
Technical Memorandum

Date: September 26, 2019
To: Dirk Marks, Santa Clarita Valley Water Agency
From: Lisa Maddaus and Tess Kretschmann, Maddaus Water Management Inc.
Title: Santa Clarita Valley Water Agency Indoor Water Use Estimates

1. PURPOSE AND BACKGROUND

The purpose of this Technical Memorandum (TM) is to examine indoor water use to project future influent to the Santa Clarita Valley Water Reclamation Plants attributable to new growth through buildout by 2050. This TM was prepared at the request of the Santa Clarita Valley Water Agency (SCVWA) to better understand: (1) the potential for future projected increases due to new growth at a lower per account water use as more water efficiency products are installed; and (2) the potential for declining indoor water use of existing accounts due to ongoing conservation activities being implemented in the SCVWA service area.

This study was commissioned by the Santa Clarita Valley Water Agency, which was created January 1, 2018 by an act of the State Legislature (SB 634) through the merger of the three water agencies in the Santa Clarita Valley. The merger included Castaic Lake Water Agency (CLWA) and three of its four previous water retailers: Santa Clarita Water Division (SCWD), Newhall County Water District (NCWD) and the Valencia Water Company (VWC). The Castaic Lake Water Agency was formed as a wholesale water agency to acquire, treat, and deliver State Water Project water supply throughout the Santa Clarita Valley. SCVWA also provides wholesale water to Los Angeles County Waterworks District #36 (LACWD).

There has been a long history of detailed analysis of water demand and conservation programs in the former CLWA, performed for the retailer water agency service areas, now SCVWA service area (exclusive of LACWD). Several past planning efforts were leveraged for the execution of this analysis. As a result, some past modeling efforts and documentation refer to the former agency naming conventions and, in this document, former “service areas” are now referenced as “Service Divisions.” The models used in this updated analysis are based on the service division boundaries and calculated as totals for the SCVWA service area.

2. PAST PLANNING EFFORTS

This section provides an overview of the past planning efforts for easier reference to the more detailed descriptions in each of the documents listed below. Given the prior analysis that began in 2013, the analysis was an effort to update the Water Use Efficiency Strategic Plan and the follow-on Urban Water Management Plan (UWMP). These past efforts were focused on the previous four water retailers as separate entities, with separate model analyses including a “roll-up” to the wholesaler CLWA. These past planning efforts provided the foundation that was updated and expanded for the purposes of this study. These efforts included the following:

Determine Accurate Population Counts for State Required Senate Bill (SB) X7-7 Per Capita Calculations. Early in the update to the Water Use Efficiency Strategic Plan effort, there were unresolved issues with past population estimates that were required to calculate the per capita water conservation targets outlined in SB X7-7. As a result, a rigorous assessment of the population, to enable tracking water consumption on a gallons per capita per day basis, was undertaken by the four Santa Clarita Valley Water Suppliers within the CLWA service area. This assessment was conducted using United States Census block data from the years 2000 and 2010. The population assessment was conducted by evaluating the population in each census block to determine what portion residing in that block was in a

particular retail agency Service Division. The population assessment was verified by using high resolution aerial maps to visually review census blocks which contained more than one Service Division.

Determine a Robust Land-Use-Based Water Demand Forecast. The Demand Study Project (Project) developed the projected demands using a new land-use-based forecasting approach for each of the four water retailer agencies (Retailers) in the Santa Clarita Valley (SCV) served by CLWA. This TM presents the land-use-based demand forecasts prepared using a “bottom-up” GIS approach based on Los Angeles County GIS layers that were further modified and Retailer provided information, leveraging the County’s analysis connected to the One Valley, One Vision transportation modeling project. The TM was updated from an earlier version issued in June 2015. This updated memorandum was necessary due to the updated information provided by Valencia Water Company (VWC) associated with revised development plans for Newhall Ranch, which altered the future demand forecast. This memorandum also incorporates the plumbing code updates due to a recent revision in September 2015, effective December 2015, for the Title 20 Appliance Efficiency Standards adopted by the California Energy Commission. This TM serves as the final land-use-based demand forecasts for each Retailer. It contains the best information currently available to support the Retailers and CLWA development of the Urban Water Management Plan in compliance with the 2015 Urban Water Management Plan Act that was completed and submitted to the Department of Water Resources by July 1, 2016.

- Maddaus Water Management Inc. *Technical Memorandum #1: SCV Demand Study: Demand Forecast Approach*. Prepared for Castaic Lake Water Agency. August 2014.
- Maddaus Water Management Inc. *Technical Memorandum #2: SCV Demand Study: Demand Projection Analysis Update*. Prepared for Castaic Lake Water Agency. June 2015.
- Maddaus Water Management Inc. *Updated Final Technical Memorandum #2. SCV Demand Study Update: Land-Use Based Demand Forecast Analysis*. March 4, 2016. Appended to *2015 Urban Water Management Plan for the Santa Clarita Valley*. Prepared for Castaic Lake Water Agency, SCWD, NCWD, VWC and LACWD36. June 16, 2016.

Revised Water Use Efficiency Strategic Plan to Meet SB X7-7 GPCD Targets using Indoor and Outdoor Conservation Measures. The Castaic Lake Water Agency Water Santa Clarita Valley Family of Water Suppliers completed the Water Use Efficiency Strategic Plan (WUESP) in June 2015. It was completed prior to the March 2016 publishing of the Updated Final Technical Memorandum #2 SCV Demand Study: Demand Projection Analysis Update Results Phase 2 (TM2) and the June 2016 adoption of the 2015 UWMP. An Addendum Water Use Efficiency Strategic Plan was then completed in 2017, which summarized the updated demand projections, estimated water savings and projected water use efficiency activities and budget levels for CLWA and the four Retailers (VWC, NCWD, SCWD, and LACWD) so they could plan for the near future. This document presented recommendations for looking ahead to meet water savings targets in 2020 (and beyond) based on SB X7-7.

- Maddaus Water Management Inc. *Santa Clarita Valley Family of Water Suppliers - Addendum to the Water Use Efficiency Strategic Plan*. May 31, 2017.

Determination of Commercial, Industrial and Institutional (CII) Demand Factors Report. This report provided a written summary of the commercial, industrial, and institutional water use per building area indoor water demand factors and development methodology as well as data sources. This summary supports the development of refined Facility Capacity Fees (FCFs) unit demand factors for CLWA on behalf of the four Water Retailers.

- Maddaus Water Management Inc. *Commercial Demand Factor Study for Castaic Lake Water Agency*. December 8, 2016.

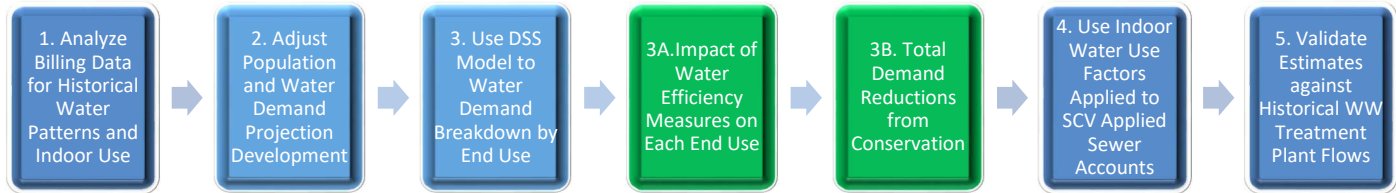
Study of West Side Communities Projected Buildout Wastewater Flow. This study was referenced for a description of annual average flows for anticipated buildout and interim development levels.

- Santa Clarita Valley Water Agency. Excel file “2018-10-09_Table_West Side Communities Buildout Sewer Flows” provided in an email from Dirk Marks at SCVWA on October 25, 2018, table name: “West Side Communities Projected Buildout Wastewater Flow.”

3. METHODOLOGY

Several fundamental steps were taken to determine a rigorous estimate of indoor water use using an end modeling approach. The following figure provides an overview of the methodology. The steps are further described below. Additional information on the analytical process is described in the following sections where results are presented.

Figure 1. Overview of the Methodology for Indoor Water Use Analysis



Summary of Indoor Water Use Analysis Steps

MWM and SCVWA collaborated on developing an approach that would meet SCVWA’s objectives of (1) quantifying the potential increased wastewater influent to the SCVSD’s Valencia Water Reclamation Plant (WRP) attributed to new development that could be made available for recycled water use without obtaining a revision to an existing 1211 permit; and (2) estimating the potential future reduction of wastewater influent attributed to estimated future passive and active water conservation actions. As discussed below this approach: (STEP 1) established a base year and identified type of water accounts that contribute to WRP influent; (STEP 2) updated water demand and population estimates to reflect revised forecasts for future development; (STEP 3) developed additional information as required to update each of the four existing DSS models in order to project reduced water use from existing and future accounts; revised conservation program savings calculations to determine reduced indoor water use; performed extensive quality assurance quality control (QA/QC); (STEP 4) post-processed DSS model output to discern indoor water use associated with existing and future accounts; and (STEP 5) validated results by comparing estimated/modeled indoor flows to historic WRP flows. This approach is outlined more definitively below.

Step 1. Key to this analysis was the establishment of a base year. To accomplish this MWM Analyzed water billing data on historical consumption (1995-2018) by customer categories water use factor (gallons per day per account) identifying non-drought, non-wet conditions (and further screening for non-economic recession conditions). For purposes of this analysis, the most recent non-drought, non-wet year 2017 was established as the base year, further the impact of the 2008 economic downturn have and the following customer categories billing data was incorporated into the modeling effort: Single Family Residential (SF), Multifamily Residential (MF), Commercial (COM), Institutional (Government) (INST), and Industrial (IND). Other customer category types like Irrigation and Other were not specifically included in the analysis as they are assumed have outdoor water use only. Likewise, non-revenue water was not analyzed.

Step 2. Adjusted previously developed land-use based population and demand forecast in consideration of recent new development timelines and residential indoor water use objectives in addition to an analysis of more recent billing data. Revise the population forecast that correlates to the updated demand forecast schedule provided by the developers. The updated population forecast was needed to accommodate calculations such as gallons per capita per day metrics and also end-use analysis of replacement fixtures and appliances by the number of people.

Step 3. Update the most recent versions of the Decision Support System Least Cost Planning Models (DSS Models).

The DSS Model is used to prepare long-range, detailed demand projection; the purpose of the extra detail is to enable a more accurate assessment of the impact of water efficiency programs on demand. A rigorous modeling approach is especially important if the project will be subject to regulatory or environmental review. The DSS Model is an “end-use” model that breaks down total water production (water demand in the service area) to specific water end uses such as plumbing fixtures and appliance uses. The model uses a bottom-up approach that allows for multiple criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and conservation efforts. To forecast urban water demands using the DSS Model, customer demand data is obtained from the water agency being modeled. This data is analyzed to approximate the split of indoor and outdoor water usage in

each customer category; the indoor/outdoor water usage is further divided into typical end uses for each customer category. In the codes and standards part of the DSS Model, specific fixture end-use type (point of use fixture or appliance), average water use, and lifetime are compiled. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, faucets and clothes washers are modeled by customer category. This yields two demand forecasts: (1) with plumbing codes and (2) without plumbing codes. Plumbing code measures are independent of any water-use efficiency program; they are based on customers following applicable current local, state, and federal laws, building codes, and ordinances. The DSS Model also evaluates active conservation measures using benefit-cost analysis with the present value of the cost of water saved. Benefits are based on savings in facility operations, maintenance (O&M) and any deferred capital expenditures. More background on the DSS Model is provided in Appendix A and Appendix B. Furthermore, subsequent sections 4.1 and 4.2 provide key information developed for DSS Model input. The following elements for each of the four DSS Models were updated as described below:

Step 3A. Revise/Updates Model Inputs and Calculate End Use Breakdowns

- Extended the historical consumption from December 2017 through Dec 2018
- Updated the population projection to account for a slower development schedule as compared to the previous estimate. Revised population estimates are provided by Service Division and Valleywide in Appendix C. Previous projections can be found in the 2015 UWMP.
- Revised the base year water use profile from 2014 to be base year on 2017. This year had assumed no outdoor irrigation in the winter minimum month (February 2017) and with more normal rainfall in 2016 continuing into the winter of 2017, was considered to be most representative of post drought conditions. Irrigation is known to modestly occur in the winter months in the Santa Clarita Valley, however assumed to be negligible given the model calibration to historical indoor water use analysis at the end use level on a per account and per capita basis. More information about this methodology can be found in Sections 4.1 and 4.2.
- Updated the demand forecast using the most recent information on new account growth by customer category available. Note that the indoor usage factors for new developed Single Family and Multifamily properties were set at the starting and end threshold for 55 down to 50 Gallons Per Capita Per Day (GPCD).¹
- Recalibrated the plumbing fixture and replacement fixture analysis to most accurately represent the changes in existing and new development for passive changes in water use as customer upgrade to more water efficient technologies as needed. Additional details on the plumbing code laws analyzed as part of this effort are presented in Appendix B.
- Revised the conservation program measure detailed measure input design worksheets to reflect the indoor water conservation programs currently be implemented and planning to be active for the foreseeable future; often conservation measures extending beyond 2035. The measure budgets, schedules, activity levels, water savings assumptions, design notes and other input details were reviewed and revised in each Service Division's model for the following indoor water conservation measures:

○ Water Loss Management ○ Automated Meter Infrastructure (AMI) ○ Public & School Education ○ Customer Water Use Reports ○ School Building Retrofit ○ Ultra-High-Efficiency (HE) Toilet Rebates ○ Top User Indoor Surveys & Incentives	○ Commercial, Industrial, & Institutional Replace Equipment & Enhance Water Use Performance ○ Ultra-High-Efficiency Urinal Rebates ○ SF Survey Leak & Pressure ○ HE Faucet & HE Showerhead Giveaway ○ Low-Income HE Fixture Installation ○ SF Hot Water on Demand ○ WaterSMART Workshop
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Step 3B. Review Model Output

- Review model analysis output for full demand forecast and the indoor water use by customer category on a gallons per account per day basis. Compare values to previous analysis results that were included in the 2015 UWMP.

¹ Water Efficiency Legislation Bill Fact Sheet:

https://www.waterboards.ca.gov/publications_forms/publications/factsheets/docs/water_efficiency_bill_factsheet.pdf

- Review by staff the assumptions for all changes made throughout the modeling update process.
- Prepare a complete independent Quality Assurance/Quality Control (QA/QC) review using Maddaus Water Management’s QA/QC checklist for each of the four individual models.

Step 4. Post-process the indoor water use factors for each projection year through 2050 to apply the forecasted data for each customer category for each Service Division’s model to the SCVWA provided wastewater treatment plant served existing and planned new accounts.

Step 5. Validate the historical wastewater generation for the SCVWA sanitation district’s service area against the DSS Model-based indoor water use estimates to confirm the approach and the reasonableness of the modeling results for future years. Prepare the documentation for the analytical results, which are presented in Section 5.

4. BASIS FOR WATER USE FACTORS BY CUSTOMER CATEGORY

This section presents the basis for the indoor water use factors generated by customer category for the four SCVWA Service Divisions (formerly “Retailers”).

4.1 Results of Historical Indoor Water Use Analysis

MWM reviewed previously generated indoor water use estimates based on historical water billing data for the following five customer categories that use indoor water: Single Family, Multifamily, Commercial, Industrial, and Institutional. Discussions with SCVWA staff yielded that more recent post-drought data based on non-drought and non-wet water years would account for permanent changes in water use behaviors. MWM assessed the indoor water use for each customer category for the four SCVWA Service Divisions.

The following tables present the estimated indoor consumption per account as a percentage of total water use and in gallons per day per account (GPDA) by customer category for the four SCVWA Service Divisions. The base year used for the analysis was 2017 since it represented the most recent non-drought and non-wet year. The decision by SCVWA to use 2017 as the base year was made after an extensive analysis of historical customer category per account water use. It is assumed that indoor use is approximately equal to the minimum use in the winter. While there may be minimal landscape watering in the winter or leakage from irrigation systems, it is assumed that this is minor, at less than 5-10 percent of the average winter water use. This method is sometimes also referred to as the “Standard Winter Method,” “Minimum Month Method,” or “Non-Seasonal Use Minimum Month Across All Water Years.” In the following table, Single Family and Multifamily are denoted with an “Existing” prefix to clarify that these indoor factors will only be applied to those respective accounts. New residential accounts will have a different indoor factor from existing residential accounts; this was introduced previously in Section 3 and will be discussed in more depth in Section 4.2. CII indoor water use factors are used for both existing and new development accounts and so are not uniquely identified in the following table.

Table 1. Estimated Indoor Demand per Account by Customer Category (2017 Base Year Indoor Percentage)¹

	Weighted Average	Range	NCWD	SCWD	VWC	LACWD36
Existing Single Family	45%	40% - 55%	40%	45%	45%	55%
Existing Multifamily	85%	75% - 90%	75%	90%	80%	90%
Commercial	60%	50% - 75%	70%	75%	50%	55%
Industrial	45%	20% - 45%	20%	45%	45%	N/A ²
Institutional	25%	20% - 30%	30%	20%	25%	20%

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

² LACWD36 does not have any industrial accounts.

Table 2. Estimated Indoor Demand per Account by Customer Category (2017 Base Year Indoor GPDA)¹

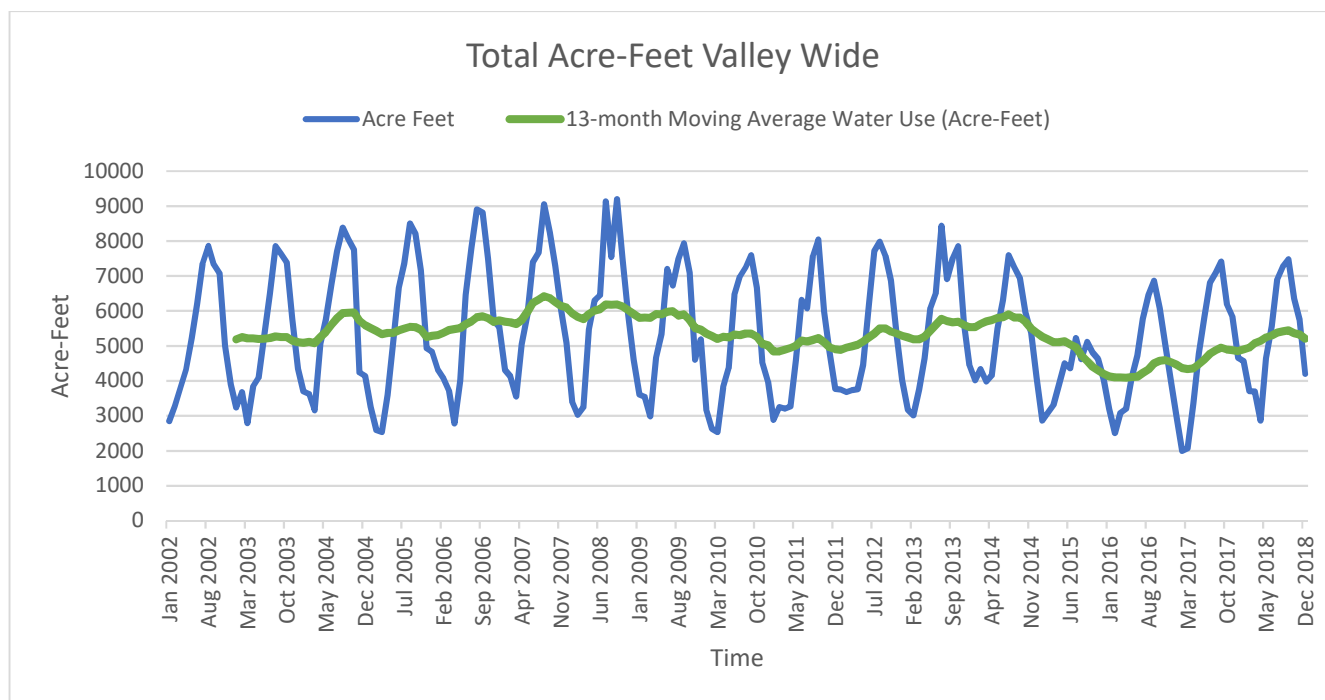
	Weighted Average	Range	NCWD	SCWD	VWC	LACWD36
Existing Single Family	220	180 - 290	200	250	180	290
Existing Multifamily	1,580	450 - 16200	2,760	450	2,780	16,200
Commercial	1,340	110 - 1660	690	950	1,660	110
Industrial	1,160	320 - 2170	320	2,170	1,040	N/A ²
Institutional	1,730	1150 - 2260	1,760	1,150	2,260	1,160

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

² LACWD36 does not have any industrial accounts.

