



**APPLE VALLEY HEIGHTS  
COUNTY WATER DISTRICT  
FINANCIAL PLANNING, REVENUE  
REQUIREMENTS, COST OF SERVICE,  
AND RATE SETTING ANALYSIS**

**Robert D. Niehaus, Inc.**

**November 5, 2018**



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COST OF SERVICE, AND RATE SETTING ANALYSIS**

**DRAFT REPORT**

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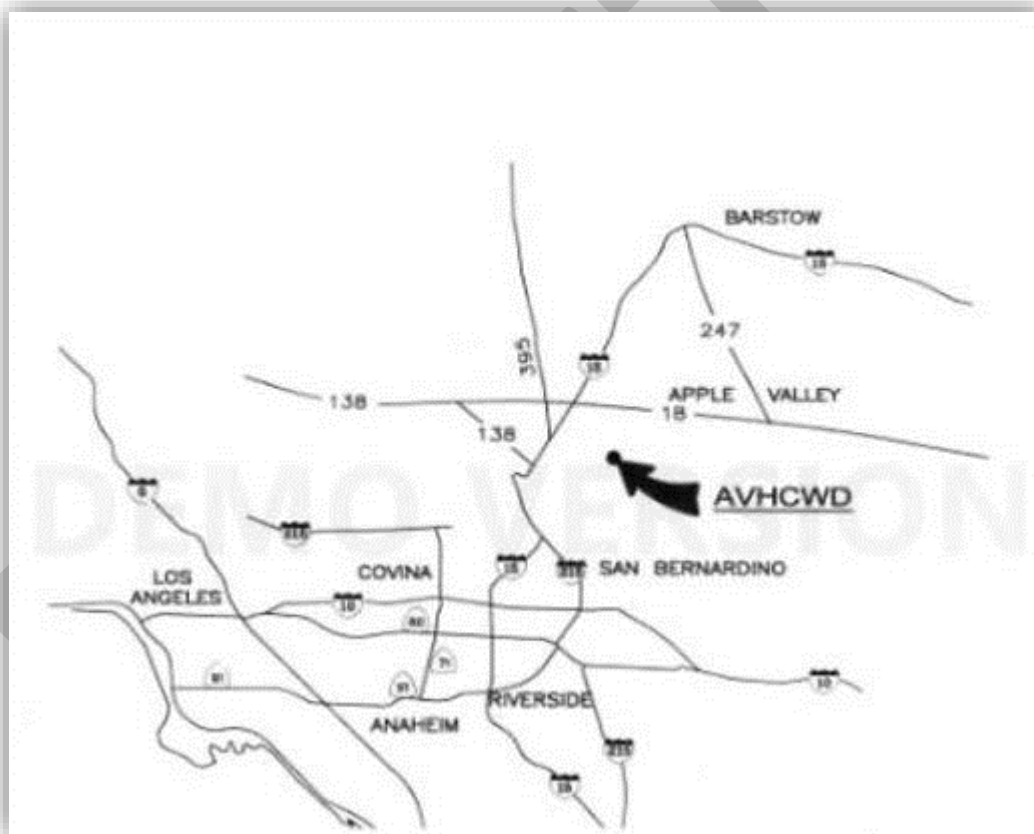
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## EXECUTIVE SUMMARY

Apple Valley Heights County Water District (AVHCWD or District) was formed in 1957 under the provision of the California Water Code. The District's service area encompasses approximately 960 acres (Figure 1) and provides water to 924 people through 284 active connections. The sole water source of the District is groundwater drawn primarily from the Upper Mojave River Groundwater Basin and is supplied directly to their distribution systems. The free production allowance (FPA) from the Basin is adjusted annually by unused or overused water usage, which carries over to the subsequent years. The AVHCWD's FPA during FY 2016-2017 was 84 Acre Feet (AF) and the District purchased additional 12 AF of replacement water to meet their water demand. The District has purchased replacement water annually for the last 15 years.

*Figure 1. Apple Valley Heights County Water District Service Area*



### Purpose of Study

The purpose of this analysis is to conduct a rate study which evaluates the District's current rates and financial data and make appropriate recommendations on rates if necessary. Utility rates must be designed to recover sufficient revenues to maintain a financially vital system, ensure customer equitability, and be compliant with legal requirements such as Proposition 218.

In October 2018, the California Rural Water Association (CRWA) retained Robert D. Niehaus, Incorporated (RDN) to develop a comprehensive water rate study for AVHCWD which includes: financial planning, a revenue

requirements analysis, a cost of service study, and a rate setting analysis with multiple levels of detailed analyses to address District financial goals.

### Key Assumption

All analyses performed throughout this study were based on an assumption of customer growth provided by AVHCWD. The District expects to add one customer with a 1-inch meter per year during the study period (FY 2019-2020 through FY 2023-24). No major housing developments have been scheduled within the District’s service area during this period.

FY 2019-2020 was chosen as the test year for which costs are to be analyzed and rates are to be established. Table 1 shows the current number of accounts reported for FY 2018-2019 and forecasted number of accounts for FY 2019-2020 through FY 2023-2024.

*Table 1. AVHCWD Number of Accounts, Actual for FY 2018-2019 and Forecasted Number of Accounts for FY 2019-2020 – FY 2023-2024*

	FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
	Current	Test Year				
<b>Single Family Residential</b>	<b>284</b>	<b>285</b>	<b>286</b>	<b>287</b>	<b>288</b>	<b>289</b>
5/8-in	251	251	251	251	251	251
1-in	33	34	35	36	37	38
<b>Inactive Meters</b>	<b>22</b>	<b>22</b>	<b>22</b>	<b>22</b>	<b>22</b>	<b>22</b>
5/8-in	22	22	22	22	22	22

### Current Rates

AVHCWD implemented new rates on October 1, 2018. Under the new rates, the District’s customers pay a fixed monthly charge of \$30.75 regardless of the meter size installed on the property. Additionally, the customers pay monthly fixed charges of \$10.00 as a Capital Improvement Fee and a \$5.00 surcharge to contribute to their reserve account. District customers also pay volumetric charges based on their consumption. The volumetric charges include five tiers, in which the rates increase based on the level of usage. The District’s current volumetric rates are shown in Table 2.

*Table 2. AVHCWD Current Water Rates, FY 2018-2019*

Monthly Fixed Base Charge \$30.75		
Capital Improvement Fee \$10.00		Surcharge \$5.00
Tier	Tier Width (in hcf)	Tier Rates (per hcf)
Tier 1	0-9	\$3.70
Tier 2	10-19	\$3.80
Tier 3	20-29	\$3.90
Tier 4	30-49	\$4.00
Tier 5	50+	\$5.00

Under this rate structure, a residential customer who has a 5/8-inch meter and uses 25 hcf of water in a month pays a \$45.75 fixed charge (\$30.75 for the base charge, \$10.00 for the Capital Improvement Fee and \$5.00 for the surcharge). The same customer also pays \$3.70 per hcf for the first 9 hcf of water used, \$3.80 for the next 10 hcf, and \$3.90 for the last 6 hcf. This hypothetical customer's total monthly water bill amounts to \$136.55 (\$45.75 for the fixed charge and \$90.80 for the volumetric charge).

## Proposed Rates

RDN developed a rate structure which reflects and links to the costs of providing services to different types of customers. The recommended rate adjustments and modifications which were drawn from this analysis are as follow:

- Reduce the number of tiers from five to four and create nexus between the costs and tiered rates to validate how incremental cost differentials were established
- Recover the water purchase cost of \$8,611 from Tier 4 usage
- Establish fixed monthly base charges to reflect service and capacity requirements of different meter sizes
- Adjust inactive meter fixed charge by removing the capacity component of fixed cost
- Consider removing the \$5.00 surcharge if the District determines there is no need for additional reserves (this is not reflected in the following analyses – the revenues in the financial plans under the current and proposed rates include revenues from this surcharge)

### Fixed Monthly Base Charge

All customers of the District pay the same fixed service charge regardless of the meter size under the current rates. The capacity and service components of the fixed charge should reflect differences in the requirements, which are dependent on the meter sizes.

RDN configured monthly base charges to include four components: billing and customer costs, public fire protection (PFP) direct costs, meter service costs, and 50 percent of capacity costs identified in the Cost of Service (COS) analysis. RDN distributed the meter related costs among different meter sizes using the estimated meter-and-service ratios (see Table 10). In addition, approximately 50 percent of the capacity component of cost is allocated to the fixed monthly charge and distributed based on the number of hydraulically equivalent meters, which measures meter capacity demand (Table 13). The billing cost and PFP direct cost are also included in the fixed portion of a monthly bill, and distributed equally among all customers regardless of the meter size. Table 3 presents proposed AVHCWD fixed monthly base charges by meter size for FY 2019-2020 through FY 2023-2024. The rates were designed to recover sufficient revenues to reach the District's reserve target by FY 2020-2021 without a rate increase during the study period. The fixed monthly charge for inactive meters was adjusted by removing the capacity costs. The Capital Improvement Fee and surcharge were kept unchanged from the current rates.

Table 3. Proposed Fixed Monthly Base Charge for AVHCWD, FY 2019-2020 – FY 2023-2024

Meter Size	Rates				
	FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
<b>Active Meters</b>	<b>Test Year</b>				
5/8-in	\$32.91	\$32.91	\$32.91	\$32.91	\$32.91
1-in	\$55.09	\$55.09	\$55.09	\$55.09	\$55.09
<b>Capital Improvement Fees</b>	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00
<b>Surcharges</b>	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00
<b>Inactive Meters</b>	\$20.01	\$20.01	\$20.01	\$20.01	\$20.01

**Volumetric Charges**

RDN removed Tier 5 in the current rates and built a four-tiered rate structure by creating a strong nexus between the rates and the costs incurred to meet different levels of service and capacity requirements. The water purchase cost was applied to the Tier 4 rate to send a price signal for conservation purposes. This cost can be eliminated if District customers continuously make conservation efforts and maintain usage within the FPA.

**Tier Pricing**

First, Tier 1, 2, and 3 was computed using unit costs of the peaking cost components based on base, max daily demand (MDD), and peak hourly demand (PHD). The total cost of each cost component was divided by the total usage and the result was used to create cost differentials between the three tiers. Tier 4 was created by adding the total water purchase cost to the Tier 3 rate. The District purchased 12 AF (approximately 5,200 hcf) of replacement water during FY 2016-2017 and projects that purchased replacement water will stay around this level on average during the five-year study period.

