COACHELLA VALLEY WATER DISTRICT

ENGINEERING DEPARTMENT

COST OF SERVICE STUDY

WATER SYSTEM BACKUP FACILITIES CHARGE

FINAL – OCTOBER 2021

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1. INTRODUCTION

On behalf of the Coachella Valley Water District (CVWD or District), Woodard & Curran has conducted a Cost of Service Study (COSS or Study) analyzing CVWD's current developer fee structure and charges for the Water System Backup Facilities Charge (WSBFC), which was last updated in 2012. The purpose of the WSBFC is to mitigate the impacts of new development by funding construction of "backup" water facilities, which include District infrastructure (wells, treatment, reservoirs, transmission mains, etc.) that support water delivery for new customers.

There are three primary objectives for the completion of this Study:

1. Evaluate different methodologies for calculating the WSBFC;

2. Make recommendations on which method is most appropriate; and

3. Prepare a financial model which would easily allow CVWD to assess modification of the charges in the future.

When setting these types of charges, utilities usually use one of two primary ways of calculating appropriate charges for connecting new customers. These standards have been in common use for years and the general theory and calculation methods are discussed in detail in Section VI, Chapters VI.1 and VI.2 of the American Water Works Association (AWWA) M1 Manual. The M1 Manual is the standard of practice for setting these types of charges.

The two main ways of establishing these charges are known as Facility Charges and System Development Charges. Facility Charges generally pay for the base costs of providing water infrastructure, while System Development Charges include the proportional costs for new development to connect to an existing water system. Either is an appropriate standard by which to set charges. Facility Charges are generally calculated using a forward-looking expectation for future costs associated with supporting new customers. System Development Charges are appropriate when utilities have a good understanding of the infrastructure costs which has been invested to date and which are directly associated with the specific customer demands based upon the system capacity of shared assets which will be used. These assessments are usually driven mainly by system assets already in use. CVWD's 2012 Water System Backup Facilities Charge Study is entirely consistent with this approach.

A third approach is to use a blended charge calculation or hybrid approach based upon expectations for the retirement of older assets (under the second approach) and changes to capital investment (in the first approach).

The objective of this Study was to evaluate the past, present, and future costs for CVWD to invest in needed backup facilities in support of system growth. The assessment was expected to provide revenues adequate to fully fund the charge's intent. Although the 2012 Study has been successful in establishing a fee that has funded projects that increased water system capacity, we reviewed and considered the alternative methodologies for calculating the WSBFC charge. The analysis included gathering and analyzing historical expenses, contractual agreements, growth projections, historic water demands, billing information, historic WSBFC revenues, future capital improvement projects, and financing information.

Based on the data, our recommendation is continued use of the System Development Charge or "Buy-In" method as the most appropriate for the District. The System Development Charge or "Buy-In" method requires developers to contribute a proportional share of existing backup system costs to their projected demands.

1.1 AUTHORITY

The District's authority to establish a demand charge is outlined in California Government Code 66000 et. Seq. (the "Mitigation Fee Act") and specifically described in Section 66013. The proposed charge is essentially a "Capacity Charge," which is defined by Government Code Section 66013(b) (3) as "a charge for facilities in existence at the time a charge is imposed or charges for new facilities to be constructed in the future that are of benefit to the person or property being charged." While the Mitigation Fee Act specifically exempts water and sewer capacity charges from the nexus finding required for other types of mitigation fees, it specifically limits capacity charges to "the estimated reasonable cost of providing the service for which the...charge is imposed."

2. BACKGROUND & HISTORY

In 1918, CVWD was formed to manage the Coachella Valley's water resources consisting primarily of groundwater supplemented by surface flow. The District's principal responsibility was to provide water to Coachella Valley residents and farmlands. In the late 1940s, the Coachella Branch of the All-American Canal was built to transport water from the Colorado River to the District to further supplement the Valley's water resources.

Over the decades, the Coachella Valley has transformed from a farming community to a destination resort for visitors from all over the world and a year-round home to a substantial and diverse population. In step with the Valley's transformation, the District has grown into a multifaceted agency that delivers irrigation and domestic (drinking) water, collects and recycles wastewater, provides regional storm water protection, replenishes the groundwater basin, and promotes water conservation to customers throughout the Coachella Valley. CVWD's service area covers approximately 1,000 square miles serving a population of 290,000.

The rapid development within the District's domestic water service area has placed increased demands for water and water infrastructure. This increased demand has led CVWD to invest significant resources to build new facilities and to seek and secure new or additional sources of water to keep pace with the area's growth.

CVWD relies on three sources of water to provide service to its customers: groundwater, recycled water, and imported water either through the State Water Project (SWP) or from the Colorado River. SWP supplies are delivered through an exchange agreement with Metropolitan Water District of Southern California via the Colorado River Aqueduct to the Whitewater Groundwater Replenishment Facility (GRF) in the West Valley. Colorado River supplies are generally delivered via the Coachella Canal in the East Valley and conveyed northwest through the agricultural areas, to the Thomas E. Levy GRF and Palm Desert GRF, and to the Mid-Valley Pipeline. Drinking water is sourced from the Indio and Mission Creek Subbasins of the Coachella Valley Groundwater Basin (groundwater), while recycled water and Canal water are typically used for land application and irrigation. The District has encouraged water conservation by working with farmers and golf courses to convert irrigation sources from potable (groundwater) to non-potable (Canal and recycled water). Canal water conveyed through the Mid-Valley Pipeline is delivered to irrigation customers and blended with recycled water at one of CVWD's three Water Reclamation Plants (WRPs) to meet irrigation demand.

Two of CVWD's key strategic goals are around Financial Viability and Water Supply Sustainability. Setting the appropriate WSBFC will directly impact both strategic goals. The charge must be sufficient and fair to cover costs to construct backup water facilities. Acquisition of sufficient water supply to meet future demand is addressed through the District's new Water Demand Offset Fee, which funds non-potable water system expansion projects that offset potable water demands by leaving groundwater in the aquifer for future potable use.