To better demonstrate why year 2017 was used as the base year, Figure 2 presents monthly total consumption volume Valleywide, with the minimum month shown for February 2017. The monthly historical total consumption volume per account by customer category for each Service Division through December 2018 is presented in Appendix D. Only those customer categories with indoor water use are presented. Note the downward trend that began in 2007 and continued to 2011. Note the downward trend that began in 2007 and continued to 2011. A robust econometric analysis was conducted and is presented in Technical Memorandum #2: SCV Demand Study: Demand Projection Analysis Update; prepared for Castaic Lake Water Agency in June 2015. Note the initial increase and then decrease in water use in the recent 2014-2017 drought with a rebounding increase in water use starting in 2017.

Figure 2. Historical Monthly Consumption – Valleywide



Note: Although there was previous data available for CLWA, VWC, and NCWD, the data available for LACWD was from 2002 onward. Therefore, this graph shows total consumption valleywide in acre-feet starting from January 2002.

4.2 Estimated Future Indoor Water Use Analysis

Taking into account indoor water use savings from plumbing codes and conservation program measure implementation, this section estimates annual indoor water use for model start year 2019 through projected buildout year 2050. Indoor water use will be projected for the five customer categories (Single Family, Multifamily, Commercial, Industrial, and Institutional) and is estimated for the four SCVWA Service Divisions for the following demand scenarios:

- Demands with plumbing code (passive) savings only
- Demands with plumbing code (passive) savings **and** the current SCVWA indoor conservation program estimated (active) savings. The indoor measures included in this analysis are listed in the previous section. More information about SCVWA's current conservation program can be found here: <https://conservation.clwa.org/>

In order to account for a different indoor water use by new residential accounts, four residential categories are tracked depending on whether the new residential account will come online before 2030 or afterwards. Residential accounts coming online between now and 2030 are conservatively assumed to use 55 gallons per day per person (GPCD). This estimate comes from the recent California legislation water use objectives as required in the new "Making Water Conservation a California Way of Life" laws,² whose implementation guidelines are currently being established. As also prescribed in the legislation, residential accounts coming online after 2030 are conservatively assumed to use 50 GPCD.

To improve water conservation and drought planning, the California legislature and governor passed into law in 2018 Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman). Collectively, these efforts provide a road map for all Californians to work together to ensure that there will be enough water, even during times of drought. DWR and the State Water Board are working closely together to develop new standards for indoor residential water use; outdoor residential water use; commercial, industrial, and institutional water use for landscape irrigation with dedicated meters; and water loss. For the purposes of this analysis, the residential categories addressing these water use objectives are as follows:

- Existing Single Family (SF) – This customer category reflects existing single family accounts assumed to use water indoors based on 2017 water use.
- New Single Family with Indoor 55 GPCD (SF55) – This customer category reflects new single family accounts assumed to use water indoors at 55 GPCD. These accounts are assumed to come online between 2020 and 2030.
- New Single Family with Indoor 50 GPCD (SF50) – This customer category reflects new single family accounts assumed to use water indoors at 50 GPCD. These accounts are assumed to come online after 2030.
- Existing Multifamily (MF) – This customer category reflects existing multifamily accounts assumed to use water indoors based on 2017 water use.
- New Multifamily with Indoor 55 GPCD (MF55) – This customer category reflects new multifamily accounts assumed to use water indoors at 55 GPCD. These accounts are assumed to come online between 2020 and 2030.
- New Multifamily with Indoor 50 GPCD (MF50) – This customer category reflects new multifamily accounts assumed to use water indoors at 50 GPCD. These accounts are assumed to come online after 2030.

Indoor water use factors for new non-residential accounts are assumed to remain similar to existing non-residential account water use factors and are likewise based on the 2017 base year use data and the previously conducted land use demand analysis. For these reasons, in the following table, Single Family and Multifamily are denoted with an "Existing" prefix to clarify that these indoor factors will only be applied to those respective accounts. New residential accounts have a different indoor factor as previously discussed. CII indoor factors are used for both existing and new development accounts and so are not uniquely identified.

² DWR. Making Conservation a Way of Life Primer of 2018 Legislation on Water Conservation and Drought Planning Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman), prepared by California Department of Water Resources and the State Water Resources Control Board, November 2018. Last accessed August 2019: <https://water.ca.gov/Programs/Water-Use-And-Efficiency/Making-Conservation-a-California-Way-of-Life> or more directly accessed at: <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Make-Water-Conservation-A-California-Way-of-Life/County-Drought-Planning/Files/Making-Water-Conservation-a-CA-Way-of-Life-Primer.pdf>

Table 3. Indoor Water Use Factors (GPDA) for NCWD¹

Year	Demands with Plumbing Code (Passive) Savings Only (GPDA)									Demands with Plumbing Code (Passive) Savings Only & Current SCVWA Indoor Conservation Program Active Savings (GPDA)								
	SF	SF55	SF50	MF	MF55	MF50	COM	IND	INST	SF	SF55	SF50	MF	MF55	MF50	COM	IND	INST
2019	200	210	190	2,760	2,470	2,250	690	320	1,760	200	210	190	2,690	2,460	2,240	690	320	1,750
2020	200	210	190	2,730	2,470	2,250	680	320	1,760	190	210	190	2,630	2,460	2,240	670	320	1,740
2025	190	210	190	2,590	2,470	2,250	620	320	1,760	180	210	190	2,420	2,460	2,240	610	320	1,710
2030	190	210	190	2,470	2,470	2,250	590	320	1,760	170	210	190	2,290	2,460	2,240	580	320	1,700
2035	180	210	190	2,380	2,470	2,250	570	320	1,760	170	210	190	2,200	2,460	2,240	570	320	1,700
2040	180	210	190	2,310	2,470	2,250	560	320	1,760	170	210	190	2,140	2,460	2,240	560	320	1,700
2045	180	210	190	2,260	2,470	2,250	560	320	1,760	170	210	190	2,100	2,460	2,240	550	320	1,700
2050	180	210	190	2,230	2,470	2,250	550	320	1,760	170	210	190	2,070	2,460	2,240	550	320	1,700

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

Table 4. Indoor Water Use Factors (GPDA) for SCWD¹

Year	Demands with Plumbing Code (Passive) Savings Only (GPDA)									Demands with Plumbing Code (Passive) Savings Only & Current SCVWA Indoor Conservation Program Active Savings (GPDA)								
	SF	SF55	SF50	MF	MF55	MF50	COM	IND	INST	SF	SF55	SF50	MF	MF55	MF50	COM	IND	INST
2019	250	220	200	450	380	350	950	2,150	1,150	240	210	190	440	380	350	920	2,110	1,110
2020	250	220	200	450	380	350	920	2,150	1,150	240	210	190	430	380	340	870	2,080	1,080
2025	240	220	200	420	380	350	830	2,150	1,150	230	210	190	390	380	340	770	2,060	1,000
2030	230	220	200	400	380	350	780	2,150	1,150	220	210	190	360	380	340	750	2,080	1,010
2035	230	220	200	380	380	350	750	2,150	1,150	220	210	190	350	380	340	730	2,100	1,020
2040	220	220	200	370	380	350	740	2,150	1,150	210	210	190	340	380	340	720	2,110	1,020
2045	220	220	200	360	380	350	730	2,150	1,150	210	210	190	330	380	340	710	2,120	1,030
2050	220	220	200	350	380	350	720	2,150	1,150	210	210	190	320	380	340	710	2,120	1,030

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

Table 5. Indoor Water Use Factors (GPDA) for VWC¹

Year	Demands with Plumbing Code (Passive) Savings Only (GPDA)									Demands with Plumbing Code (Passive) Savings Only & Current SCVWA Indoor Conservation Program Active Savings (GPDA)								
	SF	SF55	SF50	MF	MF55	MF50	COM	IND	INST	SF	SF55	SF50	MF	MF55	MF50	COM	IND	INST
2019	180	170	150	2,780	2,640	2,400	1,650	1,040	2,260	180	170	150	2,620	2,630	2,390	1,640	1,040	2,240
2020	180	170	150	2,750	2,640	2,400	1,640	1,040	2,260	180	170	150	2,490	2,630	2,390	1,620	1,030	2,220
2025	170	170	150	2,600	2,640	2,400	1,610	1,040	2,260	170	160	150	2,110	2,630	2,390	1,560	1,010	2,140
2030	170	170	150	2,460	2,640	2,400	1,590	1,040	2,260	160	160	150	1,970	2,630	2,390	1,540	1,010	2,150
2035	170	170	150	2,360	2,640	2,400	1,570	1,040	2,260	160	160	150	1,890	2,630	2,390	1,540	1,020	2,180
2040	160	170	150	2,290	2,640	2,400	1,560	1,040	2,260	160	160	150	1,820	2,630	2,390	1,530	1,030	2,180
2045	160	170	150	2,240	2,640	2,400	1,550	1,040	2,260	150	160	150	1,770	2,630	2,390	1,520	1,030	2,180
2050	160	170	150	2,200	2,640	2,400	1,550	1,040	2,260	150	160	150	1,730	2,630	2,390	1,520	1,030	2,180

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

Table 6. Indoor Water Use Factors (GPDA) for LACWD¹

Year	Demands with Plumbing Code (Passive) Savings Only (GPDA)									Demands with Plumbing Code (Passive) Savings Only & Current SCVWA Indoor Conservation Program Active Savings (GPDA)								
	SF	SF55	SF50	MF	MF55	MF50	COM	IND ²	INST	SF	SF55	SF50	MF	MF55	MF50	COM	IND ²	INST
2019	300	270	250	17,070	34,610	31,470	120	N/A	1,220	300	270	250	16,810	34,530	31,390	120	N/A	1,200
2020	300	270	250	17,070	34,610	31,470	120	N/A	1,220	300	270	250	16,550	34,530	31,320	110	N/A	1,190
2025	290	270	250	17,070	34,610	31,470	120	N/A	1,220	290	270	250	15,630	34,470	31,320	100	N/A	1,120
2030	280	270	250	17,070	34,610	31,470	120	N/A	1,220	280	270	250	15,950	34,460	31,320	110	N/A	1,150
2035	270	270	250	17,070	34,610	31,470	120	N/A	1,220	270	270	250	16,770	34,450	31,340	110	N/A	1,210
2040	270	270	250	17,070	34,610	31,470	120	N/A	1,220	270	270	250	16,770	34,450	31,330	110	N/A	1,210
2045	260	270	250	17,070	34,610	31,470	120	N/A	1,220	260	270	250	16,770	34,450	31,330	110	N/A	1,210
2050	260	270	250	17,070	34,610	31,470	120	N/A	1,220	260	270	250	16,770	34,450	31,330	110	N/A	1,210

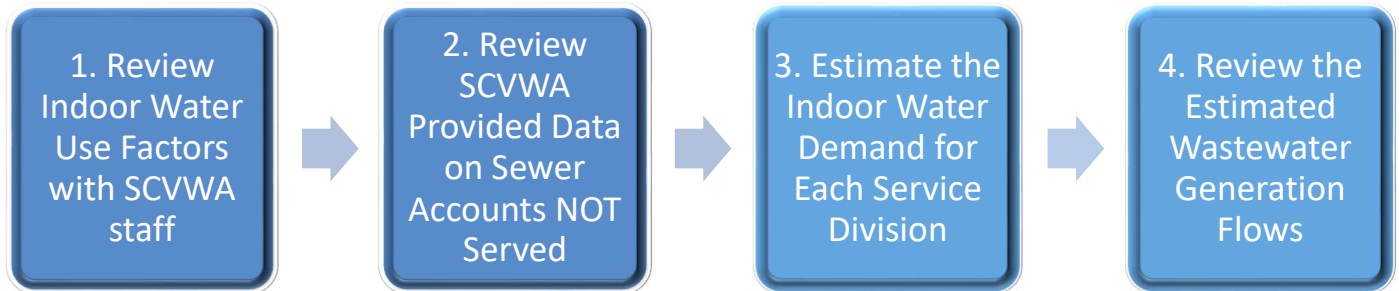
¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

² LACWD36 does not have any industrial accounts.

5. ESTIMATED WASTEWATER GENERATION FLOWS

This section presents the calculation steps performed and the estimated projected wastewater generation flows by customer type for the four SCVWA Service Divisions.

Figure 3. Overview of the Calculations for Wastewater Generation Flows

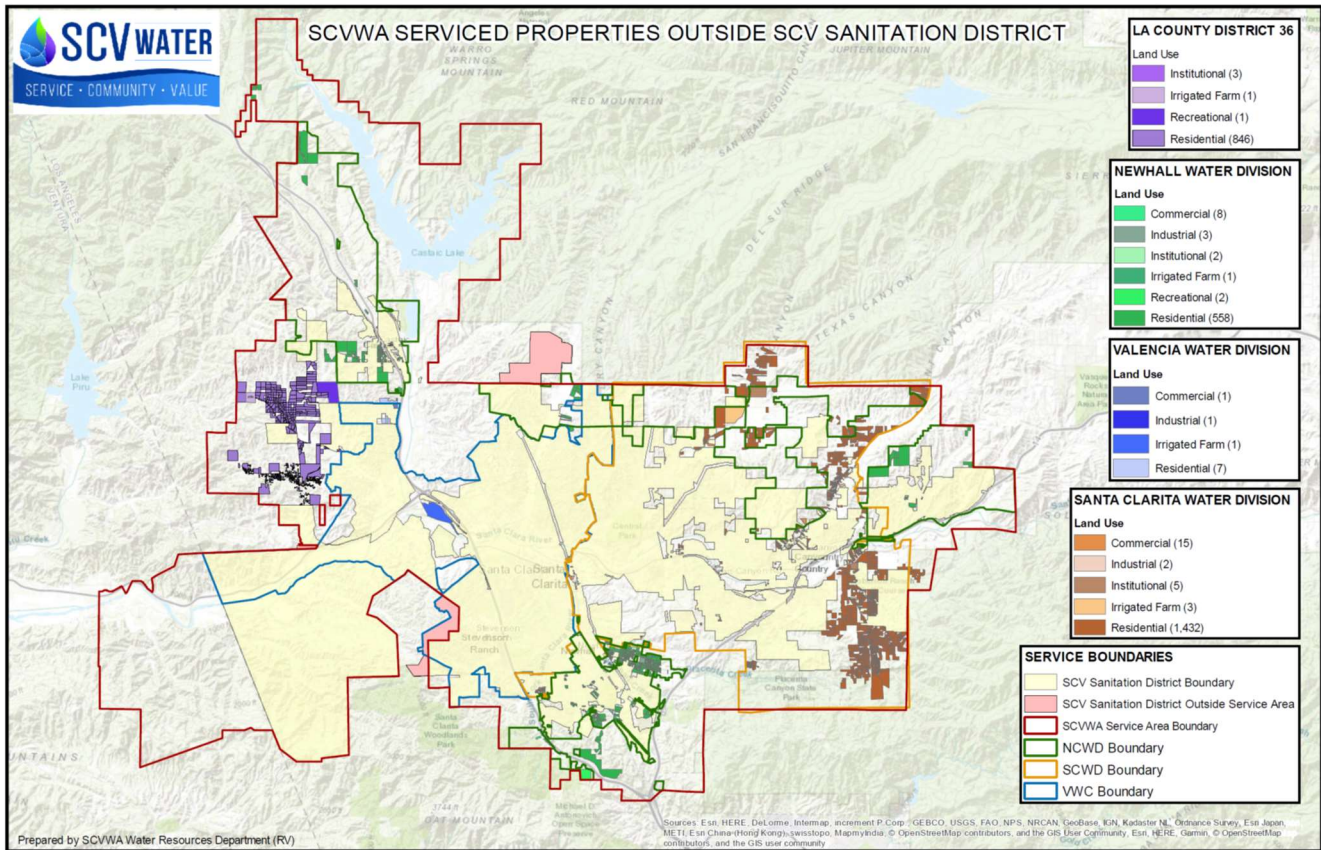


Summary Steps of Wastewater Generation Flow Calculations Performed

Step 1. Review indoor water use factors. Maddaus Water Management collaborated with SCVWA staff to confirm all data inputs into the DSS Models and finalize the Indoor Water Use Factors used in the calculations of the wastewater flows. As presented in Section 3, individual factors are available for each customer category type for each Service Division as output from the respective DSS Model.

Step 2. Determine the sewerer accounts by customer types for the Service Division. The following figure presents the SCVWA water accounts not serviced by the sanitation district. These accounts were removed from the estimated SCVWA indoor demand for the purposes of this wastewater flow analysis. It is assumed all future accounts will be within sanitation district's service area. It is assumed all residential accounts outside the sanitation district are Single Family. Accounts in the figure below that are denoted as recreational are assumed to be Commercial.

Figure 4. SCVWA Service Properties Outside the SCV Sanitation District



The following table presents the estimated number of accounts by customer category for the SCVWA Service Division that is within the sanitation district. As provided in the previous figure, Service Division water accounts not within the sanitation district have been removed. Estimated number of accounts by customer category for each of the four SCVWA Service Divisions can be found in Appendix E.

