Stantec

East Bay Municipal Utility District

Water System Capacity Charge Study

June 1, 2021

Mr. Richard Lou, Principal
Management Analyst
East Bay Municipal Utility
District
375 Eleventh St.
Oakland, CA 94607

Re: Water System Capacity
Charge Study - Final Report

Dear Mr. Lou,

Stantec and Hildebrand Consulting are pleased to provide you with this report of findings from the Water System Capacity Charge Study (Study) completed for the East Bay Municipal Utility District. We appreciate the fine assistance provided by you and all the members of the District staff who participated and contributed to the Study.

The key findings and recommendations are outlined in the enclosed report and provide a framework for the District's continued use of water system capacity charges to fund water system infrastructure necessary to serve new water connections.

If you or others at District have any questions, please do not hesitate to call me at (202) 585-6391 or send an email to david.hyder@stantec.com. We appreciate the opportunity to be of service to the District and look forward to the possibility of doing so again in the future.

Sincerely,

David Hyder
Senior Principal/Project Manager

William Zieburtz
Director/Project Director

Mark Hildebrand
Subconsultant Hildebrand Consulting

Enclosure

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EXECUTIVE SUMMARY

This Executive Summary presents an overview of the results of the Comprehensive Water System Capacity Charge Study (Study) that was completed for the East Bay Municipal Utility District (hereafter referred to as EBMUD or the District). While the Executive Summary presents the primary findings and recommendations developed during the study, the full report outlines all of the key assumptions, methodology and detailed analyses completed to arrive at the results of the Study and should be referenced to gain a full understanding of the analysis.

Background

The District utilizes Water System Capacity Charges (SCC) to recover proportional shares of the costs of water supply, treatment, and distribution system investments from new customers joining the water system or customers requiring increased system capacity. The SCCs are designed to recover the proportionate capacity-related costs of new connections on the water system. EBMUD's SCC program recognizes differences in typical demand profiles and capacity costs across the three regions within the District's service area. This SCC Study provides a comprehensive review of the District's SCC calculation methodology, including the calculation of the unit cost per 100 gallons per day, as well as the demand basis for assessing the charge to individual applicants.

The formula used by the District to calculate SCCs is shown in Figure ES-**1**. Ultimately, the SCC is determined by multiplying the unit cost of system capacity by the customer's estimated capacity requirement, both of which are calculated specifically for each of the three regions.

Figure ES-1: SCC Formula

Our review and recommendations related to these two primary components of the SCC are outlined in the following sections.

Unit Cost Determination

SCC unit costs were evaluated based on the existing systemwide, regional, and future water supply assets and their respective capacity to provide service to the District's customers. Based on our review of the current methodology, industry standards and the District's historical and ongoing investments in the water system, the following changes are recommended for the determination of the unit cost.

- Update existing asset valuation from replacement cost new (RCN) for all assets to a mix of RCN and a replacement cost new less depreciation (RCNLD) to account for the ongoing investments occurring within some asset classes.

- Update the asset register to include all previously completed future water supply projects and include these costs within the buy-in component of the SCC unit costs.
- Update the future water supply cost component of the SCC unit cost calculations to only reflect projects that are yet to be completed.
- Update the assumed system-wide and regional potable consumption to reflect the latest projections from the District's 2050 Demand Study.

Table ES-1 presents the summary of the updated FY 2022 unit costs for each of the individual SCC components based on the methodology outlined above. The current total unit costs are provided for comparison purposes.

Table ES-1: Updated SCC Unit Costs for FY 2022

	Unit Costs $/100 gpd				
Region	**System-Wide Buy-In**	**Regional Buy-In**	**Future Water Supply**	**Total**	**Current Total**
Region 1	$3,575	$1,787	$798	**$6,160**	**$6,463**
Region 2	$3,575	$4,585	$798	**$8,958**	**$8,708**
Region 3	$3,575	$2,720	$798	**$7,093**	**$6,903**

Estimated Customer Use

Currently, the District assesses SCCs to new customers based on an assumed average water use for single family residential (SFR), multi-family residential (MFR), and non-residential customer classes. As part of this Study, recent water use data from 2005 to 2017 was analyzed to update typical water use characteristics for each customer class, both system-wide and in each region. Based on our review of the historical usage patterns, the District's current methodology for developing estimated customer use by customer class and industry standards, the following changes are recommended for calculating projected customer usage for meters under 2":

- The recommended methodology calculates the average water use by customer class and meter size based on historic observed water consumption from detailed EBMUD billed water consumption data and the EBMUD 2020 Demand Study analysis. This would replace the existing approach which calculates the average water use for a 5/8" and 3/4" metered customer and then escalates the projected water use based on an AWWA meter equivalence schedule and uses updated information to more closely reflect water use for larger meter sizes.
- The recommended methodology proposes not to distinguish between regions with respect to the assumed consumption level for MFR dwelling units but would differentiate the estimated demand based on MFR dwelling unit size. Observed MFR dwelling unit water use was relatively consistent between the SCC regions, so the analysis of more detailed MFR water use by dwelling size lends to the combination of the SCC regions. For the analysis, dwelling unit size data was derived from county records and linked to MFR water use. This updated use would replace the existing methodology which calculates a single use for all multi-family residential units, regardless of size, but differentiated by region.

The following tables present the estimated water use based on our recommended approach and analysis and for application within the assessment of the SCC for each customer class.

Table ES-2: Single Family Customer Water Use (gallons per day)

	Meter Size		
Region	**5/8" & 3/4"**	**1"**	**1 ½"**
Region 1	190	270	345
Region 2	210	450	580
Region 3	490	750	965

Table ES-3: Multi-Family Customer Water Use (gallons per day)

	Dwelling Unit Size	
Region	**< 500 sq. ft**	**> 500 sq. ft**
Service Area Wide	95	120

Table ES-4: Non-Residential Customer Water Use (gallons per day)

	Meter Size			
Region	**5/8"**	**3/4"**	**1"**	**1 ½"**
Region 1	246	402	765	1,995
Region 2	334	478	856	2,430
Region 3	460	704	1,254	3,089

The proposed SCCs are calculated by applying the formula shown in Figure ES-**1**. The unit cost for each region was multiplied by the estimated water use for each customer class and meter size or dwelling unit. Estimated water use was derived from an analysis of billed water consumption data, the 2020 Demand Study and county records. Table ES-5 summarizes the current and proposed SCCs by customer class and meter size. The table demonstrates that the proposed SCCs for all customer classes are lower than the charges currently assessed by the District. For SFR, MFR and non-residential applicants, the proposed SCC will be reduced for nearly all customers from 5% to over 50% depending on the customer class and meter size, except for the nonresidential 1½" meter size, which will remain about the same as the current SCC.