**Tier Width**

The Tier 1 width (9 hcf) was set to represent indoor water usage and protect small users as well as low income customers by providing water at an affordable rate. The upper limit of Tier 2 was set at 19 hcf, on average approximately 85 percent of District customers fall within this tier. The upper limit of Tier 3 was set at 35 hcf, and approximately 95 percent of customers stay within this tier. Only 5 percent of District customers pay the Tier 4 rate for the usage over 35 hcf under the proposed rates, however on average 30 percent of the District usage comes from this tier. RDN allocated approximately 5,000 hcf of water usage to Tier 4, which is the District’s projected volume of water purchased during the study period.

Table 4. Proposed Volumetric Tier Rates and Widths for AVHCWD, FY 2019-2020 – FY 2023-2024

Tier	Width (in hcf)	Rates				
		FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
		<b>Test Year</b>				
Tier 1	up to 9 hcf	\$2.40	\$2.40	\$2.40	\$2.40	\$2.40
Tier 2	10 to 19 hcf	\$3.81	\$3.81	\$3.81	\$3.81	\$3.81
Tier 3	20 to 35 hcf	\$4.82	\$4.82	\$4.82	\$4.82	\$4.82
Tier 4	36+ hcf	\$6.51	\$6.51	\$6.51	\$6.51	\$6.51

## Revenues from Volumetric vs. Fixed Charges

Figure 2 presents the composition of revenues recovered from volumetric charges vs. revenues from fixed base charges under the current rates and proposed rates. It is estimated that currently, approximately 17 percent of the District’s expenses are variable costs (pumping power, water purchase, and fuel/gas). In order to maintain an incentive for water conservation as the District ensures revenue stability, there should be a reasonable balance between cost recovered under the fixed monthly base charges and volumetric charges. In rate setting norms, not all fixed costs are recovered in the fixed service charge because appropriately priced volumetric charges send a strong price signal to customers and promote conservation. Under the proposed rates, the revenues recovered from fixed charges are estimated to increase by 4 percent. This proportionate shift is created to reduce bill impact on customers with 1-inch meters.

*Figure 2. Revenues Recovered from Volumetric vs. Fixed Charges under Current Rates and Proposed Rates*

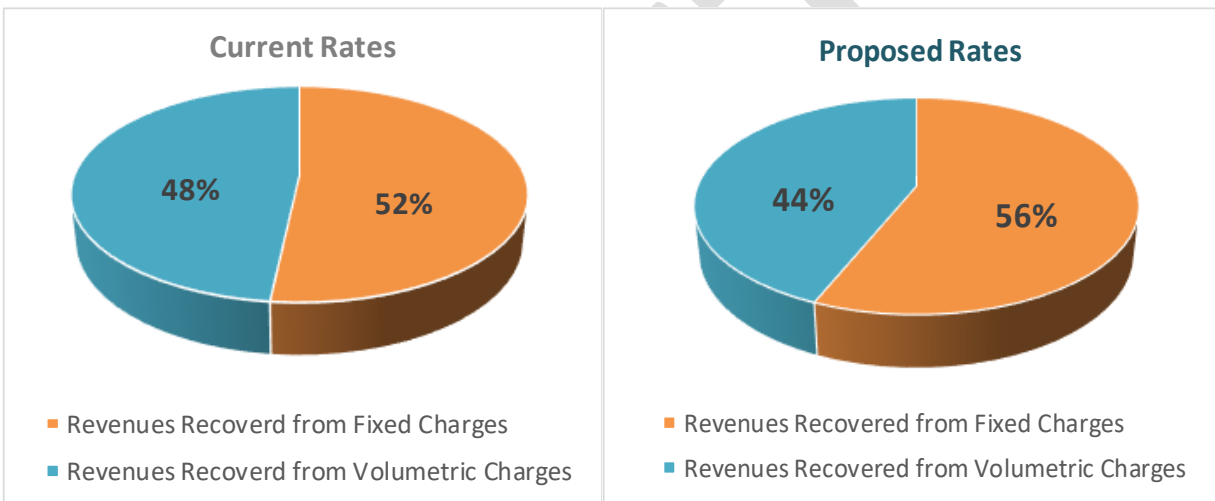
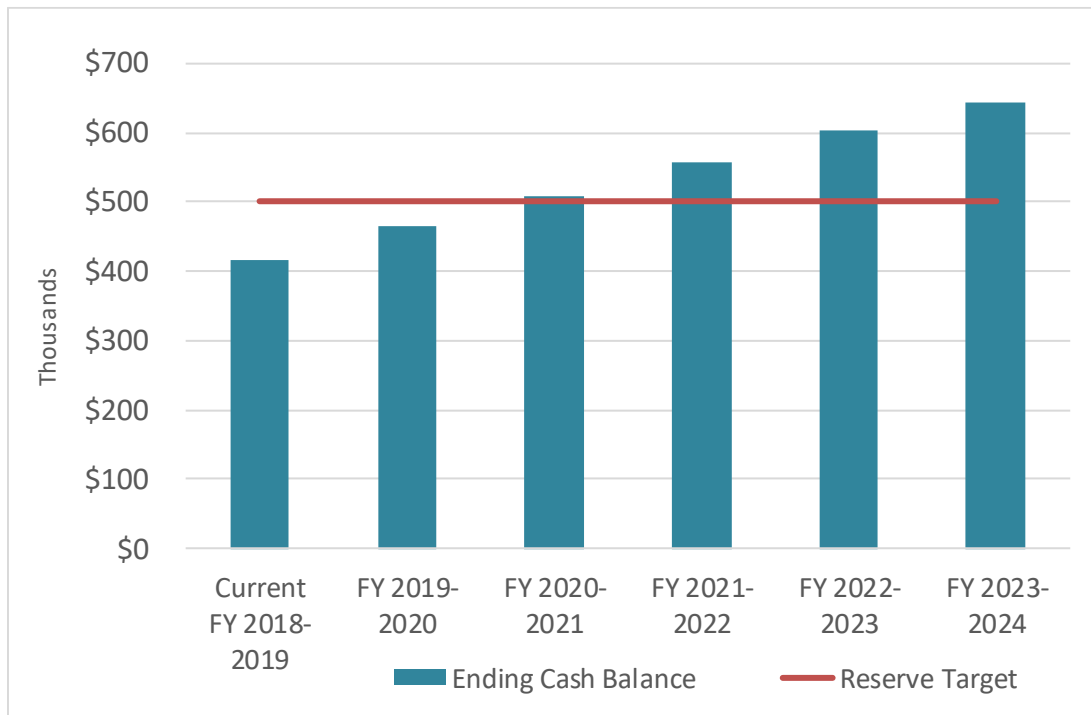


Figure 3 shows changes in the ending cash balance relative to the reserve target for the current (FY 2018-2019) plus the five-year forecasted period under the proposed rates. The ending cash balance for FY 2023-2024 is estimated to be \$643,508.



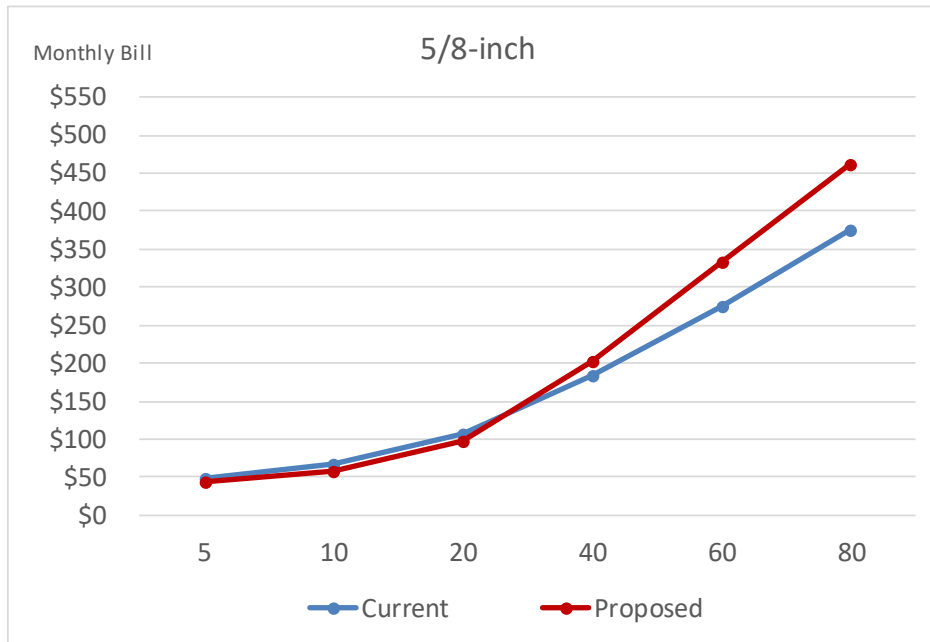
Figure 3. AVHCWD Change in Ending Cash Balance and Reserve Target for FY 2018-2019 (Current) - FY 2019-2020 – FY 2023-2024



### Bill Impacts

Figure 4 presents bill comparison for Single Family Residential customers with a 5/8-inch meter under current vs. proposed rates by usage. Customers with usage up to 29 hcf monthly will see a decrease in their bills by 0.2 to 12.0 percent. The remaining customers’ bills will increase by 0.3 to 27.9 percent monthly. For example, a customer who uses 5 hcf of water monthly, the bill will decrease from \$49.25 to \$44.89, while a customer bill with 40 hcf of consumption will increase from \$185.05 to \$202.23.

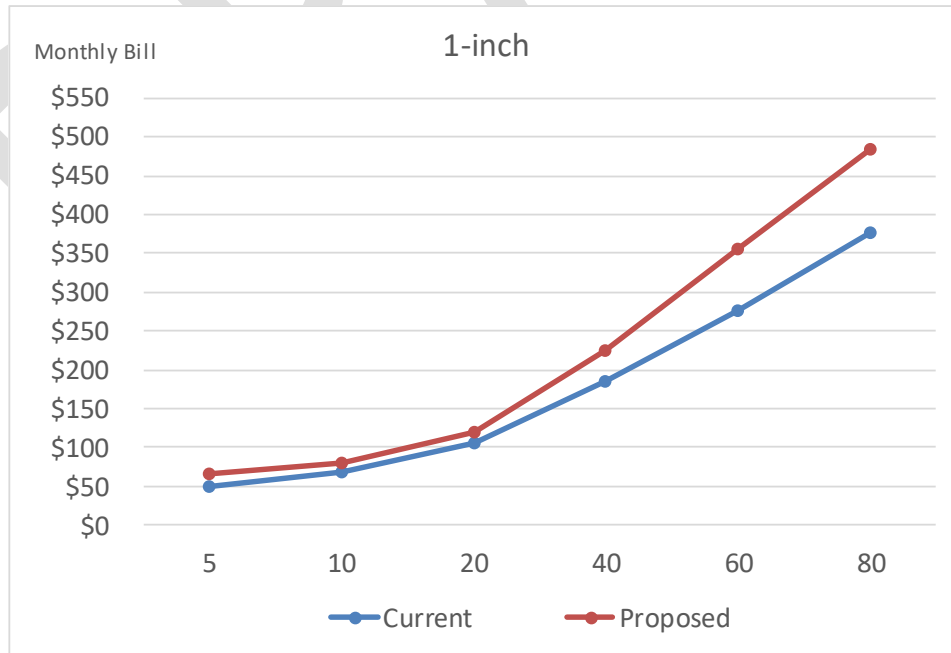
**Figure 4. Current vs. Proposed Rates for Single Family Residential Customers with 5/8-inch Meter**



Note: the amount does not include Capital Improvement Fees and Surcharges

Customers with 1-inch meter will see their bill increase by approximately 10 to 30 percent depending on their usage. For example, if a customer uses 20 hcf of water, their bill will increase from \$105.95 to \$119.54, while a customer who uses 60 hcf of water monthly will see an increase from \$276.05 to \$354.61. Figure 5 shows bill comparisons of 1-inch meter customers under current vs. proposed rates based on their monthly water usage.