Table 7. Projected Accounts by Customer Category (within Sanitation District) – Valleywide

Year	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing Accounts	Total New Accounts	Total
2019	58,859	0	0	5,443	0	0	2,081	0	420	0	238	0	67,041	0	67,041
2020	58,859	875	0	5,443	165	0	2,081	107	420	29	238	4	67,041	1,180	68,221
2025	58,859	5,034	0	5,443	989	0	2,081	643	420	174	238	22	67,041	6,862	73,903
2030	58,859	9,193	0	5,443	1,814	0	2,081	1,179	420	318	238	39	67,041	12,544	79,585
2035	58,859	9,193	4,160	5,443	1,814	824	2,081	1,715	420	463	238	57	67,041	18,227	85,267
2040	58,859	9,193	8,319	5,443	1,814	1,649	2,081	2,251	420	608	238	75	67,041	23,908	90,949
2045	58,859	9,193	10,607	5,443	1,814	2,301	2,081	2,670	420	657	238	84	67,041	27,327	94,367
2050	58,859	9,193	12,896	5,443	1,814	2,954	2,081	3,088	420	706	238	94	67,041	30,745	97,786

Step 3. Estimate indoor water demand for sewered accounts. The following table presents the estimated indoor demand by customer category for the SCVWA total service area for only accounts located within the sanitation district. Previously reported indoor water use factors per account were applied to the number and type of water account by Service Division within the sanitation district for each of the four SCVWA Service Divisions. The estimated indoor demand by customer category for each of the SCVWA Service Divisions within the sanitation district can be found in Appendix F.

Step 4. Review total wastewater flow estimates for sewered accounts within the Sanitation District. The total estimates are labeled as “valleywide” from the Sanitation District’s perspective. Therefore, the following table presents the estimated indoor water use, which is assumed to be wastewater flows generated from indoor water demands. **These estimates are for planning level purposes only and are not to be considered detailed enough for engineering design purposes.**

Table 8. Indoor Water Use (AFY) within Sanitation District for SCVWA Valleywide – Demands with Plumbing Code (Passive) Savings Only¹

Year	Demands with Plumbing Code (Passive) Savings Only (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	13,910	0	0	4,490	0	0	2,810	0	510	0	430	0	22,160	0	22,160
2020	13,830	200	0	4,440	160	0	2,770	120	510	30	430	10	21,980	520	22,500
2025	13,400	1,110	0	4,190	970	0	2,630	680	510	200	430	40	21,160	3,000	24,170
2030	13,020	2,030	0	3,970	1,780	0	2,550	1,190	510	360	430	80	20,480	5,450	25,930
2035	12,750	2,030	830	3,810	1,780	740	2,510	1,700	510	520	430	110	20,000	7,720	27,720
2040	12,550	2,030	1,670	3,690	1,780	1,470	2,470	2,190	510	690	430	150	19,650	9,980	29,630
2045	12,400	2,030	2,190	3,600	1,780	1,750	2,450	2,480	510	740	430	160	19,390	11,130	30,520
2050	12,280	2,030	2,700	3,530	1,780	2,020	2,440	2,770	510	790	430	170	19,190	12,270	31,460

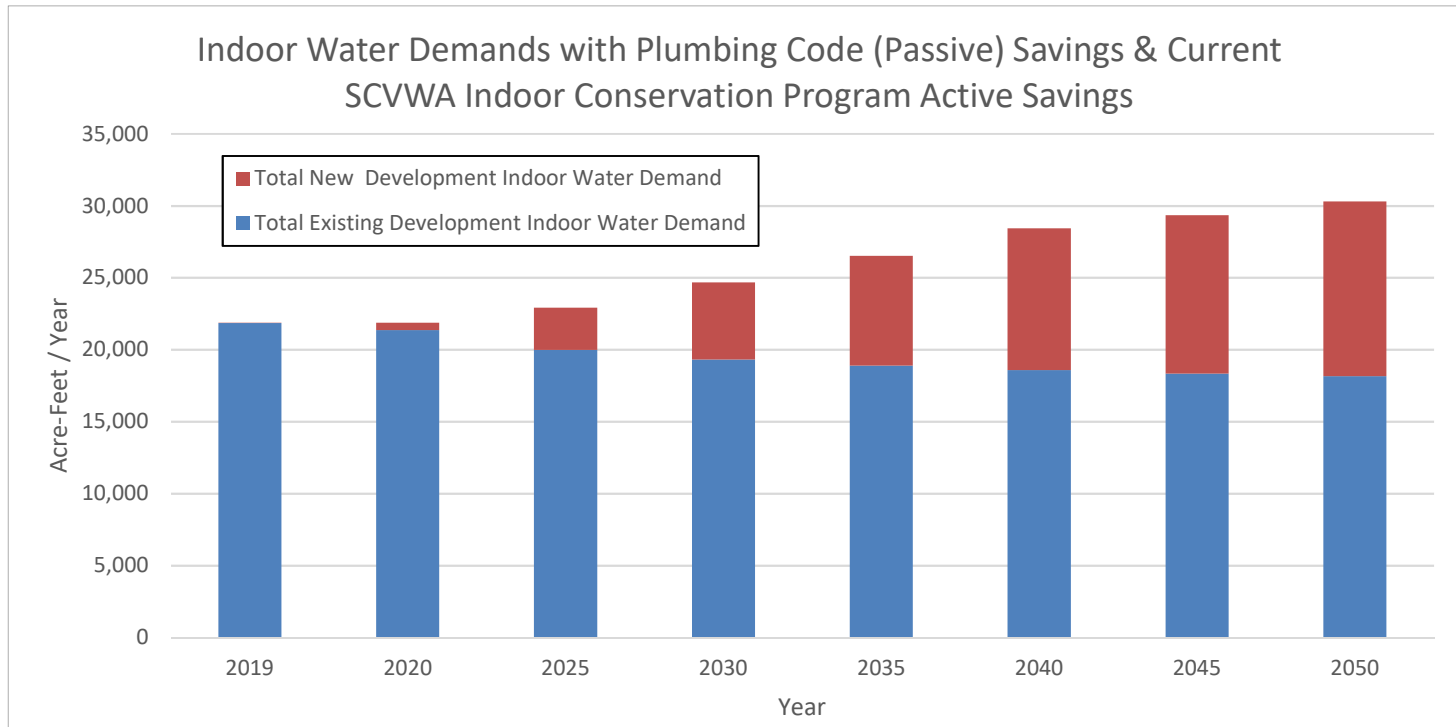
¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

Table 9. Indoor Water Use (AFY) within Sanitation District for SCVWA Valleywide - Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings¹

Year	Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	13,800	0	0	4,330	0	0	2,780	0	510	0	420	0	21,840	0	21,840
2020	13,540	200	0	4,190	160	0	2,710	120	500	30	420	10	21,350	520	21,870
2025	12,800	1,100	0	3,760	970	0	2,530	650	490	190	400	40	19,970	2,950	22,920
2030	12,400	2,010	0	3,540	1,780	0	2,470	1,160	500	350	400	70	19,310	5,370	24,670
2035	12,120	2,010	830	3,410	1,770	730	2,450	1,660	500	510	400	100	18,890	7,630	26,520
2040	11,930	2,010	1,650	3,300	1,770	1,470	2,430	2,150	500	680	400	140	18,570	9,870	28,440
2045	11,790	2,010	2,170	3,220	1,770	1,740	2,410	2,440	500	730	410	150	18,330	11,010	29,340
2050	11,680	2,010	2,680	3,160	1,770	2,010	2,400	2,730	500	780	410	160	18,150	12,150	30,300

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

Figure 5. Indoor Water Use (AFY) within Sanitation District for SCVWA Valleywide
Indoor Water Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings



6. VALIDATION WITH EXISTING RECLAIMED WATER FLOWS

The following table compares historical actual annual wastewater influent and indoor water use. Wastewater flows are generated from daily influent flow meter readings for both the Saugus and Valencia Water Reclamation Plants. Historical indoor water use is based on actual annual consumption by customer category within each of the four SCVWA Service Divisions, an applied indoor water use percentage based on 2017 indoor water use, and the estimated number of accounts in the SCVWA four Service Divisions that are located within the Sanitation Districts of Los Angeles County. The percent difference presented in the following table is within an acceptable margin of error for the purposes of this planning effort.

Table 10. Estimated Indoor Water Use (AFY) for SCVWA Service Division Sanitation Customers

Year	Actual Wastewater Influent (AFY)	Estimated Indoor Demands (AFY)	% Difference
2014	21,210	22,880	-7.9%
2015	21,392	22,137	-3.5%
2016	21,579	22,100	-2.4%
2017	21,803	21,948	-0.7%
2018	21,854	21,888	-0.2%
Average	N/A	N/A	-2.9%

Table 10 above indicates higher than expected differences in modeled versus actual flows through the drought years of 2014, 2015, and 2016. These drought years are considered abnormal as residents and businesses were responding with unique actions to curb indoor water use to help with the drought response. This observation further infers even more robust concurrence of less than 0.5% difference based on an average of the years 2017 and 2018 with normal water supply conditions between the end use model results and the actual wastewater measured influent.

7. CONCLUSIONS

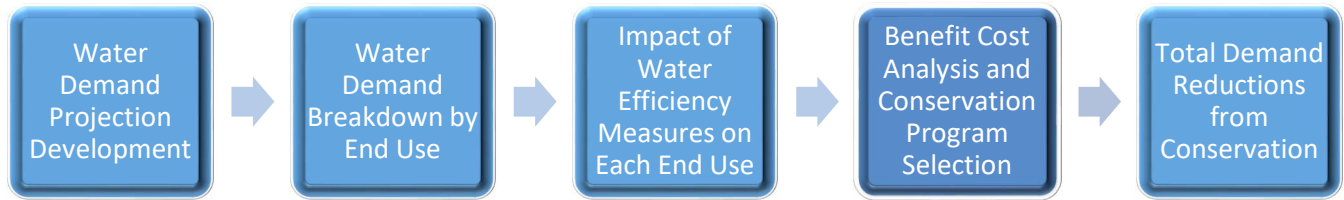
This Technical Memorandum analyzed past indoor water consumption from 1995-2018 (Figure 2) and projected future influent from 2019 to 2045 for the sewered accounts served by the Santa Clarita Valley Water Reclamation Plants. This analysis took the most sophisticated approach using end-use modeling analysis to assess: (1) the potential for future projected increases due to new growth at a lower per account water use as more water efficiency products are installed; and (2) the potential for declining indoor water use of existing accounts due to ongoing conservation activities being implemented in the SCVWA service area.

This analysis was founded on a long history of detailed analysis of water demand and conservation programs in the former CLWA that was performed for the retailer water agency service areas (now the SCVWA Service Divisions, exclusive of LACWD). Several past planning efforts were leveraged for the execution of this analysis; each of the previously developed Least Cost Planning Decision Support System Models (DSS Models) were used in this updated analysis based on the Service Division boundaries and calculated as totals for the SCVWA service area. The updates made in the revised models include:

- Extending the production and water consumption historical data sets
- Reassessing the minimum month and “base year” for the model start (for the demand and conservation forecasting analysis) from pre-2014 to post-drought conditions in 2017
- Checking assumptions on the water use factors by sector for existing accounts
- Applying the assumption on new development use factor based on recent state laws related to “Making Water Conservation a California Way of Life”
- Updating population forecast through 2045 based on new development schedule for per capita passive conservation savings analysis of recent plumbing code law changes since 2014 planning efforts
- Updating demand forecast based on revised 2017 base year and new development schedule
- Changing new plumbing and building codes to affect the “passive” savings for lower account water use
- Planning activity levels, budgets and other assumptions for the active conservation measures analysis using the best available information on SCV Water Efficiency Program actions by customer categories (focused on those measures that also reduce indoor water use).

The output of the modeling effort produced estimates of the indoor water demand factors on a gallons per account basis for different customer categories: single family and multi-family accounts for both existing and new (more efficient by law) as well as commercial, institutional and industrial account types. These factors were then applied to sewer accounts within the Reclamation Treatment Plants service area boundaries. The total summation of the sewer accounts multiplied by the respective use factors were then validated against prior influent data provided by the Reclamation Treatment Plants. With good concurrence of less than 3% average difference in recent years, it was assumed the approach was robust enough to validate the analytical results. In total, the overall estimates for wastewater generation is approximately 30,000 AFY per year at buildout year assumed to be 2050, with new growth producing about 12,200 AFY of this estimate (Table 8 and Figure 9). Detailed estimates are presented in the appendices. These estimates are for planning level purposes only and not to be considered detailed enough for engineering design purposes.

APPENDIX A. DSS MODEL DESCRIPTION



Demand Forecast Development and Model Calibration: To forecast urban water demands using the DSS Model, customer demand data is obtained from the water agency being modeled. The demand data is reconciled with available demographic data to characterize the water usage for each customer category in terms of number of users per account and per capita water use. The data is further analyzed to approximate the split of indoor and outdoor water usage in each customer category. The indoor/outdoor water usage is further divided into typical end uses for each customer category. Published data on average per-capita indoor water use and average per-

capita end use is combined with the number of water users to calibrate the volume of water allocated to specific end uses in each customer category. In other words, the DSS Model checks that social norms from end studies on water use behavior (e.g., flushes per person per day) are not exceeded or below reasonable use limits.

Passive Water Savings Calculations: The DSS Model is used to forecast service area water fixture use. In the codes and standards part of the DSS Model, specific fixture end-use type (point of use fixture or appliance), average water use, and lifetime are compiled. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, and clothes washers are modeled by customer category. These fixtures and plumbing codes can be added to, edited, or deleted by the user. This yields two demand forecasts: (1) with plumbing codes and (2) without plumbing codes. Plumbing code measures are independent of any water-use efficiency program; they are based on customers following applicable current local, state, and federal laws, building codes, and ordinances.

Active Conservation Measure Analysis using Benefit Cost Analysis: The DSS Model evaluates active conservation measures using benefit-cost analysis with the present value of the cost of water saved (\$/Million Gallons or \$/Acre-Feet). Benefits are based on savings in water and wastewater facility operations, maintenance (O&M) and any deferred capital expenditures. The previous figures above and to the left illustrate the processes for forecasting conservation water savings, including the impacts of fixture replacement due to plumbing codes and standards already in place.

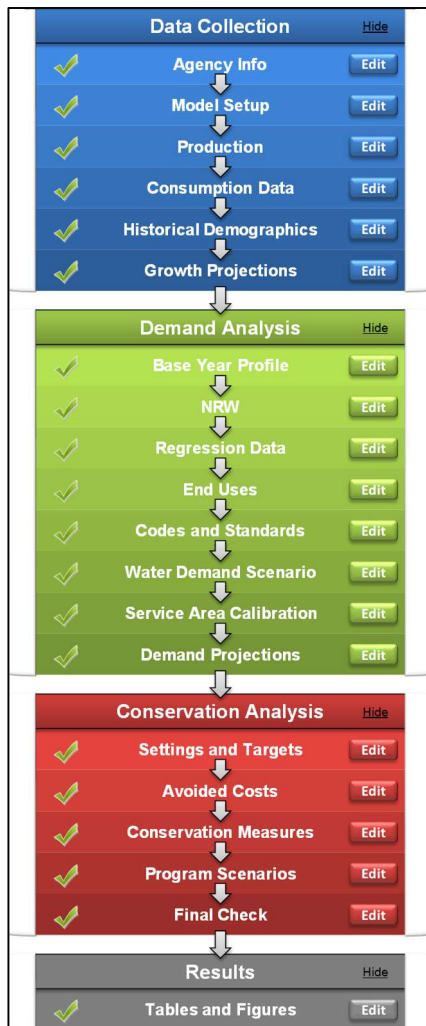


Figure 6. DSS Model Main Worksheet Screenshot

Figure 7. Sample Benefit Costs Analysis Summary

MADDOUS
WATER
MANAGEMENT INC.

Conservation Measures

Benefit Cost Analysis

Valencia Water Company

Previous Step

Conservation

12345733111111222222222222333333

B/C

Next Step

Review Data

Benefit Cost Analysis											
Util Cost Five Year Start Year		2022		Water Savings Year		2025		Units		MG	
Benefit Cost Analysis	Measure	Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2022-2027	Water Savings in 2025 (mgd)	Cost of Savings per Unit Volume (\$/mg)	
	1	Water Loss (Retailer)	\$8,754,667	\$8,754,667	\$1,024,100	\$1,024,100	8.55	8.55	\$250,000	0.173702	\$430
	2	AMI (Retailer)	\$5,130,694	\$5,395,193	\$7,224,570	\$21,128,732	0.71	0.26	\$3,667,688	0.052401	\$4,728
	3	Conservation Pricing (Retailer)	\$153,998	\$153,998	\$137,073	\$137,073	1.12	1.12	\$33,333	0.061863	\$196
	4	Public & School Education (Valleywide)	\$2,912,371	\$3,467,552	\$1,829,587	\$1,829,587	1.59	1.90	\$398,294	0.059306	\$2,324
	5	Customer Water Use Reports (Retailer)	\$8,041,834	\$9,371,526	\$1,015,842	\$1,015,842	7.92	9.23	\$254,282	0.202134	\$466
	6	SF Turf Replacement Program (Valleywide)	\$2,076,844	\$2,076,844	\$5,585,703	\$13,860,818	0.37	0.15	\$1,223,197	0.021338	\$8,703
	7	MF CII Turf Replacement Program (Valleywide)	\$27,134,656	\$27,134,656	\$5,007,208	\$7,719,263	5.42	3.52	\$1,031,882	0.285281	\$599
	8	SF Drip Irrigation Incentives (Retailer)	\$1,402,535	\$1,402,535	\$1,356,945	\$1,899,723	1.03	0.74	\$864,217	0.036189	\$3,546

Model Use and Validation: The DSS Model has been used for over 20 years for practical applications of conservation planning in over 300 service areas representing 60 million people, including extensive efforts nationally and internationally in Australia, New Zealand, and Canada.

Figure 8. DSS Models Analysis Locations



The California Water Efficiency Partnership, or CalWEP (formerly the CUWCC), peer reviewed and has endorsed the model since 2006. It is offered to all CalWEP members for use to estimate water demand, plumbing code, and conservation program savings.