Table ES-5: Current and Proposed SCC Schedule

Customer Type	Region	Current SCC	Proposed SCC
SFR 3/4"	Region 1	$18,100	$11,705
	Region 2	$31,350	$18,811
	Region 3	$40,040	$34,754
SFR 1"	Region 1	$30,230	$16,633
	Region 2	$52,350	$40,309
	Region 3	$66,870	$53,195

Customer Type	Region	Current SCC	Proposed SCC
SFR 1 ½"	Region 1	$60,460	$21,253
	Region 2	$104,700	$51,954
	Region 3	$133,740	$68,444
Non-Residential 5/8”	Region 1	$25,850	$15,151
	Region 2	$46,590	$29,960
	Region 3	$43,140	$32,619
Non-Residential 3/4”	Region 1	$38,780	$24,763
	Region 2	$69,890	$42,831
	Region 3	$64,710	$49,935
Non-Residential 1”	Region 1	$64,760	$47,118
	Region 2	$116,720	$76,663
	Region 3	$108,070	$88,960
Non-Residential 1 ½"	Region 1	$129,520	$122,871
	Region 2	$233,440	$217,654
	Region 3	$216,140	$219,086
MFR per unit (<500 sqft)	Region 1	$10,530	$5,852
	Region 2	$14,630	$8,510
	Region 3	$13,740	$6,738
MFR per unit (>500 sqft)	Region 1	$10,530	$7,392
	Region 2	$14,630	$10,749
	Region 3	$13,740	$8,511

1.0 SYSTEM CAPACITY CHARGE BACKGROUND

1.1 BACKGROUND

East Bay Municipal Utility District owns and operates a water system that serves approximately 1.4 million people across a 332 square mile area, extending from Crockett on the North, San Lorenzo on the South, and Walnut Creek and San Ramon Valley to the East. The Bay Area has and continues to be experiencing an increase in housing demand and shortages which are shifting development toward urban infill. Much of the recent and projected housing production is in the form of multi-unit complexes. The District's water treatment and distribution system has been constructed with sufficient capacity to meet existing and future water demand; however, additional water supplies are required to meet the District's projected water demands.

In publicly owned utilities, rate payers finance the construction, renewal, and replacement of system assets through user rates, taxes, and other fees. When new connections are added to the system, they receive services through infrastructure that has been funded by existing customers. It is common for utilities to impose charges or fees to fund the capital improvements required to serve growth and new or expanded development.

The District utilizes Water System Capacity Charges (SCC) to recover from new customers a share of the costs of constructing future water supply projects, and existing public facilities for storage, transmission, treatment and distribution that are of proportional benefit to the person or property being charged. The SCC program allows EBMUD to adhere to the principle of '*growth-pays-for growth*' which recovers the cost of providing system capacity to new customers for both existing system infrastructure and the additional future water supplies that will be needed to meet new demand. The SCCs are designed to recover the proportionate capacity-related costs of new connections on the water system. EBMUD's SCC program recognizes differences in typical demand profiles and capacity costs across the three regions within the District's service area. The charge basis used by the District has been updated multiple times since the inception of the SCC in 1983, with the charge escalated annually using the Engineering News Record (ENR) construction cost index.

The SCC is comprised of three components: a system-wide component, a regional component, and a future water supply component. The system-wide component is calculated to ensure new or upsized connections pay for their proportionate share of the value of existing facilities that serve the entire service area. The regional component serves the same purpose, but for specific facilities that primarily benefit the water service within to the individual regions (Figure 1-1). Finally, the future water supply component is established to collect the incremental cost of constructing future water supply projects to serve new or upsized connections.

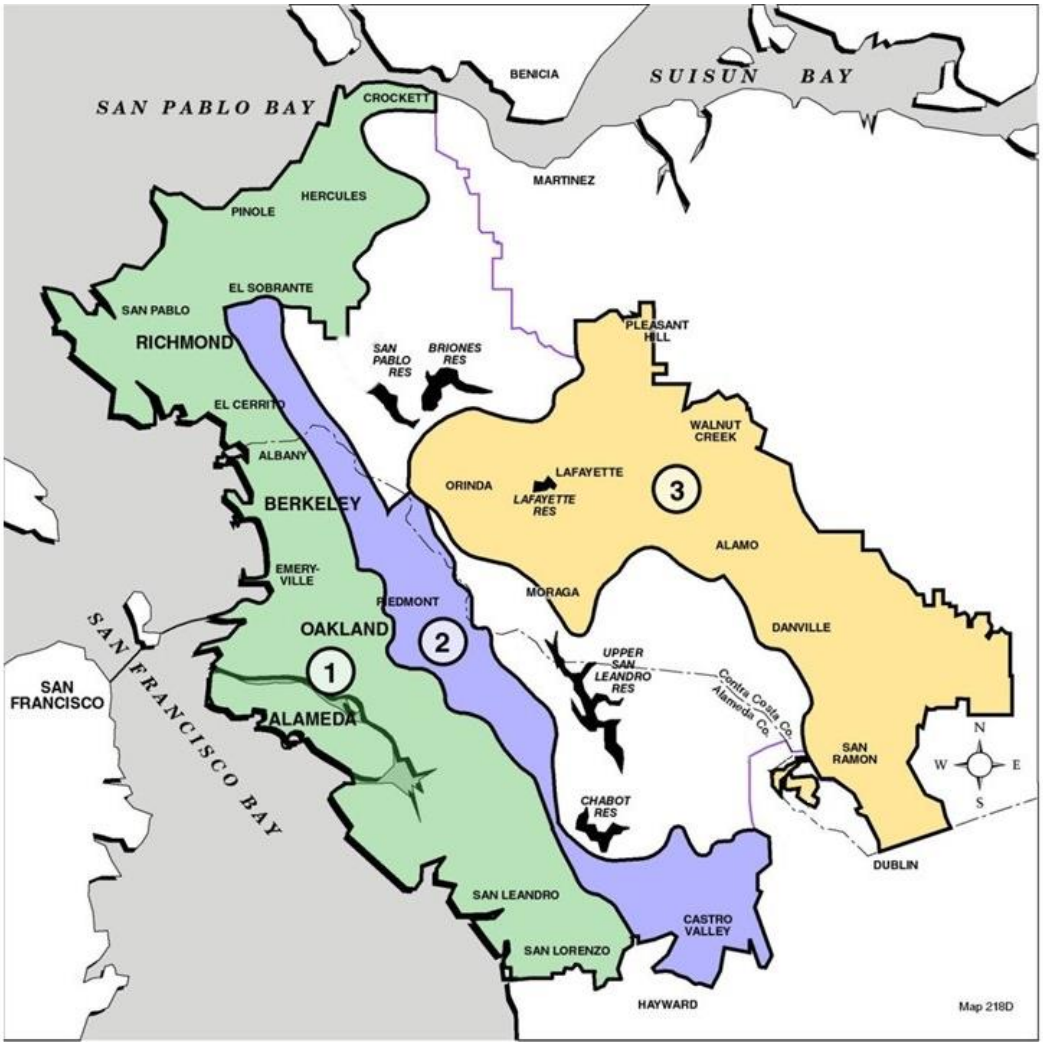

Figure 1-1: East Bay Municipal Utility District SCC Regions.