**Figure 5. Current vs. Proposed Rates for Single Family Residential Customers with 1-inch Meter**



Note: the amount does not include Capital Improvement Fees and Surcharges

## 1. GENERAL METHODOLOGY AND LEGAL CONSIDERATIONS

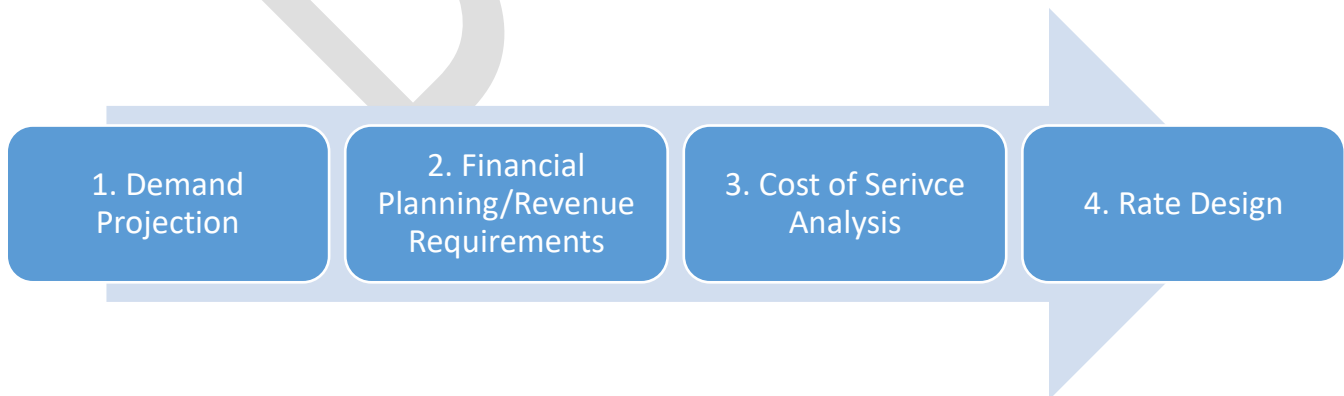
The primary goal of this Study is to help AVHCWD establish a rate structure that achieves the District’s objectives of revenue stability, equitable cost recovery, and rate-payer affordability while being compliant with Propositions 218, and other regulations and state policies. RDN’s rate-making practices incorporate methods described by the AWWA Manual 1 (M1). The flowchart (Figure 6) presents a typical process of a rate study.

### General Methodology

The methodology described in this section is broken into four steps which outline the basic procedures of rate-setting norms.

1. **Demand Projection** - project water demand for the five-year study period, FY 2018-2019 through FY 2023-2024, using the District’s customers’ historical usage data. The five-year demand projection forecasts revenues for the study period based on the projected water demand.
2. **Financial Planning and Revenue Requirements** - develop a 5-year financial plan based on the projected revenues and annual costs which include both operating and capital expenses. The District’s target reserve level and debt service coverage ratio on the debt obligations should also be considered as part of the financial planning. Based on the financial planning, revenue requirements are determined for each year of the study period and fed into the Cost of Service (COS) model.
3. **Cost of Service (COS) Analysis** - perform COS analysis to allocate costs among the customers commensurate with their service requirements. The proportionate allocation of costs must consider not only the relative quantity of water used by customer but also the peak rate at which it is consumed. COS analysis also determines cost allocation among different types of water users based on the demand they impose on the utility such as usage volumes and usage pattern at a peak-day or hour.
4. **Rate Design** - develop rates to equitably recover the rate revenue requirements from each customer class given the projected customer demand identified as a result of the COS analysis. Properly designed rates should recover the costs of providing service, and generate adequate funding for capital needs. Rates must be compliant with all legal statutes of Proposition 218 and any other applicable California laws.

*Figure 6. Typical Process of Rate Study*



## Proposition 218 Requirements

Utility rates are subject to the procedural and substantive requirements as set forth in Proposition 218. Proposition 218 was adopted by California voters in 1996 and added Articles 13C and 13D to the California Constitution. Article 13D, Section 6 governs property-related charges, which the California Supreme Court subsequently ruled includes ongoing utility service charges such as water and wastewater. Article 13D, Section 6 establishes a) procedural requirements for imposing or increasing property-related charges, and b) substantive requirements for those charges. Article 13D also requires voter approval for new or increased property-related charges but exempts from this voting requirement rates for water and wastewater service. The substantive requirements of Article 13D, Section 6 require the District's utility rates to meet the following conditions:

- Revenues derived from the fee or charge shall not exceed the funds required to provide the property related service.
- Revenues derived from the fee or charge shall not be used for any purpose other than that for which the fee or charge was imposed.
- The amount of a fee or charge imposed upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel.
- No fee or charge may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in question.
- No fee or charge may be imposed for general governmental services, such as police or fire services, where the service is available to the public at large in substantially the same manner as it is to property owners.

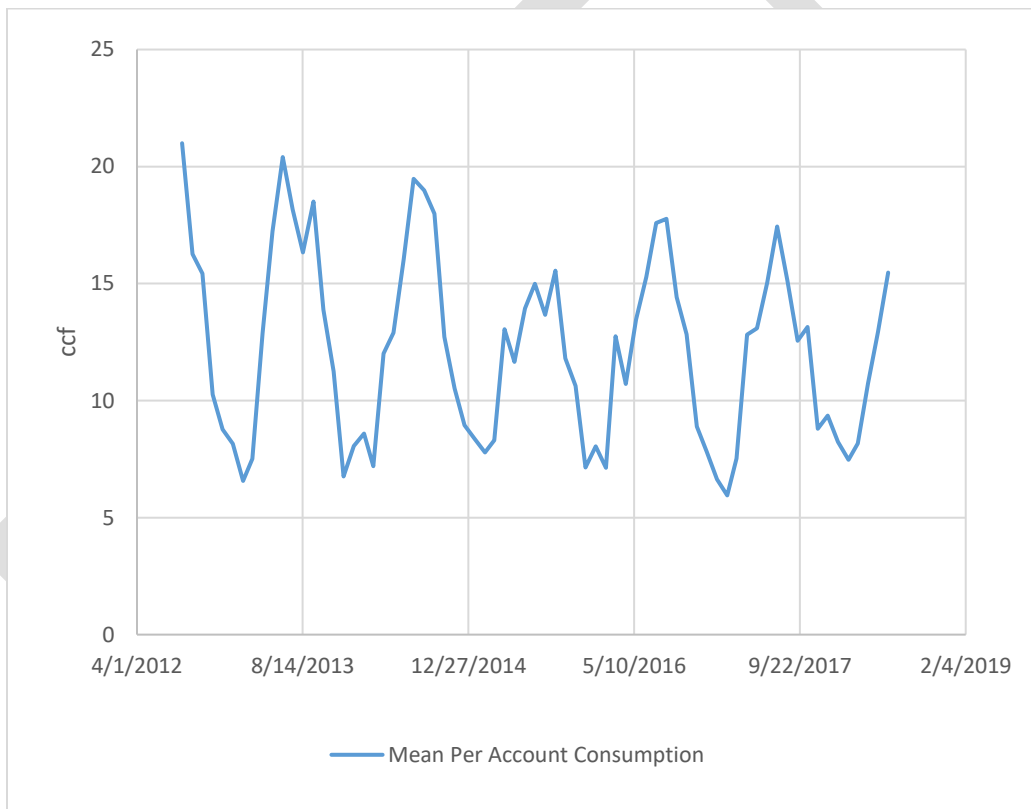
The procedural requirements of Proposition 218 for all utility rate increases are as follows:

- **Noticing Requirement:** The District must mail a notice of proposed rate increases to all affected property owners. The notice must specify the basis of the fee, the reason for the fee, and the date/time/location of a public rate hearing at which the proposed rates will be considered/adopted.
- **Public Hearing:** The District must hold a public hearing prior to adopting the proposed rate increases. The public hearing must be held not less than 45 days after the required notices are mailed.
- **Rate Increases Subject to Majority Protest:** At the public hearing, the proposed rate increases are subject to majority protest. If more than 50% of affected property owners submit written protests against the proposed rate increases, the increases cannot be adopted.

## 2. DEMAND PROJECTIONS

RDN first reviewed historical water consumption data and forecasted the District’s future water demand for FY 2018-2019 through FY 2023-2024. This analysis relied on the use of seasonal autoregressive-moving-average (ARIMA) models. ARIMA models extrapolate future values of a variable resulting from variations in previous values and have two components: an autoregressive component that takes into account previous values of the variable, and a moving-average component which incorporates previous values of the error term for the seasonal and non-seasonal portions of the series. A seasonal ARIMA (p,d,q) (P,D,Q) model includes p lags of the autoregressive component, d levels of integration, and q lags of the moving-average component. The first term with lower case letters refers to the non-seasonal parts of the data, while the second term with upper case letters refers to the seasonal portion for the data. Figure 7 shows the mean per account water consumption for the District for FY 2012-2013 – FY 2017-2018.

*Figure 7. Mean Per Account Water Consumption, FY 2012-2013 – FY 2017-2018*



Per account water consumption decreased as a result of strong and persistent drought conditions after FY 2014-2015. The consumption reduction is apparent in Figure 7, particularly through the middle part of 2015. In order to conduct conservative forecasts that do not overestimate expected revenue from water sales, the sample used for forecasting was limited to the period between FY 2015-2016 and FY 2017-2018.

