		\$19,673.08	\$77,817.95	\$107,108.97		\$204,600.00 total service fees
1 % increase p/c p/yr		-27%	44%	96%		
156 % increase total p/yr		-27%	44%	96%		

**Example 3)** Inversely, with such a small system, if all of the fixed costs were divided up equally among all the users, the difference in the variable costs will still penalize the low-end users and benefit the high-end users on a per gallon cost basis and create very minimal incentive to conservation. *See Table 15*

*Table 15*

<b>Example 3 Distribution of 'All' Fixed Costs assigned to Base Rate then Variable costs by p/gal usage</b>						
	T1	T2	T3	T4	Total Bi-monthly	
3 yr Avg	45	74	33	4	1,434,001	Total 3-yr average annual water usage
1 Avg Gals - bi-m	2,366	6,925	14,273	84,210	107,774	Total average bi-monthly water usage
1 Base Rate(0 gals)bi-	\$180.98	\$180.98	\$180.98	\$180.98	\$169,400.00	Total Fixed Costs + Res/156 c
1 Usage - bi-monthly	\$9.68	\$28.33	\$58.39	\$344.51	\$0.0041	Total Variable costs/8,604,004 avg gals
1 Total bi-monthly	\$190.66	\$209.31	\$239.38	\$525.50		
1 Total Annual	\$1,143.97	\$1,255.88	\$1,436.25	\$3,152.98		
156 Total Bi-m Revenues	\$8,579.81	\$15,489.23	\$7,899.39	\$2,101.98		
156 Total Annl Revenues	\$51,478.87	\$92,935.37	\$47,396.34	\$12,611.90	\$204,422.49	total service fee revenues
1 % increase p/c p/yr	91%	72%	-3%	-64%		change from previous rate p/connection
156 % increase total p/yr	91%	72%	-3%	-67%		change from previous rate 156
Previous	T1	T2	T3	T4		
1 Previous bi-monthly	\$49.92	\$71.67	\$196.17	\$1,405.67		
1 Prev Annual +WCI	\$599.52	\$730.02	\$1,477.02	\$8,734.02		
156 Total Prev Revenue	\$26,978.40	\$54,021.48	\$48,741.66	\$38,186.08		



**Example 4)** On the flip side, to allocate all costs (fixed and variable) on a p/gallon basis, benefits the low-end users, captures the full cost of the highest users, but also creates a very desirable incentive to conserve which may leave the district falling short on revenues with no built-in dependable base income for infrastructure. *See Table 16*

*Table 16*

Example 4 Total Fixed + Variable Expenses charge p/gallon w/ no base rate						
	T1	T2	T3	T4	Total	
3 yr Avg	45	74	33	4		\$204,600.00
Bi-monthly Total Gals p/tier	106,458	443,168	627,990	252,630		8,604,004
Avg gal p/ c p/tier	2,366	6,925	14,273	84,210		
Usage (.0295)p/gal						Exp=\$204,600 /Gals=8,604,004
1 Total bi-monthly	\$56.26	\$164.67	\$339.41	\$2,002.48		
1 Total Annual	\$337.58	\$988.04	\$2,036.44	\$12,014.89		
156 Total bi-monthly	\$2,531.82	\$12,185.87	\$11,200.42	\$8,009.93		
156 Total annually	\$15,190.90	\$73,115.22	\$67,202.51	\$48,059.58	\$203,568.20	
1 % increase p/c p/yr	-44%	35%	38%	38%		
156 % increase total p/yr	-44%	35%	38%	26%		
Previous	T1	T2	T3	T4		
1 Previous bi-monthly	\$49.92	\$71.67	\$196.17	\$1,405.67		
1 Prev Annual +WCI	\$599.52	\$730.02	\$1,477.02	\$8,734.02		
156 Total Prev Revenue	\$26,978.40	\$54,021.48	\$48,741.66	\$38,186.08		

**Example 5)** One more balanced approach, yet not as financially risky option for the District, is to set a two-rate structure with one charge based on 1) Capacity (infrastructure) and the second fee based on 2) Volumetric pricing (usage fee). The industry standard is to use a Meter fee aligning fixed meter charges with infrastructure costs. The AWWA M1 guidelines are used to determine water meter flow capacity which provides a standard cost basis for fixed meter charges. Meter charges are considered “availability” or “readiness-to-serve” charges for providing customers with access to water at all times. These constitute a fixed portion of the customers’ bills because they are levied whether or not water is used. *See Table 17*