Since 1978, with the passing of Proposition 13, capital construction costs for new domestic water facilities have been borne by developers through the District's WSBFC. The WSBFC was created as a funding mechanism for the construction of backup water facilities to ensure domestic water availability for new development projects. Typically, developers of new projects will construct the on-site pipelines and deed ownership to the District for future operation

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and maintenance. The District will subsequently build the necessary off-site "backup" facilities, such as wells, treatment facilities, booster stations, reservoirs, and large diameter transmission mains, which are funded by the developer through the WSBFC. The last Water System Backup Facilities Charge Study was conducted in 2012. This revised 2021 Water System Backup Facilities Charge Study updates the unit demands, unit facilities costs, and charges to ensure domestic water availability for future development. The WSBFC is assessed on all new development and redevelopment projects within the District's service area. The WSBFC is comprised of two components:

1. **Dwelling Unit Charge / Building Unit Charge** (DUC/BUC) – Monies assessed on a per Dwelling/Building Unit or per meter basis used to construct backup water facilities.

2. **Meter Surcharge** – Monies assessed on large meters (greater than ¾-inch) used to construct backup water facilities.

The 2012 Study included a third component – the Supplemental Water Supply Charge (SWSC) – which assessed developers on gross acreage by development type. The charge was used to purchase additional water entitlements. Acquisition of sufficient water supply to meet future demand is now addressed through the District's new Water Demand Offset Fee, which assesses developers on a potable water demand basis. The new Water Demand Offset Fee, which is described in a separate report, provides the District with a more flexible vehicle for funding future non-potable and water conservation projects to reduce the pumping of potable groundwater, thereby ensuring more potable water is available for use by future developments.

3. WSBFC CALCULATION

The WSBFC is comprised of two components, Dwelling Unit Charge / Building Unit Charge (DUC/BUC) and Meter Surcharge. The DUC is applicable to residential developments including apartments and hotels/motels, while the BUC applies to non-residential development projects. The Meter Surcharge is assessed on meters larger than ¾ -inch. The WSBFC provides funds to construct backup facilities to maintain domestic water service to new developments at peak flow conditions.

3.1 DOMESTIC WATER SYSTEM

The District's domestic water system is generally divided into nine production zones, each having its own respective facilities. Production zones are required due to the large elevation differences found throughout the Valley. Several inter-zone transfer stations exist between pressure zones for added reliability. Typically, the water pressure in each zone ranges from 40 pounds per square inch (psi) to 110 psi. Approximately 97% of the District's customers are located within the nine (9) largest production zones.

Each production zone has production (wells) and booster facilities that provide water through the transmission main and distribution mains to the respective zones' storage reservoirs and customers.

3.2 UPDATES TO THE CALCULATIONS MADE IN THE 2012 STUDY

As the current WSBFC has been successful for many years in generating the necessary revenue to build backup facilities to support growth, Woodard & Curran recommends an update using the same methodology used in the 2012 Study. The methodology that was used in the 2012 Study is generally thought of as a "buy-in" methodology where new customers who will be joining the system and gaining the benefit of using the assets paid for by existing customers.

The following updates were made to the methodology from the 2012 Study and will be displayed and discussed in the sections below:

1. The base data of all tables has been updated to reflect current asset measurements:

2. The historical cost data has been adjusted to reflect current construction cost indices using the same ENR Construction Cost Index used in the 2012 Study. All tables used calculations which reflect the current ENR Construction Cost Index of 12,237 for July 2021.

3. The District added a series of Depreciation tables for the backup facilities to reflect current guidelines of the Government Accounting Standards Bureau Statement 34 (commonly called GASB34). This is consistent with other utilities who use this type of charge to ensure that values for existing assets are not unduly accounted for in the charges.

4. A Reservoir Fee has been included for circumstances when a water storage facility is needed for a new project and the WSBFC Storage Subcomponent Charge does not account for the full value of the storage required for the development.

5. A reduced Dwelling Unit Charge has been included for developments that use non-potable water.

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6. A Meter Surcharge Waiver has been included to account for special circumstances if larger meters are needed for reasons other than increased water demand.

7. The EDU value for Mobile Home Park units has been reduced from 1 EDU to 0.67 EDU based on an analysis of water demands for mobile home parks.

The following sections present the updated WSBFC calculations.

3.3 DEPRECIATION ON ASSETS

Depreciation is the accounting practice that reduces the value of a capital asset as it ages. The goal is to depreciate the asset over its useful life, so that the asset's current value is measured.

The WSBFC calculation includes depreciation to better illustrate the true value of the existing capital assets within CVWD's water system. This depreciation is done using a straight-line method. The straight-line method is calculated by reducing an asset's value by the same amount each year, over the full useful life of the asset. Table 1 shows the assumed useful life of assets in the calculations based on the District's historical records and experience:

Table 1: Capital Asset Depreciation

Asset	Average Useful Life (Years)
Production Facilities	25
Treatment Facilities	15
Storage Facilities	35
Pressure Boosting/Reducing Facilities	25
Transmission Facilities	50

3.4 DWELLING UNIT CHARGE (DUC)

The DUC applies to all new residential land development or redevelopment projects and is based on the number of Dwelling Units located within the project.

Although Dwelling Units vary in terms of type and physical size, the demands on the domestic water system within the District is deemed equal in regards to required flow rates. The DUC is applicable to residential development including duplexes, apartments, condominiums, hotels, motels, and recreational vehicle and trailer park spaces. For the purposes of calculating the DUC, each recreational vehicle, motel room, and hotel room shall constitute 0.5 Dwelling Units. In addition, each mobile home unit within a mobile home park shall constitute 0.67 Dwelling Units.

The Dwelling Unit Charge (DUC) is comprised of the five (5) sub-components that make up the District's domestic water system. These sub-components include:

1. Production Facilities
2. Treatment Facilities
3. Storage Facilities
4. Booster Facilities
5. Transmission Network

In general, each sub-component is sized to handle peak and/or emergency conditions necessary to support water service. Production, treatment, pressure boosting/reducing, and transmission facilities are sized to handle peak flow conditions. Production facilities are designed to meet the peak day demand and account for wells offline. In smaller hydro-pneumatic pressure zones, production facilities are sized to handle peak hour conditions. Storage facilities are sized to provide water for operational equalization, fire flows, and emergencies. For each sub-component, the facility's demand or requirement is calculated and multiplied by the unit cost to calculate the sub-component's cost. The DUC is the sum of the costs of all five (5) sub-components. The following formula represents this calculation:

$$DUC = DUC_P + DUC_T + DUC_S + DUC_B + DUC_M$$

Where:

DUC_P = Production Facilities unit cost

DUC_T = Treatment Facilities unit cost

DUC_S = Storage Facilities unit cost

DUC_B = Pressure Booster/Reducing Facilities unit cost

DUC_M = Transmission Network unit cost

Table 9 (in Section 3.4.6 below) shows the DUC costs used in this recommended approach.