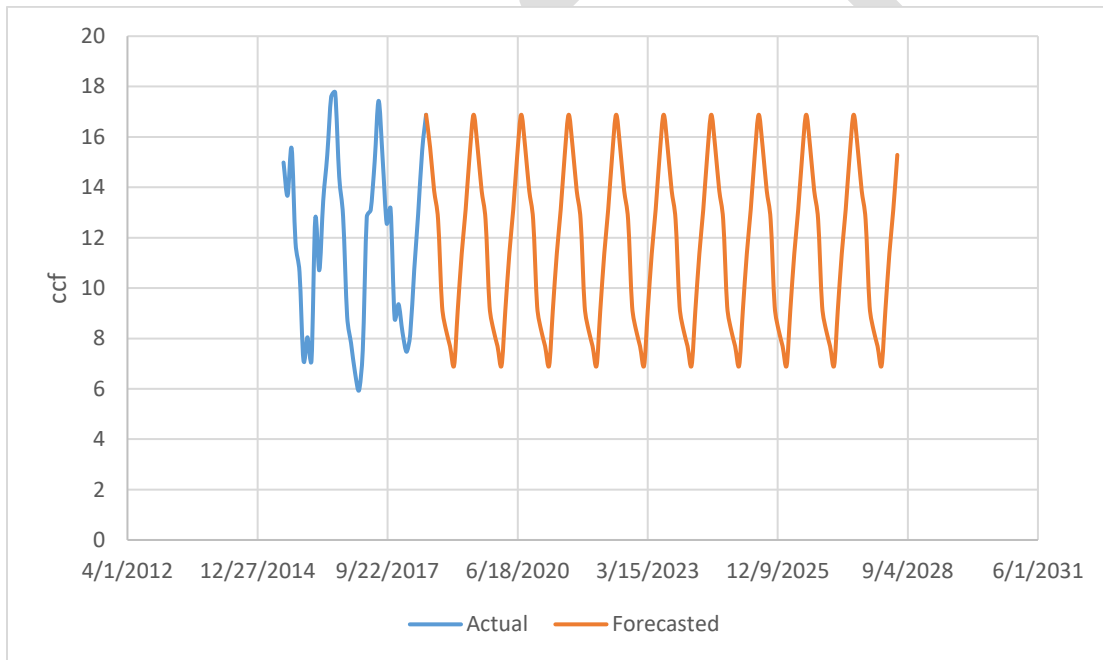
Additionally, it is likely that behavior changes stemming from drought conditions will persist into the future, because much of this consumption reduction is likely the result of upgrading to more efficient appliances and switching to drought-tolerant landscaping. This implies that water consumption from after FY 2014-2015

represents the new baseline for the District. Therefore, monthly billing data from FY 2014-2015 - FY 2017-2018 was utilized when forecasting future water demand.

The Box-Jenkins methodology was applied to the data series for the selected time period. Prior to identification of the ARIMA model, a Dickey-Fuller test confirmed that the per account water consumption series is stationary at the 0.01 percent level. Different combinations of the ARIMA (p,d,q)(P,D,Q) model were tested according to the Akaike Information Criterion through the use of the auto.arima command in R. Ultimately, the ARIMA (0,0,0)(0,1,1) specification of the model was selected.

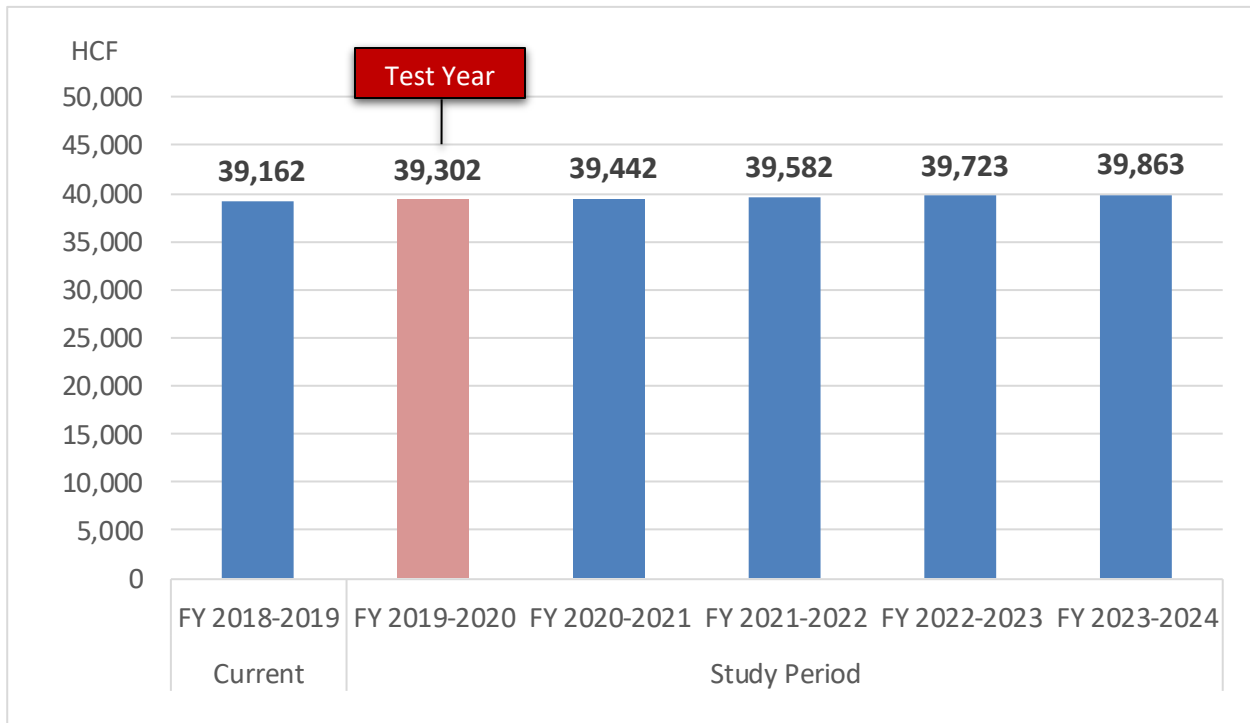
Upon model selection, the plot of the error term appears to be white-noise, suggesting that the ARMA (5,0) specification has captured all the serial correlation of the data. Therefore, the ARIMA (0,0,0)(0,1,1) specification of the model was used for forecasting. The model was fit to monthly data for per account usage, and monthly values for the next ten years were forecasted. Figure 8 presents the mean per account water consumption forecast for an ARMA (5,0) model based on water consumption data from Fiscal Year 2014-2015 to Fiscal Year 2017-2018.

*Figure 8. Mean Per Account Water Consumption, FY 2015 – FY 2028*



At the direction of the District, the number of accounts was projected to increase by one each year. The subsequent number of accounts was multiplied by the forecasted per account water consumption for each month to find the aggregated water consumption. Finally, the monthly data was transformed into annual data. Figure 9 presents projected water demand for the study period. FY 2019-2020 water usage was used for the subsequent COS and rate setting analysis.

Figure 9. Projected Water Demand for AVHCWD, FY 2018-2019 – FY 2023-2024



### 3. FINANCIAL PLANNING AND REVENUE REQUIREMENTS ANALYSIS

Based on the District’s demand projections, revenues from water sales under the current rates were forecasted for the study period. The itemized budget for FY 2018-2019 were carefully reviewed with the District and used as basis to forecast operating and capital expenses for the study period. The escalation factors were calculated for seven independent variables using historical Consumer Price Index (CPI) data from Los Angeles-Riverside-Orange County, CA between 2000 and the most current calendar year, Riverside-San Bernardino CPI data for 2018 (the only year available), and projections by the California Department of Transportation (CADOT), the California Department of Finance (CADOFF), and other rate-setting studies in the immediate area (NBS 2016, 2017<sup>1</sup>). Table 5 displays the projected escalation factors that are used to forecast AVHCWD’s future expenses for the study period. Due to local contingencies, the Cost of Water Inflation Rate is expected to rise at the highest rate, 7.3 percent per year. The Employee Expenses Inflation Rate, which includes salaries, insurance, and payroll taxes, is only expected to rise 1.8 percent per year during the study period. Expenses that are not expected to increase during the study period are assigned to have zero percent escalation.

<sup>1</sup> Victorville Water District Water Rate Resolution and Study, February 2016; Hesperia Water District Water and Sewer Rate Study, November 2017

*Table 5. Estimated Escalation Factors for FY 2018-2019 – FY 2023-2024*

Escalation Factors	FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
Overall Inflation Rate:	2.4%	2.4%	2.4%	2.4%	2.3%	2.3%
Production/Utility/Chemical Inflation Rate:	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Cost of Water Inflation Rate:	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%
Employee Expenses Inflation Rate:	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Equipment Inflation Rate:	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Fuels and Automobile Inflation Rate:	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Construction Inflation Rate:	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
No Escalation:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

For government-owned utilities, the initial measure of whether revenues under existing rates are adequate is made to determine whether such revenues are sufficient to meet the utility’s cash reserve requirements over the study period. To address the District’s concern for unforeseeable capital expenditures, a target for the cash reserve was set at \$500,000. The projected expenses and debt service payments including the cash reserve target were offset by other operating revenues (excluding rate revenues) and interest income to compute revenue requirements for the five-year study period.

The District’s current rates generate sufficient revenues to cover the system’s operating costs and make contribution to their reserve. The District will reach the reserve target of \$500,000 by FY 2020-2021 without any overall revenue increase. Table 6 displays the current year (FY 2018-2019) plus five-year financial planning for AVHCWD under the rates implemented in October 2018. The District’s itemized operating and maintenance (O&M) expenses in the budgetary document; and information on CIP expense and debt service payments obtained from the District were used to create a financial plan for the current plus FY 2019-2020 through FY 2023-2024.



