



Technical Memorandum

Date: October 22, 2021
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From: Lisa Maddaus, Maddaus Water Management Inc.
Title: **Summary of 2021 SCV Water Demand Factors**

Introduction

The purpose of this 2021 SCV Water Demand Factors Input Technical Memorandum (TM) is to support continued water supply planning by Santa Clarita Valley Water Agency (SCV Water). This TM provides the basis for the unallocated new development demands in the SCV Water service area as reported in the April 2021 SCV Demand Study: Land-Use-Based Demand Forecast Analysis (2021 Demand Study) and 2020 SCV Urban Water Management Plan (UWMP). This TM presents the following:

1. Background information on the development of the demand factors as the basis for the long-range demand forecast
2. Intended and potential uses for the demand factors
3. Population basis including people per household estimates by residential lot type
4. Indoor and outdoor demand factor inputs for residential and non-residential customer land use types and SCV Water customer categories, including demand factor adjustments
5. A summary of conclusions and next steps, including considerations for selecting and updating demand factors for future planning by SCV Water

Background

This TM presents the basis of and potential use for the water demand factors that helped determine the water demand for unallocated development in the existing SCV Water service area. These factors could potentially be utilized in the future to determine water use estimates for specific new development projects in the Santa Clarita Valley. Maddaus Water Management used for the 2021 Demand Study the demand forecasting and conservation analysis software: Decision Support System for Least Cost Planning Model (DSS Model). More information related to the DSS Model software is available online: <http://maddauswatermanagement.com/software.html>. The DSS Model software is most sophisticated and detailed software available to derive demand forecasting based on an evaluation of historical SCV Water consumption data and projected future land use and water demands. The DSS Model was used for both the 2015 and updated version was used for the 2020 UWMP to frame the future water demand scenarios without and with conservation savings included.

Unallocated new development demand refers to the water use attributed to the One Valley One Vision (OVOV) buildout scenario that has not yet been allocated to a specifically planned development or site with a Water Supply Assessment conducted and/or detailed plans submitted. Please refer to the 2021 Demand Study for information about future **allocated** demands for the City of Santa Clarita and the Los Angeles County area developments of Northlake, Spring Canyon, Sloan Canyon, Tapia, Tesoro del Valle, and the Five Point Project. Projected demand for development within the City of Santa Clarita of approved

and pending development units can be found in the 2021 Demand Study as well. These demands were included in the 2020 UWMP.

Again, this demand factor TM *only* presents the basis for determining the unallocated demand, often also called the “OVOV balance” demand. The OVOV balance is based on the remaining land designated for future development as defined by the City of Santa Clarita and Los Angeles County. SCV Water role and responsibility is to serve for existing and future development based on water supply availability and reliability.

A demand factor is a unit of demand, such as water consumption per residential lot type (or customer category). Another type of demand factor may be based on water consumption on a per capita basis. There are four primary functions in water supply planning that rely on per lot (or account) demand factors:

- **Water Supply Reliability in Urban Water Management Plans:** long range estimate of total added demand to ensure enough water supply is available in drought conditions. This was performed as part of the 2020 UWMP effort and relied on the build-out conditions in year 2050 based on OVOV guidance.
- **Water Supply Assessment (WSA)/Development Project Demand Management Planning:** unit or per account type water demands used to estimate anticipated water savings due to various conservation activities, using existing customer demands tied to customer billing data. California Senate Bill (SB) 610 and SB 221 require public agencies to determine whether adequate water supply exists for certain large development projects as part of the environmental review process under the California Environmental Quality Act (CEQA) by, in part, requesting WSAs from water service providers.
- **Infrastructure Planning:** uses number of new connections by type multiplied by the per account type water use summed up for each year that new connections are planned to be added to the system in order to build up a forecast for committed future water demands.
- **Infrastructure Design:** state code requirements specify the criteria for design of water treatment plants for capacity and water quality. Demand factors are used to determine the total average annual demand estimated at a future date to determine the infrastructure and then apply a “peaking factor” to account for seasonal variation and requirements to serve fire flow (peak hour demands).

Intended Use of the Demand Factors

In summary, the recommendation included in this TM is to use the 2021 Demand Study’s residential demand factors and outdoor demand factors developed for long range demand forecasting to the extent applicable. Wherever possible, SCV Water is recommended to use site-specific information to refine or further validate residential and non-residential land use type’s water use.

The following input values may be directly used in determining new development demand in the SCV Water service area. Background on the demand factor calculations is thoroughly elaborated upon in the 2021 Demand Study.