3.4.1 PRODUCTION FACILITIES

All domestic water delivered by the District to the domestic water system is extracted from the Coachella Valley Groundwater Basin by wells. Currently, the District operates approximately 97 wells. Most of the District's wells are drilled to depths of 700 to 1,300 feet. The capacity for the wells is typically in the range of 1,500 to 2,000 gallons per minute (gpm). However, some of the older wells have capacities less than 1,000 gpm.

3.4.1.1 Production Facilities Unit Demand

Production Facilities Unit Demand is the amount of water capacity required for each Dwelling Unit in the domestic water system. This Production Facility Unit Demand is measured in gpm per Dwelling Unit.

In 2012, the Production Facilities Unit Demand was calculated to be 1.00 gpm/unit. Based on results of a recent two-year metering program on new residential construction within CVWD's service area, the new Production Facilities Unit Demand is reduced to 0.81 gpm/unit for this study. This reduction in demand is in line with recent trends in water efficiency because of successful implementation of the *2010 Coachella Valley Water Management Plan Update (2010 CVWMP)* (CVWD, 2012) and mandatory water efficiency measures over the last decade. The District adopted stringent water conservation programs as part of *2010 CVWMP* implementation, including Landscape Ordinance No. 1302.5. New developments are now using drought resistant landscaping, more efficient irrigation systems, and water saving appliances in new homes. In addition, the District implemented tiered rates in April 2010.

3.4.1.2 Production Facilities Unit Cost

The Production Facilities Unit Cost is the cost per gpm to drill a well and build a pumping plant with a backup generator for domestic water production. Site improvement costs are not included in the calculation of the Production Facilities

Unit Cost. Table 2 is a summary of the Production Facilities Unit Cost. The construction costs included in the table are the actual costs at the time of completion. The construction costs are adjusted to today's dollars (July 2021) based on the Engineering News Record Construction Cost Index. The construction cost divided by the capacity of the production facility provides a unit cost of $821.31gpm without depreciation.

This table also includes a depreciation and adjusted value for each production facility, based on standard GASB 34 standards. Including the standard depreciation of production facilities, the unit cost decreases to $438.71/gpm.

3.4.1.3 Production Facilities Sub-Component Cost

Based on the Production Facilities Unit Demand and the Production Facilities Unit Cost calculated above, the DUC sub-component cost for the Production Facilities component is $355.36 (0.81 gpm/unit x $438.71/gpm).

3.4.2 TREATMENT FACILITIES

Federal and state water quality regulations required the District to construct water treatment facilities at several locations to reduce arsenic levels in groundwater to meet the water quality standards. With the increasing pressure on the Valley's groundwater basin, supplemental treatment may be required for other groundwater sources in the future.

3.4.2.1 Treatment Facilities Unit Demand

The areas receiving service from treatment facilities comprise a small portion of the total domestic water service area. The Treatment Facilities Unit Demand is calculated by multiplying the Production Facilities Unit Demand by the percentage of CVWD's service area that is served by treatment facilities. This percentage is estimated at 4.72%. Therefore, the Treatment Facilities Unit Demand is 0.038 gpm/unit.

> Unit Treatment Facility Demand = Production Facilities Unit Demand x Percentage Served
> = 0.81 x 4.72% = 0.038 gpm/unit

3.4.2.2 Treatment Facilities Unit Cost

The Treatment Facilities Unit Cost is the cost per gpm required to construct a treatment facility for domestic water production. It should be noted that site improvement and maintenance costs are not included in the calculation of the Treatment Facilities Unit Cost. Table 3 lists the water treatment facilities within the CVWD system. There are currently two water treatment plants in service that were both constructed in early 2007. The estimated costs do not include any maintenance or operations expenses. The construction costs are adjusted to today's dollars (July 2021) based on the Engineering News Record Construction Cost Index. Both plants were constructed in January 2007, so they both have an ENR adjustment of 55.3%. The total adjusted construction cost of the plants is $16.28 Million in 2021 dollars.

The table divides the total costs by the capacity, to arrive at a Treatment Facilities Unit Cost of $2,034.59/gpm without depreciation.

This table also includes a depreciation calculation for the water treatment plants. Since the plants are 14 years old, depreciation based on GASB 34 standards reduces the unit cost to $81.38/gpm.

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Table 2: Production Facilities Unit Cost

Well/ Pumping Plant	Capacity (gpm)	Construction Cost ($)	Completion Date	% Funded by WSBFC	ENR @ Completion Date	ENR Change (%)	Adjusted Cost ($)	Unit Cost ($/gpm)	Depreciation Period*	Depreciation %	Adjusted Depreciated Cost ($)	Depreciated Unit Cost ($/gpm)
6726-1	1,780	$792,180	February-06	100%	7,689	59.15%	$1,260,750	$708.29	15.5	62.0%	$479,085.00	$269.15
4614-2	1,800	$852,814	February-06	100%	7,689	59.15%	$1,357,249	$754.03	15.5	62.0%	$515,754.49	$286.53
4613-1	1,875	$765,309	February-06	100%	7,689	59.15%	$1,217,985	$649.59	15.5	62.0%	$462,834.28	$246.84
5725-1	1,725	$909,339	February-06	100%	7,689	59.15%	$1,447,208	$838.96	15.5	62.0%	$549,938.99	$318.81
6729-1	2,075	$819,058	July-06	100%	7,721	58.49%	$1,298,124	$625.60	15	60.0%	$519,249.46	$250.24
6707-1	1,965	$1,057,051	January-08	100%	8,090	51.26%	$1,598,904	$813.69	13.5	54.0%	$735,495.82	$374.30
3409-2	2,030	$909,064	July-12	51%	9,324	31.24%	$1,193,073	$587.72	9	36.0%	$763,566.96	$376.14
4615-1	1,669	$2,447,196	Septemb-19	100%	11,311	8.19%	$2,647,541	$1,586.30	1.8	7.2%	$2,456,918.15	$1,472.09
Total	13,924						$11,436,228	$821.31			$6,108,695.34	

Depreciated Unit Cost ($/gpm): $438.71**

* Wells include backup generation benchmarked to their date of construction.