The methodology used by the District to calculate SCCs is shown in Figure 1-2**Error! Reference source not found.**. Ultimately, the SCC charged to new connections or existing customers requiring additional capacity is determined by multiplying the unit cost of system capacity by the customer's estimated capacity requirement, both of which are calculated specifically for each of the three regions.

Figure 1-2: SCC Formula

1.2 SCOPE OF WORK

The scope of work completed by Stantec and Hildebrand Consulting for the District can be summarized into four primary tasks:

Task 1: Update the unit cost of system-wide and regional capacity, expressed in hundreds of gallons per day (100 gpd) using the most current available District data (Section 2).

Task 2: Conduct a water use analysis by region to determine the estimated capacity use by customer class (Section 3).

Task 3: Evaluate the structure of the SCC for each customer class (Section 3).

Task 4: Develop an updated schedule of SCCs for each customer class by region (Section 4) based on Task 1 through 3.

The SCC Study provides a comprehensive review of the SCC calculation methodology, including the calculation of the system-wide and regional components, the calculation of the incremental cost of future water supply, and the demand basis for assessing the charge to individual applicants. Each element of the SCC methodology was evaluated, to not only update the values used to calculate SCC's, but also update the District's approach where appropriate. The unit cost of capacity was updated by considering the District's approach to assessing the value of existing and growth-related infrastructure, how assets are allocated to each region in the District, and the projected consumption by each region. The estimated water demands for each customer class were reviewed by evaluating historic water use data to update the typical water use characteristics for each customer class, both system-wide and in each region.

2.0 SYSTEM CAPACITY CHARGE UNIT COST EVALUATION

This section of the report outlines the methodology used to evaluate the SCC unit cost for each region.

In the water utility industry, there are three primary approaches used to calculate the unit cost of system capacity for development of system capacity charges. The "buy-in" method calculates the unit cost of capacity solely on the value of existing utility system assets. This approach is most appropriate for system assets with sufficient excess capacity to serve anticipated growth. The "incremental cost" method is based on the estimated cost of providing new system capacity to serve growth. Because, the District has sufficient excess capacity within its current treatment and distribution facilities for new growth but must build new dry year water supply projects for new customers, the District uses the third approach which is a combination of the first two approaches to determine a combined unit cost of capacity for inclusion in the SCC.

Figure 2-1 depicts how the District calculates SCCs on a regional basis. The system-wide unit cost and the regional unit costs are based on existing assets, and therefore the buy-in method is used. The District's future water supply includes new capital improvement projects to expand the existing supply, and therefore uses the incremental method.

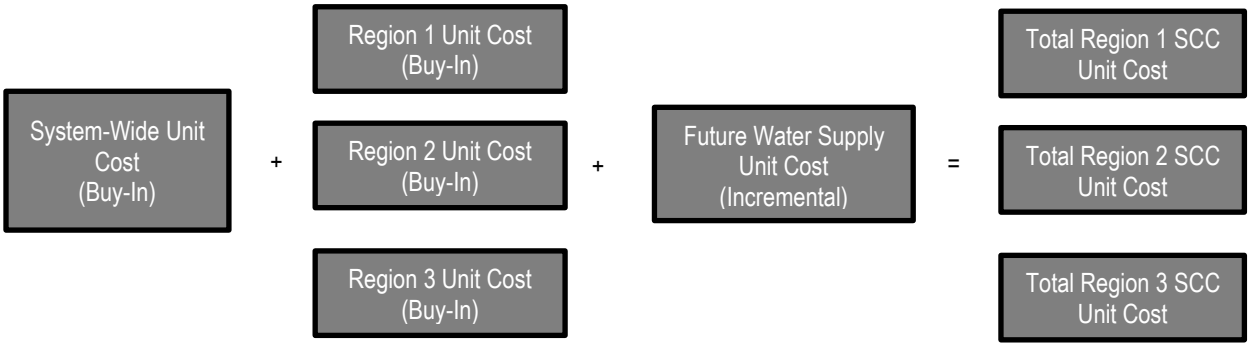

Figure 2-1: Total SCC Unit Cost Determination

2.1 SYSTEM-WIDE AND REGIONAL COSTS (BUY-IN COMPONENT)

To evaluate the value of the buy-in method components, the existing assets, available cash on hand designated for capital projects, and any outstanding debt on system assets were reviewed along with the most recent forecast of system-wide and regional water demands (forecasted potable metered consumption) from the District's 2050 Demand Study. Figure 2-2 demonstrates the components and the steps used to calculate both the system-wide and regional unit costs. The methodology to develop these buy-in component unit costs are explained in the following sections of this report.