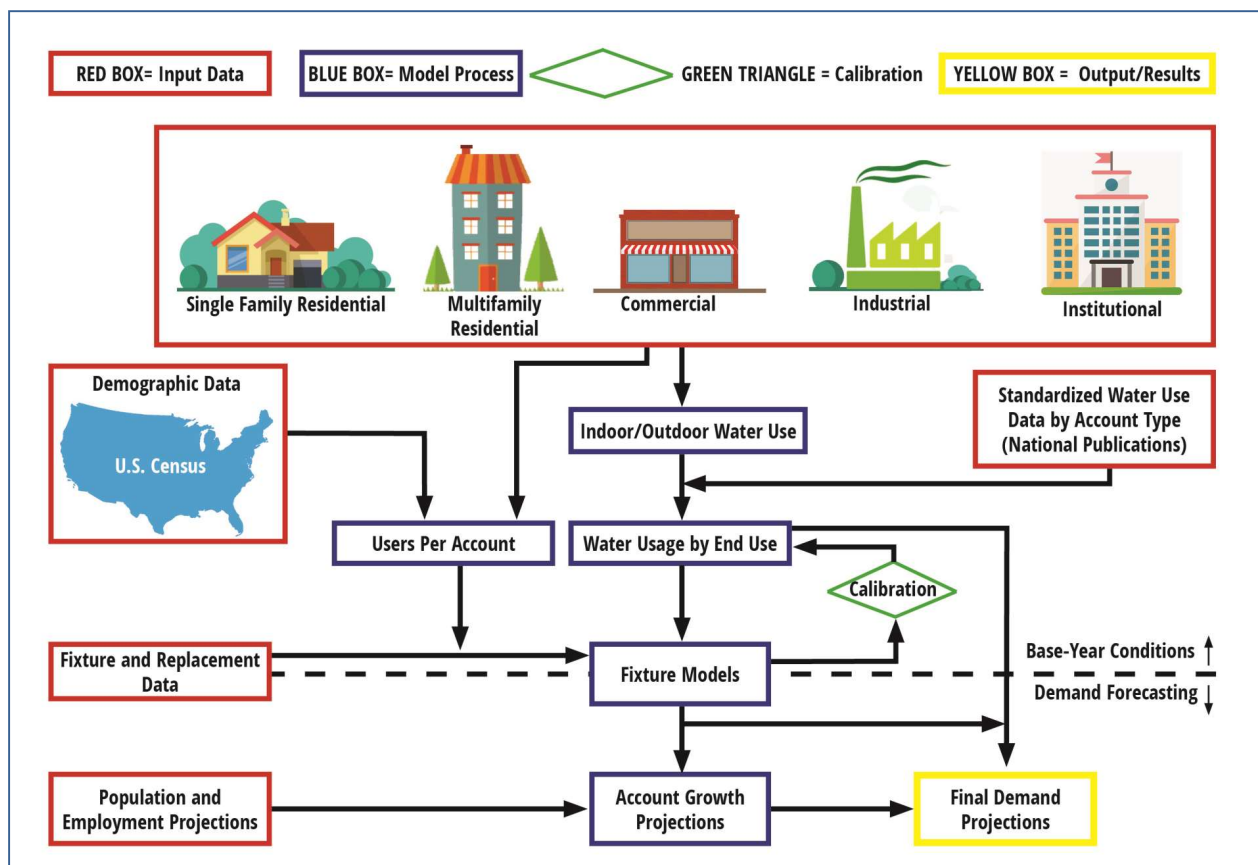
APPENDIX B. PLUMBING CODE REFERENCE DOCUMENTATION

Plumbing code measures are independent of any conservation program; they are based on customers following applicable current local, state and federal laws, building codes, and ordinances. The DSS Model incorporates the following items as a “code” meaning that the savings are assumed to occur and are therefore “passive” savings:

- The Federal Energy Policy Act of 1992 (amended in 2005)
- California Code of Regulations Title 20 California State Law (Assembly Bill 715)
- California State Law Senate Bill 407
- 2016 CALGreen Code (effective January 1, 2017)
- 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations

The following figure conceptually describes how plumbing codes are incorporated into the flow of information in the DSS Model via the Fixture models. The demand projections, including plumbing code savings, further assumes no active involvement by the water utility, and that the costs of purchasing and installing replacement equipment (and new equipment in new construction) are borne solely by the customers, occurring at no direct utility expense. The inverse of the fixture life is the natural replacement rate, expressed as a percent (i.e., 10 years is a rate of 10% per year).

Figure 9. DSS Model Overview Used to Make Potable Water Demand Projections



This appendix describes national plumbing codes and California State Laws and Code of Regulations applicable to the State Plumbing Code and this effort.

B.1 National Plumbing Code

The Federal Energy Policy Act of 1992, as amended in 2005, mandates that only fixtures meeting the following standards can be installed in new buildings:

- Toilet – 1.6 gal/flush maximum
- Urinals – 1.0 gal/flush maximum
- Showerhead – 2.5 gal/min at 80 pounds per square inch (psi)
- Residential faucets – 2.2 gal/min at 60 psi
- Public restroom faucets – 0.5 gal/min at 60 psi
- Dishwashing pre-rinse spray valves – 1.6 gal/min at 60 psi

Replacement of fixtures in existing buildings is also governed by the Federal Energy Policy Act, which mandates that only devices with the specified level of efficiency (as shown above) can be sold as of 2006. The net result of the plumbing code is that new buildings will have more efficient fixtures and old inefficient fixtures will slowly be replaced with new, more efficient models. The national plumbing code is an important piece of legislation and must be carefully taken into consideration when analyzing the overall water efficiency of a service area.

In addition to the plumbing code, the U.S. Department of Energy regulates appliances, such as residential clothes washers, further reducing indoor water demands. Regulations to make these appliances more energy efficient have driven manufactures to dramatically reduce the amount of water these machines use. Generally, front loading washing machines use 30 to 50% less water than conventional models (which are still available).

In this analysis, the DSS Model forecasts a gradual transition to high efficiency clothes washers (using 12 gallons or less) so that by the year 2025 that will be the only type of machine available for purchase. In addition to the industry becoming more efficient, rebate programs for washers have been successful in encouraging customers to buy more water efficient models. Given that machines last about 10 years, eventually all machines on the market will be the more water efficient models. Energy Star washing machines have a water factor of 6.0 or less – the equivalent of using 3.1 cubic feet (or 23.2 gallons) of water per load. The maximum water factor for residential clothes washers under current federal standards is 9.5. The water factor equals the number of gallons used per cycle per cubic foot of capacity. Prior to year 2000, the water factor for a typical new residential clothes washer was about 12. In March 2015, the federal standard reduced the maximum water factor for top- and front-loading machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for top-loading machines was further reduced to 6.5. For commercial washers, the maximum water factors were reduced in 2010 to 8.5 and 5.5 for top- and front-loading machines, respectively. Beginning in 2015, the maximum water factor for Energy Star certified washers was 3.7 for front-loading and 4.3 for top-loading machines. In 2011, the U.S. Environmental Protection Agency estimated that Energy Star washers comprised more than 60% of the residential market and 30% of the commercial market (Energy Star, 2011). A new Energy Star compliant washer uses about two-thirds less water per cycle than washers manufactured in the 1990s.



B.2 California State Law – AB 715

Plumbing codes for toilets, urinals, showerheads, and faucets were initially adopted by California in 1991, mandating the sale and use of ultra-low flush toilets (ULFTs) using 1.6 gpf, urinals using 1 gpf, and low-flow showerheads and faucets. California Code of Regulations Title 20 updated based on California State Law (Assembly Bill 715) requires high efficiency toilets and high efficiency urinals be exclusively sold in the state by

2014. Effective January 1, 2014, AB 715 (enacted in 2007) required that toilets and urinals sold and installed in California cannot have flush ratings exceeding 1.28 gpf (toilets) and 0.5 gpf (urinals).

B.3 California State Laws – SB 407 and SB 837

SB 407 addresses plumbing fixture retrofits on resale or remodel. The DSS Model carefully considers the overlap with SB 407, the plumbing code (natural replacement), CALGreen, AB 715 and rebate programs (such as toilet rebates). SB 407 (enacted in 2009) requires that properties built prior to 1994 be fully retrofitted with water conserving fixtures by the year 2017 for single family residential houses and 2019 for multifamily and commercial properties. SB 407 program length is variable and continues until all the older high flush toilets have been replaced in the service area. The number of accounts with high flow fixtures is tracked to make sure that the situation of replacing more high flow fixtures than actually exist does not occur. Additionally, SB 407 conditions issuance of building permits for major improvements and renovations upon retrofit of non-compliant plumbing fixtures. SB 837 (enacted in 2011) requires that sellers of real property disclose on their Real Estate Transfer Disclosure Statement whether their property complies with these requirements. Both laws are intended to accelerate the replacement of older, low efficiency plumbing fixtures, and ensure that only high efficiency fixtures are installed in new residential and commercial buildings.

B.4 2016 CALGreen and 2015 CA Code of Regulations Title 20 Appliance Efficiency Regulations

Fixture characteristics in the DSS Model are tracked in new accounts, which are subject to the requirements of the 2016 California Green Building Code and 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the California Energy Commission (CEC) on September 1, 2015. The CEC 2015 appliance efficiency standards apply to the following new appliances, if they are sold in California: showerheads, lavatory faucets, kitchen faucets, metering faucets, replacement aerators, wash fountains, tub spout diverters, public lavatory faucets, commercial pre-rinse spray valves, urinals, and toilets. The DSS Model accounts for plumbing code savings due to the effects these standards have on showerheads, faucets, aerators, urinals, and toilets.

- Showerheads – July 2018: 1.8 gpm
- Wall Mounted Urinals – January 2016: 0.125 gpf (pint)
- Lavatory Faucets and Aerator – July 2016: 1.2 gpm at 60 psi
- Kitchen Faucets and Aerator – July 2016: 1.8 gpm with optional temporary flow of 2.2 gpm at 60 psi
- Public Lavatory Faucets – July 2016: 0.5 gpm at 60 psi



In summary, the controlling law for **toilets** is Assembly Bill 715. This bill requires high efficiency toilets (1.28 gpf) to be exclusively sold in California beginning

January 1, 2014. The controlling law for wall-mounted urinals is the 2015 CEC efficiency regulations requiring that ultra-high efficiency pint **urinals** (0.125 gpf) be exclusively sold in California beginning January 1, 2016. This is an efficiency progression for urinals from AB 715's requirement of high efficiency (0.5 gpf) urinals starting in 2014.

Standards for **residential clothes washers** fall under the regulations of the U.S. Department of Energy. In 2018, the maximum water factor for standard top-loading machines was reduced to 6.5.

Showerhead flow rates are newly regulated under the 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the CEC, which requires the exclusive sale in California of 2.0 gpm showerheads at 80 psi as of July 1, 2016 and 1.8 gpm showerheads at 80 psi as of July 1, 2018. The WaterSense specification applies to showerheads that have a maximum flow rate of 2.0 gpm or less. This represents a 20% reduction in showerhead flow rate over the current federal standard of 2.5 gpm, as specified by the Energy Policy Act of 1992.

Faucet flow rates have likewise been recently regulated by the 2015 CEC Title 20 regulations. This standard requires that the residential faucets and aerators manufactured on or after July 1, 2016 be exclusively sold in California at 1.2 gpm at 60 psi; and public lavatory and kitchen faucets/aerators sold or offered for sale on or after July 1, 2016 be 0.5 gpm at 60 psi and 1.8 gpm at 60 psi (with optional temporary flow of 2.2 gpm), respectively. Previously, all faucets had been regulated by the 2010 California Green Building Code at 2.2 gpm at 60 psi.

B.5 DSS Model Key Assumptions Resources

The following table presents the references for the key assumptions used in the DSS Model in determining projected demands with plumbing code savings.

Table 11. Key Assumptions Resources

Parameter	Resource
Residential End Uses	Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study," (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses) and AWWA Research Foundation (AWWARF) Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016). Table 2-A. Water Consumption by Water-Using Plumbing Products and Appliances - 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition. 2013. http://www.map-testing.com/content/info/menu/perc.html Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet.
Non-Residential End Uses, percent	Key Reference: AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use). Santa Clara Valley Water District Water Use Efficiency Unit. "SCVWD CII Water Use and Baseline Study." February 2008. Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet.
Efficiency Residential Fixture Current Installation Rates	U.S. Census, Housing age by type of dwelling plus natural replacement plus rebate program (if any). Key Reference: California Urban Water Conservation Council Potential Best Management Practice Report "High Efficiency Plumbing Fixtures – Toilets and Urinals" (Koeller, 2005 – Page 42, Table 8 and Table 9: Residential toilet installation rates in California). Key Reference: Consortium for Efficient Energy (www.cee1.org). Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures.
Water Savings for Fixtures, gal/capita/day	Key Reference: AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016). Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study" (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses). WCWCD

Parameter	Resource
	supplied data on costs and savings; professional judgment was made where no published data was available. Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014. Model Input Values are found in the “Codes and Standards” green section on the “Fixtures” worksheet of the DSS Model.
Non-Residential Fixture Efficiency Current Installation Rates	Key Reference: 2010 U.S. Census, Housing age by type of dwelling plus natural replacement plus rebate program (if any). Assume commercial establishments built at same rate as housing, plus natural replacement. California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014. Santa Clara Valley Water District Water Use Efficiency Unit. "SCVWD CII Water Use and Baseline Study." February 2008. Model Input Values are found in the “Codes and Standards” green section of the DSS Model by customer category fixtures.
Residential Frequency of Use Data, Toilets, Showers, Faucets, Washers, Uses/user/day	Key Reference: AWWARF Report “Residential End Uses of Water, Version 2 - 4309” (DeOreo, 2016). Summary values can be found in the full report: http://www.waterrf.org/Pages/Projects.aspx?PID=4309 Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014. Key Reference: Alliance for Water Efficiency, The Status of Legislation, Regulation, Codes & Standards on Indoor Plumbing Water Efficiency, January 2016. Model Input Values are found in the “Codes and Standards” green section on the “Fixtures” worksheet of the DSS Model and confirmed in each “Service Area Calibration End Use” worksheet by customer category.
Non-Residential Frequency of Use Data, Toilets, Urinals, and Faucets, Uses/user/day	Key References: Estimated based on AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use). Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014. Fixture uses over a 5-day work week are prorated to 7 days. Non-residential 0.5gpm faucet standards per Table 2-A. Water Consumption by Water-Using Plumbing Products and Appliances - 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition, 2012. http://www.map-testing.com/content/info/menu/perc.html Model Input Values are found in the “Codes and Standards” green section on the “Fixtures” worksheet of the DSS Model and confirmed in each “Service Area Calibration End Use” worksheet by customer category.

Parameter	Resource
Natural Replacement Rate of Fixtures (percent per year)	Residential Toilets 2%
	Non-Residential Toilets 2%
	Residential Showers 4% (corresponds to 25-year life of a new fixture)
	Residential Clothes Washers 6.7% (based on 15-year washer life). Key References: “Residential End Uses of Water” (DeOreo, 2016) and “Bern Clothes Washer Study, Final Report” (Oak Ridge National Laboratory, 1998).
	Residential Faucets 10% and Non-Residential Faucets 6.7% (every 15 years). CEC uses an average life of 10 years for faucet accessories (aerators). A similar assumption can be made for public lavatories, though no hard data exists and since CII fixtures are typically replaced less frequently than residential, 15 years is assumed. CEC, Analysis of Standards Proposal for Residential Faucets and Faucet Accessories, a report prepared under CEC’s Codes and Standards Enhancement Initiative, Docket #12-AAER-2C, August 2013.
	Model Input Value is found in the “Codes and Standards” green section on the “Fixtures” worksheet of the DSS Model.

APPENDIX C. POPULATION PROJECTION ESTIMATES

As part of this effort, previously developed land-use based population estimates were adjusted in consideration of recent new development timelines. The revised population forecast presented below correlates to the updated development schedule provided by the developers to SCVWA staff.

Figure 10. Projected Population ¹

Year	NCWD	SCWD	VWC	LACWD36	Valleywide
2019	48,500	129,700	99,100	8,400	285,700
2020	49,200	131,500	101,900	9,000	291,600
2025	52,800	140,300	115,800	10,800	319,700
2030	56,300	149,200	129,700	12,500	347,700
2035	59,900	158,000	143,600	14,300	375,800
2040	63,400	166,800	157,500	16,000	403,700
2045	67,000	175,600	157,500	17,800	417,900
2050	70,500	184,500	157,500	19,500	432,000

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

APPENDIX D. HISTORICAL MONTHLY WATER USE PER ACCOUNT BY SERVICE DIVISION

To better demonstrate why year 2017 was used as the base year, monthly historical total consumption volume per account by customer category for each Service Division through December 2018 are presented. Only those customer categories with indoor water use are presented. Note the downward trend that began in 2007 and continued to 2011. A robust econometric analysis was conducted and is presented in Technical Memorandum #2: SCV Demand Study: Demand Projection Analysis Update; prepared for Castaic Lake Water Agency in June 2015. Note the initial increase and then decrease in water use in the recent 2014-2017 drought with a rebounding increase in water use starting in 2017.