**Depreciated Unit Cost = Adjusted Depreciated Cost($)/Capacity (gpm)

Table 3: Treatment Facilities Unit Cost

Treatment Plant	Capacity (gpm)	Construction Cost ($)	Completion Date	% Funded by WSBFC	ENR @ Completion Date	ENR Change (%)	Adjusted Cost ($)	Unit Cost ($/gpm)	Depreciation Period*	Depreciation %	Adjusted Depreciated Cost ($)	Depreciated Unit Cost ($/gpm)
7802-1	4,000	$5,110,735	January-07	100%	7,880	55.3%	$7,936,556	$1,984.14	14.4	96.0%	$317,462.25	$79.37
6806-1	4,000	$5,370,650	January-07	100%	7,880	55.3%	$8,340,183	$2,085.05	14.4	96.0%	$333,607.33	$83.40
Total	8,000						$16,276,740	$2,034.59			$651,069.58	

Depreciated Unit Cost ($/gpm): $81.38*

*Depreciated Unit Cost = Adjusted Depreciated Cost($)/Capacity (gpm)

3.4.2.3 Treatment Facilities Sub-Component Cost

Based on the Treatment Facilities Unit Demand and the Treatment Facilities Unit Cost calculated above, the DUC sub-component cost for the Treatment Facilities component is $3.09 (0.038 gpm/unit x $81.38/gpm).

3.4.3 STORAGE FACILITIES

The District has approximately 65 domestic water reservoirs or storage tanks located throughout its jurisdiction. The combined storage capacity of these facilities is over 151.9 million gallons. Typically, these storage facilities are located at an elevation higher than the service area. Most reservoirs pressurize their respective zones as a result of their elevated location.

3.4.3.1 Storage Facilities Unit Demand

Storage volume criteria is based on guidelines presented in CVWD's Development Design Manual (DDM). The Storage Facilities Unit Demand is the sum of three components:

1. Unit Peak Equalization Storage

2. Unit Fire Flow Storage

3. Unit Emergency Storage

Unit Peak Equalization Storage

The Unit Peak Equalization Storage is the volume of storage required to meet 50% of the peak daily demand (equates to 50% of the non-fire protection storage component). For CVWD, the peak daily demand is 1.8 x Average Day Demand = 0.81 gpm. The Unit Peak Equalization Storage can be calculated as follows:

> Unit Peak Equalization Storage = (Production Facilities Unit Demand x 24-hour period) x 50%
>
> = (0.81 gpm x 24 hours x 60/minute/hour) x 0.5 = 583.2 gallons per unit

Unit Fire Flow Storage

The Unit Fire Flow Storage is the volume of stored water required per equivalent ¾ inch meter to supply water at 1,500 gpm for two hours. Table 4 includes the meter counts in each Production Zone. There are nine (9) Production Zones, and a total of 108,366 meters. Larger meters (greater than ¾ inch) are adjusted based on AWWA equivalent meter standards. Based on these AWWA standards, there are 130,003 equivalent ¾ inch meters within the system. The number of equivalent meters are increased by dividing the equivalent number of meters by 0.81 to account for additional system capacity based on reducing the peak day demand factor of 1.0 gpm used in the 2012 Study to the updated peak day demand factor of 0.81 gpm. The District's nine largest zones were used for calculation purposes.

Based on the number of new ¾-inch meter equivalents in each zone, the Unit Fire Flow Storage can be calculated as follows:

> Unit Fire Flow Storage = (1,500 gpm x 2 hours x 60 min/hour) / New avg. equivalent ¾-inch meters per zone
>
> = (1,500 x 2 hours x 60 min/hour)/17,833 = 10.09 gallons per unit

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Table 4: Equivalent ¾-inch Meters/Zone

Production Zone	Total Meters	Equivalent ¾-inch Meters
Date Palm	11,613	12,904
Desert Hot Springs	1,720	2,078
Sky Mountain	16,353	20,671
Middleton	3,738	4,397
Mission Hills	3,907	4,731
Valley	39,028	48,871
La Quinta	17,512	20,071
Sun City	7,667	8,169
Lake Cahuilla	6,828	8,111
Totals	108,366	130,003
Average Equivalent ¾-inch Meters per zone:		14,445
Production Facilities Unit Demand (PFUD) (gpm/EDU):		0.81
New Equivalent ¾-inch Meters based on PFUD:		160,498
New Average Equivalent ¾-inch Meters per zone:		17,833

Unit Emergency Storage

The Unit Emergency Storage is the additional storage required to protect the District's customers in case of an emergency. The Unit Emergency Storage provides one-half day of storage at peak day demand. The Unit Emergency Storage can be calculated as follows:

Unit Emergency Storage = Production Facilities Unit Demand x 24 hours) x 50%

= (0.81 gpm x 24 hours x 60 min/hour) x 50% = 583.2 gallons/unit

Storage Facilities Unit Demand Calculation

The Storage Facilities Unit Demand is the sum of the Unit Peak Equalization Storage, Unit Fire Flow Storage, and Unit Emergency Storage calculated above.

Storage Facilities Unit Demand = Peak Equalization + Fire Flow + Emergency

= 583.2 + 10.09 + 583.2 = 1,176 gallons/unit

3.4.3.2 Storage Facilities Unit Cost

The Storage Facilities Unit Cost is the cost per gallon to construct a storage reservoir. Site acquistion and maintenance costs are not included while calculating the Storage Facilities Unit Cost. Table 5 calculates the Storage Facilities Unit Cost. There are 10 storage facilities in the system, dating back to 2001. This includes the three facilities that were included in the 2012 Study, five new facilities built between 2012 and 2021, and two new facilities that will be completed by mid- 2022. The construction costs are adjusted to today's dollars (July 2021) based on the Engineering News Record Construction Cost Index. Total adjusted cost of all the storage facilities is $45.46 million. The total costs are divided over the total storage capacity to arrive at a unit cost of $0.86/gallon without depreciation.