*Table 17*

American Water Works Association								
Fixed Charge Meter Ratios								
AWWA M1	AWWA M1	AWWA M1	Example	MBCSD	MBCSD	MBCSD	MBCSD	MBCSD
Meter Size	Capacity	Factor	Rates	Proposed	Meters	Meters	Meters	Meters
		Based 5/8"			# of total	% of total	# Post SWP	% Post SWP
			Bi-monthly	Bi-monthly	156	156	156	156
5/8"	20	1.0	\$ 70.83	\$ 70.83	140	90%	87	56%
3/4"	30	1.5	\$ 106.25	\$ 70.83	8	5%	8	5%
1"	50	2.5	\$ 177.08	\$ 70.83	7	4%	60	38%
1.5"	100	5.0	\$ 354.15	\$ 354.15	1	1%	1	1%
2"	160	8.0	\$ 566.64	\$ 566.64	0	0%	0	0%
					156	100%	156	100%

The fee usually includes the infrastructure costs (short-term infrastructure reserves) with a separate charge for water meter reading related fixed costs. In this example, the meter charge of \$70.83 plus the meter reading fee of \$7.90 would combine for a \$78.73 overall fixed fee for a standard 5/8” to 1” meter which would be a 21% decrease from the total current monthly average fixed billing of \$99.92 (Base rate



plus the \$50 WCI fee). Then, the implementation of a single volumetric rate guarantees all customers pay a uniform volumetric rate for water usage. The volumetric charge would include all operating costs both fixed and variable into a single per gallon rate for each gallon used. Having a set capacity charge plus one volumetric rate fee does give some protection for covering infrastructure related fixed costs, while getting closer to an equitable balance between cost increase and usage, and still providing some incentive for conservation. In example 5, the volumetric fee increases water revenues by an average of 18% overall. So together with the 33% increase in Capital Improvements, and an 18% increase in service fees, this would result in an average increase of 23% overall in total water revenues from \$167,927 to \$205,951 - although different volumetric fees would fluctuate depending on water usage. *See Table 18*

*Table 18*

Example 5 Base Rate Calculated on 'Infrastructure' Meter Capacity costs then usage calculated at p/gal rate									
	Tiers	T1	T2	T3	T4	Total			
3 yr Avg	Users p/ tier	45	74	33	4				
	May-18 gallons p/tier	106,458	443,168	627,990	252,630		Total Gallons - May 2018	Meter Charge Calculation	
							p/gal \$187,900/8,604,004	\$0.0161 p/gallon	
	1 Meter Fee (0 gals)	\$70.83	\$70.83	\$70.83	\$70.83	\$66,300.00	Incls: LT Res + P&E Res	\$40,000.00 LT Res	
	1 Avg usage (.0218)	\$35.99	\$91.11	\$289.52	\$960.87	\$130,557.26		\$26,300.00 Pipe&Eq Res	
	1 Meter Reading bi-m	\$7.90	\$7.90	\$7.90	\$7.90	\$7,394.40	annual fee p/customer=\$47.43		
	1 Total bi-monthly	\$114.73	\$169.85	\$368.25	\$1,039.60			\$66,300.00 Total Base	
	1 Total annual	\$688.35	\$1,019.07	\$2,209.52	\$6,237.61			\$425.00 p/c/ p/yr	
156	Total Annual	\$30,975.81	\$75,411.34	\$72,914.06	\$26,650.48	\$205,951.70	total service fees+infrastructure	\$70.83 p/c/ p/bm3/4'	
								\$177.08 p/c/ p/bm 1"	
	1 % increase p/c p/yr	15%	40%	50%	-29%			\$354.17 p/c/ p/bm1.5"	
156	% increase total p/yr	15%	40%	50%	-30%			\$566.67 p/c/ p/bm 2"	
								\$7.90 p/c/ p/bm	
Previous		T1	T2	T3	T4				
	1 Previous bi-monthly	\$ 49.92	\$ 71.67	\$196.17	\$ 1,405.67				
	1 Prev Annual +WCI	\$ 599.52	\$ 730.02	\$1,477.02	\$ 8,734.02				
156	Total Prev Revenue	\$ 26,978.40	\$ 54,021.48	\$48,741.66	\$ 38,186.08	\$ 167,927.62			

## Water Conservation and Incentives

The MBCSD Water Department Rates and Policies -Updated June 21, 2016 includes the District's mandatory conservation levels during dry periods to be approximately 15,000 gallons per month/per user, which translates into 30,000 gallons per bi-monthly billing period per residential customer.