Figure 11. NCWD Single Family Consumption Data

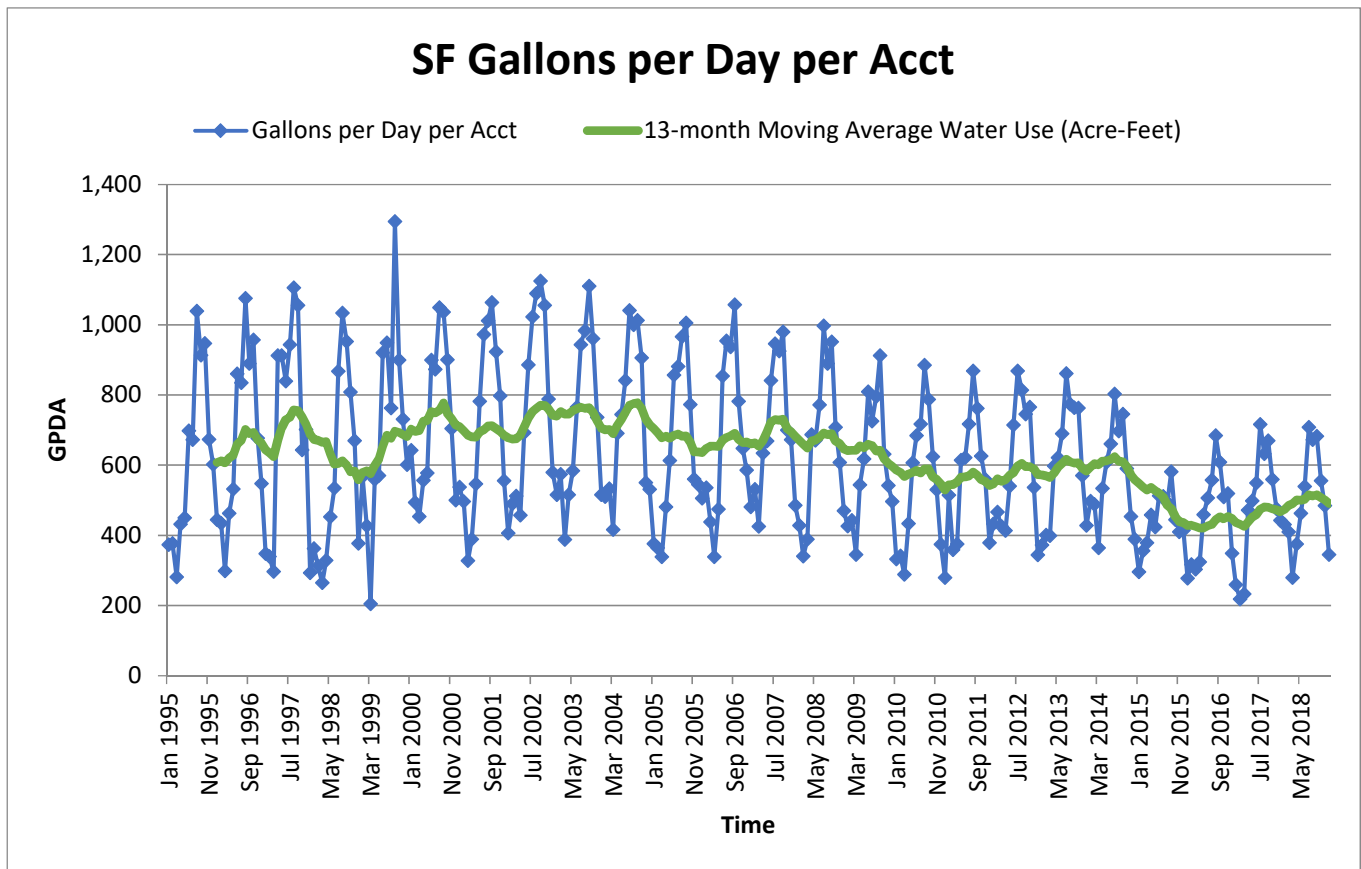


Figure 12. NCWD Multifamily Consumption Data

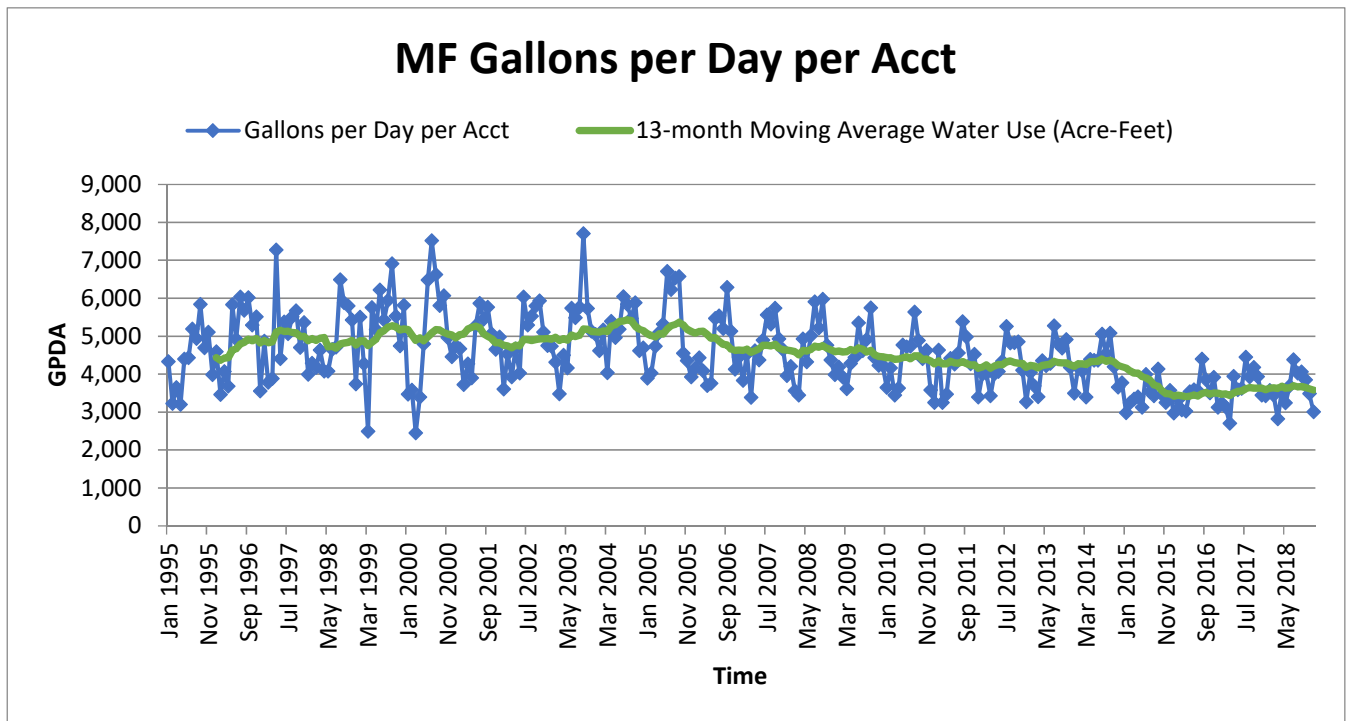


Figure 13. NCWD Commercial Consumption Data

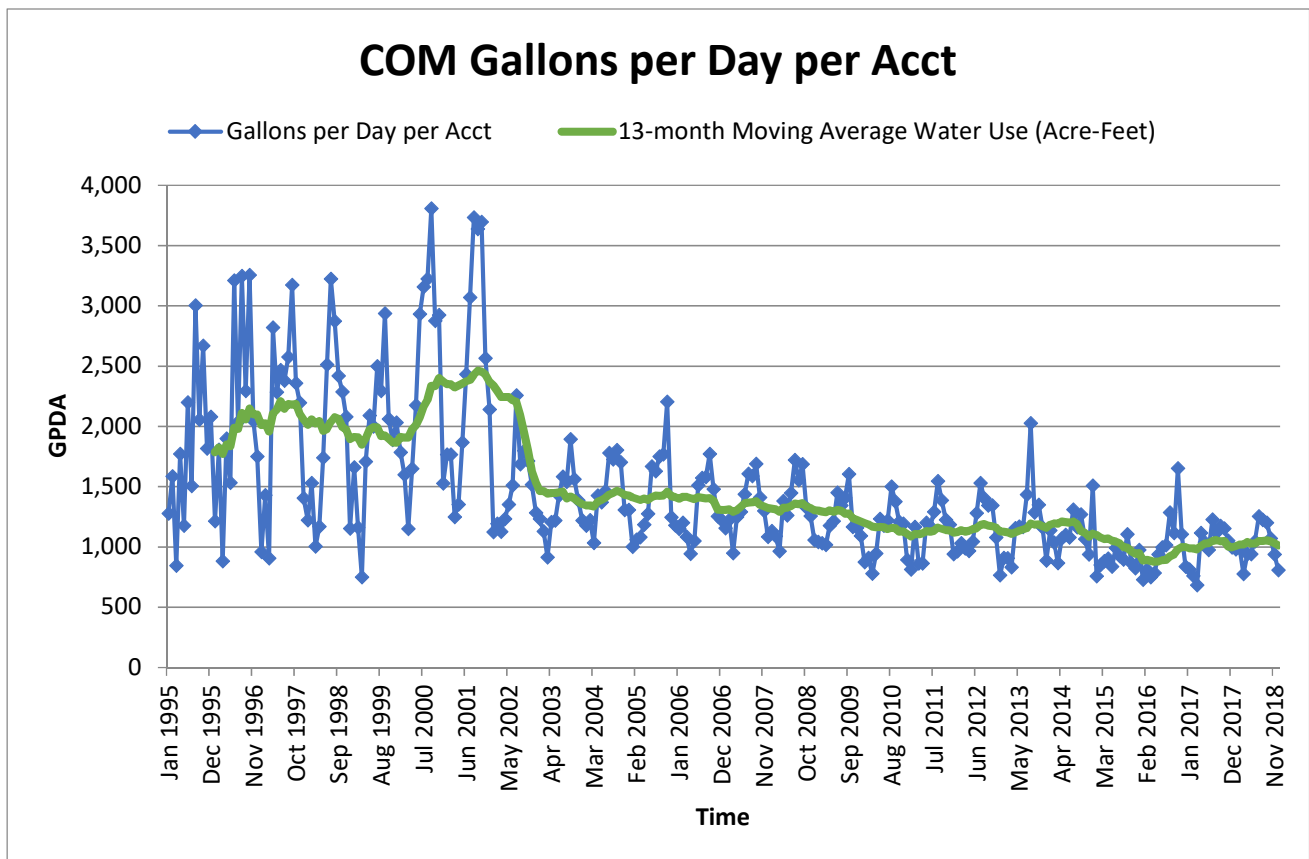


Figure 14. NCWD Industrial Consumption Data

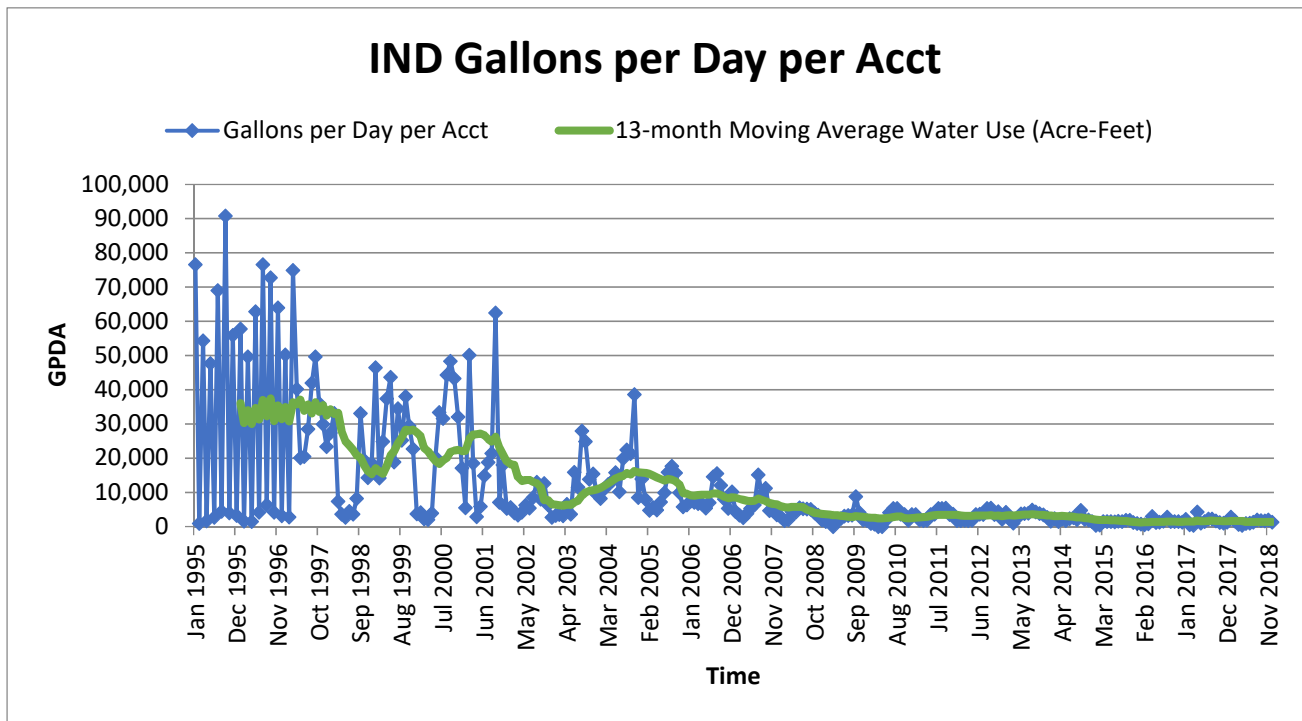


Figure 15. NCWD Institutional Consumption Data

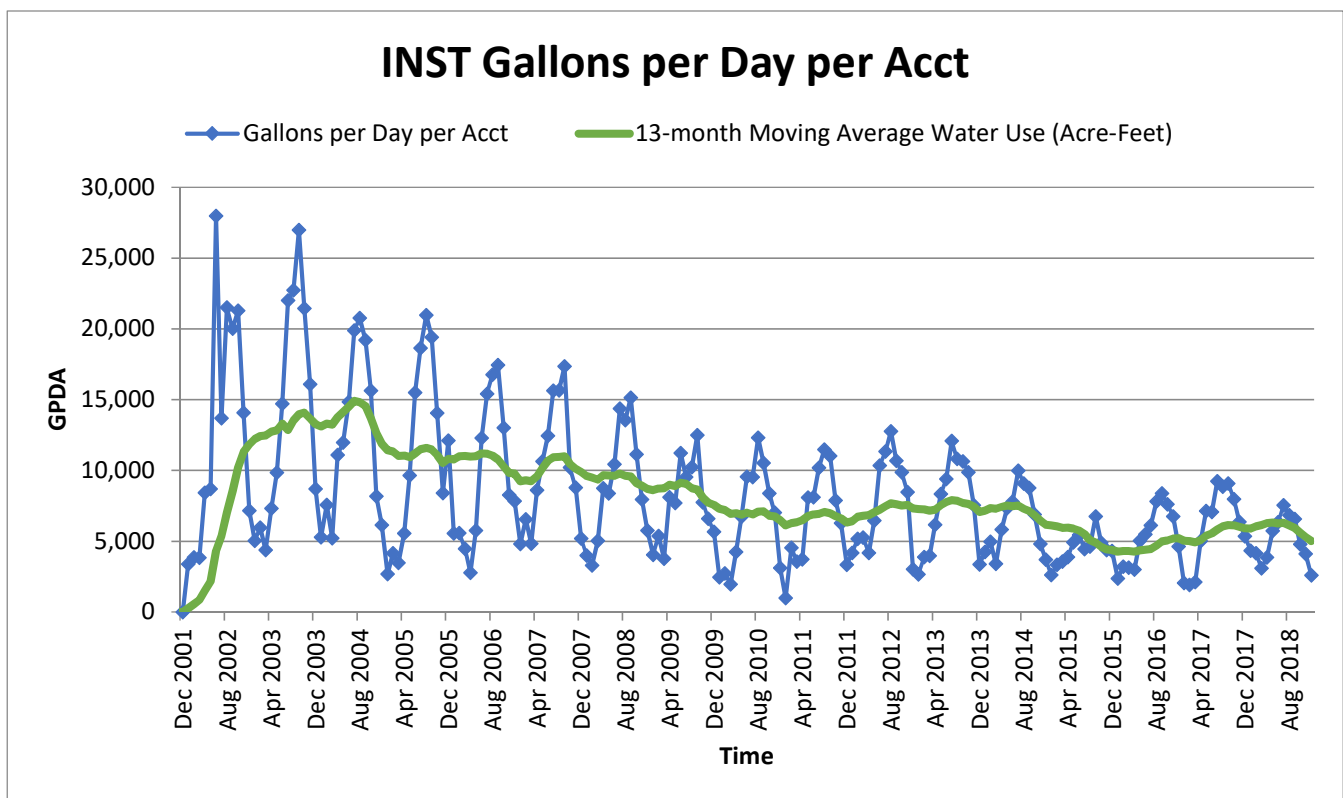


Figure 16. SCWD Single Family Consumption Data

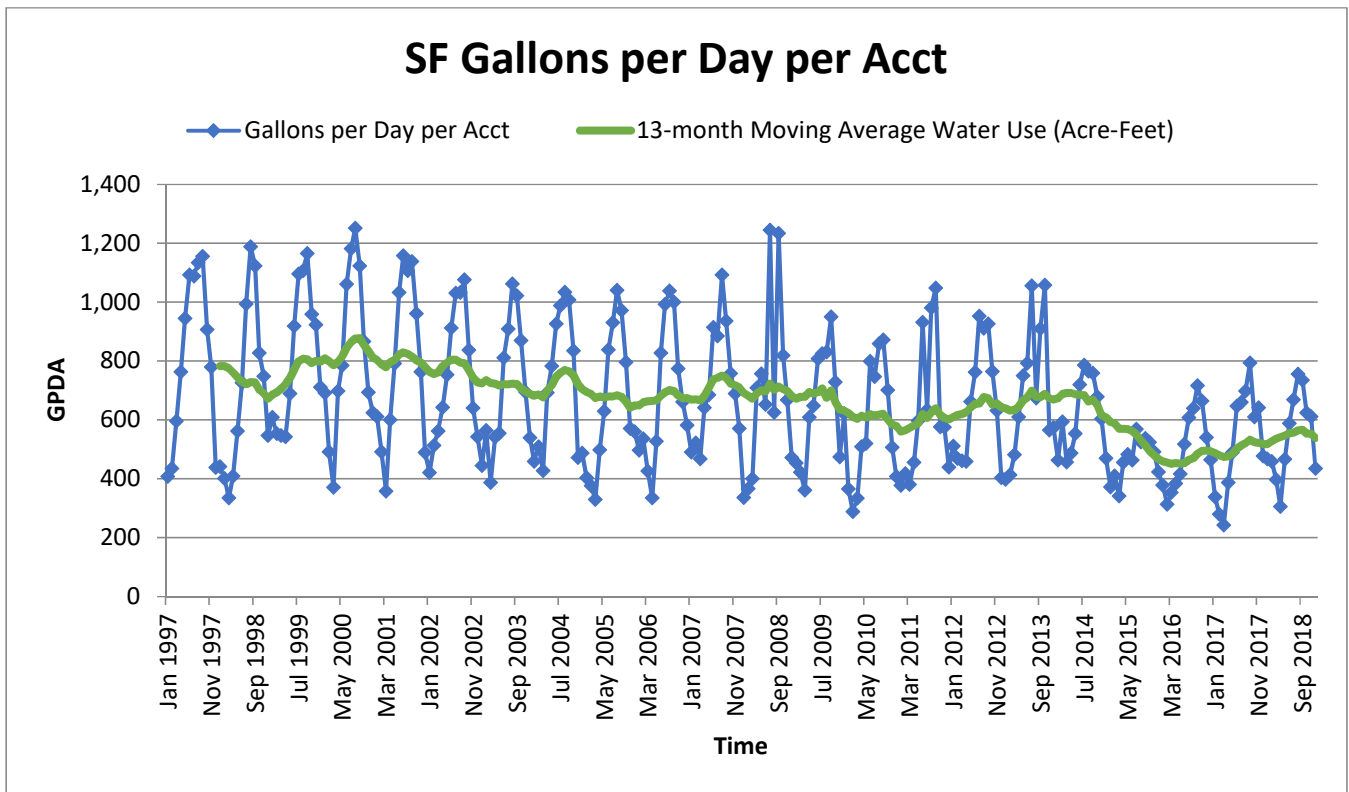


Figure 17. SCWD Multifamily Consumption Data

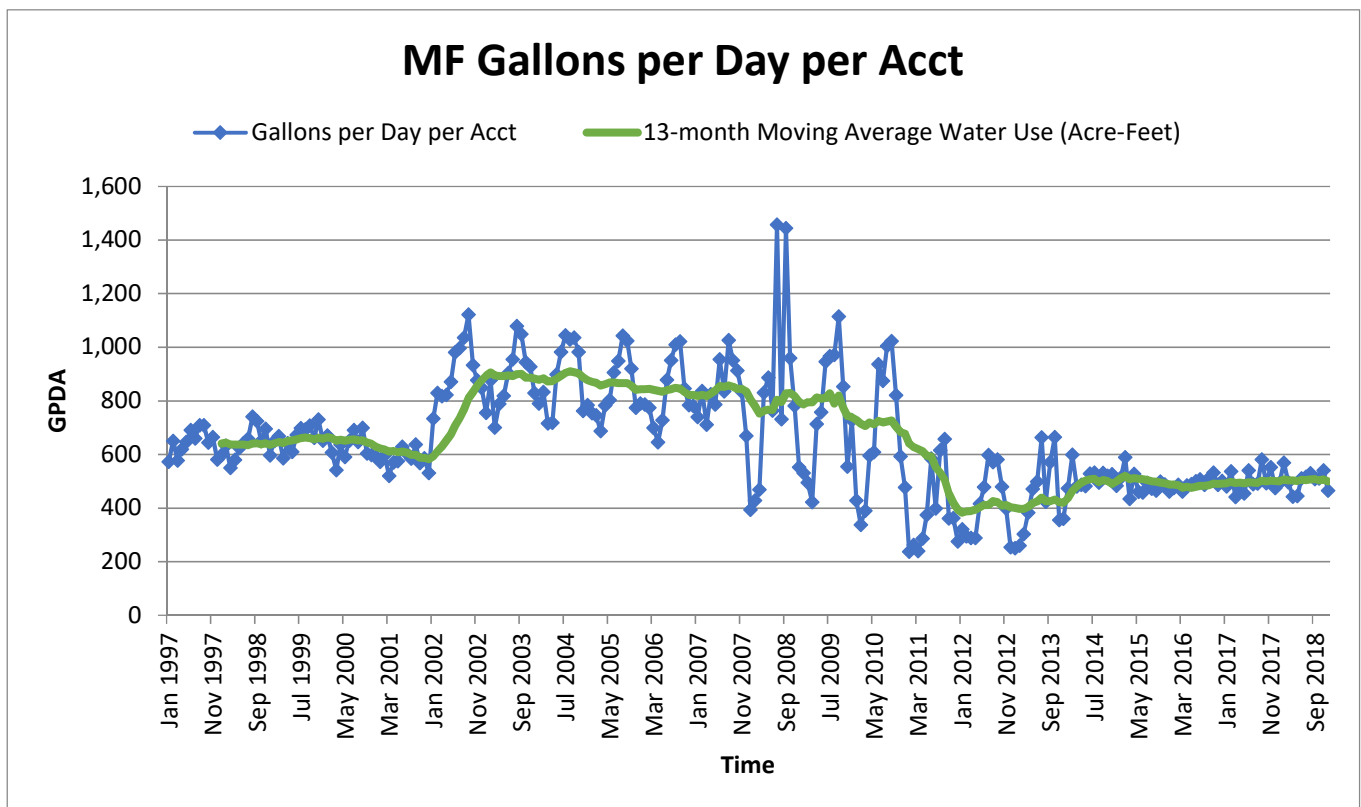


Figure 18. SCWD Commercial Consumption Data

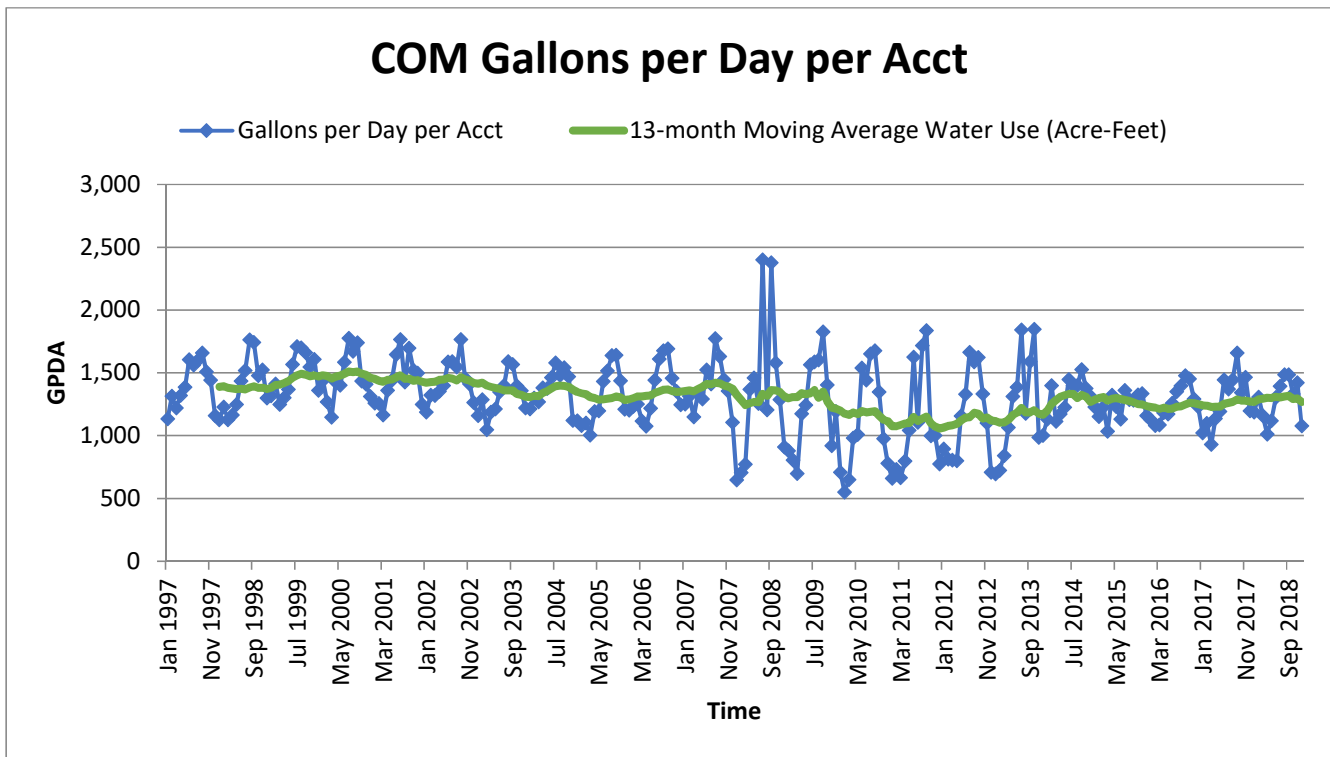


Figure 19. SCWD Industrial Consumption Data

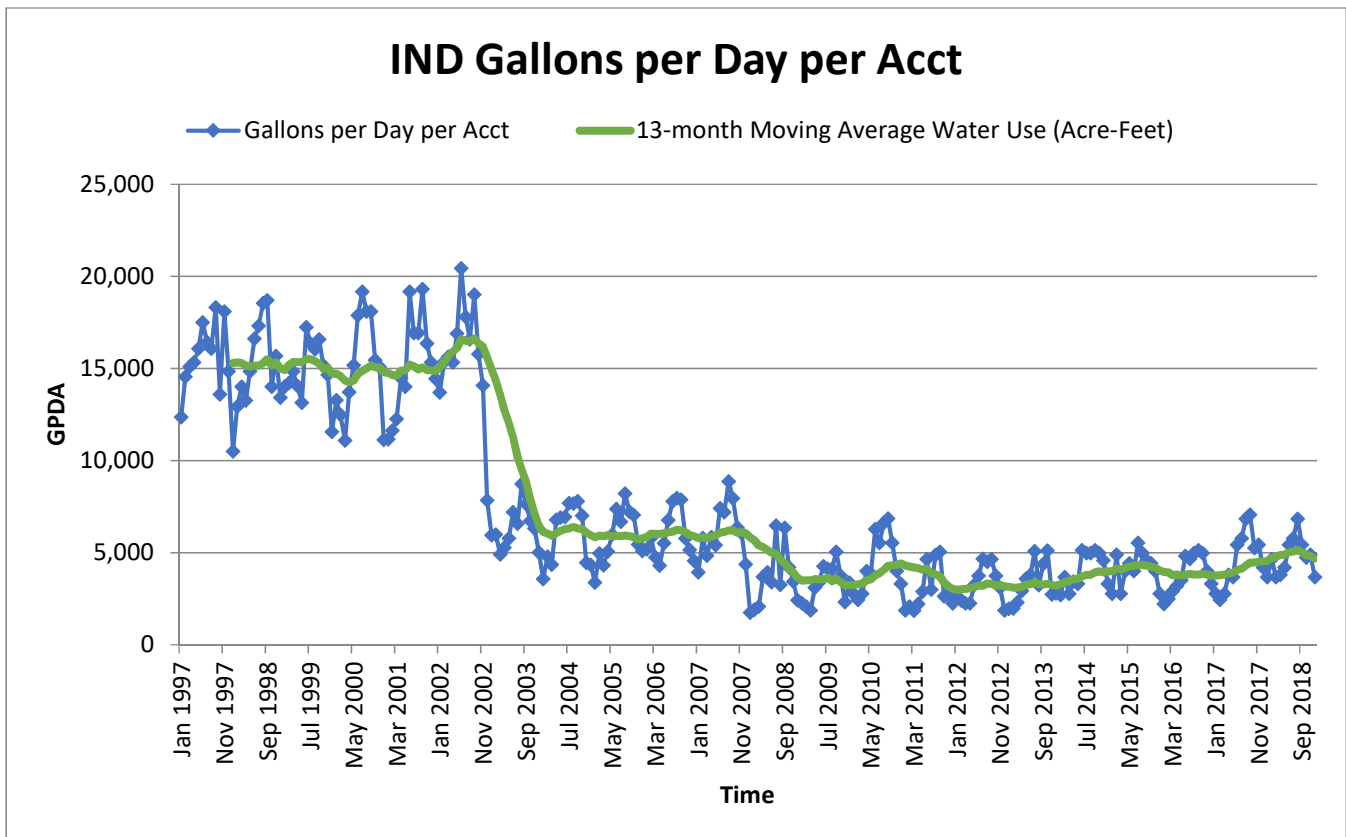


Figure 20. SCWD Institutional Consumption Data

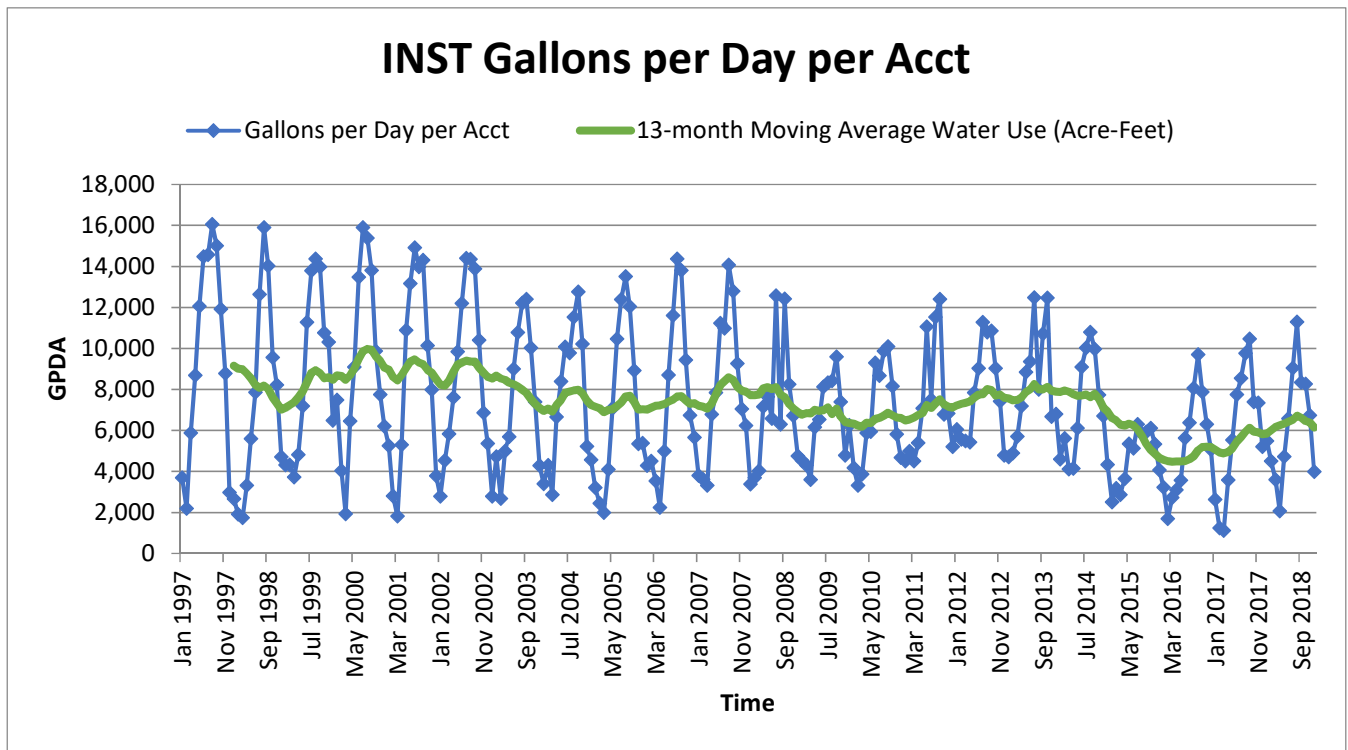


Figure 21. VWC Single Family Consumption Data

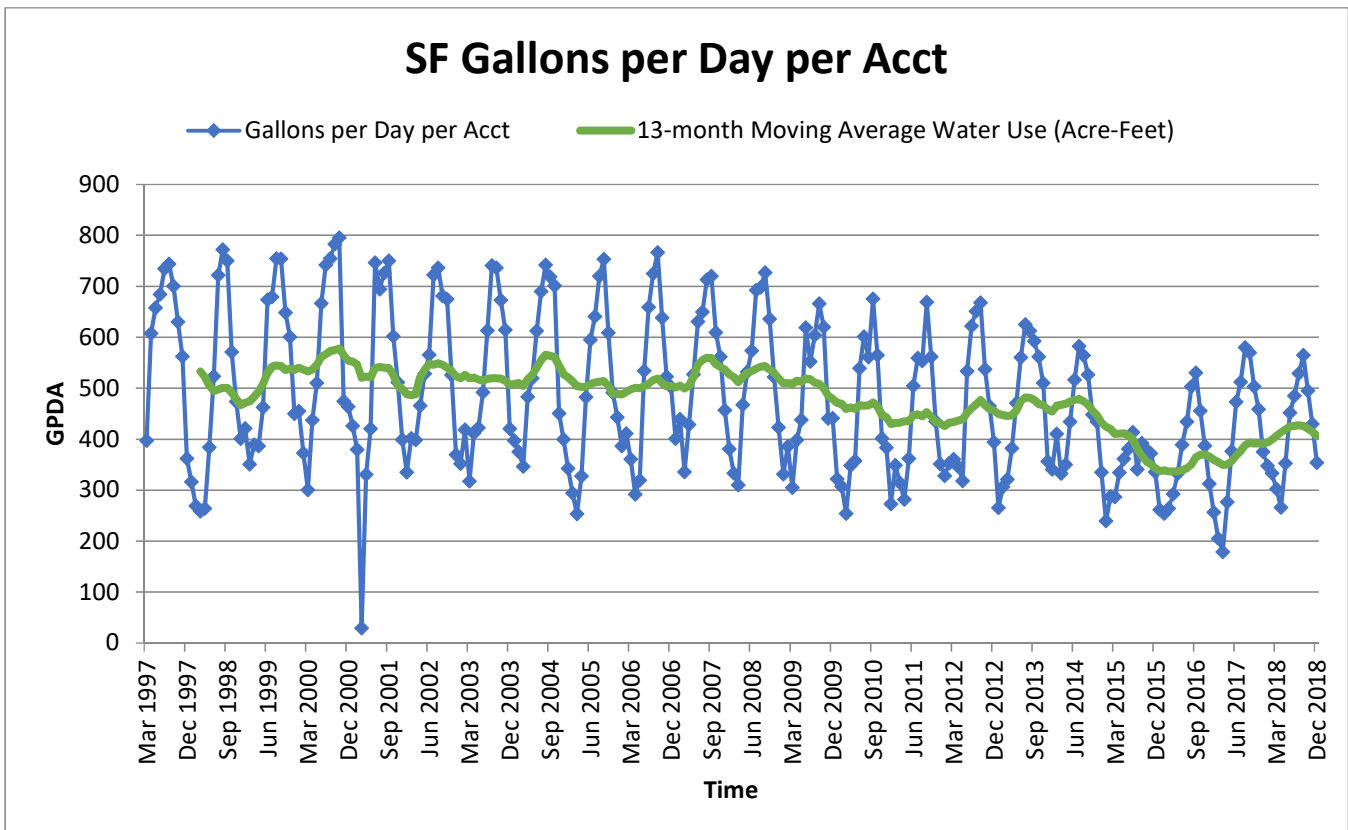


Figure 22. VWC Multifamily Consumption Data

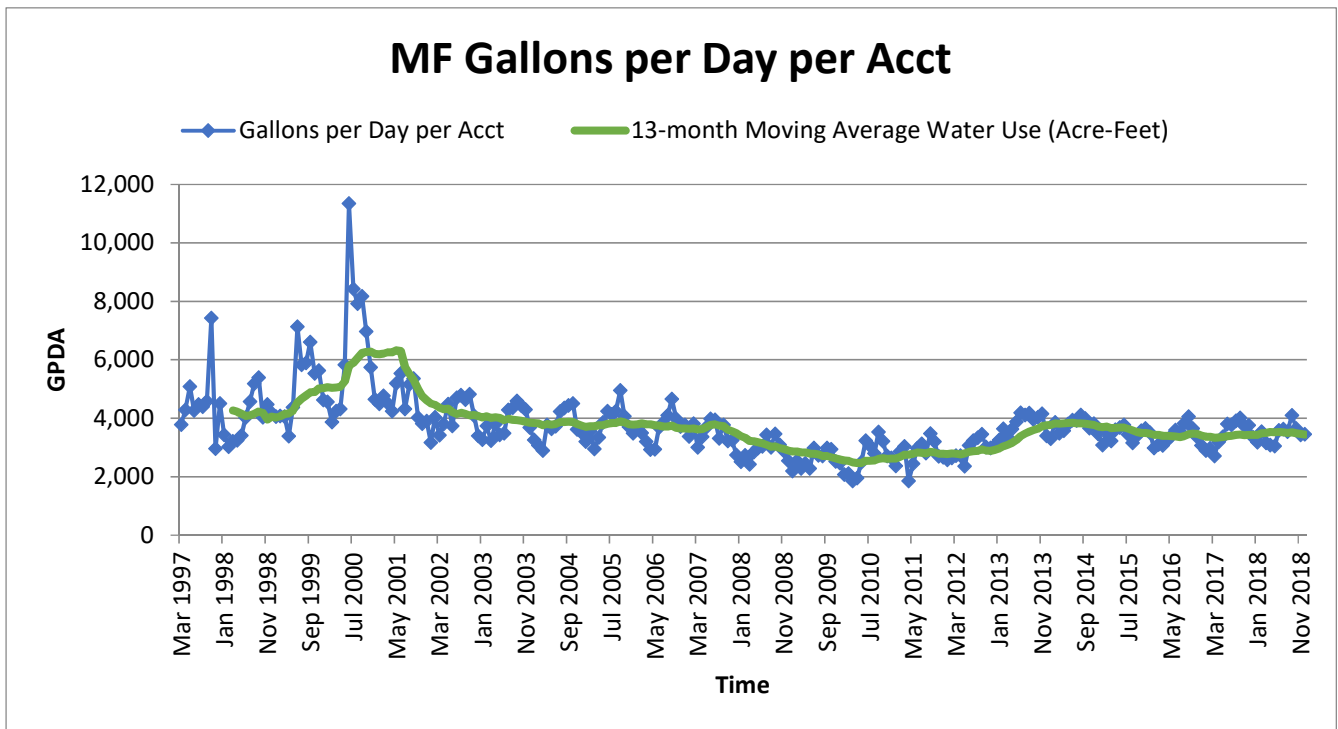


Figure 23. VWC Commercial Consumption Data

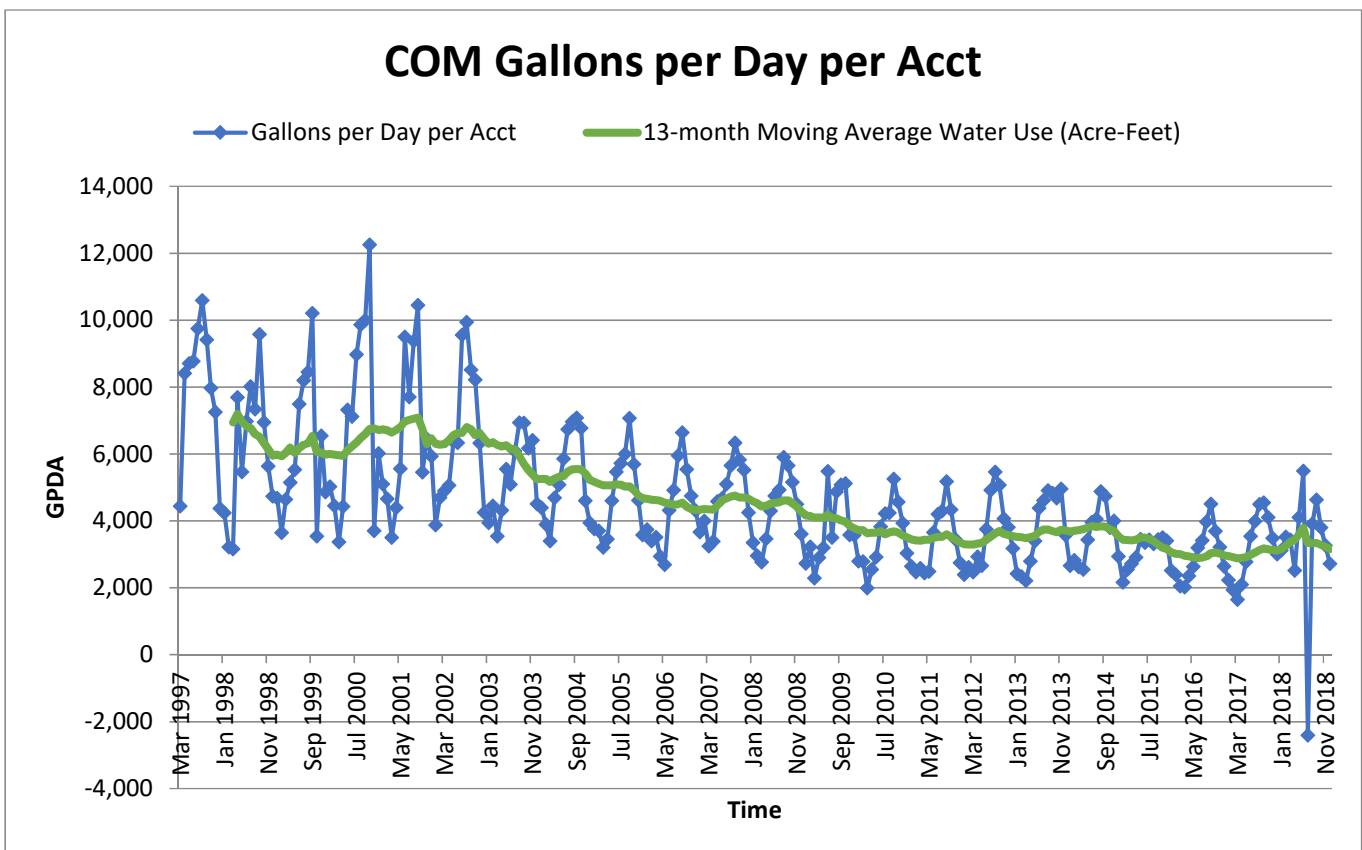


Figure 24. VWC Industrial Consumption Data

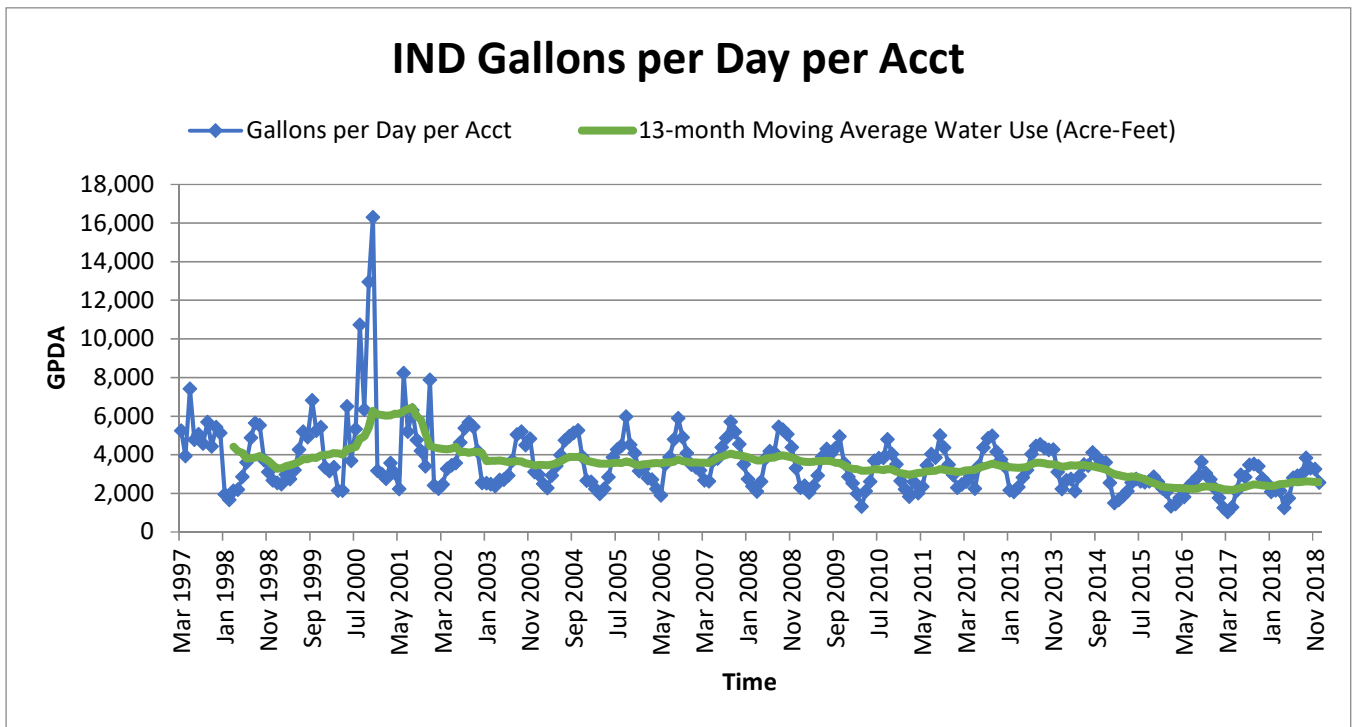


Figure 25. VWC Institutional Consumption Data

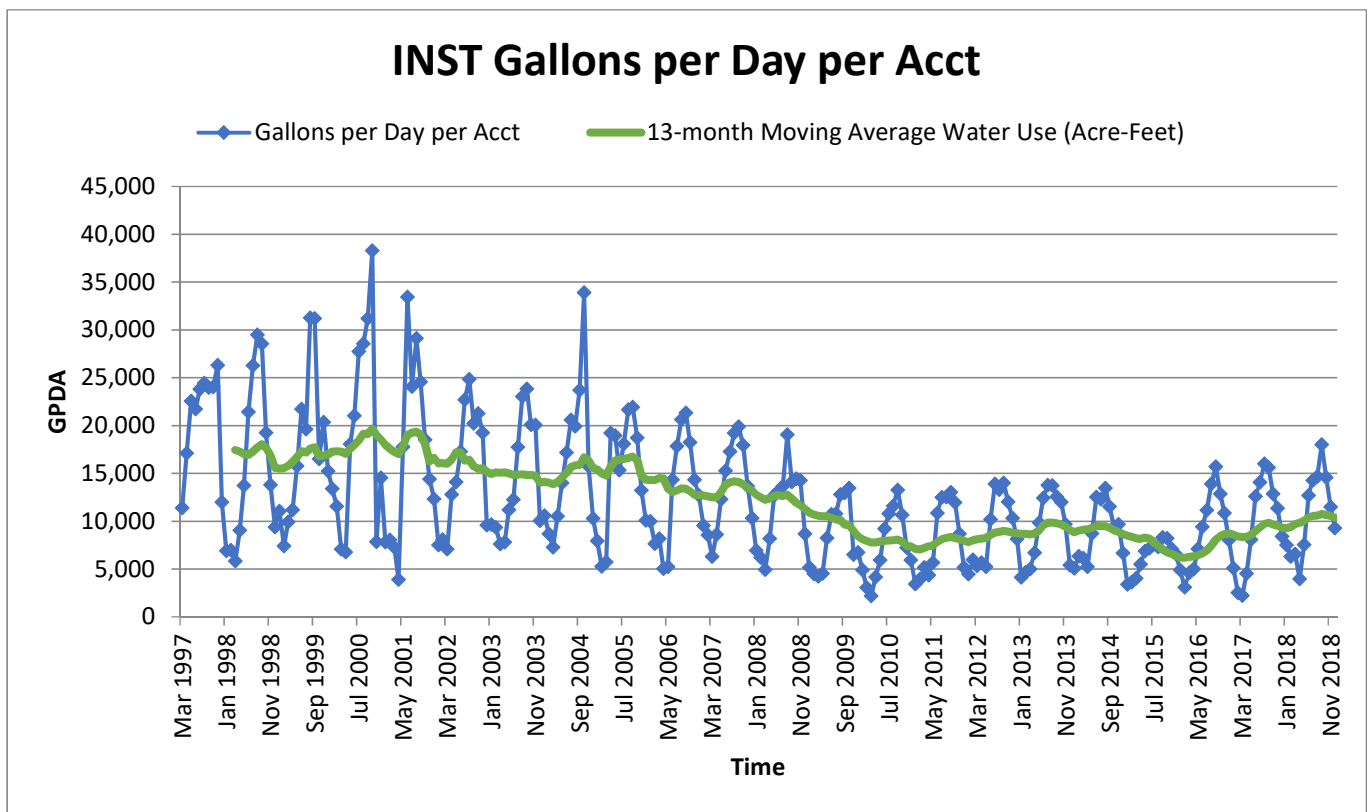


Figure 26. LACWD Single Family Consumption Data

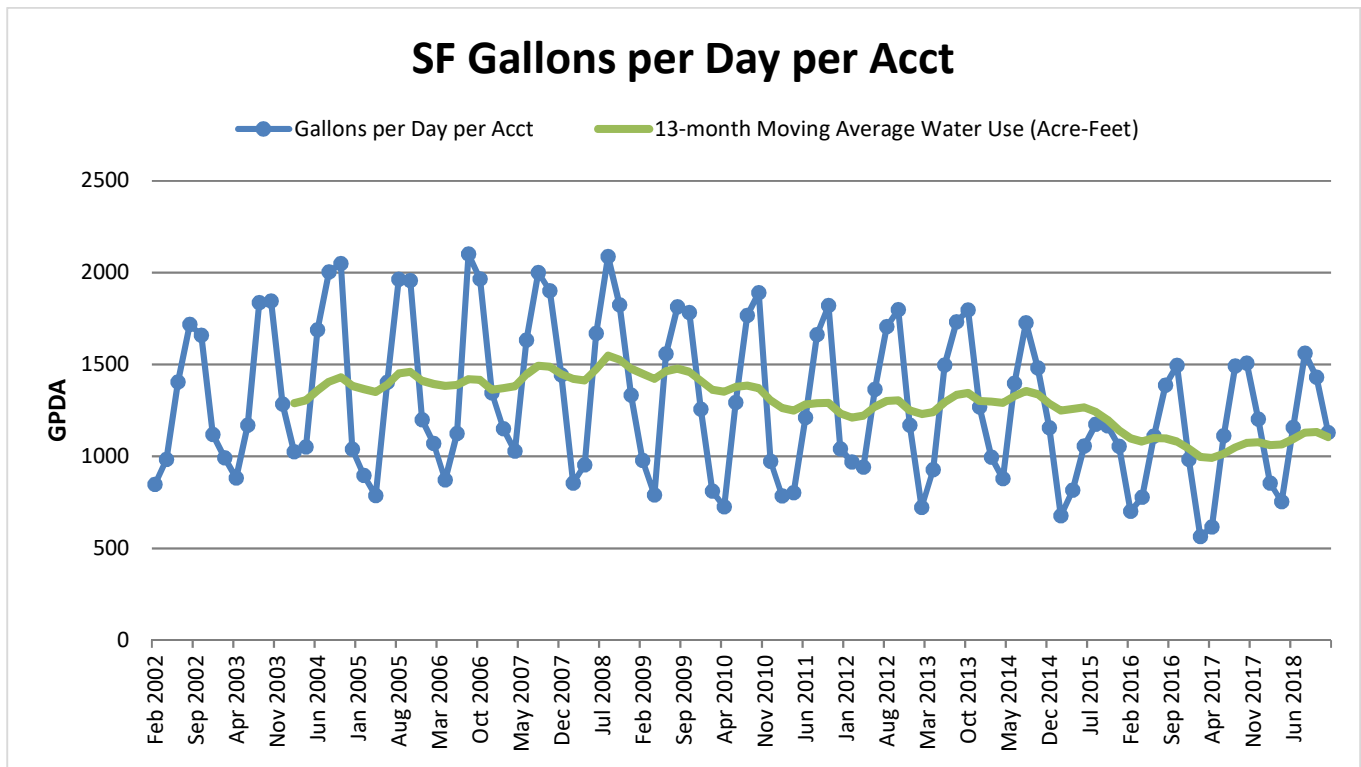


Figure 27. LACWD Multifamily Consumption Data

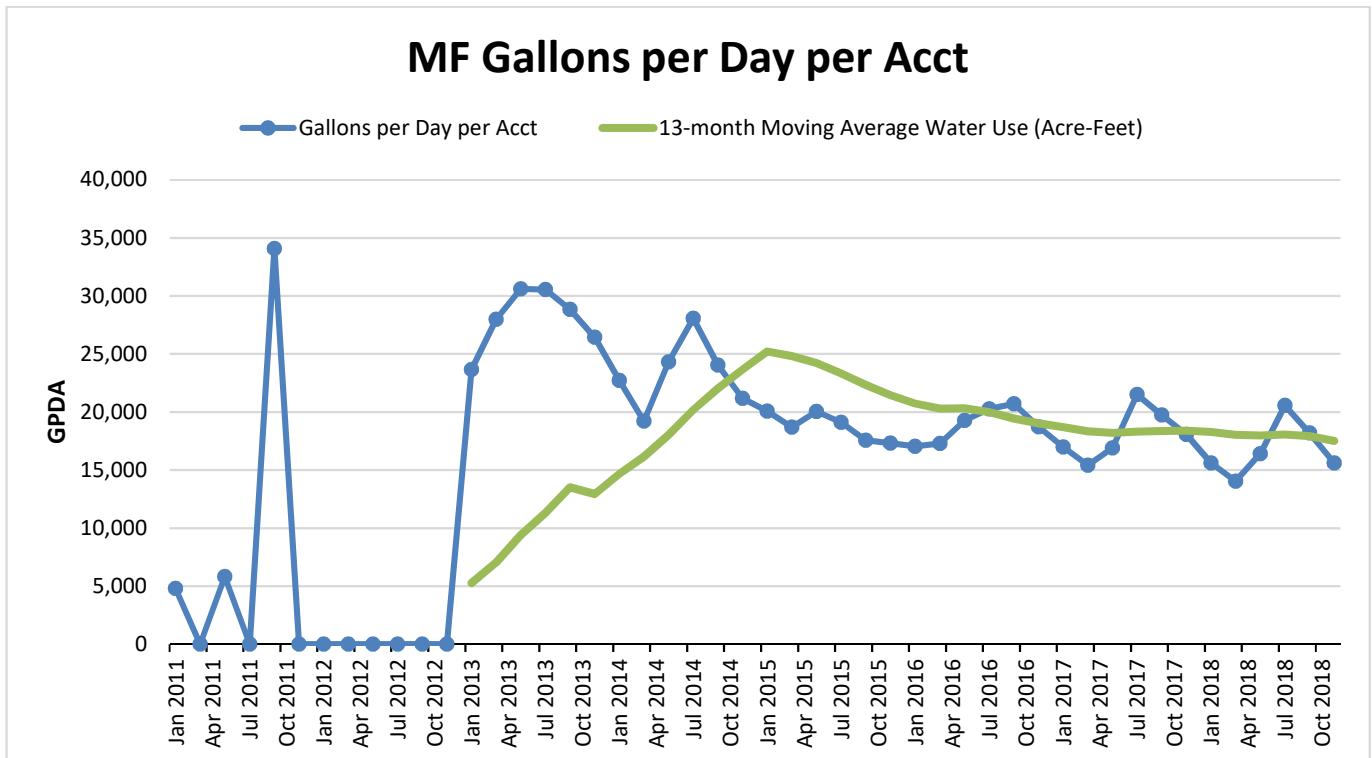


Figure 28. LACWD Commercial Consumption Data

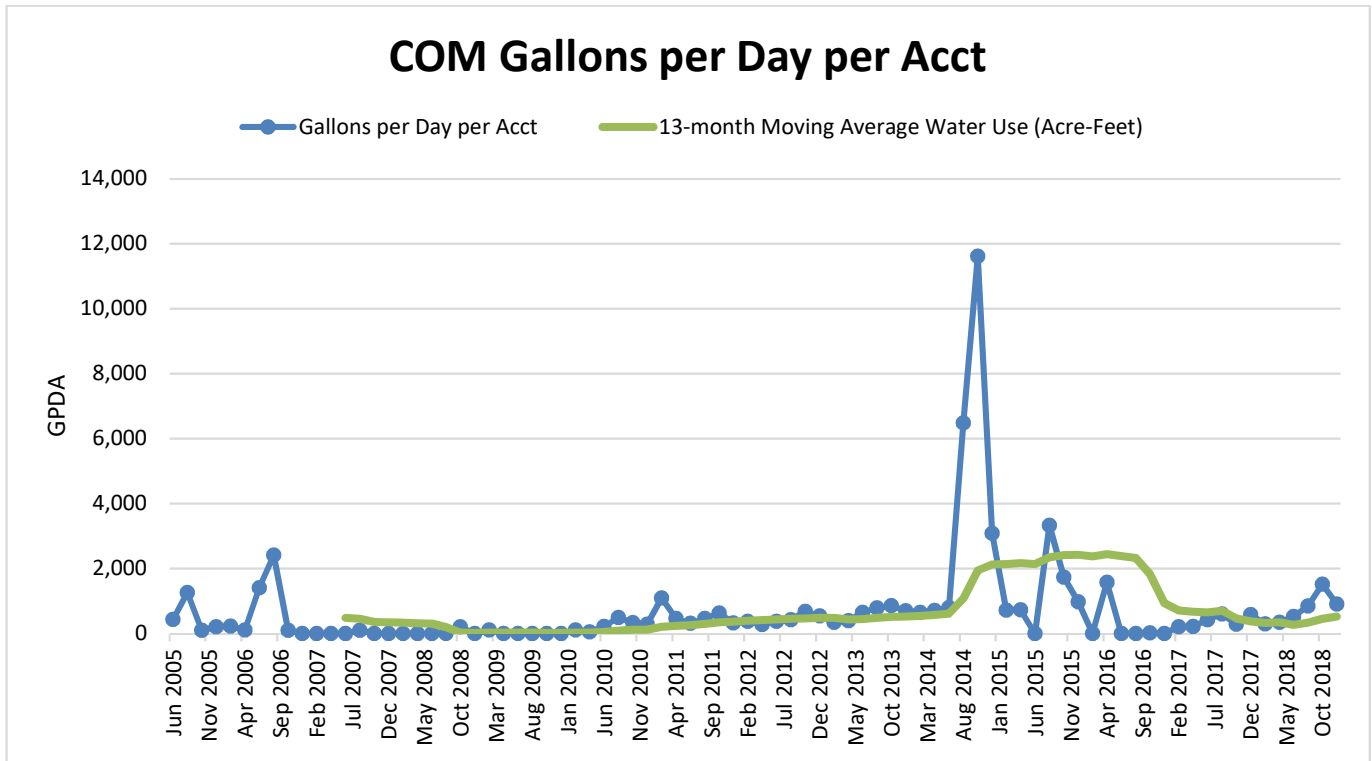
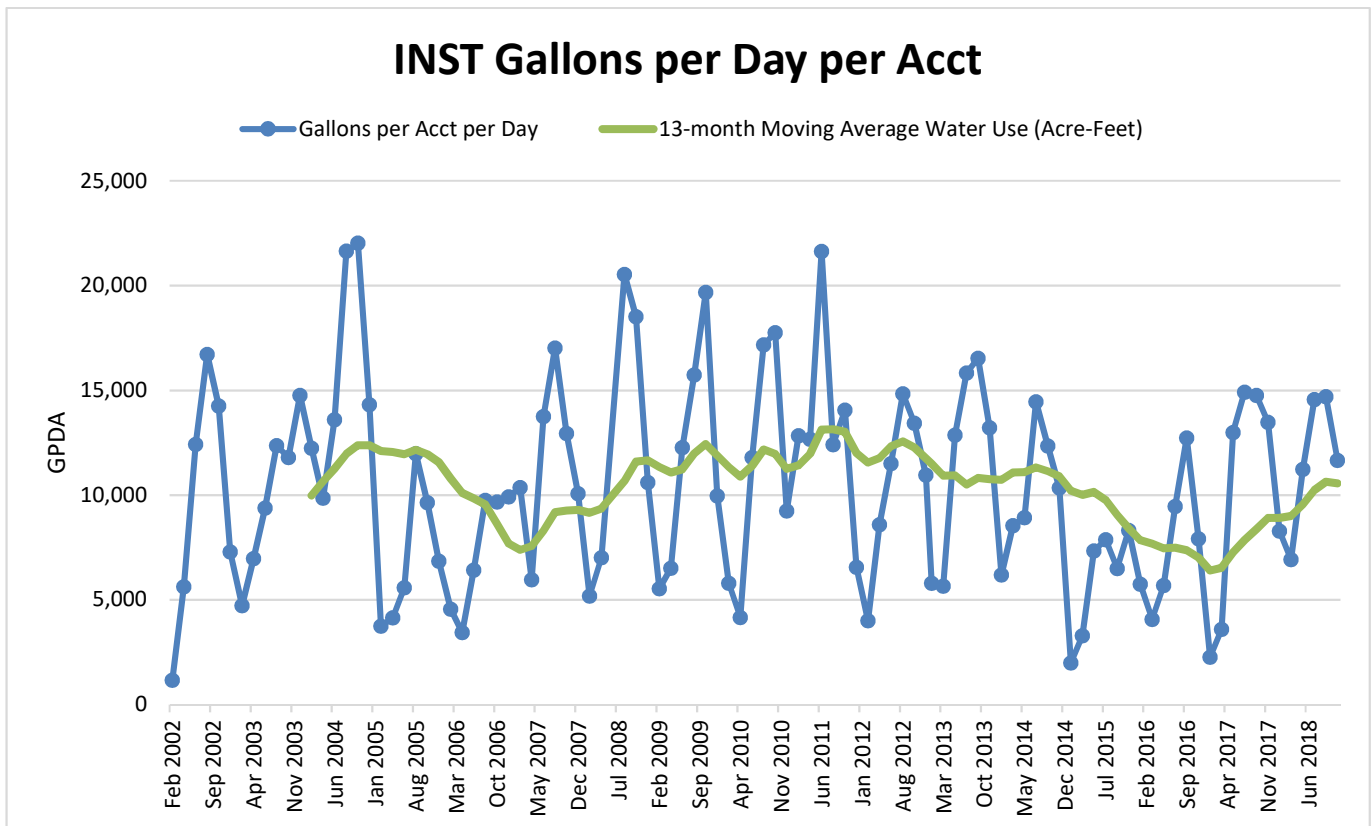


Figure 29. LACWD Institutional Consumption Data



APPENDIX E. SCVWA SERVICE DIVISION ACCOUNTS SERVED BY THE SANITATION DISTRICT

The following tables present the estimated number of accounts by customer category for the four SCVWA Service Divisions that are within the sanitation district.

Table 12. Projected Accounts by Customer Category (within Sanitation District) – NCWD

Year	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing Accounts	Total New Accounts	Total
2019	8,120	0	0	323	0	0	421	0	9	0	63	0	8,936	0	8,936
2020	8,120	171	0	323	1	0	421	28	9	6	63	0	8,936	207	9,143
2025	8,120	1,026	0	323	7	0	421	170	9	39	63	1	8,936	1,244	10,180
2030	8,120	1,882	0	323	13	0	421	312	9	71	63	3	8,936	2,280	11,216
2035	8,120	1,882	855	323	13	6	421	453	9	104	63	4	8,936	3,316	12,253
2040	8,120	1,882	1,710	323	13	12	421	595	9	136	63	5	8,936	4,353	13,289
2045	8,120	1,882	2,566	323	13	18	421	737	9	168	63	6	8,936	5,389	14,325
2050	8,120	1,882	3,421	323	13	24	421	878	9	201	63	7	8,936	6,426	15,362

Table 13. Projected Accounts by Customer Category (within Sanitation District) – SCWD

Year	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing Accounts	Total New Accounts	Total
2019	23,138	0	0	4,782	0	0	738	0	21	0	105	0	28,784	0	28,784
2020	23,138	222	0	4,782	129	0	738	55	21	3	105	1	28,784	411	29,195
2025	23,138	1,332	0	4,782	776	0	738	330	21	20	105	7	28,784	2,466	31,250