This table also includes depreciation for each facility, based on the completion date and using GASB 34 standard depreciation methods. The adjusted unit cost after depreciation is $0.75/gallon.

3.4.3.3 Storage Facilities Sub-Component Cost

Based on the Storage Facilities Unit Demand and the Storage Facilities Unit Cost calculated above, the DUC sub-component cost for the Storage Facilities component is $882.00 (1,176 gallons/unit x $0.75/gallon).

3.4.4 PRESSURE BOOSTING/REDUCING FACILITIES

Pressure boosting or reducing stations transport domestic water to areas not directly served by wells by transferring domestic water between production zones and service areas. A booster station increases the pressure and sends water from a lower pressure zone to a higher pressure zone. Conversely, a pressure reducing station permits flow from a higher pressure zone to a lower pressure zone. These facilities also typically incorporate the ability to handle emergency flows.

3.4.4.1 Pressure Boosting/Reducing Facilities Unit Demand

Only a portion of CVWD's service area requires booster stations or pressure reducing stations. This area is estimated to be 33%. Therefore, the Pressure Boosting and Reducing Facilities Unit Demand is calculated by multiplying the Production Facility Unit Demand by the percentage of the District served by the pressure booster/reducing stations.

Pressure Boosting/Reducing Facilities Unit Demand = Production Facilities Unit Demand x Percent Coverage
= 0.81 x 33% = 0.27 gpm/unit

3.4.4.2 Pressure Boosting/Reducing Facilities Unit Cost

The Pressure Boosting/Reducing Facilities Unit Cost is the cost per gpm required to construct a pressure boosting and reducing station for domestic water production. Site improvement and maintenance costs are not included while calculating the Pressure Boosting/Reducing Facilities Unit Cost. Table 6 lists the Pressure Boosting and Reducing Stations included in this Study. The table includes seven total stations, constructed between 2000 and 2008.

Each station's original construction costs are shown, along with capacity and construction dates. The construction costs are adjusted to today's dollars (July 2021) based on the Engineering News Record Construction Cost Index. The total adjusted cost of the pressure boosting and reducing stations is $14 million. This total cost is then divided by the total capacity of the stations, and generates an average unit cost of $456.21/gpm without depreciation.

Table 6 also includes depreciation for each facility, based on the completion date and using GASB 34 standard depreciation methods. The adjusted unit cost after depreciation is $126.00/gpm.

3.4.4.3 Pressure Boosting/Reducing Facilities Sub-Component Cost

Based on the Pressure Boosting/Reducing Facilities Demand and the Pressure Boosting/Reducing Facilities Unit Cost calculated above, the DUC sub-component cost for the Pressure Boosting/Reducing Facilities component is $34.02 (0.27 gpm/unit x $126.00/gpm).

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Table 5: Storage Facilities Unit Cost

Reservoir	Capacity (MG)	Construction Cost ($)	Completion Date	% Funded by WSBFC	ENR @ Completion Date	ENR Change (%)	Adjusted Cost ($)	Unit Cost ($/gal)	Depreciation Period*	Depreciation %	Adjusted Depreciated Cost ($)	Depreciated Unit Cost ($/gal)
5510-2	1.00	$373,000	May-01	100%	6,288	94.6%	$725,891	$0.73	20.2	57.7%	$306,948.09	$0.31
7802-1	2.50	$926,830	August-03	100%	6,733	81.7%	$1,684,482	$0.67	17.9	51.1%	$822,989.88	$0.33
6630-2	10.00	$3,830,904	March-06	100%	7,692	59.1%	$6,094,484	$0.61	15.3	43.7%	$3,430,323.95	$0.34
1092-2	2.50	$1,490,705	March-12	100%	9,268	32.0%	$1,968,252	$0.79	9.3	26.6%	$1,445,259.16	$0.58
3601-2	1.72	$1,552,475	March-18	100%	10,959	11.7%	$1,733,519	$1.01	3.3	9.4%	$1,570,072.67	$0.91
4605-1	10.00	$10,002,190	February-18	100%	10,889	12.4%	$11,240,407	$1.12	3.5	10.0%	$10,116,366.47	$1.01
4606-1	6.50	$4,030,792	May-20	100%	11,418	7.2%	$4,319,916	$0.66	1.2	3.4%	$4,171,804.96	$0.64
4602-2	2.00	$2,900,000	October-21	100%	12,237	0.0%	$2,900,000	$1.45	0	0.0%	$2,900,000.00	$1.45
4605-2	10.00	$10,495,000	Est. 8/2022	100%	12,237	0.0%	$10,495,000	$1.05	0	0.0%	$10,495,000.00	$1.05
4606-2	6.50	$4,300,000	Est. 2/2022	100%	12,237	0.0%	$4,300,000	$0.66	0	0.0%	$4,300,000.00	$0.66
Total	52.72						$45,461,951	$0.86			$39,558,765.18	
							Depreciated Unit Cost ($/gal):				$0.75 *	

*Depreciated Unit Cost = Adjusted Depreciated Cost($)/Capacity (MG)

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Table 6: Pressure Boosting/Reducing Facilities Unit Cost

Booster/ Reducing Station	Capacity (gpm)	Construction Cost ($)	Completion Date	% Funded by WSBFC	ENR @ Completion Date	ENR Change (%)	Adjusted Cost ($)	Unit Cost ($/gpm)	Depreciation Period*	Depreciation %	Adjusted Depreciated Cost ($)	Depreciated Unit Cost ($/gpm)
05693	5,084	$1,141,303	August-00	100%	6,233	96.3%	$2,240,675	$440.73	20.9	83.6%	$367,470.64	$72.28
05692	6,936	$1,217,649	August-00	100%	6,233	96.3%	$2,390,562	$344.66	20.9	83.6%	$392,052.11	$56.52
05690	6,778	$949,383	August-00	100%	6,233	96.3%	$1,863,886	$274.99	20.9	83.6%	$305,677.26	$45.10
05636	3,703	$500,000	April-01	100%	6,286	94.7%	$973,353	$262.86	20.4	81.6%	$179,097.04	$48.37
05505	2,272	$1,000,000	October-04	100%	7,312	67.4%	$1,673,550	$736.60	16.7	66.8%	$555,618.71	$244.55
04568	2,000	$1,529,835	February-06	100%	7,689	59.1%	$2,434,724	$1,217.36	15.4	61.6%	$934,933.92	$467.47
06711	4,000	$1,628,642	February-08	100%	8,094	51.2%	$2,462,280	$615.57	13.4	53.6%	$1,142,497.80	$285.62
Total	**30,773**						**$14,039,029**	**$456.21**			**$3,877,347.47**	
						Depreciated Unit Cost ($/gpm):					$126.00 *	