FINANCIAL PLANNING, REVENUE REQUIREMENTS, COST OF SERVICE, AND RATE SETTING ANALYSIS

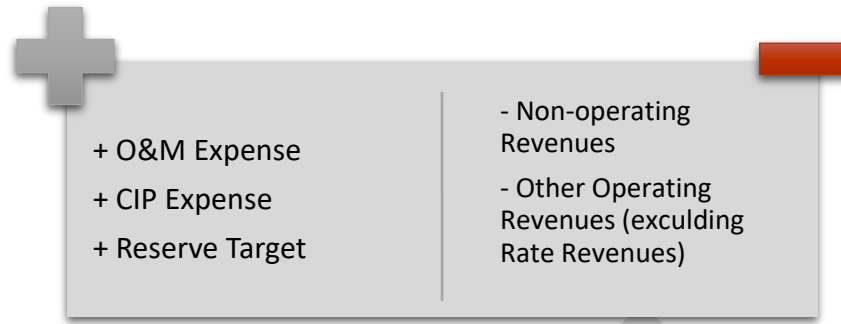
Table 6. Current plus 5-Year Financial Planning Under Current Rates for AVHCWD, FY 2018-2019 – FY 2023-2024

Description	Current FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
<b>Operating Revenues</b>	<b>\$337,073</b>	<b>\$338,164</b>	<b>\$339,256</b>	<b>\$340,347</b>	<b>\$341,438</b>	<b>\$342,530</b>
Water Sales - Existing	\$315,592	\$316,683	\$317,775	\$318,866	\$319,957	\$321,049
Year 2 - 0 %		\$0	\$0	\$0	\$0	\$0
Year 3 - 0 %			\$0	\$0	\$0	\$0
Year 4 - 0 %				\$0	\$0	\$0
Year 5 - 0 %					\$0	\$0
Water Sales	\$315,592	\$316,683	\$317,775	\$318,866	\$319,957	\$321,049
Other Operating Revenues	\$21,481	\$21,481	\$21,481	\$21,481	\$21,481	\$21,481
<b>O&amp;M Expenses</b>	<b>(\$252,110)</b>	<b>(\$257,492)</b>	<b>(\$263,080)</b>	<b>(\$268,878)</b>	<b>(\$274,882)</b>	<b>(\$281,122)</b>
Net Operating Revenues	\$84,963	\$80,673	\$76,176	\$71,469	\$66,557	\$61,407
Non-operating Revenues	\$63	\$63	\$63	\$63	\$63	\$63
<b>Other Obligations</b>	<b>(\$33,100)</b>	<b>(\$33,100)</b>	<b>(\$33,100)</b>	<b>(\$22,000)</b>	<b>(\$22,000)</b>	<b>(\$22,000)</b>
PAYGO	(\$22,000)	(\$22,000)	(\$22,000)	(\$22,000)	(\$22,000)	(\$22,000)
Debt Service	(\$11,100)	(\$11,100)	(\$11,100)	\$0	\$0	\$0
Net Balance from Operations	\$51,926	\$47,636	\$43,139	\$49,533	\$44,620	\$39,471
Beginning of the Year Balance	\$364,749	\$416,675	\$464,311	\$507,450	\$556,982	\$601,602
<b>Ending Balance</b>	<b>\$416,675</b>	<b>\$464,311</b>	<b>\$507,450</b>	<b>\$556,982</b>	<b>\$601,602</b>	<b>\$641,073</b>
Reserve/CIRF	\$112,584	\$163,884	\$215,364	\$267,024	\$318,864	\$370,884
Other Cash Reserves	\$252,165	\$300,427	\$292,086	\$289,958	\$282,738	\$270,189
Cumulative Revenue		\$316,683	\$317,775	\$318,866	\$319,957	\$321,049
Cumulative Net Balance		\$99,562	\$90,775	\$92,671	\$94,153	\$84,091
Cumulative Deficit/Surplus		31.4%	28.6%	29.1%	29.4%	26.2%

Note: Current/FY 2018-2019 revenues are computed based on the water demand projected by RDN and expenses are budgeted by the District

Revenue requirements are computed by adding all expenses including target cash reserve balance offsetting the total amount by non-operating revenues as well as other operating revenues. This computation allows RDN to extract the sole portion of revenue requirements that need to be recovered from the District's water rates collected from monthly billing paid by customers. Figure 10 presents what is included in a computation of revenue requirements.

Figure 10. Revenue Requirements Formula



Forecasted revenue requirements for FY 2019-2020 through FY 2023-2024 are presented in Table 7. The revenue requirement for FY 2019-2020 was used for the subsequent COS and rate setting analysis. Water purchases shown as a direct cost for the amount of \$8,611 was removed from the rate revenue requirements and the COS analysis. This cost was applied to the Tier 4 rate to be recovered from the District’s excess usage in the rate setting analysis. The District’s debt service payments end in FY 2020-2021.

Table 7. Revenue Requirements for AVHCWD, FY 2018-2019 – FY 2023-2024

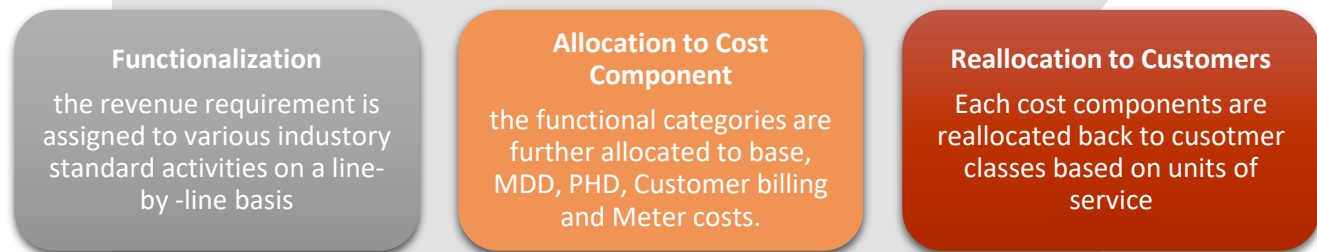
Description	Current FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
		<b>Test Year</b>				
Other Operating Revenues	(\$21,481)	(\$21,481)	(\$21,481)	(\$21,481)	(\$21,481)	(\$21,481)
O&M Expenses	\$252,110	\$257,492	\$263,080	\$268,878	\$274,882	\$281,122
Direct Cost (Water Purchase)	(\$8,000)	(\$8,611)	(\$9,268)	(\$9,975)	(\$10,736)	(\$11,555)
Non-operating Revenues	(\$63)	(\$63)	(\$63)	(\$63)	(\$63)	(\$63)
Other Obligations	\$33,100	\$33,100	\$33,100	\$22,000	\$22,000	\$22,000
PAYGO	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000
Debt Service	\$11,100	\$11,100	\$11,100	\$0	\$0	\$0
Net Balance	\$51,926	\$47,636	\$43,139	\$49,533	\$44,620	\$39,471
<b>Rate Revenue Requirements</b>	<b>\$307,592</b>	<b>\$308,073</b>	<b>\$308,507</b>	<b>\$308,891</b>	<b>\$309,221</b>	<b>\$309,494</b>

## 4. COST OF SERVICE ANALYSIS

The purpose of a Cost of Service (COS) Analysis is to allocate costs among customers commensurate with their service requirements. RDN employed the “base-extra capacity” cost-of-service method promulgated in AWWA’s Manual M1: Principles of Water Rates, Fees, and Charges for the water system, whereby costs are first allocated to individual functions or activities then the cost of each function is distributed to appropriate system parameters to calculate unit costs. The unit costs are then used to distribute system costs to each customer class based on their usage characteristics. The results of the COS form a reasonable and equitable basis for designing rates. Figure 11 displays a typical flow of a process for the COS analysis.

AVHCWD currently serves one customer class – Single Family Residential customers. The cost of serving public fire protection service was also determined through this analysis.

*Figure 11. A typical Flow for Cost of Service Analysis Process*



The first step in the COS analysis is to allocate each cost to functional cost components on the basis of the parameter and characteristics of the cost. The allocation of costs into water industry standard functional components provides a means for distributing such costs to the customers on the basis of their respective responsibilities for each particular type of service. The water system comprises of various facilities; each designed and operated to fulfill a given function. The functions commonly used for a COS analysis include: source of supply, pumping, water treatment, transmission and distribution, customer accounts, and administrative and general.

Figure 12 and Figure 13 presents distributions of AVHCWD’s functionalized O&M expenses and CIP expenses respectively.

Figure 12. Functionalized O&M Costs

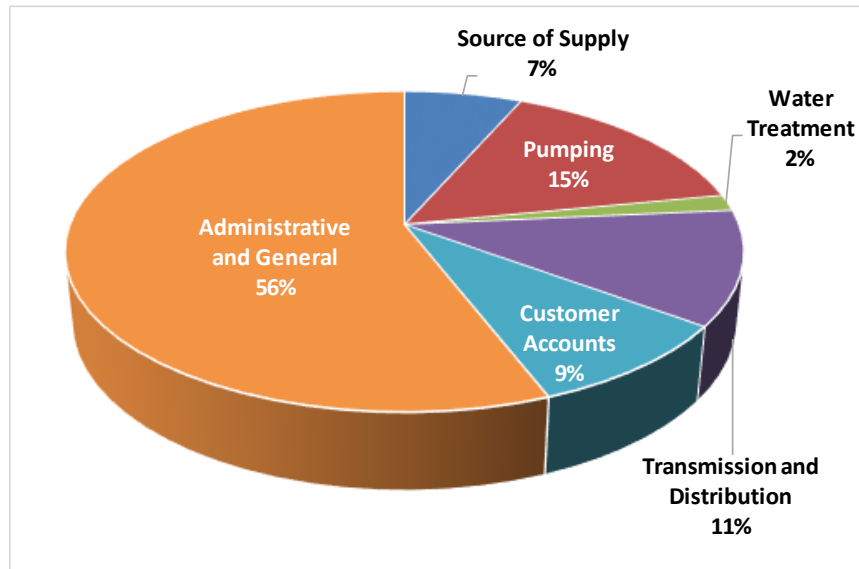
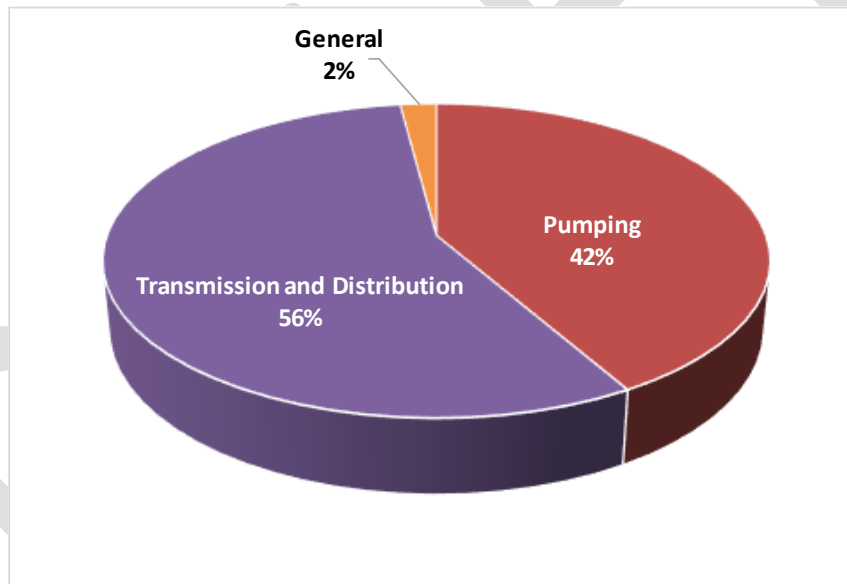


Figure 13. Functionalized Plant Asset/CIP Cost Allocation



For the system to provide adequate service to its customers at all times, it must be capable of meeting not only the annual volume requirements, but also the maximum demand - the peak rate at which water is consumed. Therefore, the capacities of the various facilities must meet the maximum coincidental demand of all customers. Each water service facility within the system has an underlying average demand, exerted by the customers for whom the base cost component applies. For those facilities designed solely to meet average daily demand, 100 percent of the costs should go to the base cost component. Extra capacity requirements associated with demand in excess of average use consist of maximum daily and maximum hourly demand subcomponents. max day demand (MDD) and peak hourly demand (PHD) factors were estimated because the District’s daily and hourly usage data were not available. The MDD factor was computed using the District’s 3-year average monthly water usage data shown below:

$$\text{Peaking Factor} = \frac{\text{Maximum Monthly Water Use}}{\text{Average Monthly Water Use}}$$

On average the District’s customers used the least amount of water in December compared to the highest usage in July. Using the District’s available data, the overall District MDD factor was computed to be 1.43. Based on the MDD factor, RDN estimated the average hourly flow during MDD and multiplied by a peaking factor of 1.5 (the lowest factor recommended by the State Board’s Division of Drinking Water<sup>2</sup>) to compute PHD factor. The PHD factor used for the analysis is 2.14.