2030	23,138	2,443	0	4,782	1,423	0	738	606	21	37	105	14	28,784	4,522	33,306
2035	23,138	2,443	1,110	4,782	1,423	647	738	881	21	54	105	20	28,784	6,577	35,361
2040	23,138	2,443	2,221	4,782	1,423	1,293	738	1,157	21	70	105	26	28,784	8,632	37,416
2045	23,138	2,443	3,331	4,782	1,423	1,940	738	1,432	21	87	105	32	28,784	10,687	39,471
2050	23,138	2,443	4,441	4,782	1,423	2,586	738	1,707	21	104	105	38	28,784	12,743	41,527

Table 14. Projected Accounts by Customer Category (within Sanitation District) – VWC

Year	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing Accounts	Total New Accounts	Total
2019	27,116	0	0	337	0	0	915	0	390	0	64	0	28,822	0	28,822
2020	27,116	374	0	337	34	0	915	23	390	19	64	2	28,822	453	29,275
2025	27,116	2,245	0	337	206	0	915	140	390	115	64	10	28,822	2,716	31,538
2030	27,116	4,116	0	337	378	0	915	257	390	210	64	19	28,822	4,980	33,802
2035	27,116	4,116	1,871	337	378	172	915	374	390	306	64	27	28,822	7,244	36,066
2040	27,116	4,116	3,742	337	378	343	915	492	390	402	64	36	28,822	9,507	38,329
2045	27,116	4,116	3,742	337	378	343	915	492	390	402	64	36	28,822	9,507	38,329
2050	27,116	4,116	3,742	337	378	343	915	492	390	402	64	36	28,822	9,507	38,329

Table 15. Projected Accounts by Customer Category (within Sanitation District) – LACWD

Year	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing Accounts	Total New Accounts	Total
2019	484	0	0	1	0	0	7	0	0	0	6	0	499	0	499
2020	484	108	0	1	0	0	7	1	0	0	6	1	499	109	608
2025	484	431	0	1	0	0	7	2	0	0	6	3	499	436	935
2030	484	753	0	1	1	0	7	4	0	0	6	4	499	762	1,261
2035	484	753	324	1	1	0	7	6	0	0	6	6	499	1,090	1,588
2040	484	753	646	1	1	1	7	8	0	0	6	8	499	1,416	1,915
2045	484	753	969	1	1	1	7	9	0	0	6	10	499	1,743	2,241
2050	484	753	1,292	1	1	1	7	11	0	0	6	12	499	2,070	2,568

APPENDIX F. SCVWA SERVICE DIVISION INDOOR WATER USE (AFY) WITHIN SANITATION DISTRICT

The following tables present the estimated indoor demand by customer category for the four SCVWA Service Divisions within the sanitation district. Previously reported indoor water use factors per account were applied to the number and type of water Service Division within the sanitation district for each of the four SCVWA Service Divisions.

Table 16. Indoor Water Use (AFY) within Sanitation District for NCWD Demands with Plumbing Code (Passive) Savings Only¹

Year	Demands with Plumbing Code (Passive) Savings Only (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	1,820	0	0	1,000	0	0	330	0	3	0	120	0	3,270	0	3,270
2020	1,810	40	0	990	3	0	320	20	3	2	120	0	3,240	70	3,310
2025	1,760	240	0	940	20	0	290	120	3	10	120	3	3,110	400	3,510
2030	1,710	450	0	890	40	0	280	210	3	30	120	10	3,010	720	3,730
2035	1,680	450	180	860	40	10	270	290	3	40	120	10	2,930	1,020	3,950
2040	1,650	450	370	840	40	30	270	380	3	50	120	10	2,880	1,320	4,200
2045	1,630	450	550	820	40	40	260	460	3	60	120	10	2,840	1,610	4,450
2050	1,620	450	740	800	40	60	260	540	3	70	120	10	2,810	1,910	4,720

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