### 8) Water Conservation

*As the district's water supply is limited, water conservation measures are encouraged throughout the year. A general guideline is no more than 80 gallons of water per day per occupant.*

*In conformance with the District's Water Rights permit, we are required to monitor the levels in Redwood Creek, and during conditions when the creek is not continuously flowing, Muir Beach is required to go on Water Conservation Alert and curtail our use of water. During times of noticed conservation, there are severe financial penalties for any residential customer who exceeds 2,000 cubic feet of water in a month (approximately 15,000 gallons).<sup>6</sup>*

Included in *Table 19* below is an example of how a Water Conservation Discount can be used by the District as an additional incentive to encourage water conservation. This meets Prop 218 requirements for proportional costs as long as a Water Conservation Reserve is used in developing the total water costs. In Example 6 below, there is a conservation discount with a sliding scale based on water usage brackets from the current tier system with the maximum usage level aligning with the District's mandatory conservation requirements. In this example, discount levels are set at the previous breakpoints for tier rate usage levels. There is a 50% discount for bi-monthly water use under 4500

gallons, 43% discount for use over 4501 but under 10,000 gallons, and then lastly a 30% discount for bi-monthly water usage over 10,001 gallons but less than 30,000 gallons. There is no discount over 30,001 gallons.

Table 19

Water Operation Expenses - Full Cost Breakout of Fixed, Variable, and Total Costs						Total Annual	Comments
Expenses							
				p/cust/ p/yr	p/cust p/bm		
Fixed:	Dedicated	\$48,660.00 *					based on draft FY19/20 budget
	Allocated Gen	\$44,440.00 *					20% Ops + 20% WCI =40% (FY19/20)
	Depreciation					\$ 33,000.00	5 yr avg -incls LT liner + Sunset pipeline
	WF Debt - Due to GF	\$2,600.00					\$2600 for 20 years(Due to Gen \$52,870)
	Discount Reserve	\$57,000.00					Conservation Discount Reserve
	FY20/21 CPI - F	*					
	Total Fixed:		\$152,700.00	\$978.85	\$163.14	\$152,700.00	
Variable:	Repairs & Maint	\$15,000.00 *					
	Utilities	\$11,860.00 *					
	Treatment	\$5,000.00 *					
	Water Manage Xt	\$3,340.00 *					extra hours usually due to repairs
	FY20/21 CPI - V	*					
	Total Variable:		\$35,200.00			\$35,200.00	
				p/ gallon	p/100 gals		
Total Exp:			\$187,900.00			\$187,900.00	estimated for FY19/20
	Cost p/gal - Variable			0.00409112	0.40911185	8,604,004	total avg. annual gals delivered (3yrs)
	Cost p/gal - Total Exp			0.0218	2.18386695	0.0218387	cost p/gallon to breakeven for Ops
Previous		T1	T2	T3	T4		
		45	74	33	4		
	1 Previous bi-monthly	\$49.92	\$71.67	\$196.17	\$1,405.67	\$19,646.27	total service fee p/bm
	1 Prev Annual +WCI	\$599.52	\$730.02	\$1,477.02	\$8,734.02	\$117,877.62	total service fee p/yr
	156 Total Prev Revenue	\$26,978.40	\$54,021.48	\$48,741.66	\$38,186.08	\$167,927.62	
						\$49,750.00	previous WCI fee
				\$86,927.74	\$10,211.04	\$ 108,211.00	annual service fees - last 12 years

Example 6 Base Rate Calculated on 'Infrastructure' Meter Capacity costs then usage calculated at p/gal rate w/ Conservation Discounts										
Cons disc%		0.5	0.43	0.3	0					
3 yr Avg	Tiers	T1	T2	T3	T4	Total	Annual - 156			
May-18	Users p/ tier	45	74	33	4	156				
	gallons p/tier	106,458	443,168	627,990	252,630	1,430,246	Total Gallons - May 2018		Meter Charge Calculation	
	1 Cons Disc 50/43/30/0	\$ (25.83)	\$ (56.24)	\$ (124.68)	0	\$ (9,438.42)	\$ (56,630.50)	p/gal \$187,900/8,604,004	\$0.0218	p/gallon
	1 Meter Fee (0 gals)	\$70.83	\$70.83	\$70.83	\$70.83	\$11,050.00	\$66,300.00	incls: LT Reserves & P&E Reserves	\$40,000.00	LT Res
	1 Meter Reading bi-m	\$7.90	\$7.90	\$7.90	\$7.90					
	1 Base Rate									
	1 Avg usage (cost p/gal)	\$51.66	\$130.79	\$415.59	\$1,379.28				\$26,300.00	Pipe&Eq Re
							\$68,000.00	total WCI		
	1 Total bi-monthly	\$104.57	\$153.28	\$369.65	\$1,458.01	18,250	total WCI increase from previous rates	\$66,300.00	Total Base	
	1 Total annual	\$627.39	\$919.69	\$2,217.88	\$8,748.03	37%	total % increase	\$425.00	p/c/ p/yr	
	156 Total Annual	\$28,232.70	\$68,057.04	\$73,189.96	\$37,046.31	\$206,526.01	total service fees + WCI	\$70.83	p/c/ p/bm5	
						\$38,598.39	total increase from previous rates	\$177.08	p/c/ p/bm.	
	1 % increase p/c p/yr	5%	26%	50%	0%	23%	total % increase	\$354.17	p/c/ p/bm1	
	156 % increase total p/yr	5%	26%	50%	-3%	\$138,526.01	total service fees	\$566.67	p/c/ p/bm.	
						\$20,648.39	service fee increase from previous rates	\$2.56	p/c/ p/bm	
						18%	service % increase			