Table 8 summarizes the District’s O&M cost allocations to functions and to the cost components.

**Table 8. Functionalized O&M Cost Allocation to Cost Components, FY 2019-2020 (Test Year)**

O&M Cost Allocation	Total Cost	Base	Max Day	Max Hour	Meters	Customer Service	Public Fire Protection Service
<b>Source of Supply</b>	\$8,355	\$8,355	\$0	\$0	\$0	\$0	\$0
<b>Pumping</b>							
Purchased Power	\$23,079	\$10,776	\$4,610	\$7,693	\$0	\$0	\$0
Other	\$16,387	\$7,652	\$3,273	\$5,462	\$0	\$0	\$0
<b>Water Treatment</b>							
Chemicals	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Other	\$4,181	\$4,181	\$0	\$0	\$0	\$0	\$0
<b>Transmission and Distributions</b>							
Storage	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Transmission Mains	\$12,705	\$8,899	\$3,806	\$0	\$0	\$0	\$0
Distribution Mains	\$14,840	\$6,929	\$2,964	\$4,947	\$0	\$0	\$0
Hydrants	\$2,134	\$0	\$0	\$0	\$0	\$0	\$2,134
Other	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Customer Accounts</b>							
Meters and Services	\$10,671	\$0	\$0	\$0	\$10,671	\$0	\$0
Billing	\$12,564	\$0	\$0	\$0	\$0	\$12,564	\$0
<b>Administrative and General</b>							
Salaries	\$75,294	\$28,343	\$10,291	\$10,666	\$10,934	\$12,874	\$2,187
Employee Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Insurance	\$8,707	\$3,278	\$1,190	\$1,233	\$1,264	\$1,489	\$253
Other	\$59,933	\$22,561	\$8,191	\$8,490	\$8,703	\$10,247	\$1,741
<b>Total</b>	<b>\$248,851</b>	<b>\$100,974</b>	<b>\$34,325</b>	<b>\$38,490</b>	<b>\$31,572</b>	<b>\$37,174</b>	<b>\$6,314</b>

Note: The source of supply cost shown above excludes water purchase cost of \$8,611, which was applied to the Tier 4 rate as a direct cost to be recovered from the Tier 4 usage

Similar to O&M expenses, RDN allocates existing fixed assets (which serve as a proxy for the current capital investments) directly to cost components to the extent possible. The allocation of costs into the cost components provides a basis for annual investment in water system facilities. Table 9 shows the allocation of system investment serving water customers. The total net system investment of \$376,257 shown represents the net book value of the District’s fixed assets (the original investment cost minus accumulated depreciation) ending June 30, 2017. Using the distribution of total net system investment across the functional cost components, RDN allocated the CIP expense of \$22,000 and the scheduled debt service payments of \$11,000 for the test year FY 2019-2020 (Test Year).

<sup>2</sup> Titles 17 and 22 California Code of Regulations California Regulations Related to Drinking Water, Page 195

Table 9. Functionalized Fixed Asset Allocation to Cost Components, FY 2019-2020 (Test Year)

Asset Cost Allocation	Total Cost	Base	Max Day	Max Hour	Meters	Customer Service	Public Fire Protection Service
<b>Source of Supply</b>							
Land	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Reservoir	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pumping							
<b>Land</b>	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Structures	\$938	\$438	\$187	\$313	\$0	\$0	\$0
Electrical Pumping Equipment	\$77,970	\$36,407	\$15,573	\$25,990	\$0	\$0	\$0
<b>Other Pumping Equipment</b>	\$77,970	\$36,407	\$15,573	\$25,990	\$0	\$0	\$0
Water Treatment							
Structures	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Water Treatment Plant	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Transmission and Distributions							
Land	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Structures</b>	\$51,986	\$24,274	\$10,383	\$17,329	\$0	\$0	\$0
Distribution Storage	\$52,924	\$24,712	\$10,570	\$17,641	\$0	\$0	\$0
Transmission Mains	\$51,986	\$36,411	\$15,575	\$0	\$0	\$0	\$0
<b>Distribution Mains</b>	\$51,986	\$24,274	\$10,383	\$17,329	\$0	\$0	\$0
Services	\$938	\$0	\$0	\$0	\$0	\$938	\$0
Meters	\$938	\$0	\$0	\$0	\$938	\$0	\$0
Hydrants	\$938	\$0	\$0	\$0	\$0	\$0	\$938
<b>General</b>							
Land	\$4,873	\$1,834	\$666	\$690	\$708	\$833	\$142
Structures	\$938	\$353	\$128	\$133	\$136	\$160	\$27
Other	\$1,875	\$706	\$256	\$266	\$272	\$321	\$54
<b>Total Plant Assets</b>	\$376,257	\$185,817	\$79,294	\$105,680	\$2,054	\$2,252	\$1,161
<b>Rate Funded CIP Cost Allocation</b>	\$22,000	\$10,865	\$4,636	\$6,179	\$120	\$132	\$68
<b>Debt Service Cost Allocation</b>	\$11,100	\$5,482	\$2,339	\$3,118	\$61	\$66	\$34

The unit costs for peaking cost components were computed by dividing the total cost of the cost component by the corresponding unit of service. Customer related costs such as reading meters and replacement of meters are allocated on the basis of the number of equivalent meters based on estimated Meter-and-Service ratios. The meter service cost on various meter sizes are compared to the cost of 5/8-inch meter and established cost ratios (Table 10). The equivalent meter ratios adopted in this analysis are consistent with those established in AWWA M6 Manual, “Water Meters - Selection, Installation, Testing and Maintenance.”

Table 10. Estimated Equivalent Meter-And-Service Ratios

Meter Size	Ratios
5/8-in	1.0
3/4-in	1.1
1-in	1.4
1 1/2-in	1.8
2-in	2.9
3-in	11.0
4-in	14.0

The reserve contribution was allocated to each cost component using the same distribution for those of CIP cost allocations. Non-rate revenues such as non-operating revenues and other operating revenues were subtracted from the total amount to offset the costs and to compute rate revenue requirements that need to be recovered from customer water rates.

*Table 11. Unit Cost of Service by Functional Cost Component*

Cost Allocation Summary	Total Cost	Base	MDD	PHD	Meters	Customer Service	Public Fire Protection Service
O&M Cost Allocation	\$248,851	\$100,974	\$34,325	\$38,490	\$31,572	\$37,174	\$6,314
CIP Cost Allocation	\$22,000	\$10,865	\$4,636	\$6,179	\$120	\$132	\$68
Debt Service	\$11,100	\$5,482	\$2,339	\$3,118	\$61	\$66	\$34
Reserve Contributions	\$47,666	\$23,540	\$10,045	\$13,388	\$260	\$285	\$147
Total	\$329,617	\$140,861	\$51,346	\$61,175	\$32,013	\$37,658	\$6,564
Non-rate Revenues	(\$21,544)	(\$10,640)	(\$4,540)	(\$6,051)	(\$118)	(\$129)	(\$66)
<b>Rate Revenue Requirements</b>	<b>\$308,073</b>	<b>\$130,221</b>	<b>\$46,806</b>	<b>\$55,124</b>	<b>\$31,896</b>	<b>\$37,529</b>	<b>\$6,497</b>
Units of Service		39,162	126	184	319	3,672	-
<b>Cost per Unit by Cost Components</b>		<b>\$3.33</b>	<b>\$371.25</b>	<b>\$299.97</b>	<b>\$99.92</b>	<b>\$10.22</b>	<b>\$6,497</b>

Note: The source of supply cost shown above excludes water purchase cost of \$8,611, which was applied to the Tier 4 rate as a direct cost to be recovered from the Tier 4 usage

The cost of Public Fire Protection (PFP) service was identified through the COS analysis and reallocated to single family residential customers and commercial customers. Table 12 shows the result of the COS analysis.

*Table 12. Results of COS Analysis*

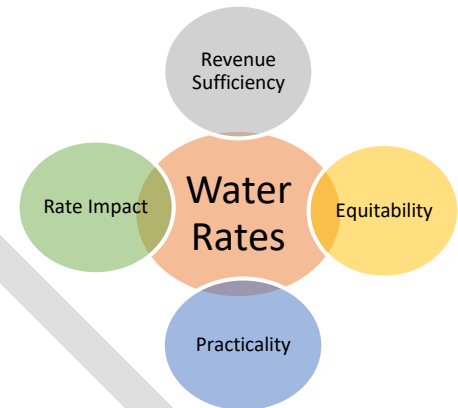
Customer Class	Cost Allocation	Reallocation of PFP	Final Cost Allocation	% Distribution
<b>Single Family Residential</b>	\$266,900	\$35,623	\$302,523	<b>98%</b>
<b>Inactive Accounts</b>	\$4,896	\$654	\$5,550	<b>2%</b>
<b>Public Fire Protection</b>	\$36,276	\$0	\$0	<b>0%</b>
<b>Total</b>	<b>\$308,073</b>	<b>\$36,276</b>	<b>\$308,073</b>	<b>100%</b>

## 5. RATE SETTING ANALYSIS

The final step of a rate study is designing rates. Rates must be designed to equitably recover the rate revenue requirements from each customer given the projected customer demand identified as a result of the COS analysis.