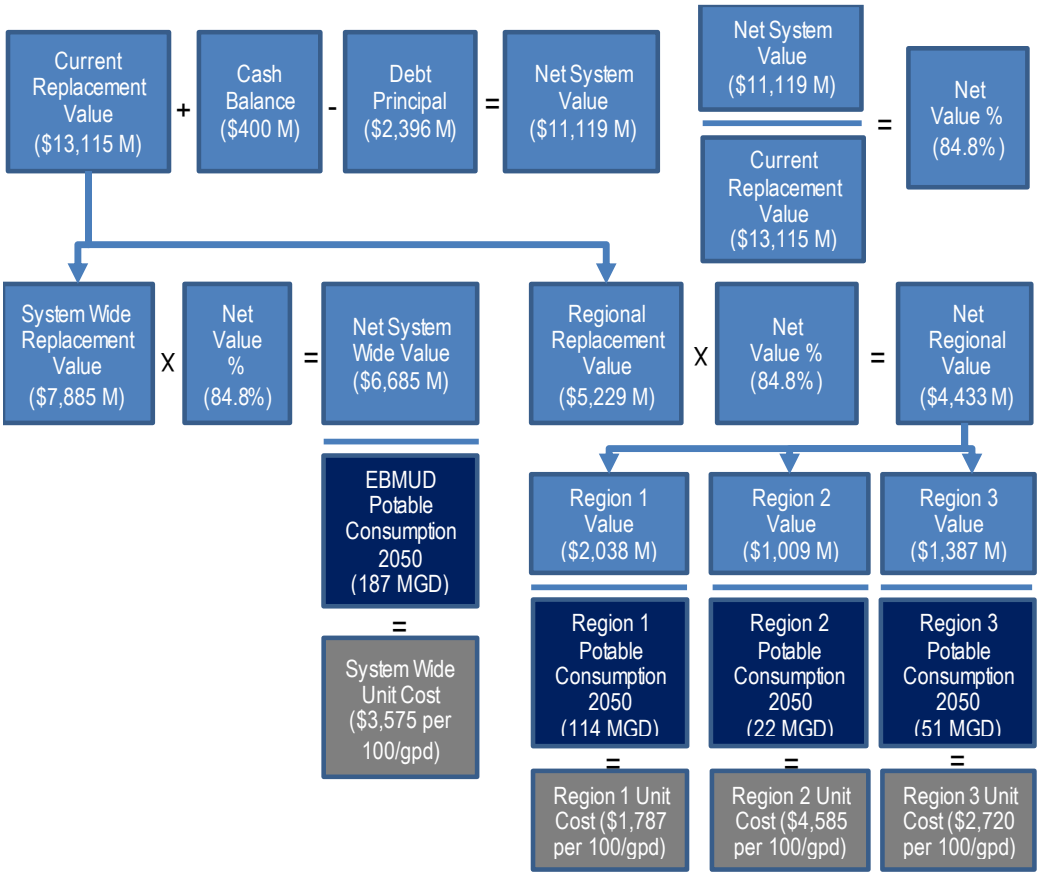

Figure 2-2: System Wide and Regional Unit Cost Determination

The District provided Stantec an asset register for the water system which included an asset identification number, description, service date, original cost, the expected useful life, accumulated depreciation, salvage value, and the net book value for each asset installed through June 30, 2019. The District's system asset register was used to calculate the value of each class of asset, as well as distinguish between the individual assets that serve the entire service area or specifically serve an individual region.

The District has historically used a replacement cost approach for valuing all existing system assets, which takes the original cost of the asset then inflates the value to current dollars using the ENR index. This study proposes to retain the replacement cost asset valuation approach for long lived assets that are not being actively replaced such as terminal reservoirs, reclamation facilities, the Freeport project, and land. For facilities that are actively being replaced, such as pipelines, pumping plants, distribution reservoirs, and equipment, we recommend that the replacement costs of these assets be adjusted to reflect their estimated remaining useful life (based on age, existing condition and the typical useful life of the asset). Additionally, while the District's distribution mains and aqueducts have an average accounting useful life of 65-years and 75-years respectively, many of these assets have a much longer useful life in practice. To account for this, we recommend utilizing a 100-year useful life for these assets. Laterals and water meters only provide benefits to individual customers are excluded from the SCC system and regional asset analysis. Table 2-1 documents each of the assets by type, the original cost, valuation

approach updated per Stantec's recommendations, and the resulting asset value used in the analysis. The sum of the value of the asset classes yields the total current asset replacement value.

Table 2-1: Summary of Asset Valuation by Asset Type

Account	Description	Original Cost	Valuation Approach	Systemwide or Regional	Asset Value in Analysis
1001	Auto Control System	$ 69,616,886	RCN	Systemwide	$ 154,642,381
1005	Hydroelectric Power Gen.	50,165,544	RCN	Systemwide	164,047,498
1007	General Facilities & Equip.	3,002,422	RCN	Systemwide	3,959,911
1015	Source of Water Supply	116,244,212	RCN	Systemwide	881,552,215
1025	Raw Water Transmission	326,793,370	RCN	Systemwide	2,696,194,198
1060	Raw Water Trans Pump	40,844,897	RCN	Systemwide	345,227,796
1080	Terminal Reservoirs	193,360,238	RCN	Systemwide	1,037,966,685
1090	Reclamation Facilities	111,457,846	RCN	Systemwide	184,510,160
1100	Water Treatment	379,876,736	RCN	Regional	1,143,923,058
1130	Distribution Pumping	176,813,081	RCNLD	Regional	219,842,897
1140	Distribution Reservoirs	338,690,760	RCNLD	Regional	529,167,785
1166	Distribution Mains	1,133,134,095	RCNLD	Regional	2,836,247,463
1170	Distribution Aqueducts	89,169,460	RCNLD	Regional	159,023,872
1175	Pressure Regulators	30,625,255	RCN	Regional	89,505,607
1180	Venturi Meters	6,032,937	RCN	Regional	18,699,944
1185	Distribution Hydrants	55,112,392	RCN	Regional	232,902,753
1200	General Plant Structures	217,567,238	RCN	Systemwide	469,295,872
1205	Equipment-Trans & Constr.	50,498,327	RCNLD	Systemwide	50,275,350
1210	Equipment-Office	19,922,148	RCNLD	Systemwide	3,295,337
1215	Equipment- Eng. & Labor	3,699,288	RCNLD	Systemwide	374,794
1220	Equipment-Tools & Work	4,516,067	RCNLD	Systemwide	1,134,214
1225	Equipment- Stores	7,894	RCNLD	Systemwide	9,406
1230	Equipment- Shop	1,688,016	RCNLD	Systemwide	892,489
1240	Non-Operative Property	1,397,142	RCN	Systemwide	5,833,705
1245	Recreational Facilities	68,448,912	RCN	Systemwide	111,704,109
1300	Land Source of Supply	7,832,091	RCN	Systemwide	113,246,007
1310	Land Raw Water Trans	3,710,592	RCN	Systemwide	53,910,171
1315	ROW Raw Water Trans	1,229,538	RCN	Systemwide	3,691,660
1320	Land Terminal Reservoirs	18,931,841	RCN	Systemwide	227,461,099
1330	Land Water Treatment	2,974,390	RCN	Systemwide	22,292,870
1340	Land Reclamation	2,174,793	RCN	Systemwide	4,572,465
1350	Land Distribution	7,928,007	RCN	Systemwide	66,126,240
1355	Land	1,737,088	RCN	Systemwide	4,758,236
1360	Land General Plan	7,714,529	RCN	Systemwide	33,118,514
1370	Land	990,966	RCN	Systemwide	22,358,708
1910	Unallocated As-Built Costs	10,304,085	RCN	Systemwide	20,679,581
1911	Deferred Software Costs	66,439,595	RCN	Systemwide	116,044,022
1981	Watershed Master Plan	5,900,230	RCN	Systemwide	11,512,918
1985	Lab Expansion Costs	8,874,204	RCN	Systemwide	17,935,857
1988	Engineering & Env. Studies	74,404,275	RCN	Systemwide	197,250,866
	DERWA	84,784,101	RCN	Systemwide	60,441,633
	Freeport	410,009,849	RCN	Systemwide	276,032,066
	CWIP	522,919,362	RCN	Systemwide	522,919,362
	TOTAL	**$3,525,262,123**			**$13,114,581,773**

District staff identified which assets serve specific regions and which assets serve all customers to allow for determination of the systemwide and regional costs. Allocation factors were generated based on the proportionate value of the regional assets obtained from the prior SCC regional asset report (**Error! Not a**

valid bookmark self-reference.)**Error! Reference source not found.**. These allocation factors were used to distribute the value of the asset types shown in each region.

