Summary of Recommendations for Variances

WUES-DWR-2021-04

A Report to the State Water Resources Control Board Prepared Pursuant to California Water Code Section 10609.14

September 2022

California Department of Water Resources
Water Use Efficiency Branch

Note: This report is part of the package of reports developed by the California Department of Water Resources to meet the requirements of Senate Bill 606 and Assembly Bill 1668 of 2018 for urban water use efficiency.

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Abbreviations and Acronyms

2018 Legislation	2018 Legislation on Water Conservation and Drought Planning (Senate Bill 606 [Hertzberg] and Assembly Bill 1668 [Friedman], as amended)
AB	Assembly Bill
AMI	advanced metering infrastructure
CAL FIRE	California Department of Forestry and Fire Protection
CFM	cubic feet per minute
CII	commercial, industrial, and institutional
CII-DIM	commercial, industrial, and institutional dedicated irrigation meter
CII-DIMWUS	Commercial, Industrial, and Institutional Outdoor Irrigation of Landscape Areas with Dedicated Irrigation Meters Water Use Efficiency Standard
DIM	dedicated irrigation meter
DWR	California Department of Water Resources
EC	evaporative cooler (Note: Acronym as used in WUES-DWR-2021-01B, WUES-DWR-2021-04, and WUES-DWR-2021-05)
ECe	plant threshold salinity
ECiw	salinity of the irrigation (recycled) water
ETAF	evapotranspiration factor in Model Water Efficient Landscape Ordinance design standard (on parcel level)
ETF	evapotranspiration factor (on urban retail water supplier level)
ETF_gs	evapotranspiration factor based on the average reference evapotranspiration for an average growing season in the service area of an urban retail water supplier
ETF_gsCrop	evapotranspiration factor based on the crop-specific growing season and reference evapotranspiration in the service area of an urban retail water supplier

ETF_SLA	evapotranspiration factor for special landscape areas' irrigation with recycled water per Model Water Efficient Landscape Ordinance, as amended
ETo	reference evapotranspiration
ETo_gs	average reference evapotranspiration during growing season in the service area of an urban retail water supplier
ETo_gsCrop	crop-specific reference evapotranspiration during growing season in the service area of an urban retail water supplier
FRA	Federal Responsibility Area
GC	California Government Code
GIS	geographic information system
gpcd	gallons per capita per day
HD	hemodialysis
IE	irrigation efficiency
IE_Crop	crop-specific irrigation efficiency
IRWUS	Indoor Residential Water Use Efficiency Standard
Kc_gs	crop coefficient during growing season
LA	landscape area
LA_Crop	irrigated land area per crop or crop type
LAM	landscape area measurement
Legislature	California State Legislature
LR	leaching requirement
LRA	Local Responsibility Area
MAWA	maximum applied water allowance
mg/L	milligrams per liter
MWELO	Model Water Efficient Landscape Ordinance
N/A	not applicable
OR_LAM_Ag Mask	Outdoor Residential Landscape Area Measurement Agricultural Mask
ORWUS	Outdoor Residential Water Use Efficiency Standard

PD	peritoneal dialysis
Peff	effective precipitation
Peff_gs	average effective precipitation during growing season
Peff_gsCrop	crop-specific effective precipitation during growing season
PF	plant factor
ppm	parts per million
Recommendation Package	Urban Water Use Efficiency Recommendation Package
SB	Senate Bill
SLA	Special Landscape Area
SLA_htds	total special landscape area irrigated with high total dissolved solids recycled water
SNMP	Salt and Nutrient Management Plan
SRA	State Responsibility Area
State	State of California
State Water Board	State Water Resources Control Board
TDS	total dissolved solids
UWUO	urban water use objective
UWUO_EP	the standards-based urban water use objective during qualified emergency period(s) for the qualified emergency zone(s)
WC	California Water Code
WCEC	Western Cooling Efficiency Center
WDR	Waste Discharge Requirement
WLS	Water Loss Standard
WUS	Water Use Study

Executive Summary

The California State Legislature passed the 2018 Legislation on Water Conservation and Drought Planning (Senate Bill 606 [Hertzberg] and Assembly Bill 1668 [Friedman], as amended; hereinafter referred to as the "2018 Legislation"), which included provisions for advancing urban water use efficiency through developing and implementing various water use efficiency standards, variances, and performance measures. This report is intended to summarize the scope, approach, recommendations, and implementation considerations for variances, as directed by California Water Code (WC) Section 10609.14.