In reviewing District's water rates and finances, RDN used the following criteria in developing our recommendations:

- 1) Revenue Sufficiency: Rates should recover the annual cost of service and provide revenue stability.
- 2) Rate Impact: While rates are calculated to generate sufficient revenue to cover all costs, they should be designed to minimize, as much as possible, the impacts on ratepayers.
- 3) Equitability: Rates should be fairly allocated among all customers based on their estimated demand characteristics.
- 4) Practicality: Rates should be simple in form and, therefore, adaptable to changing conditions, easy to administer, and easy to understand.



### Recommendations for Rate Modifications

RDN performed Revenue Analysis and Revenue Requirements Analysis to determine if the current rates will recover sufficient revenues to cover costs incurred to operate a system. AVHCWD's current rates generate sufficient revenues to cover all costs including O&M expenses, CIP expense, and debt service payments; and to build up cash reserves to the target level. The District will reach its target of \$500,000 by FY 2020-2021 without further rate increases. Reserves can play a significant role in addressing current and future challenges facing utility systems, such as demand volatility, water supply costs, large capital requirements, and potential liabilities from system failures associated with aged infrastructure<sup>3</sup>. For FY 2019-2020 (test year), the rate revenue requirements are estimated to be \$308,073. RDN's proposed rates reconfigure the District's rate structure and meet the requirements for the District to operate a financially viable water system.

RDN recommends the following:

- Reduce the number of tiers from five to four and create nexus between the costs and tiered rates to validate how incremental cost differentials were established
- Recover the water purchase cost of \$8,611 from Tier 4 usage and create incremental rate differential between Tier 3 and Tier 4
- Create fixed monthly base charges to reflect service requirements that vary depending on the size of the meter
- Build inactive meter charges based on their service requirements (should not include peaking factors since they are not in use)

<sup>3</sup> American Water Works Association. Cash Reserve Policy Guidelines, 2018.



- Consider removing the \$5.00 surcharge if the District determines there is no need for additional reserves (this is not reflected in the following analyses – the revenues in the financial plans under the current and proposed rates include revenues from this surcharge)

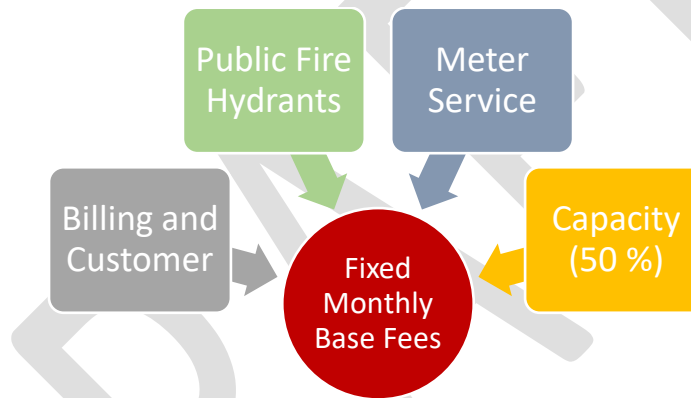
The following section describes how these modifications were made in detail.

### Fixed Monthly Base Charge

All customers of the District pay the same fixed service charge regardless of the meter size under the current rates. The capacity and service components of the fixed charge should reflect differences in the requirements, which are dependent on the meter sizes.

RDN configured fixed monthly charges to include four components (Figure 14): billing and customer costs, public fire protection (PFP) direct costs, meter service costs, and 50 percent of capacity costs identified in the COS analysis.

Figure 14. Proposed Fixed Monthly Base Charge Components



The components for billing and customer costs and the public fire protection (PFP) service costs should be borne by all customers evenly regardless of the size of their meters. The costs in the meter service and capacity components vary depending on the sizes of meters installed in their property. The meter service costs were distributed among different meter sizes using estimated equivalent meter-and-service ratios (Table 10). The capacity components of costs are scaled and distributed to customers based on factors using demand capacity factors expressed in hydraulically equivalent meter ratios shown in Table 13. The formulas below are used to compute five different measures to set the fixed rates.

$$\text{Billing and Customer Component} = \frac{\text{Billing and Collection Costs}}{\text{Total Number of Yearly Bills}}$$

$$\text{Capacity Component} = \frac{\text{Capacity Costs}}{\text{\# of Hydraulically Equivalent Meters}} \times 50\%$$

$$\text{Meter Service Component} = \frac{\text{Meter Service Costs}}{\text{\# of Equivalent Meters}}$$

$$\text{Public Fire Protection Service} = \frac{\text{Public Fire Protection Service Costs}}{\text{Total \# of Accounts}}$$

Table 13. Hydraulically equivalent meter ratios

Meter Size	AWWA Ratio
5/8-in	1.00
3/4-in	1.50
1-in	2.50
1 1/2-in	5.00
2-in	8.00

Table 14 presents the fixed monthly base charges by meter size proposed by RDN for FY 2019-2020 through FY 2023-2024. Capital Improvement Fees and Surcharges are kept unchanged from the current rates.

Table 14. Proposed Fixed Monthly Base Charges by Meter Size and Customer Class for AVHCWD, FY 2019-2020 – FY 2023-2024

Meter Size	Rates				
	FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
<b>Active Meters</b>	<b>Test Year</b>				
5/8-in	\$32.91	\$32.91	\$32.91	\$32.91	\$32.91
1-in	\$55.09	\$55.09	\$55.09	\$55.09	\$55.09
<b>Capital Improvement Fees</b>	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00
<b>Surcharges</b>	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00
<b>Inactive Meters</b>	\$20.01	\$20.01	\$20.01	\$20.01	\$20.01

**Volumetric Charges**

The proposed volumetric charges consist of four tiers. RDN created a strong nexus between the tiered rates and the costs that are incurred to meet different levels of service and capacity requirements. The water purchase cost was applied to the Tier 4 rate to send large users a price signal for conservation purposes. The water purchase cost incurs because the District buys replacement water when the water demand exceeds their Free Production Allowance (FPA) from Mojave Basin. This cost can be eliminated if District customers continuously make conservation effort and maintain usage within the FPA.

**Tier Pricing**

Tiered rates are an effective way to promote conservation if designed properly. The tiered rate pricing must be linked to the costs that cause incremental differences between the tiers. Pricing for Tier 1, 2, and 3 was computed using unit costs of the peaking cost components, which include base, MDD, and PHD. The unit costs were calculated by dividing the total cost of each cost component by the system total usage. Unit costs were used to create cost differentials between the three tiers expressed in ratios as follows:

$$\text{Tier 1} - 1.00 \quad \text{Tier 2} - 1.59 \quad \text{Tier 3} - 2.01$$

Using the ratios developed, Tier 1 rate was computed using the following formula:

$$\text{Tier 1 Rate} = \frac{\text{Total Consumption Based Revenue Requirement for Customers}}{\text{Tier 1 Sales} + (\text{Tier 2 Sales} \times 1.59) + (\text{Tier 3 Sales} \times 2.01)}$$

Accordingly, Tier 1 through Tier 3 rates were set at \$2.40 /hcf, \$3.81/hcf, and \$4.82/hcf, respectively.

Tier 4 rate was created by adding the water purchase cost to the Tier 3 rate. The District purchased 12 AF (approximately 5,200 hcf) of replacement water during FY 2016-2017 and the District projects the amount of purchased replacement water will stay at this level for the five-year study period. RDN allocated approximately 5,000 hcf to the Tier 4 water usage based on the District’s FY 2017-2018 consumption pattern and computed a unit cost of \$1.69 per hcf for the additionally purchased water (the purchased cost of \$8,610.70 divided by the estimated Tier 4 usage of 5,000 units). This cost was added to Tier 3 rate to create an incremental cost difference between Tier 3 and Tier 4. Tier 4 rate was therefore set at \$6.51.

*Tier Width*

The Tier 1 width (9 hcf) was set to represent indoor water usage and protect small users as well as low income customers by providing water at an affordable rate. The District’s water usage data for FY 2017-2018 indicated that during off-peak season (November to April), monthly average usage is approximately 9 hcf per customer account. Since customers use significantly less water for landscaping during winter months, the average usage of off-peak season is presumed as a good indicator for indoor water usage. The upper limit of Tier 2 was set at 19 hcf. On average, approximately 85 percent of District customers fall within this tier. The upper limit of Tier 3 was set at 35 hcf and approximately 95 percent of customers stay within this tier. Only 5 percent of District customers pay the Tier 4 rate for the usage over 35 hcf under the proposed rates; however, on average 30 percent of the District usage comes from this tier. RDN allocated approximately 5,000 hcf of water to Tier 4 since that is the amount of replacement water purchased for FY 2016-2017. The District projects that customers will maintain this level of additional water demand during the five-year study period. Figure 15 presents the proposed tier rates and the tier widths established for the study period.

*Figure 15. Composition of Tier Rates for AVHCWD, FY 2019-2020*

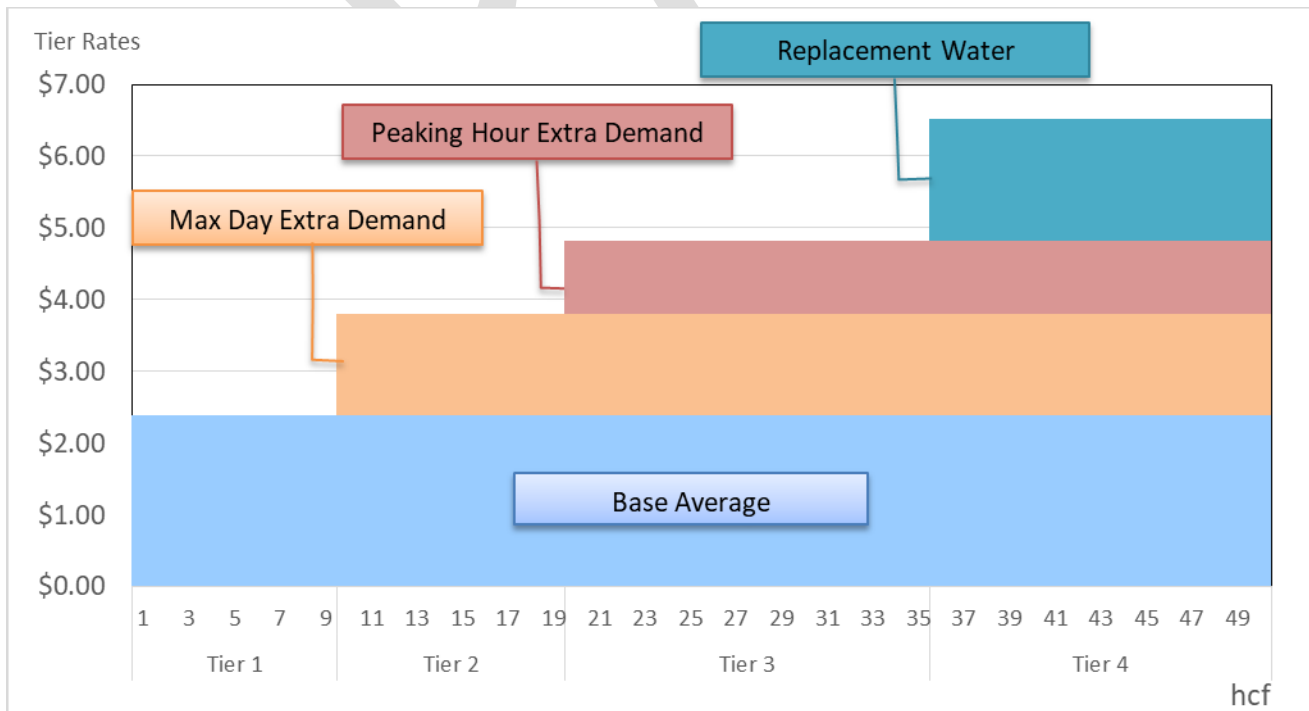


Table 15 displays the volumetric tiered rate structure for AVHCWD proposed by RDN.