1. An indoor per capita water use of 50 gallons per person per day (GPCD) for indoor residential water use may be applied to the following people per household (PPH) estimates:
 - a. 3.54 PPH for single family (SF), condominium and townhouse units
 - b. 3.37 PPH for apartment and mobile home units
 - c. 1.87 PPH for senior type units
 - d. 1.0 PPH for Accessory Dwelling Units (ADUs)
2. The following outdoor gallons per acre per year demand factor may be applied to actual site areas

- a. 1,260,049 gallons/acre/year for SF outdoor use
 - b. 2,520,097 gallons/acre/year for multifamily (MF) outdoor use
 - c. 1,023,102 gallons/acre/year for park area outdoor use
 - i. If the landscape design (grass, shrub, trees, etc.) of the outdoor park area is known, a more accurate water use factor should be derived.
3. The non-residential customer water use categories accounted for in the DSS Model: Commercial, Institutional and Industrial (CII) and Other customer category average demands may be used for comparison purposes. However, actual site-specific unit types and areas should be considered and ideally recent neighboring similar type use per area used, wherever possible. MWM and SCV Water will be revisiting this in future phase of GIS analyzing and modeling demand factors in a post-COVID.
 4. To capture the effect of climate change, a 2050 demand increase of 3.77% may be applied, feathering in that volume linearly starting with a zero increase in 2021 and rising to 3.77% in 2050.
 5. Supplemental water supply would need to be added due to the lower supply availability (e.g., lower river flows/higher evaporation) from source supplies that may be applicable as directed by SCV Water staff.

Population Basis

This section presents PPH assumptions by residential land use type for determining unallocated new development residential population. The land-use-based population projections were founded on dwelling unit projection estimates from the total remaining OVOV-based buildout projection. Table 1 presents PPH by land use type used to determine the unallocated OVOV balance population. The Customer Account Category column in the table presents the customer category for each unit type – for the potential purpose of determining SF and MF population and demand.

Table 1. Unallocated Demand Population Basis – People Per Household for Residential Lot Types

Land Use Type Unit Code	Land Use Type	People Per Household	SCV Water Customer Account Category
1	Single Family (<1 du/ac)	3.54	SF
2	Single Family (1-5 du/ac)	3.54	SF
3	Single Family (6-10 du/ac)	3.54	SF
4	Condominium/Townhouse	3.54	MF
5	Apartment	2.37	MF
6	Mobile Home	2.37	MF
7	Senior (Active)	1.87	MF
N/A	Accessory Dwelling Unit	1.00	N/A

Note: du/ac = dwelling unit/acre

New development residential units in the OVOV balance assumed average PPH values derived for the former Santa Clarita Water Division (SCWD) and former Newhall Water Division (NWD) were based on the

March 2016 Demand Study¹ (which was based on the 2010 U.S. Census and 2014 Castaic Lake Water Agency Population Assessment and GPCD Review Technical Memorandum). For land use type unit codes 1-6 shown in Table 1, a weighted average of the SCWD and NWD PPH was taken using each water division's 2015 population. The PPH of 1.87 for "Senior" land use type 7 is based on lowest multifamily PPH derived value per direction of SCV Water (Rick Vasilopoulos) during the 2021 Demand Study effort. Estimated PPH factors were then applied to dwelling units according to land use type to calculate population.

Accessory dwelling units (ADU) on SF properties were added to the development profile as an **additional** development feature to the OVOV buildout unit numbers at the direction of SCV Water staff based on a recent increase in permit applications for this kind of use. It is assumed that these units would not be served by an additional meter and so aren't labeled as an SF or MF account. The City of Santa Clarita received 80 permit applications for these in 2020. The 2021 Demand Study analysis assumed the number of permit applications for ADUs may more than double to approximately 200 per year through buildout. ADUs were assumed to add approximately 1 person per ADU as well as indoor water use only at 50 GPCD. ADU outdoor demand was assumed to be part of the single-family account in which the ADU resides.

Demand Factor Inputs

This section presents the unallocated new development demand factor inputs for determining new development demands by residential land use type, all outdoor areas, and CII and Other customer category account types.

Residential and Irrigation Demand Factors

New residential demand factors were based on 50 indoor GPCD and align outdoor use with maximum applied water allowance requirements as specified in California's Model Water Efficiency Landscape Ordinance (MWELO).² The basis for new development outdoor water use factors is presented in the 2021 Demand Study's Appendix H. The outdoor demand factor shown in Table 2 is based on an annual normal evapotranspiration (ET_o) of 66.7 inches. In summary, even though the historical California Irrigation Management Information System (CIMIS) as maintained by the California Department of Water Resources references an ET_o value of 61.5 inches for Santa Clarita, an ET_o of 66.7 inches per year was the 10-year average observed at a more applicable local monitoring station located at SCV Water's Rio Vista Water Treatment Plant. It was determined to be more appropriate to use the observed ET_o value of 66.7 inches, as it provided a conservative (high) estimate of potential outdoor water demands.