*Depreciated Unit Cost = Adjusted Depreciated Cost($)/Capacity (gpm)

3.4.5 TRANSMISSION FACILITIES

The domestic water pipeline network is a grid of pipelines consisting of transmission mains and distribution mains. Transmission mains are larger pipelines (18, 24, 30, 36 and 42-inch) and are generally located on section lines. Distribution mains are smaller (6, 8 and 12- inch) and are dispersed throughout a development. From the transmission mains, the water flows through the smaller diameter distribution mains to the customers. Any excess production water flows through the transmission facilities to the storage reservoir(s) serving the area.

3.4.5.1 Transmission Facilities Unit Demand

The Transmission Facilities Unit Demand applies only to mains used to transmit domestic water from production and treatment facilities to the development, not the distribution mains built within the development. The Transmission Facilities Unit Demand is determined by summing the length of the transmission mains serving a given area and dividing this length by the number of new equivalent ¾-inch meters within that area.

Table 7 shows the length of transmission mains within each production zone. Transmission mains are defined as large pipe (18+ inch diameter) used to convey large volumes of water from production facilities out to the smaller distribution main networks. This table provides the total length of transmission main (in feet) within each production zone. We then divide the length of the main, by the number of new equivalent meters, to arrive at the length of main (in feet) per equivalent meter. The District's nine largest zones were used for calculation purposes.

Table 7: Transmission Facilities Unit Demand and Main Lengths

Production Zone	Total Meters	Equivalent ¾-inch Meters	Main Length (ft) (>18 inches)
Date Palm	11,613	12,904	115,483
Desert Hot Springs	1,720	2,078	62,803
Sky Mountain	16,353	20,671	220,696
Middleton	3,738	4,397	160,909
Mission Hills	3,907	4,731	88,530
Valley	39,028	48,871	467,013
La Quinta	17,512	20,071	264,567
Sun City	7,667	8,169	105,804
Lake Cahuilla	6,828	8,111	261,437
Totals	**108,366**	**130,003**	**1,747,242**
Production Unit Demand (PUD) (gpm/EDU):	0.81		
New Equivalent ¾-inch Meters based on PUD:	160,498		
Transmission Length per New Equivalent Meters:	10.89		
New Average Equivalent ¾-inch Meters per zone:	17,833		

In addition, to account for conservation and the decrease in the Production Unit Demand from 1.00 gpm to 0.81 gpm between the 2012 Study and this Study, the total equivalent meters were divided by the Production Unit Demand to get the new equivalent meters (130,003 equivalent ¾-inch meters / 0.81 gpm/meter = 160,498 new equivalent ¾-inch meters).

3.4.5.2 Transmission Facilities Unit Cost

The Transmission Facilities Unit Cost is the cost per foot to build a transmission main. Site improvement and maintenance costs are not included while calculating the Transmission Network Unit Cost. Table 8 summarizes the Transmission Main network and associated costs. Each transmission main shows the total construction costs and completion date. The construction costs are adjusted to today's dollars (July 2021) based on the Engineering News Record Construction Cost Index. After adjusting costs to 2021 dollars, the total cost of transmission main is $33.74 million in 2021 dollars. The new average equivalent ¾-inch meters per zone is also adjusted based on the reduced Production Unit Demand (New Equivalent ¾-inch Meters based on PUD/Nine Pressure Zones).

This total cost is divided over the feet of transmission main in the network, to arrive at an average cost of $285.91/per foot before depreciation. The table also includes depreciation for each facility, based on the completion date and using GASB 34 standard depreciation methods. The unit cost after depreciation is $227.95/per foot.

3.4.5.3 Transmission Facilities Sub-Component Cost

Based on the Transmission Facilities Unit Demand and the Transmission Facilities Unit Cost calculated above, the DUC sub-component cost for the Transmission Mains Facilities component is $2,482.38 (10.89 feet/unit x $227.95/foot).

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Table 8: Transmission Facilities Unit Cost

Transmission Main	Length (feet)	Construction Cost ($)	Completion Date	% Funded by WSBFC*	ENR @ Completion Date	ENR Change (%)	Adjusted Cost ($)	Unit Cost ($/ft)	Depreciation Period*	Depreciation %	Adjusted Depreciated Cost ($)	Depreciated Unit Cost ($/ft)
East Gerald Ford	5,987	$1,306,044	January-06	100%	7,660	59.8%	$2,086,431	$348.49	15.5	31.0%	$1,439,637.30	$240.46
Miles Avenue	1,980	$543,225	March-06	100%	7,692	59.1%	$864,202	$436.47	15.3	30.6%	$599,756.42	$302.91
Frank Sinatra	2,668	$1,165,656	March-06	100%	7,692	59.1%	$1,854,411	$695.06	15.3	30.6%	$1,286,961.51	$482.37
Jefferson Street	4,768	$659,854	March-07	100%	7,856	55.8%	$1,027,830	$215.57	14.3	28.6%	$733,870.70	$153.92
Bob Hope	1,900	$373,198	July-07	100%	7,959	53.8%	$573,794	$302.00	14	28.0%	$413,131.45	$217.44
Ramon Road	2,500	$266,619	October-07	100%	8,092	51.2%	$403,190	$161.28	13.7	27.4%	$292,716.23	$117.09
Reservoir 6726-1	12,176	$3,236,216	February-08	100%	8,094	51.2%	$4,892,708	$401.83	13.4	26.8%	$3,581,461.95	$294.14
Highway 86	48,135	$6,165,534	Novemb-08	100%	8,551	43.1%	$8,823,253	$183.30	12.7	25.4%	$6,582,147.01	$136.74
Avenue 60	10,000	$2,702,110	March-13	100%	9,456	29.4%	$3,496,798	$349.68	8.3	16.6%	$2,916,329.37	$291.63
Dillon Road	21,500	$2,644,652	January-18	47%	10,878	12.5%	$2,975,051	$138.37	3.5	7.0%	$2,766,797.58	$128.69
Mission Hills	22,600	$9,312,513	February-18	53%	10,889	12.4%	$10,465,352	$463.07	3.4	6.8%	$9,753,708.47	$431.58
Sky Mountain	12,400	$5,258,127	February-18	47%	10,889	12.4%	$5,909,055	$476.54	3.4	6.8%	$5,507,239.36	$444.13
Total	**118,025**						**$33,744,784**	**$285.91**			**$26,904,274.80**	