Table 15. Proposed Volumetric Tier Rates and Widths for AVHCWD, FY 2019-2020 – FY 2023-2024

Tier	Width (in hcf)	Rates				
		FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
<b>Test Year</b>						
Tier 1	up to 9 hcf	\$2.40	\$2.40	\$2.40	\$2.40	\$2.40
Tier 2	10 to 19 hcf	\$3.81	\$3.81	\$3.81	\$3.81	\$3.81
Tier 3	20 to 35 hcf	\$4.82	\$4.82	\$4.82	\$4.82	\$4.82
Tier 4	36+ hcf	\$6.51	\$6.51	\$6.51	\$6.51	\$6.51

### Financial Plan after Rate Restructuring

A summary of rate revenues generated from the proposed volumetric and fixed monthly charge is presented in Table 16. Over the five-year period, the volumetric charge will produce about 44 percent of the rate revenues. The fixed base charge will produce about 56 percent of the total revenue. Capital Improvement Fees and surcharges are kept unchanged for the study period.

Table 16. Summary of Rate Revenue Projections by Types of Charges under Proposed Rates

Types of Revenues	FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
<b>Test Year</b>					
<b>Volumetric Charge</b>					
Total Usage	39,302	39,442	39,582	39,723	39,863
Single Family Residential					
Tier 1	\$50,882	\$51,063	\$51,245	\$51,426	\$51,608
Tier 2	\$30,465	\$30,574	\$30,682	\$30,791	\$30,900
Tier 3	\$23,970	\$24,055	\$24,141	\$24,226	\$24,312
Tier 4	\$33,180	\$33,299	\$33,417	\$33,535	\$33,653
<b>Total Revenue from Volumetric Charges</b>	<b>\$138,497</b>	<b>\$138,991</b>	<b>\$139,485</b>	<b>\$139,978</b>	<b>\$140,472</b>
<b>Fixed Charge</b>					
Single Family Residential					
5/8-in	\$99,129	\$99,129	\$99,129	\$99,129	\$99,129
1-in	\$22,476	\$23,137	\$23,798	\$24,459	\$25,120
Inactive Accounts					
5/8-in	\$5,282	\$5,282	\$5,282	\$5,282	\$5,282
<b>Total Revenue from Volumetric Charges</b>	<b>\$126,886</b>	<b>\$127,548</b>	<b>\$128,209</b>	<b>\$128,870</b>	<b>\$129,531</b>
<b>CIP Charge</b>	<b>\$34,200</b>	<b>\$34,320</b>	<b>\$34,440</b>	<b>\$34,560</b>	<b>\$34,680</b>
<b>Surcharge</b>	<b>\$17,100</b>	<b>\$17,160</b>	<b>\$17,220</b>	<b>\$17,280</b>	<b>\$17,340</b>
<b>Total Rate Revenues</b>	<b>\$316,683</b>	<b>\$318,018</b>	<b>\$319,353</b>	<b>\$320,688</b>	<b>\$322,023</b>

Table 17 displays the District’s financial plan under proposed rates. The new rate structure will generate sufficient revenues for the next five years and accrue cash reserves of \$644,013 by the end of the study period, FY 2023-2024.

*Table 17. Financial Plan under Proposed Rates for AVHCWD, FY 2019-2020 – FY 2023-2024*

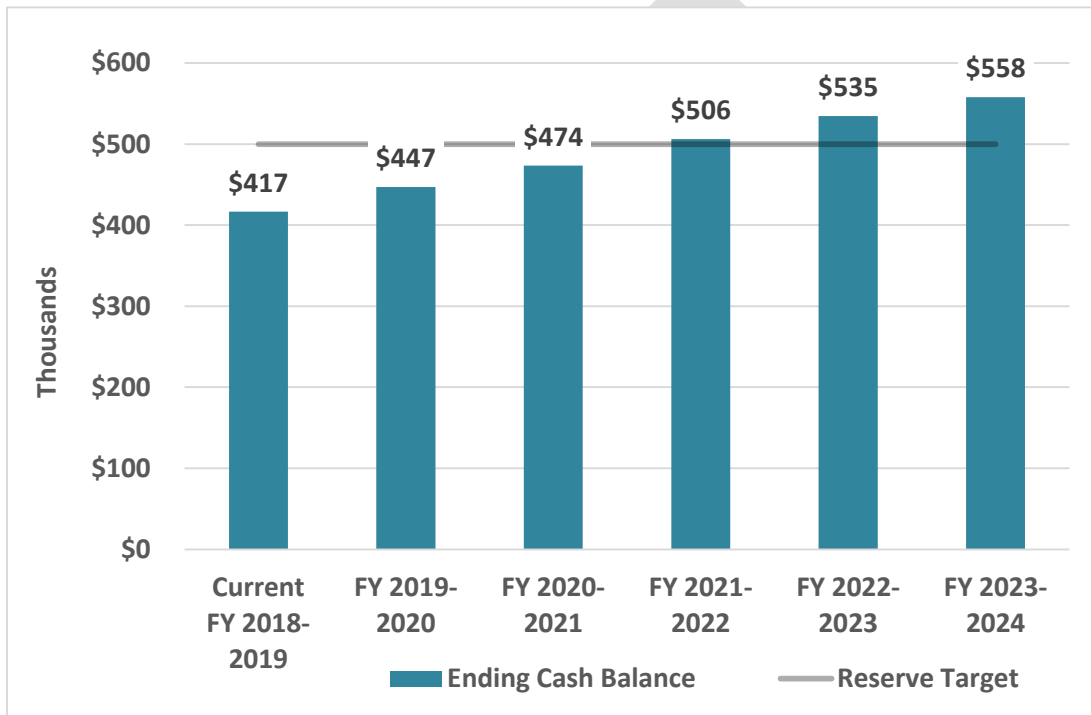
Description	Current FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022	FY 2022-2023	FY 2023-2024
<b>Operating Revenues</b>	<b>\$337,073</b>	<b>\$338,164</b>	<b>\$339,499</b>	<b>\$340,834</b>	<b>\$342,169</b>	<b>\$343,504</b>
Water Sales - Proposed	\$315,592	\$316,683	\$318,018	\$319,353	\$320,688	\$322,023
Other Operating Revenues	\$21,481	\$21,481	\$21,481	\$21,481	\$21,481	\$21,481
<b>O&amp;M Expenses</b>	<b>(\$252,110)</b>	<b>(\$257,462)</b>	<b>(\$263,018)</b>	<b>(\$268,780)</b>	<b>(\$274,746)</b>	<b>(\$280,944)</b>
Net Operating Revenues	\$84,963	\$80,703	\$76,482	\$72,054	\$67,423	\$62,559
Non-operating Revenues	\$63	\$63	\$63	\$63	\$63	\$63
<b>Other Obligations</b>	<b>(\$33,100)</b>	<b>(\$33,100)</b>	<b>(\$33,100)</b>	<b>(\$22,000)</b>	<b>(\$22,000)</b>	<b>(\$22,000)</b>
PAYGO	(\$22,000)	(\$22,000)	(\$22,000)	(\$22,000)	(\$22,000)	(\$22,000)
Debt Service	(\$11,100)	(\$11,100)	(\$11,100)	\$0	\$0	\$0
Net Balance from Operations	\$51,926	\$47,666	\$43,445	\$50,118	\$45,487	\$40,623
Beginning of the Year Balance	\$364,749	\$416,675	\$464,341	\$507,786	\$557,903	\$603,390
<b>Ending Cash Balance</b>	<b>\$416,675</b>	<b>\$464,341</b>	<b>\$507,786</b>	<b>\$557,903</b>	<b>\$603,390</b>	<b>\$644,013</b>
Cumulative Revenue		\$316,683	\$634,702	\$954,055	\$1,274,743	\$1,596,766
Cumulative Net Balance		\$99,592	\$143,037	\$193,154	\$238,641	\$279,264
Cumulative Deficit/Surplus		31.4%	22.5%	20.2%	18.7%	17.5%

## 6. CONCLUSION

The Financial Planning, Revenue Requirements, Cost of Service, and Rate Setting Analysis proposes modifications to the District’s water rates. A summary of findings and recommendations are as follows:

- The District’s current rates generate sufficient revenues to cover the system’s costs including O&M expense, CIP expense, and debt service payments and accrue the cash balance to the level of reserves the District wishes to maintain by FY 2020-2021. RDN recommends removing the monthly surcharge of \$5.00 if the District determines no additional CIP projects are needed – the District will still meet the reserve target of \$500,000 by the FY 2021-2022 without the surcharge.

Figure 16. Reserve Balance Projection without \$5.00 Surcharge



- The District currently charges all customers the same fixed monthly base fee which does not reflect various levels of service and capacity requirements of different meter sizes. RDN recommends implementation of fixed monthly base charges that are dependent on the meter size; however, this will create significant impact on customers with 1-inch meter. If the District decides to implement new tiered rate structure and keep the same fixed charge for all customers as a phase-in approach for the test year, the fixed service charge will be set for \$35.56 (excludes \$10.00 Capital Improvement Fee and \$5.00 surcharge) for all active customers. The fixed monthly service charge for inactive meters should be kept at \$20.01 because of their service requirements.
- The District current rate structure consists of five arbitrarily set tiers. RDN recommends reducing the number of tiers from five to four and creating a strong nexus between the costs and tier rates to justify the cost differentials among tiers.