The following table also presents an average irrigated area per dwelling unit that was based on site-specific data compiled in the Outdoor Water Use Research Study (Appendix H of the 2021 Demand Study). In the 2021 Demand Study these outdoor factors were applied to both potable and non-potable new development residential and non-residential irrigated areas. New residential outdoor demand factors were applied to an estimated residential outdoor irrigated area by residential land use type. Additionally, an estimate for residential Homeowner Association (HOA) common areas is presented in the following table, based on common area landscapes for recent development unit types.

Table 2 presents the new development demand factor inputs for determining new development demands by residential land use type and outdoor areas. The outdoor demand factors in the following table already include the overwatering factors discussed in the subsequent adjustment basis section. More information about the outdoor demand factor basis can be found in the 2021 SCV Water Agency's Residential and

¹ CLWA (now SCV Water) Updated Final Technical Memorandum #2 – SCV Demand Study Update: Land-Use Based Demand Forecast Analysis, dated March 3, 2016.

² [Model Water Efficient Landscape Ordinance](#)

Non-Residential Outdoor Water Use Research Study (2021 Outdoor Water Use Study) located in Appendix H of the 2021 Demand Study.

To clarify and for example, the following table estimates that the largest single family home type (a home on a lot greater than one acre) may have an average irrigated area of 0.373 acres and an outdoor demand of 1,290 gallons per day; this demand was calculated using an outdoor demand factor of 1,260,050 gallons/acre/year. Of course, in reality, a large single home may have significantly more or less irrigated area. So, to determine the outdoor demand of a large single-family home using this table (and the 2021 Demand Study analysis output), the demand factor of 1,260,050 gallons/acre/year may be multiplied by the **actual** site irrigated area (typically known for a new development). Furthermore, it is important to note that these demand factors were based on average service area data (further explained in the 2021 Outdoor Water Use Study). When the required landscaping plan is available for a site, with the specifically defined irrigated area with ratios of shrubs, turf, and trees, a more accurate outdoor water use estimate should be derived and used to comply with the MWELo mandate.

Table 2. Unallocated Demand (OVOV Balance) Residential Indoor and Outdoor Demand Factor Inputs

Land Use Type Unit Code	Land Use Type	New Development Indoor Demand Factors (GPCD)	Outdoor Demand Factors (Gallons/Acre/Year)	Average Irrigated Area (acres) per DU	Outdoor Demand (gal) per DU per Day
1	Single Family (<1 du/ac)	50	1,260,050	0.373	1,290
2	Single Family (>1-5 du/ac)	50	1,260,050	0.104	360
3	Single Family (>6-10 du/ac)	50	1,260,050	0.056	190
4	Condominium/Townhouse	50	2,520,100	0.031	210
5	Apartment	50	2,520,100	0.039	270
6	Mobile Home	50	2,520,100	0.021	150
7	Senior (Active)	50	2,520,100	0.017	120
50	Golf Course	N/A	1,023,100	N/A	N/A
51	Developed Park	N/A	1,023,100	N/A	N/A
52	Undeveloped Park	N/A	1,023,100	N/A	N/A
N/A	HOA Common Area Dedicated Irrigation for SF	N/A	1,023,100	0.084	N/A
N/A	HOA Common Area Dedicated Irrigation for MF	N/A	1,023,100	0.045	N/A

Notes:

1. Outdoor Demand Factors and Average Irrigated Acreage Values are estimates based on the findings of 2021 SCV Water Agency Outdoor Water Use Research Study. Best available information including site specific details should be customized and validated for each development project.
2. Outdoor Demand Factors and rounded to the nearest 10 gallons per acre per year.
3. Outdoor Demand per DU per Day is rounded to the nearest 10 gallons per DU per day.