**Table 17. Indoor Water Use (AFY) within Sanitation District for NCWD
Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings¹**

Year	Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	1,810	0	0	970	0	0	330	0	3	0	120	0	3,240	0	3,240
2020	1,770	40	0	950	3	0	320	20	3	2	120	0	3,160	70	3,230
2025	1,640	240	0	870	20	0	290	120	3	10	120	3	2,930	390	3,320
2030	1,590	440	0	830	40	0	280	200	3	30	120	10	2,820	710	3,530
2035	1,560	440	180	800	40	10	270	290	3	40	120	10	2,750	1,010	3,750
2040	1,540	440	370	780	40	30	260	370	3	50	120	10	2,700	1,300	4,000
2045	1,520	440	550	760	40	40	260	460	3	60	120	10	2,670	1,600	4,260
2050	1,510	440	730	750	40	60	260	540	3	70	120	10	2,640	1,890	4,530

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

**Table 18. Indoor Water Use (AFY) within Sanitation District for SCWD
Demands with Plumbing Code (Passive) Savings Only¹**

Year	Demands with Plumbing Code (Passive) Savings Only (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	6,420	0	0	2,430	0	0	790	0	50	0	140	0	9,820	0	9,820
2020	6,380	50	0	2,400	60	0	760	60	50	10	140	2	9,720	180	9,900
2025	6,180	320	0	2,250	330	0	680	310	50	50	140	10	9,300	1,020	10,320
2030	6,000	590	0	2,130	610	0	640	530	50	90	140	20	8,960	1,830	10,800
2035	5,880	590	240	2,030	610	250	620	740	50	130	140	30	8,720	2,590	11,310
2040	5,780	590	490	1,970	610	500	610	960	50	170	140	30	8,550	3,350	11,890
2045	5,710	590	730	1,920	610	750	600	1,160	50	210	140	40	8,420	4,100	12,510
2050	5,660	590	980	1,880	610	1,000	590	1,370	50	250	140	50	8,320	4,850	13,170

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

**Table 19. Indoor Water Use (AFY) within Sanitation District for SCWD
Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings¹**

Year	Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	6,350	0	0	2,350	0	0	760	0	50	0	130	0	9,650	0	9,650
2020	6,220	50	0	2,280	60	0	720	50	50	10	130	1	9,400	170	9,570
2025	5,900	320	0	2,070	330	0	640	290	50	50	120	10	8,770	990	9,760
2030	5,740	580	0	1,950	600	0	620	510	50	90	120	20	8,480	1,800	10,270
2035	5,620	580	240	1,880	600	250	610	720	50	130	120	20	8,270	2,550	10,820
2040	5,530	580	480	1,820	600	500	600	930	50	170	120	30	8,120	3,300	11,420
2045	5,470	580	720	1,770	600	750	590	1,140	50	210	120	40	8,000	4,050	12,050
2050	5,420	580	970	1,740	600	1,000	580	1,350	50	250	120	40	7,920	4,790	12,710

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

**Table 20. Indoor Water Use (AFY) within Sanitation District for VWC
Demands with Plumbing Code (Passive) Savings Only¹**

Year	Demands with Plumbing Code (Passive) Savings Only (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	5,510	0	0	1,050	0	0	1,690	0	450	0	160	0	8,870	0	8,870
2020	5,480	70	0	1,040	100	0	1,680	40	450	20	160	4	8,820	240	9,060
2025	5,310	420	0	980	610	0	1,650	250	450	130	160	30	8,560	1,440	10,000
2030	5,160	770	0	930	1,120	0	1,630	460	450	250	160	50	8,330	2,630	10,970
2035	5,050	770	320	890	1,120	460	1,610	660	450	360	160	70	8,170	3,750	11,920
2040	4,970	770	630	870	1,120	920	1,600	860	450	470	160	90	8,050	4,860	12,910