Table 2-2: Regional Asset Value Allocation Factors

Account	Description	Region 1	Region 2	Region 3
1100	Water Treatment	49.5%	16.3%	34.2%
1130	Distribution Pumping	19.6%	34.1%	46.4%
1140	Distribution Reservoirs	27.4%	36.7%	35.9%
1166	Distribution Main	48.6%	21.3%	30.1%
1170	Distribution Aqueducts	79.4%	20.6%	0.0%
1175	Pressure Regulator	26.2%	60.9%	12.8%
1180	Venturi & Cathodic	62.3%	5.4%	32.2%
1185	Distribution Hydrants	47.8%	17.1%	35.1%

The net system value was then calculated by adding the District's capital reserve cash balance, net the outstanding principal on current debt, to arrive at the current asset replacement value (Table 2-3). The current replacement value was then divided by the net system value to calculate the net value percentage.

Table 2-3: Net System Value Calculation

Buy-In Component	Value
System Assets	$ 13,114,581,773
Capital Reserve Cash Balance	400,111,000
Outstanding Principal on Debt	(2,396,190,000)
Net System Value	**$ 11,118,502,773**
Net System Value as a Percentage of System Assets	**84.8%**

The current asset replacement value of the system-wide assets and the respective regional assets were then multiplied by the net value percentage to calculate the respective net system-wide and net regional values (Table 2-4).

Table 2-4: Net System Value Calculation by Service Area

Service Area	Replacement Value	Net Value %	Net Value
System Wide Replacement Value	$ 7,885,268,394	84.8%	$ 6,685,106,702
Region 1 Replacement Value	2,403,566,343	84.8%	2,037,736,278
Region 2 Replacement Value	1,189,696,740	84.8%	1,008,621,299
Region 3 Replacement Value	1,636,050,295	84.8%	1,387,038,493
Total Value	**$ 13,114,581,773**		**$ 11,118,502,773**

Finally, the system unit cost (expressed in dollars per hundred gallons per day) is calculated by dividing net values (Table 2-4) by the total estimated demand for each respective service area. These estimated demands were based on the District's 2050 Demand study, which projected water demands for the entire District and for each region between 2020 and 2050. The projected net system-wide demand for 2050 is

187 million gallons per day (MGD). Dividing net system-wide and regional values by their respective system demands allows for the determination of the unit costs (Table 2-5).

Table 2-5: Unit Cost Calculation by Service Area

Service Area	Net Value	Potable Consumption Estimate (MGD)	Unit Cost ($/100 gpd)
System Wide Replacement Value	$ 6,685,106,702	187	$ 3,575
Region 1 Replacement Value	$ 2,037,736,278	114	$ 1,787
Region 2 Replacement Value	$ 1,008,621,299	22	$ 4,585
Region 3 Replacement Value	$ 1,387,038,493	51	$ 2,720

2.2 FUTURE WATER SUPPLY (INCREMENTAL COMPONENT)

Historically, the calculation of the cost of future water supply projects included the portion of previously completed water supply projects that were allocated to new or upsized accounts. To be consistent throughout the calculations for the SCCs, we recommend that the cost of the completed projects be moved into the buy-in component of the SCC calculation. As a result, the new future water supply unit cost calculation is therefore simplified to only include future growth-related capital projects. These future water projects include various water recycling projects, Bayside Phase 2 Groundwater Project, and the San Joaquin Groundwater Banking Project. Table 2-6 provides a summary of the future water supply projects and their estimated cost. District Staff anticipates that these projects will produce sufficient water supplies to meet the projected 55 MGD increase in water demand by 2050.

Table 2-6: Future Water Supply Capital Projects

Future Water Supply Unit Cost Components		Total CIP
Recycled Water Projects		
San Ramon Valley Recycled Water Project	$	50,000,000
East Bayshore Recycled Water Project		130,000,000
Richmond Advance Recycled Expansion (RARE)		110,000,000
Phillips 66 Refinery		50,000,000
Groundwater Projects		
Groundwater Bayside Phase 2		35,900,000
San Joaquin Banking Project		62,800,000
Total	**$**	**438,700,000**

The cost of these future projects that are required to meet future supply requirements are divided by the increase in water demand as a result of new customers, which yields the unit cost of future water supply (

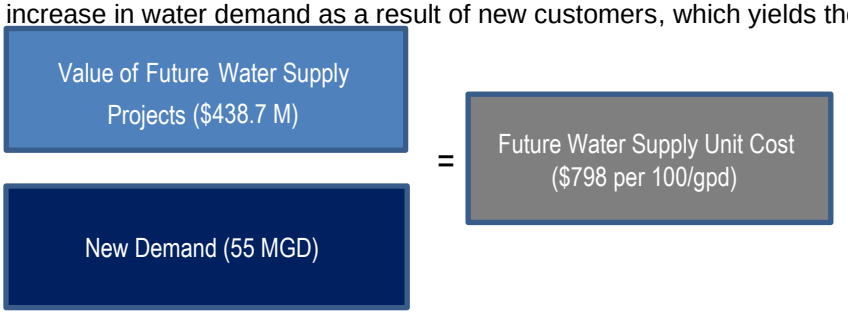

Figure 2-3). As shown in the figure, the future water supply unit cost is calculated to be $798 per 100/gpd of new demand.

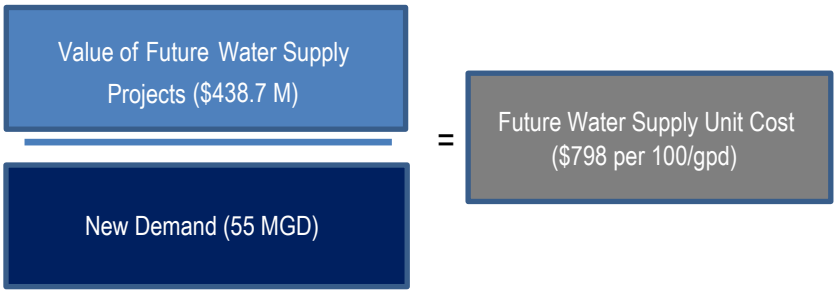

Figure 2-3: Future Water Supply Unit Cost Determination

The summation of the unit costs for the "buy-in" components and the "incremental" components (future water supply) provides the total unit cost for the determination of the SCC. Table 2-7 presents the breakdown of the updated FY 2022 unit costs for each of the individual SCC components based on the methodology outlined above. The current total unit costs are provided for comparison purposes. The Future Water Supply unit costs are applied equally to each SCC region because the additional water supplies benefit all SCC regions equally as additional water supplies can be distributed to all SCC regions as needed.

Table 2-7: Updated SCC Unit Costs for FY 2022

	Unit Costs $/100 gpd				
Region	**System-Wide Buy-In**	**Regional Buy-In**	**Future Water Supply**	**Total**	**Current Total**
Region 1	$3,575	$1,787	$798	**$6,160**	**$6,463**
Region 2	$3,575	$4,585	$798	**$8,958**	**$8,708**
Region 3	$3,575	$2,720	$798	**$7,093**	**$6,903**

3.0 WATER USE ANALYSIS

This section of the report documents the evaluation of water usage within the District's service area by customer class and examines potential changes to the structure of SCC's for assessment of the charges.