The current set of examples included both the capital improvement fees and the operation costs into one water rate schedule. This could be similar to the current Water Capital Improvement Fee and could be used to build reserves for water capital infrastructure projects.

Another option for setting up conservation incentives, is to levy a Water Capital Improvement Tax through a voter ballot process. This would require the district to hold a public hearing for the water service rate proposal and then do a separate ballot measure for the Water Capital Improvement Tax. A Water Capital Improvement (WCI) Tax would need to be approved by a 2/3 vote at the ballot if the District decided to attempt to renew a similar annual charge to meet infrastructure needs as they incur verses debt finance capital improvements.

A WCI tax could also provide another level of conservation incentive by having a sliding scale fee based on a parcel's previous year's annual usage. The current system of four tiers does seem to provide for a certain level of conservation but the tax could be structured with more or less brackets. The current four tiers maximum water use brackets are at Tier 1 – 4,500, Tier 2 – 10,000, Tier 3 – 30,000, and Tier 4 – 30,001 +, so with a majority of 98% of the users falling between Tier 1 and Tier 3, it would seem that Tier 4 - which makes up 2% of users, but consumes 25% of the water usage – would be the tier of users most in need of encouragement to conservation. For example, the District could use the mandatory conservation usage level of 30,000 gallons per monthly billing period, prorated annually, which also correlates to the maximum use level in Tier 3, to create a possible two-tiered conservation-based tax rate. Using the current fee structure, that would be a \$300 annual tax for parcels using less than or equal to 180,000 gallons annually, and \$3,250 for those customers using greater than 180,000 gallons annually.

In summary, the MBCSD water system has many challenges in developing a rate structure in the face of both its physical and legal environment. Its first, and foremost limitation, is having a small service population with no opportunity for expansion or growth within its service area to help spread its operational and infrastructure costs. The majority of the District's cost of service are fixed costs which need to be shared equitably among its users that in turn can make creating conservation incentives challenging. These conservation requirements are both mandated by its Water Diversion Permit, the State of California, and the National Park Service which manages the creek for which the District draws its water supply. Prop 218 also creates its own challenges in trying to balance the cost of service with these conservation requirements as it sets the legal requirements for which the District's rate structure must conform. The District's goal is to set its water service rates in such a manner that the cost of service is distributed equally per parcel and that no customer is charged more than is attributable to that parcel for services provided. While no one can disagree with the concept of reasonable and equitable service, it becomes more challenging in practice for small districts to maintain the integrity of a water system's infrastructure, while at the same time encouraging conservation, and making sure that the water system will continue to deliver the highest quality of water supply and service to its customers into the future.

## Resources

<sup>1</sup> California Constitution Article XIII D, section 6

<sup>2</sup> California Constitution Article X, section 2

<sup>3</sup> LAFCO Water Service Study 2015 (Muir Beach CSD)

<sup>4</sup> MBCSD Water Billing worksheets (January 16, 2016 – January 16, 2019)

<sup>5</sup> DataUSA (Muir Beach, CA – 2019 population – 248)

DataUSA (Muir Beach, CA – 2016 population – 275)

US Census 2010 (Muir Beach, CA population – 310)

<sup>6</sup> MBCSD Water Department Rates and Policies -Updated June 21, 2016

<sup>7</sup> MBCSD Water Permit (2100508) Amendment – May 2018

<sup>8</sup> MBCSD FY18/19 Annual Budget

<sup>9</sup> Preliminary Review of Water System (September 20, 2018) – MOE Engineering

<sup>10</sup> Piping Asset Inventory 2018 (September 20, 2018) – MOE Engineering

## Piping Asset Inventory 2018 (September 20, 2018) – MOE Engineering

**Mary Halley**  
District Manager  
Muir Beach Community Services District  
19 Seacape Drive, Muir Beach, CA 94965  
Office: 415-383-9969  
Voicemail: 415-388-7804  
Cell: 415-297-1831  
[mary@muirbeachcsd.com](mailto:mary@muirbeachcsd.com)