Depreciated Unit Cost ($/ft): $227.95**

* Adjusted for account funding source (some projects not funded using 100% WSBFC)

**Depreciated Unit Cost = Adjusted Depreciated Cost($)/Length (feet)

3.4.6 DWELLING UNIT CHARGE CALCULATION

The Dwelling Unit Charge (DUC), shown in Table 9, is the sum of the facility demands for each sub-component multiplied by their respective costs as calculated in the preceding tables. Since this Study includes the ability to depreciate the backup facilities based upon GASB34 standards, note that there are two different sub-component costs – one unhighlighted cost which represents the update of the traditional calculation (non-depreciated cost) and a second cost in orange which represents the depreciated sub-component unit cost used to calculate the DUC.

Table 9: Dwelling Unit Charge

DUC Sub-component	Unit Quantity	Measure	Unit Cost	Sub-component Cost	Depreciated Unit Cost	Depreciated Sub-component Cost
Production Facilities	0.81	gpm	$821.31	$665.26	$438.71	$355.36
Treatment Facilities	0.038	gpm	$2,034.59	$77.31	$81.38	$3.09
Storage Facilities	1,176	gallons	$0.86	$1,014.10	$0.75	$882.00
Pressure Boosting/Reducing Facilities	0.27	gpm	$456.21	$123.18	$126.00	$34.02
Transmission Mains	10.89	feet	$285.91	$3,113.56	$227.95	$2,482.38
Total				$4,990.67		$3,756.85
Dwelling Unit Charge:				$4,991		$3,757
Dwelling Unit Charge Using 60% Non-potable Water (Maximum Reduction):				$1,996		$1,503

3.4.6.1 DUC Credit For Non-Potable Water Use

CVWD seeks to encourage non-potable water use (Canal and/or recycled water) for non-domestic water purposes, such as outdoor irrigation. If a new development were to use non-potable water for a portion of its non-domestic water demands, CVWD will reduce the DUC since backup domestic water system facilities are not necessary to meet those demands. In the case of a residential dwelling unit with a dual plumbing system that meets a percentage of its total water demands with non-potable water, the DUC would be reduced to account for this usage. The DUC will be reduced accordingly based on the proposed non-potable water demands, up to a maximum of 60% of the DUC.

3.4.6.2 DUC Credit for Offsite Facilities

Developers are eligible for credit against the specific DUC sub-components if they build or contribute to backup facilities that can be used by others, as shown by the example below.

> *Example*: A developer is required to construct a 1,000-foot offsite transmission pipeline for a 100 unit development.
> - DUC for 100 units = 100 x $3,757 = $375,700.
> - Transmission Main Unit component is $2,482.38/unit; therefore, credit is 100 x $2,482.38 = $248,238.
> - The DUC will be reduced up to $248,238.
> - The DUC for the development will be $375,685 - $248,238 = $127,462.

3.4.6.3 Reservoir Fee

A Reservoir Fee may be collected from Developers to pay for their proportional share of the cost of a reservoir necessary to serve their development if the developer's proportional storage cost exceeds the total amount of the Storage Facilities sub-component portion of the WSBFC collected for the development. The Reservoir Fee will be based on actual costs (if available) or the non-depreciated Storage Facilities Unit Cost multiplied by the gallons of storage needed.

3.5 BUILDING UNIT CHARGE (BUC)

The BUC is based on the DUC, and is applicable to all non-residential development projects. This charge is calculated by determining Equivalent Water Units (EWU) for each non-residential project, then multiplying by the DUC.

3.5.1 EQUIVALENT WATER UNITS (EWU)

Domestic water demand for non-residential projects are calculated on an individual basis and can vary based on project type and size. The non-residential demand is expressed in EWU. The EWU is made up of three components:

1. Fire Flow Demand

2. Indoor Water Demand

3. Outdoor Water Demand

These three components are summed to generate the total EWU for the project. The following formula represents this calculation:

$$EWU = EWU_{FF} + EWU_{ID} + EWU_{OD}$$

Where:

EWU_{FF} = Fire Flow Demand

EWU_{ID} = Indoor Water Demand

EWU_{OD} = Outdoor Water Demand

As necessary, the General Manager has the discretionary authority to review and modify the EWU to reflect the realistic demand that a new development project will impose on the domestic water system.

3.5.1.1 Fire Flow Demand

The residential fire flow demand is typically 1,500 gpm for two hours. Non-residential fire flow demand is the increased fire flow demand required for non-residential developments compared to the typical residential fire flow. Non-residential fire flow demand is determined by local fire officials based on the California Fire Code. There are several factors considered, including building use, building materials, and the height and size of the structure. Typically, additional capacity is required to meet the increased fire protection demands on non-residential projects.

The following formula represents the non-residential fire flow calculation:

$$EWU_{FF} = ((FF \text{ (gpm)} \times T \text{ (hours)}) / (1,500 \text{ gpm} \times 2 \text{ hours})) - 1$$

Where:

FF = Fire Flow in GPM as required by the Fire Marshall

T = Fire Flow duration as required by the Fire Marshall

3.5.1.2 Indoor Water Demand

The non-residential indoor water demand utilizes and converts the sanitation equivalent dwelling unit (EDU) to an indoor EWU. The peak day EDU demand factors are found in Table A-1 of Appendix I of the Development Design Manual. Indoor water demands for non-residential development projects are determined on a case-by-case basis. The Indoor Water Demand for non-residential projects is determined using the following formula:

$$EWU_{ID} = \text{Table A-1 (EDU's)}$$

Where:

1 EDU_{ID} (EWU Indoor Demand) = 1 EDU*

*EDU = Table A-1

3.5.1.3 Outdoor Water Demand

The non-residential outdoor water demand compares the water applied to landscaped areas of a non-residential development project to the outdoor water demand of a typical residential dwelling unit. This component of the EWU ensures that all domestic water demands, even those strictly used for irrigation, are accounted for and the necessary backup facilities required to supply domestic water are accurately funded. The outdoor water demand is determined by comparing the maximum annual applied water allowance (MAAWA) to the total peak day demand that a typical residential dwelling would use on outdoor landscaping. It is estimated that 70% of water use for a typical residential dwelling unit on a peak day in the summer is used for outdoor irrigation, which is equal to 70% x 0.81 gpm x 1,440 = 816 gpd/unit.