3.1 BACKGROUND

Currently, the District assesses SCCs to new customers based on an assumed average water use for single family residential, multi-family residential, and non-residential customer classes (Table 3-1 through

Table 3-3). Single family residential customers' SCCs are presently based on the average water use for a parcel serviced by a standard 5/8" or 3/4" water meter, with charges for larger meters scaled based on an industry-standard meter equivalency schedule[1] up to 1 ½". Similarly, non-residential customers' SCCs are based on the average water use for a 5/8" water meter, with charges for larger meters scaled based on the same meter equivalency schedule up to 1 ½". All non-residential customers served by larger than 1 ½" meter presently have their projected water use calculated on a case-by-case basis using water use information provided by the applicant. Multi-family residential customers' SCCs are presently based on an analysis of average water use per dwelling unit without considering dwelling unit size.

Table 3-1: Current Single Family Customer Water Use (gallons per day)

	Meter Size		
Region	3/4"	1"	1 ½"
Region 1	280	470	940
Region 2	360	600	1,200
Region 3	580	970	1,940

Table 3-2: Current Multi-Family Customer Water Use (gallons per day)

Region	Per Dwelling Unit
Region 1	163
Region 2	168
Region 3	199

Table 3-3: Current Non-Residential Customer Water Use (gallons per day)

	Meter Size			
Region	5/8"	3/4"	1"	1 ½"
Region 1	408	612	1,020	2,040
Region 2	535	806	1,350	2,700
Region 3	625	960	1,600	3,200

[1] *American Water Works Association Manual M1 Principles of Water Rates, Fees, and Charges*

3.2 APPROACH

As part of this Study, individual bill-level water use data from 2005 to 2017 were analyzed to update typical water use characteristics for each customer class, both system-wide and in each region. This analysis included nearly 57 million data points that helped to characterize customer demands over time and across customer classes and service area regions. The District's billing data was merged with land use data, meter data, and LandVision property data. This compilation of account, usage and property data allowed water use characteristics to be analyzed for each customer class with consideration of meter size, as well as alternative charge units including number of rooms per household, number of bedrooms, building square footage, dwelling size, and irrigation area. Water demands were analyzed relative to each of these parameters using a series of statistical tests to identify statistically significant relationships and representative billing units. These tests and other considerations were applied to the District's current approach to estimating usage for the basis of the SCCs as well as alternatives to arrive at the recommended basis for estimating usage within the charge, shown in Table 3-4.

Table 3-4: Existing Charge Basis, Alternatives Considered, and Recommended Basis

Current Basis for Charge	Alternative Basis for Charge Considered	Recommended Basis for Charge
Single Family • Average usage at 3/4-inch meter for each region • Scale with meter equivalencies • Fixture counts to determine appropriate meter size	**Single Family** • Meter size • Square feet • Bedrooms • Rooms	**Single Family** • Average usage observed per meter size for each region. • Fixture counts to determine appropriate meter size
Multiple Family • Average usage per dwelling unit	**Multiple Family** • Dwelling unit size • Square feet • Bedrooms • Rooms • Dwelling units	**Multiple Family** • Average usage per dwelling unit for small (<500 square foot) and standard (>500 square feet) sized units
Non-Residential • Average usage at 5/8-inch meter for each region • Scale with meter equivalencies • Fixture counts to determine appropriate meter size	**Non-Residential** • Meter size • Square feet	**Non-Residential** • Average usage observed per meter size for each region. • Fixture counts to determine appropriate meter size

Demand characteristics were primarily evaluated using a series of analysis of variance (ANOVA) tests to understand the true differentiation between customer usage characteristics relative to the potential charge parameters described above. While customer demands are often established by simply calculating the average water demand for, say, every meter size, use of the ANOVA test determines whether these differences in mean water demands at each meter size are statistically significant or simply "a matter of

chance." This is similar to the commonly used t-test but can be expanded to evaluate more than two group in an individual test. For example, testing differences in mean water usage relative to meter size using t-tests would require comparing each meter size to every other meter size in individual t-tests in a pairwise manner. Alternatively, the ANOVA test compares the mean water use for each meter size pairing in a single test to determine the statistical significance of the differences in each group's mean water usage. The ANOVA test was used to compare across potential charge parameters and across service area regions.

When analyzing water usage characteristics, it is almost universally true that water consumption is not normally distributed, meaning the distribution of consumption per account is not symmetrical around the mean. Rather, a distribution with a long tail to the right for high-volume users is observed, indicating a positive skew. While this is typical for most, if not all, water service providers, it is worth noting that the mean usage for each customer type and for each of the billing parameters evaluated is still an appropriate indicator of typical usage for purposes of the SCC. This is supported by three key factors:

- The amount of skew is similar across SCC regions, meaning no particular region of the service area is disproportionately impacted,
- The SCC is intended to account for both typical AND potential water usage of a new applicant as opposed to simply the most common usage level, which is why similar charges are often assessed based on meter capacity, and
- The use of median water usage for new applicants would under-assign water usage to new customers and lead to discrepancies between the usage per applicant and the total usage from all new applicants.

Additional consideration was given to the viability of actually charging SCCs based on the parameters listed in Table 3.4. Discussions of charge viability focused primarily on the following considerations:

- **Statistical significance** – As discussed above, testing for statistical significance in the differences in demand characteristics between customer types provided confidence that average demands for each group were in fact different and not caused by noise in the data.
- **Data reliability** – Because the analysis involved a large amount of data from various sources, consistency and reliability of the data were important considerations to provide confidence that the demands relative to potential charge parameters (e.g., number of rooms, square footage, meter size, etc.) could be accurately measured and evaluated.
- **Administrative burden** – The anticipated level of effort required to implement and assess charges based on each of the potential billing parameters was an important consideration to ensure the District could effectively and efficiently determine the SCCs to be charged to new developments.

3.3 CUSTOMER CLASS USAGE RESULTS AND RECOMMENDATIONS

Based on the results of the ANOVA testing and consideration of the factors listed above, charge parameters and water usage levels were determined for each customer class. These parameters are described below.

For single family residential customers, the current approach of assessing charges based on meter size continues to be the recommended approach. However, water use characteristics were analyzed to determine actual average water use by each meter size which would be used to determine the SCC for each SFR meter size. This recommended alternative approach replaces the existing approach of scaling the average demand for meters greater than 3/4" based on a meter equivalency schedule and uses the most up-to-date data to reflect current levels of water use for larger meter sizes. Since 2010, the standard SFR installation are based on 3/4" meter size.