Demand Factor Adjustment Basis and Inputs

Given that the baseline CII and Other Customer Categories demand factors were developed using historical consumption data, a review of SCV Water’s future community water use necessitated some adjustments to better align with how land use development is planned. As a result, demand factor adjustments addressed the need to account for weather normalization and drought rebound. More information about this part of the analysis can be found in Appendix A of the 2021 Demand Study. The assumptions associated with each factor are described below and presented in Table 3. It is assumed that these demand factors will be at least minimally revisited with future UWMP updates, every four to five years, if not more frequently with every large new development’s water supply assessment. **SCV Water should consider establishing a protocol for reviewing and updating these inputs along with tracking and monitoring water use with the DSS Model to keep current with the actual water use by customer categories compared to the planned estimated demand in the 2020 UWMP.**

Climate Change: The 2050 customer category demands were increased by 3.77% to capture the effect of climate change. This incremental annual increase should be added based on the buildout date, and may be determined and applied at any point in time in linearly starting with a zero increase initially in 2020 and rising to 3.77% in 2050. More information on the basis of this increase can be found in Appendix E of the 2021 Demand Study. This increase is **not** included in any of the demand factors presented in this TM since the adjustment magnitude varies by year. Since a WSA has a 30-year outlook, it is entirely reasonable to include climate change considerations in a WSA analysis and even immediately in the initial year 2025 estimation. It’s a small increase at first, but it’s there.

For example,

In 2022, the demand with climate change is calculated as follows:

$$[\text{year 2022 demand}] * 1 + \frac{3.77\%}{(2050-2020)*(2022-2020)}$$

In 2023, the demand with climate change is calculated as follows:

$$[\text{year 2023 demand}] * 1 + \frac{3.77\%}{(2050-2020)*(2023-2020)}$$

Weather Normalization: 2018 and 2019 CII and Other demands were adjusted to account for 2018 being slightly warmer than normal and 2019 being significantly cooler than normal. More information on the basis of this adjustment can be found in Appendix D of the 2021 Demand Study.

Drought Rebound: It was estimated that a total drought rebound of 9% occurred by 2019 as compared to year 2015 pre-drought water use. The CII and Other Customer Category demand factors assume an additional 2% rebound (increase) in water use on top of the weather normalized average 2018 and 2019 outdoor water use and 2017 indoor water use. This adjustment is applied to the water use basis of all CII and Other Customer Category water use. More information on the basis of this adjustment can be found in Appendix D of the 2021 Demand Study.

Irrigation Demand Factor: This analysis derived an irrigation demand factor for each land use type based on the 2021 Outdoor Water Use Study presented in Appendix H of the 2021 SCV Demand Study. The

irrigation demand factor accounts for baseline irrigation use estimated by land use types for landscaped areas for future customers based on MWELo requirements.

Outdoor Conservation Potential/Overwatering Factor: This overwatering factor adjusts the previously presented irrigation demand factor to account for outside water uses beyond irrigation. Using the output from the 2021 Outdoor Water Use Study, this factor takes into account outside water uses, like car washing, in addition to potential overwatering due to irrigation inefficiencies and device degradation. These landscape inefficiencies and device disrepair have been proven to occur if developers do not design, operate, and install landscapes to standards that account for efficiency losses through time. This overwatering factor was applied to both potable and non-potable new development residential and non-residential irrigated areas in the 2021 Demand Study and offers additional, potential water conservation opportunities. This outdoor overwatering factor was partially derived from the difference between the MWELo/MAWA (Maximum Applied Water Allowance) design standard and what the 2021 Outdoor Water Use Study found was actually being applied.

Table 3 presents the various potential adjustments that were made to demands. For CII and Other Customer Categories, the 2018 and 2019 historical average GPDA was adjusted for weather normalization and drought. New development irrigation/outdoor use and residential outdoor use presented previously includes the overwatering factor presented in Table 3.

Table 3. Demand Factor Adjustment Values

Adjustment Factors	Value	
	2018	2019
Weather Normalization	-0.78%	5.21%
Climate Change*	3.77%	
Drought Rebound	2.0%	
Residential Overwatering Factor	26.5%	
Non-Residential Overwatering Factor	25.6%	

* This increase is **not** included in any of the demand factors presented in this TM since the adjustment magnitude varies by year. The 3.77% is the total increase expected by year 2050.

Commercial, Industrial and Institutional Demand Factors

New CII and Other Customer Category demand factors were based on adjusted 2018 and 2019 outdoor water use and 2017 indoor water use. Historical monthly billing data was reviewed and leveraged to determine that 2018 and 2019 represented the most normal recent year water use profile. For purposes of this analysis, recent non-drought, non-wet year 2017 was established as the base year for indoor water use to be consistent with the recent 2016 Santa Clarita Valley Water Agency Indoor Water Use Estimates technical analysis.³

Table 4 presents the average gallons per day per account assumed for new CII and Other accounts that served as the basis for future water demand forecasting in aggregate across the SCV Water service area. Values do **not** include climate change adjustments. **It is not recommended to use these factors for a**

³ Technical Memorandum – Santa Clarita Valley Water Agency Indoor Water Use Estimates, dated September 26, 2019.

detailed site water use estimate. It is recommended to use CII demand factors derived on a case by case basis for Water Supply Assessment purposes that is more customized to the actual development plans being proposed.