WC Section 10609.14 directs the California Department of Water Resources (DWR), in coordination with the State Water Resources Control Board (State Water Board), to conduct necessary studies to recommend appropriate variances for unique uses of water that could have a material effect on an urban retail water supplier's urban water use objective (UWUO). For each variance, the recommendation includes a threshold of significance and guidelines and methodologies for calculating efficient water use allowable under that variance. Per the 2018 Legislation, appropriate variances may include, but are not limited to, the following eight identified in WC Section 10609.14(b):

1. Significant use of evaporative coolers.
2. Significant populations of horses and other livestock.
3. Significant fluctuations in seasonal populations.
4. Significant landscaped areas irrigated with recycled water having high levels of total dissolved solids.
5. Significant use of water for soil compaction and dust control.
6. Significant use of water to supplement ponds and lakes to sustain wildlife.
7. Significant use of water to irrigate vegetation for fire protection.
8. Significant use of water for commercial or noncommercial agricultural use.

DWR conducted topic-specific research and investigations to answer three critical questions prior to developing the recommendation for each potential variance:

1. Is this water use outside of the scope of the UWUO? In other words, is this water for non-urban use or part of the commercial, industrial, and institutional (CII) water uses other than irrigating landscape with dedicated irrigation meters? If so, the water use is either not subject to the provisions of urban water use efficiency

in the 2018 Legislation or excluded from the UWUO and, thus, there is no need for a variance.

2. Is this water use unique within the context of the UWUO? If no, it is not eligible. If yes, the water use is potentially eligible for a variance. The following two questions need to be answered “yes” to be determined eligible:

    a. Is this water use shared by only some urban retail water suppliers or needed in unusual circumstances, but not commonly used enough to be included in one of the standards?

    b. Is this water use excluded from all urban water use efficiency standards and other variances?

3. Could this unique water use have a material effect on the UWUO of some urban retail water suppliers? If so, the water use is warranted for variance development.

For each potential variance, after confirming the above in collaboration with stakeholders and the State Water Board, DWR proceeded with variance development with a clarified scope, whereby the applicable use of water could be appropriately estimated and incorporated in an urban retail water supplier’s UWUO.

Consistent with the legislative directive, DWR used a public process involving a diverse group of stakeholders in the review of potential variances, including the eight defined in the 2018 Legislation and those identified through discussions in that public process. The Water Use Studies Working Group and the Standards, Methods, and Performance Measures Working Group that DWR established to assist in implementing the 2018 Legislation were the primary stakeholders involved in the variance development process. Additional stakeholders included State of California agencies, cities, counties, urban retail water suppliers, environmental organizations, and other interested parties. Working group members and stakeholders were provided with many opportunities to comment on and inform the appropriateness of each variance recommendation. Additionally, they were able to comment on, and inform the development and refinements for, the applicable scope, specifications, and methodologies for estimating the efficient water use volume for a variance. The resource requirements for administering a variance and associated supporting data requirements, accessibility, and quality were considered in the evaluations and implementation considerations, including the need for technical assistance, are included with each variance recommendation.

Through investigation of available data and stakeholder input, DWR has concluded that sufficient evidence supports the establishment of the eight variances identified in the 2018 Legislation; however, two should be refined: “significant use of water for soil compaction and dust control” should be limited to “significant use of water for dust

control for horse corrals and animal exercising arenas," and "significant use of water to irrigate vegetation for fire protection" should be modified and expanded to "significant use of water during major emergencies."

DWR also explored additional potential variances beyond the eight identified in the 2018 Legislation. Through research and stakeholder input, DWR found that "significant use of water for home use medical devices" had merits to be considered as a potential variance. However, DWR recommends the development be deferred until the associated unique water use becomes more prevalent, such that it could have a material effect on urban retail water suppliers' UWUO.

DWR has completed a significant body of work to meet the requirements of the 2018 Legislation and provide recommendations on different topics to the State Water Board for adoption. To streamline document development and recognize the inherent interrelationship among different topics and the need for overall consistency, DWR organized the various reports in an Urban Water Use Efficiency Recommendation Package (Recommendation Package) that allows mutual referencing and incorporates content by reference. All reports in this Recommendation Package are given a serial number in the form of "WUES-DWR-2021-xx." For each report, Appendix A includes the list of documents in the Recommendation Package that are incorporated by reference.

Recommendations for the eight variances and the deferral of one variance are part of the *Recommendations for Urban Water Use Efficiency Standards, Variances, Performance Measures, and Annual Water Use Reporting* (WUES-DWR-2021-01A). The recommendations were prepared per the requirements of the 2018 Legislation and are to be transmitted to the State Water Board. All recommendations are subject to approval and adoption by the State Water Board.

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1.0 Introduction

1.1 Background

Senate Bill (SB) 606 (Hertzberg) and Assembly Bill (AB) 1668 (Friedman) of 2018, as amended (hereinafter referred to as the "2018 Legislation"), established a new foundation for long-term improvements in water conservation and drought planning to adapt to climate change and the resulting longer and more intense droughts in the State of California (State). These two bills provide expanded and new authorities and requirements to enable permanent changes and actions for those purposes, thereby improving the State's water future for generations to come.