For MFR SCC, the District uses the number of dwelling units to estimate the expected overall water use for the MFR structure rather than meter size because it provides a more detailed estimate of water use. The charge basis for multi-family residential accounts was updated to refine the previous per-dwelling unit approach. Based on detailed analysis of water demands for this class of customers, a statistically significant difference could be shown for multi-family accounts with an average dwelling unit size of less than 500 square feet (SF) and greater than 500 SF. This analysis included testing of a number of different approaches, including three tiers of dwelling unit size and various dwelling unit size breakpoints for each tier. Throughout this testing, the most consistent and statistically significant difference was found at the 500 SF per dwelling unit threshold. As such, typical water demands were estimated for small (less than 500 SF) and standard (greater than 500 SF) dwelling units, allowing for differentiation in the per-dwelling unit charge based on dwelling unit size. Observed MFR dwelling unit water use was relatively consistent between SCC regions, so the analysis of more detailed MFR water use by dwelling unit size combined the SCC regions. For the analysis, dwelling unit size data was derived from county records and linked to MFR water use.

For non-residential accounts, it was found that that typical water use consistently increased with meter size. Similar to the update for single family residential customers, it is recommended that the water demand basis for non-residential accounts be scaled for the SCC based on the calculated average water use per meter size in each region, rather scaling average water use for 5/8" meters based on a meter equivalency factor. It is recommended that the existing approach to allow for case-specific demand calculations for accounts with larger meter sizes of greater than 1 ½" be maintained by the District because the of the variability in water use in the larger meter sizes.

The following tables present the estimated water use based on our analysis and for application within the assessment of the SCC for each customer class.

Table 3-5: Single Family Customer Water Use (gallons per day)

	Meter Size		
Region	**3/4"**	**1”**	**1 ½"**
Region 1	190	270	345
Region 2	210	450	580
Region 3	490	750	965

Table 3-6: Multi-Family Customer Water Use (gallons per day)

	Dwelling Unit Size	
Region	**< 500 sq. ft**	**> 500 sq. ft**
Service Area Wide	95	120

Table 3-7: Non-Residential Family Customer Water Use (gallons per day)

	Meter Size			
Region	**5/8"**	**3/4"**	**1"**	**1 ½"**
Region 1	246	402	765	1,995
Region 2	334	478	856	2,430
Region 3	460	704	1,254	3,089

4.0 PROPOSED SYSTEM CAPACITY CHARGES AND COMPARISONS, REVENUE ESTIMATES

This section of the report documents the proposed system capacity charges based on the determination of the unit costs and the water use analysis and provides a comparison of benchmarked utilities.

4.1 PROPOSED SYSTEM CAPACITY CHARGES

The proposed SCCs are calculated by applying the formula shown in **Error! Reference source not found.**. The unit cost for each region was multiplied by the calculated estimated water use for each customer class and meter size or dwelling unit. Table 4-1 through Table 4-3 provide a summary of the proposed SCC schedules for single family residential, multi-family residential, and non-residential customers.

Table 4-1: Proposed Single Family Residential SCC Schedule

	Meter Size		
Region	**5/8" & 3/4"**	**1"**	**1 ½"**
Region 1	$11,705	$16,633	$21,253
Region 2	$18,811	$40,309	$51,954
Region 3	$34,754	$53,195	$68,444

Table 4-2: Proposed Multi-Family Residential SCC Schedule

	Dwelling Unit Size	
Region	**< 500 sq. ft**	**> 500 sq. ft**
Region 1	$5,852	$7,392
Region 2	$8,510	$10,749
Region 3	$6,738	$8,511

Table 4-3: Proposed Non-Residential SCC Schedule

	Meter Size			
Region	**5/8"**	**3/4"**	**1"**	**1 ½"**
Region 1	$15,151	$24,763	$47,118	$122,871
Region 2	$29,960	$42,831	$76,663	$217,654
Region 3	$32,619	$49,935	$88,960	$219,086

Table 4-4 summarizes the current and proposed SCCs by customer class. The table demonstrates that the proposed SCCs for all customer classes are lower than the charges currently assessed by the District. For SFR, MFR and non-residential applicants, the proposed SCC will be reduced nearly all customers from as little as 5% to over 50% depending on the customer class and meter size, except for the nonresidential 1½" meter size, which will remain about the same as the current SCC.

Table 4-4: Comparison of Current and Proposed SCCs

Customer Type	Region	Current SCC	Proposed SCC
SFR 3/4”	Region 1	$18,100	$11,705
	Region 2	$31,350	$18,811
	Region 3	$40,040	$34,754
SFR 1”	Region 1	$30,230	$16,633
	Region 2	$52,350	$40,309
	Region 3	$66,870	$53,195
SFR 1 ½”	Region 1	$60,460	$21,253
	Region 2	$104,700	$51,954
	Region 3	$133,740	$68,444
Non-Residential 5/8”	Region 1	$25,850	$15,151
	Region 2	$46,590	$29,960
	Region 3	$43,140	$32,619
Non-Residential 3/4”	Region 1	$38,780	$24,763
	Region 2	$69,890	$42,831
	Region 3	$64,710	$49,935
Non-Residential 1”	Region 1	$64,760	$47,118
	Region 2	$116,720	$76,663
	Region 3	$108,070	$88,960
Non-Residential 1 ½”	Region 1	$129,520	$122,871
	Region 2	$233,440	$217,654
	Region 3	$216,140	$219,086
MFR per unit (<500 sqft)	Region 1	$10,530	$5,852
	Region 2	$14,630	$8,510
	Region 3	$13,740	$6,738
MFR per unit (>500 sqft)	Region 1	$10,530	$7,392
	Region 2	$14,630	$10,749
	Region 3	$13,740	$8,511

While there is some variation in the unit costs by region, the primary reason for the recent and future decreases are due to the significant water use reductions, reflecting the trend of more water conservation. Like most utilities around the United States, the District has and continues to experience a reduction in per account usage due to factors such as more efficient water fixtures, economic conditions, and conservation. Table 4-5 presents a comparison of the currently-applied water use estimates and those developed in the Study.

Table 4-5: Comparison of Existing and Proposed Water Use

Customer Type	Region	Current Estimated Water Use (gpd)	Calculated Water Use (gpd)
SFR 3/4"	Region 1	280	190
	Region 2	360	210
	Region 3	580	490
SFR 1"	Region 1	470	270
	Region 2	600	450
	Region 3	970	750
SFR 1 ½"	Region 1	940	345
	Region 2	1,200	580
	Region 3	1,940	965
Non-Residential 5/8"	Region 1	408	246
	Region 2	535	334
	Region 3	625	460
Non-Residential 3/4"	Region 1	612	402
	Region 2	806	478
	Region 3	960	704
Non-Residential 1"	Region 1	1,020	765
	Region 2	1,350	856
	Region 3	1,600	1,254
Non-Residential 1 ½"	Region 1	2,040	1,995
	Region 2	2,700	2,430
	Region 3	3,200	3,089
MFR per unit (<500 sqft)	Region 1	163	95
	Region 2	168	95
	Region 3	199	95
MFR per unit (>500 sqft)	Region 1	163	120
	Region 2	168	120
	Region 3	199	120

4.2 SYSTEM CAPACITY CHARGES FOR LARGER METERS

The SCC for service connections with meters larger than 1½ inches (except for MFR which is calculated based on dwelling unit) should be determined on a case-by-case basis by the District based on water use information furnished by the applicant and applying the same unit charge basis that is applied to calculate the SCC for smaller meters shown in Table 2-7. The SCC is then determined by multiplying the total unit cost for the connection's region by the estimated water demand in units of 100 gpd, rounded to three significant units.