Table 4. Commercial, Institutional, Industrial and Other Demand Factors

Water Utility Customer Account Category	AVG 2018 & 2019 Adjusted* GPDA
Commercial	2,090
Industrial	2,650
Institutional	6,750
Other	2,940

* Adjusted factors include weather normalization and drought rebound. They do **not** include climate change considerations. Values are rounded to the nearest 10 GPDA.

Unallocated Non-residential Demand

Table 5 presents information about unallocated new development in the SCV Water service area. Unallocated new development refers to the development attributed to the OVOV buildout scenario that has not yet been allocated to a specifically planned development or site. All new development nonresidential demand was based on adjusted average 2018 and 2019 GPDA as presented in the previous section. This demand factor was applied to existing accounts by SCV Water customer category growing proportionally to the projected square footage growth from baseline 2019 through buildout of these categories. A water use factor per specific non-residential new development land use type was not specifically applied. New and existing nonresidential accounts are assumed to use the same per account water use.

For information about future **allocated** development that has been defined within the service area and was included in the 2021 Demand Study and 2020 UWMP, refer to the 2021 Demand Study. Projected developments include pending or approved sites for the City of Santa Clarita and the Los Angeles County area developments, including Northlake, Spring Canyon, Sloan Canyon, Tapia, Tesoro del Valle, and the Five Point Project.

Again, the information in the following table only represents the total projected basis for the **unallocated** development (OVOV balance).

Table 5. Unallocated Development for Nonresidential Customer Categories (OVOV Balance)

SCV Water Customer Account Category	Demand (Acre-Feet) ¹	No. of Accounts ²
Commercial	1,810	770
Industrial	690	230
Institutional	1	1
Other	3,920	1,190

¹ Demands consider weather normalization and drought rebound. Values are rounded to the nearest 10 acre-feet. Demand does **not** include climate change or any passive or active savings.

² Number of accounts were estimated based on the average GPDA presented in Table 4. Values are rounded to the nearest 10 accounts.

Conclusions & Next Steps

This TM provides a summary of the demand factors derived for the long-range demand forecast developed for the 2020 UWMP. It is important to note that these demand factors were developed as key basis for the long-term planning effort for SCV Water service area in its entirety and are not based on any specific development. They should be used as a starting point and modified based on specific development parameters as well as more recent water use data from new developments that have similar use patterns and potential among the various land use types (i.e., single family household) and end use types (i.e., restaurant).

As new developments provide detailed plans and water use estimates, the portion of unallocated demand will decrease with time as the new development is constructed (should the OVOV threshold of dwelling units and building space limitations be maintained). SCV Water should collaborate on an on-going basis as the City and County track this OVOV balance in relation to total projected demands as modeled the DSS Model software and reported in the 2020 UWMP. A comparison to future supply and demand assessment is to be conducted annually in line with the fundamental UWMP requirements that can be informative as WSA demand versus supply reliability analysis is revisited. SCV Water also would ideally track actual water use by development area and compare it to previous estimates to support future WSAs as part of the SCV approval process. This monitoring of water use by land use type would also refine future estimates immensely for the 2025 UWMP.

Given this analysis follows industry standard practice for developing demand factors and there is adequate accounting for variability in demands due to influences of demand outside of SCV Water control, these factors are recommended to be: (a) further defined based on shifts in planned new development; or (b) a sliding scale based on irrigated area to generate a more accurate water budget and adhering to MWELO requirements. There is a future review of demand factors envisioned as part of the 2025 UWMP development.

The water demand factors can be applied to updates to SCV Water's water demand forecasts as future developments are requested. As the water demand from two smaller homes can use more water than one large estate lot, some careful planning associated with how to forecast future demand for types of new connections needs to be accounted for conservatively.

In addition, careful tracking of the building timing of larger lots is important given that larger residential lots would result in an increase in GPDA usage that may put SCV Water at risk for not meeting its water use objectives.

Limitations

This document was prepared solely for SCV Water in accordance with professional standards at the time the services were performed and in accordance with the consulting agreement between SCV Water and Maddaus Water Management, Inc. dated April 2020. This document is governed by the specific scope of work authorized by SCV Water; it is not intended to be relied upon by any other party except for intentions stated and contemplated by the original scope of work to support the development of the 2020 UWMP. We have relied on information or instructions provided by SCV Water and other parties, such as Los Angeles County and City of Santa Clarita and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information (e.g., accuracy of metered billing data or developed or planned development of land acreage by lot use type).