The non-residential development MAAWA is based on District Ordinance No. 1302.5, Landscape and Irrigation System Design Criteria which was created to ensure new developments are meeting conservation measures. The Outdoor Water Demand is determined using the below formula:

$$EWU_{OD} = MAAWA \text{ (gpd)} / 816 \text{ gpd/unit}$$

Where:

MAAWA = Maximum Annual Applied Water Allowance (gpd) reviewed and approved by CVWD

3.5.2 BULDING UNIT CHARGE CALCULATION

The BUC is calculated individually for each project and is equal to the DUC multiplied by the EWU of the project.

$$BUC = DUC \times EWU$$

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3.6 METER SURCHARGE

The purpose of the meter surcharge is to pay for backup facilities to accommodate the increased flows through meters larger than ¾-inch in size.

3.6.1 METER SURCHARGE FACTOR

The standard service for CVWD residential customers consists of a 1-inch diameter service line with a ¾-inch meter. Meters larger than ¾-inch allow for greater flow rates. For example, a 1-inch meter can transmit nearly ⅔ more flow than a standard ¾-inch meter. Since larger meters transmit larger flows, more "backup" facilities are required for a large meter than the standard ¾-inch meter. Therefore, a meter surcharge is assessed for each meter larger than the standard ¾-inch meter.

Similar to the 2012 Study, the American Water Works Association's (AWWA) M-6 Manual standard meter size factors are used to reflect the larger long term and peak demand (and the cost of providing backup facilities to meet those demands) which larger meters will place on the system.

Table 10 lists the meter surcharge factors to be used in calculation of the WSBFC.

Table 10: Meter Surcharge Factor

Meter Size	Maximum Capacity (gpm)	Capacity Ratio*	Meter Surcharge Factor
3/4-inch	30	1	0
1-inch	50	1.67	0.67
1-1/2 inch	100	3.33	2.33
2-inch	160	5.33	4.33
3-inch	350	11.67	10.67
4-inch	600	20	19
6-inch	1250	41.67	40.67
8-inch	1800	60	59

* Based upon AWWA Standards detailed in M6 Manual on the Sizing of Water Meters.

3.6.2 MODIFIED DUC FOR METER SURCHARGE

A Modified DUC is used in this case because the fire flow requirement is not dependent on the meter size. The Modified DUC is calculated by subtracting the Unit Fire Flow Storage component of the Storage Facilities Unit Cost, as described below, from the DUC.

> Modified DUC = DUC – Unit Fire Flow Storage component of Storage Facilities Unit Cost
>
> = $3,757 – (10.09 gallons/unit x 1.2 storage factor x $0.75 depreciated storage cost) = $3,748/unit

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3.6.3 METER SURCHARGE CALCULATION

The meter surcharge is equal to the Modified DUC multiplied by a factor to account for increased flows through larger meters. The factors, multiplied by the Modified DUC, are equal to the ratio of the maximum capacity of a large meter to the maximum capacity of a ¾-inch meter minus one. One is subtracted from the ratio to account for the first DUC paid on the meter.

The Meter Surcharge is determined by multiplying the Modified DUC by the Meter Surcharge Factor:

> Meter Surcharge = Modified DUC x Meter Surcharge Factor

The Meter Surcharge is shown in Table 11 and is determined by multiplying the Modified DUC by the Meter Surcharge Factor as described in Section 3.6.1. The Meter Surcharge was also depreciated using GASB 34 standard depreciation methods. The depreciated values for the meter surcharge range from $2,511 for a 1-inch meter to $221,132 for an 8-inch meter.

Table 11: Meter Surcharge

Meter Size	Meter Surcharge Factor	Meter Surcharge	Depreciated Meter Surcharge
3/4-inch	0	$0	$0
1-inch	0.67	$3,344	$2,511
1.5-inch	2.33	$11,628	$8,733
2-inch	4.33	$21,610	$16,229
3-inch	10.67	$53,250	$39,991
4-inch	19	$94,823	$71,212
6-inch	40.67	$202,971	$152,431
8-inch	59	$294,450	$221,132

3.6.3.1 Meter Surcharge Waiver

There are circumstances in which certain residential accounts are required to install an incrementally larger meter for reasons other than the account's anticipated daily domestic water needs. For example, the new account may be located in a low pressure area (which requires a larger meter in order to maintain adequate pressure) or due to residential fire sprinkler requirements.

Under such circumstances, CVWD staff may assess the lower capacity charge that corresponds to the meter size that would otherwise be appropriate for the new account in normal circumstances (i.e., normal pressure and without fire sprinkler requirements).

3.7 CONCLUSIONS

The updated WSBFC maintains the charge similar to historical rates and achieves the goal of "growth paying for growth". The System Development Charge or "Buy-In" methodology accounts for various components of the backup system, including production, treatment, storage, pressure boosting and reducing stations, and transmission facilities. This structure allows CVWD to continue crediting developers for offsite facilities that they build. The updated charge also allows credit given to developers for installation of dual-plumbed systems that reduce domestic water system demands. In addition, the updated WSBFC takes into account conservation efforts made since the 2012 Study was prepared by adjusting/reducing the Unit Quantities shown in Table 9 for Production, Storage, Pressure Boosting/Reducing, and Transmission Facilities compared to the 2012 Study.

4. SUMMARY OF CHARGES

The new recommended components of the WSBFC are as follows:

- Dwelling Unit Charge (DUC): $3,757 (as shown in Table 9)

- Meter Surcharge: As shown in Table 11 (Depreciated Meter Surcharge) for the various meter sizes.