The District should make certain that during these individual calculations that the SCC for a meter larger than 1½ inches should never be less than the amount charged for a 1½ inch meter in the same region, consistent with the District's current practice to ensure applicants with meters larger than 1 ½" pay at least as much as customers with 1 ½' meters.

4.3 SCC FOR ACCESSORY DWELLING UNITS

Since the enactment of new state laws regarding the development of ADUs and JADUs in recent years, the District has seen growth in construction of ADUs in the service area. State laws limit the District from charging an SCC and WCF for an ADU when the ADU meets certain statutory requirements under California Government Code Section 65852.2.

ADUs and JADUs are attached or detached units for residential purposes which are constructed as part of a single-family premises or multi-family premises as defined by California Government Code Sections 65852.2 and 65852.22. Under certain conditions described in California Government Code Section 65852.2, ADUs constructed within an existing or proposed SFR structure or other existing accessory structure are exempted from capacity charges. The current District practice is to not charge an SCC to these applicants. The District should ensure that its SCC procedures do not charge an SCC to ADUs and JADUs that meet the capacity charge exemption requirements.

For ADUs and JADUs that do not qualify for this capacity charge exemption, a capacity charge that does not exceed the estimated reasonable cost of providing the service and is of proportional benefit to the person or property being charged may be assessed, based upon either drainage fixture units (DFU) or square footage of the unit. For SFR applicants with ADUs and JADUs that do not meet the exemption requirements, the District assesses the SCC based on the meter size that is calculated from the fixture unit count of the SFR structure and the drainage fixture unit count of the ADU and JADU. For MFR applicants with ADUs and JADUs that do not meet the exemption requirements, the ADU or JADU square footage is added to the MFR dwelling unit square footage to determine the assessed MFR SCC (over 500 square feet charge or 500 square feet and under charge).

4.4 CAPACITY CHARGE SURVEY

Figure 4-1 shows the current capacity charges for nearby water agencies compared to the District's SCC. Cities often consider the impact of capacity charges on their development plans and may minimize the allocation of costs to new customers resulting in lower connection charges when compared to special districts. Cities expect new development to generate benefits in increased local economic activity, taxes, and other ancillary financial benefits. As a special district, the District does not receive these types of benefits and must recover the full value of the investments in the water system made by its ratepayers. Any reduction in the revenue collected from the SCC would have to be replaced by increased water rates and/or reduced investment in future capital facilities (which would hamper the District's ability to meet future demand). Other factors that affect capacity charges include the complexity of the water system, age and condition of facilities, and amount of new capacity required to serve new customers. In addition, some agencies do not include the water supply costs in their capacity charges because they are supplied by a wholesaler.

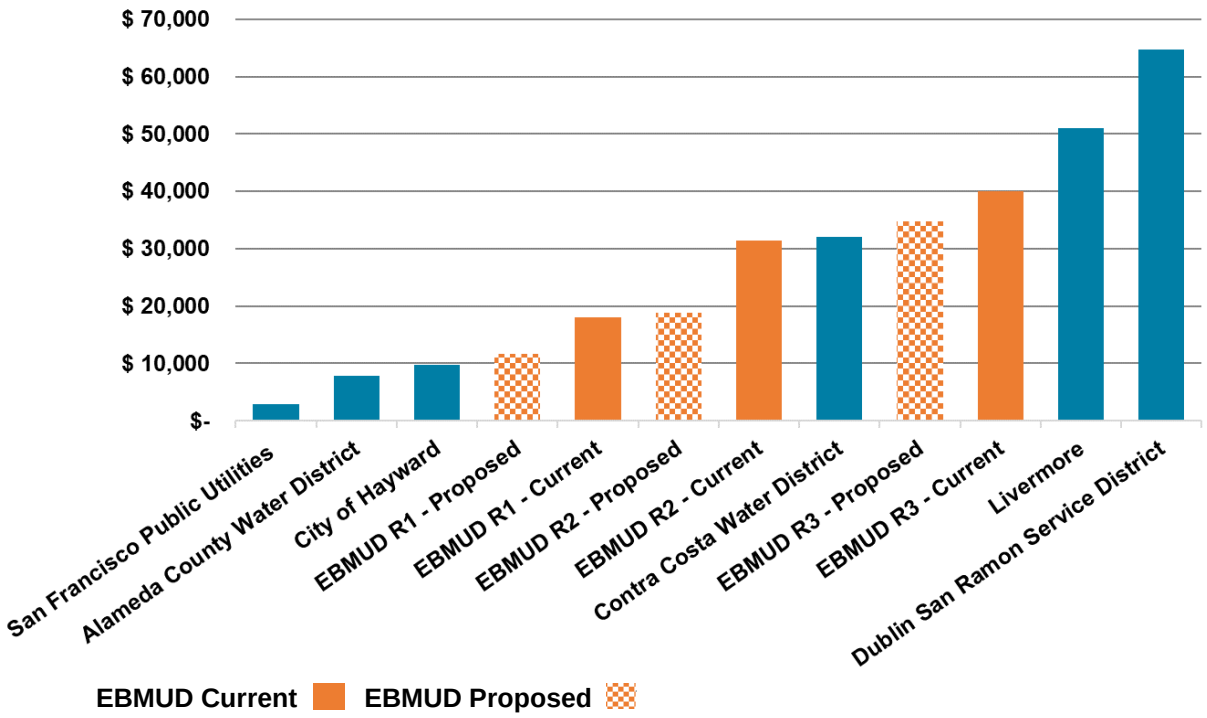

Figure 4-1: Survey of Single Family Capacity Charges for Customers with 3/4" Meters[2]

[2] -SFPUC has higher retail water rates than all other utilities surveyed.
-City of Hayward's Connection Fee does not include a water supply component and they have relatively high retail water rates.
-Alameda County Water District and Contra Costa Water District have less complex systems than EBMUD.
-Dublin San Ramon Service District and Livermore both include Zone 7 charges.

4.5 PROJECTED IMPACT OF SCC UPDATE ON SCC REVENUE

Beginning in FY 2016, the service area has seen a high level of new development, especially in the urban core. Most of the growth has been in large MFR projects. The District experienced a reduction in new connections in FY 2020, which also coincides with the COVID-19 pandemic. It is unclear what the long-term impact of the pandemic will have on development, but a slowdown had been expected even prior to the pandemic. District staff estimate that the proposed updates to the SCC methodology will reduce the current SCC by approximately 30 percent and would have a corresponding reduction in SCC revenues collected depending on the development pattern. The District's projection for SCC revenue for FY 2022 was $40 million under the current SCC. If the District implements the proposed SCC changes, the projected SCC revenue for the same level of development would be approximately $28 million over the same period.