2045	4,910	770	630	850	1,120	920	1,590	850	450	470	160	90	7,960	4,850	12,820
2050	4,860	770	630	830	1,120	920	1,580	850	450	470	160	90	7,890	4,850	12,750

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

**Table 21. Indoor Water Use (AFY) within Sanitation District for VWC
Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings¹**

Year	Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial	New Industrial	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	5,480	0	0	990	0	0	1,680	0	450	0	160	0	8,770	0	8,770
2020	5,390	70	0	940	100	0	1,670	40	450	20	160	4	8,600	240	8,840
2025	5,100	410	0	800	610	0	1,600	250	440	130	150	20	8,090	1,420	9,510
2030	4,920	760	0	740	1,110	0	1,580	440	440	240	150	50	7,840	2,600	10,440
2035	4,800	760	310	720	1,110	460	1,580	650	450	350	160	70	7,690	3,710	11,400
2040	4,720	760	630	690	1,110	920	1,570	840	450	460	160	90	7,580	4,810	12,390
2045	4,660	760	630	670	1,110	920	1,560	840	450	460	160	90	7,490	4,810	12,300
2050	4,610	760	630	650	1,110	920	1,560	840	450	460	160	90	7,420	4,800	12,230

¹ The values presented above are rounded to the nearest tenth for planning purposes. Due to rounding, the numbers presented in the above table may not add up precisely to the totals indicated.

**Table 22. Indoor Water Use (AFY) within Sanitation District for LACWD
Demands with Plumbing Code (Passive) Savings Only**

Year	Demands with Plumbing Code (Passive) Savings Only (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial ¹	New Industrial ¹	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	164	0	0	19	0	0	1	0	0	0	8	0	193	0	193
2020	163	33	0	19	5	0	1	0	0	0	8	1	192	38	230
2025	157	131	0	19	14	0	1	0	0	0	8	3	186	149	335
2030	152	229	0	19	24	0	1	1	0	0	8	6	180	259	440
2035	148	229	89	19	24	9	1	1	0	0	8	9	177	360	537
2040	145	229	178	19	24	18	1	1	0	0	8	11	174	461	635
2045	143	229	268	19	24	26	1	1	0	0	8	14	172	562	734
2050	142	229	357	19	24	35	1	1	0	0	8	16	170	663	833

¹ LACWD36 does not have any industrial accounts.

**Table 23. Indoor Water Use (AFY) within Sanitation District for LACWD
Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings¹**

Year	Demands with Plumbing Code (Passive) Savings & Current SCVWA Indoor Conservation Program Active Savings (AFY)														
	Existing Single Family	New SF with Indoor 55 GPCD	New SF with Indoor 50 GPCD	Existing Multifamily	New MF with Indoor 55 GPCD	New MF with Indoor 50 GPCD	Existing Commercial	New Commercial	Existing Industrial ¹	New Industrial ¹	Existing Institutional	New Institutional	Total Existing	Total New	TOTAL
2019	164	0	0	19	0	0	1	0	0	0	8	0	192	0	192
2020	162	33	0	19	5	0	1	0	0	0	8	1	190	38	228
2025	156	130	0	18	14	0	1	0	0	0	8	3	182	148	330
2030	151	228	0	18	24	0	1	0	0	0	8	6	177	258	435
2035	147	228	89	19	24	9	1	1	0	0	8	8	175	359	534
2040	144	228	178	19	24	18	1	1	0	0	8	11	172	459	631
2045	142	228	266	19	24	26	1	1	0	0	8	14	170	559	729
2050	141	228	355	19	24	35	1	1	0	0	8	16	169	659	828

¹ LACWD36 does not have any industrial accounts.