SB 606 and AB 1668 are direct outcomes of California Governor Edmund G. Brown Jr.'s Executive Order B-37-16, issued in May 2016. The recommendations in an April 2017 report titled *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16* (2017 Framework) and subsequent extensive legislative outreach efforts informed the development of SB 606 and AB 1668. For additional information on SB 606, AB 1668, and the 2017 Framework, refer to *Making Water Conservation a Way of Life, Primer on the 2018 Legislation on Water Conservation and Drought Planning Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman).*[2]

The 2017 Framework built on the need for conservation realized during the 2012 to 2016 statewide drought, as well as implementation of the Governor's California Water Action Plan (first released in 2014 and then updated in 2016). The 2017 Framework outlined a suite of actions that can be implemented under existing authorities and, where necessary, recommended additional actions that can be implemented with new or expanded authorities given by the Legislature. To that end, the Legislature enacted the 2018 Legislation, which provides complementary authorities and requirements that affect water conservation and drought planning for urban retail water suppliers, agricultural water suppliers, and small water suppliers and rural communities.

One of the four primary goals in Executive Order B-37-16 is to "use water more wisely," and the majority of the new and expanded authorities relate to achieving that goal, with the addition of a chapter in the California Water Code (WC), Chapter 9 (commencing with WC Section 10609) of Part 2.55 of Division 6. The 2018 Legislation does not change existing implementation of the Water Conservation Act of 2019 (also known as SB X7-7, commencing with WC Section 10608); the statewide goal of a 20 percent

[2] California Department of Water Resources and State Water Resources Control Board. 2018. Making Water Conservation a California Way of Life. Primer of 2018 Legislation on Water Conservation and Drought Planning Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman). Accessed at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Make-Water-Conservation-A-California-Way-of-Life/Files/PDFs/Final-WCL-Primer.pdf?la=en&hash=B442FD7A34349FA91DA5CDEFC47134EA38ABF209

reduction in urban per capita use by 2020 is still in place and water use by individual customers is not limited.

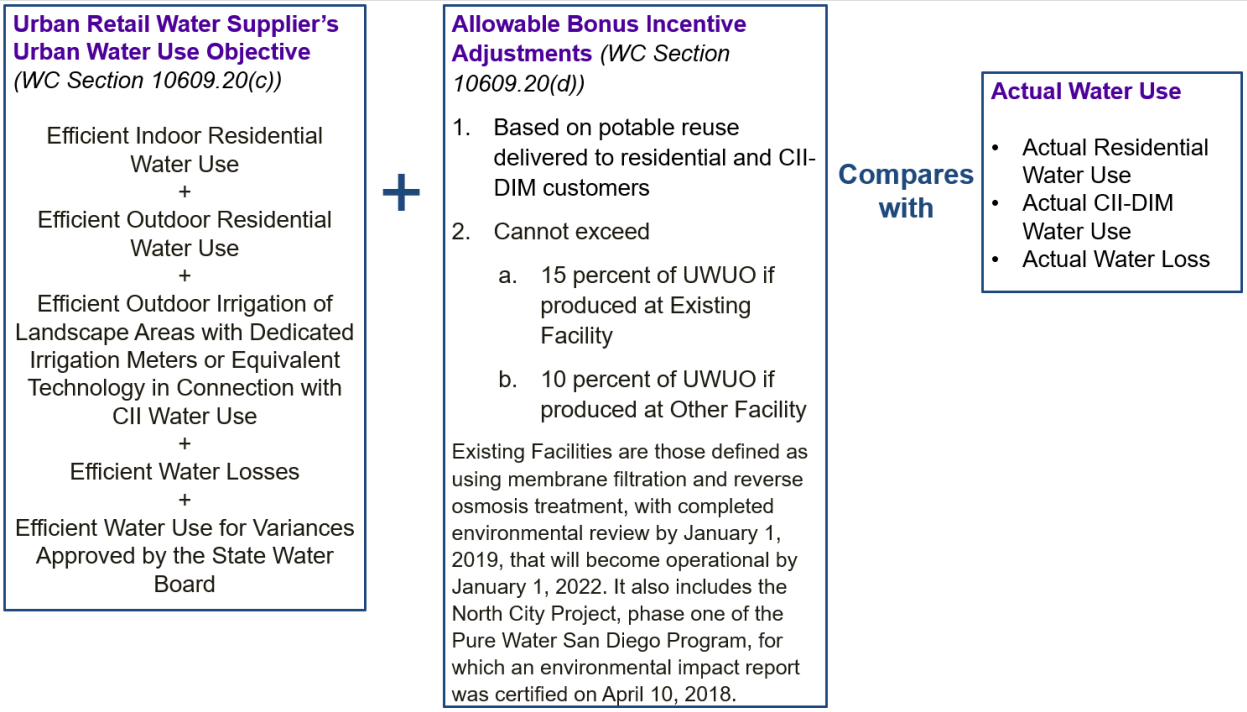
The 2018 Legislation requires the California Department of Water Resources (DWR), in coordination with the the State Water Resources Control Board (State Water Board), to conduct necessary studies and investigations and recommend for adoption by the State Water Board:

- Standards for outdoor residential use (WC Section 10609.6).
- Standards for outdoor irrigation of landscape areas with dedicated irrigation meter or other means of calculating outdoor irrigation use in connection with commercial, industrial, and institutional (CII) water use (WC Section 10609.8).
- Performance measures for CII water use (WC Section 10609.10).
- Appropriate variances for unique uses that can have a material effect on water use of an urban retail water supplier's urban water use objective (UWUO) (WC Section 10609.14).

DWR is also required to recommend for adoption by the State Water Board guidelines and methodologies for urban retail water suppliers calculating their UWUO (WC Section 10609.16).

To maintain consistency with the State policy encouraging potable reuse (as defined in WC Section 13561), a bonus incentive is allowed for an urban retail water supplier that delivers water from a groundwater basin, reservoir, or other source that is augmented by potable reuse water (WC Section 10609.20). The bonus incentive is to adjust the urban retail water supplier's UWUO by the volume of eligible potable reuse water delivered to residential customers and landscape areas with dedicated irrigation meters (DIM) in connection with CII water use.

Components of an urban retail water supplier's UWUO calculation are depicted below in Figure 1-1. The Legislature recognizes the substantial diversity of businesses and institutions throughout the State, and requires collection of additional data as part of implementation.



Key:
CII = commercial, industrial, and institutional
CII-DIM = commercial, industrial, and institutional dedicated irrigation meter
DIM = dedicated irrigation meter
UWUO = urban water use objective
WC = California Water Code

Figure 1-1 Urban Retail Water Supplier's Urban Water Use Objective Calculation

As defined in WC Section 10609.14, appropriate variances may include, but are not limited to:

1. Significant use of evaporative coolers.
2. Significant populations of horses and other livestock.
3. Significant fluctuations in seasonal populations.
4. Significant landscaped areas irrigated with recycled water having high levels of total dissolved solids.
5. Significant use of water for soil compaction and dust control.
6. Significant use of water to supplement ponds and lakes to sustain wildlife.
7. Significant use of water to irrigate vegetation for fire protection.
8. Significant use of water for commercial or noncommercial agricultural use.

An urban retail water supplier is required to calculate and report its UWUO, after the State Water Board adopts urban water use efficiency standards, performance measures, variances, and their associated guidelines and methodologies. Along with actual water use, this calculation for the previous year is to be reported in the urban retail water supplier's annual water use report, filed by January 1, starting in 2024 (WC Section 10609.24).

1.2 Purpose

This report and other supporting documents incorporated by reference are intended to fulfill the requirement for DWR to submit its variance recommendations to the State Water Board (WC Section 10609.14). This report summarizes the scope, approach, variance recommendations, and implementation considerations of this effort.

1.3 Report Organization

This report is organized into six sections: Supporting documents detailing the scope, development, and design of each recommended variance are incorporated by reference.

- **Section 1 – Introduction** provides the background and purpose of ths document.
- **Section 2 – Scope Definition** describes the requirements for development of variance recommendations by DWR.
- **Section 3 – Approach** describes technical considerations, stakeholder engagement, and State Water Board coordination as each relates to variance development.
- **Section 4 – Variance Recommendations** summarizes DWR's variance recommendations and addresses deferred variances, redirected variances, and consideration of future variances.
- **Section 5 – Implementation Considerations** discusses the need for a variance implementation process, following the State Water Board's rulemaking in adoption of the variances.
- **Section 6 – Glossary** provides a list of key terms and their definitions used in this document.

This report includes one appendix:

Appendix A provides the list of documents in DWR's Recommendation Package that are incorporated by reference.

2.0 Scope Definition

As directed in the 2018 Legislation and described in WC Section 10609.14, DWR, in coordination with the State Water Board, is to (1) conduct necessary studies and investigations, and (2) recommend appropriate variances for adoption by the State Water Board. Variances are one component of an urban retail water supplier's UWUO calculation (see Section 1.1 and Figure 1-1, above).

Per WC Section 10609.16, DWR's recommendations for each variance are to:

- Confirm that it is a unique use of water that warrants consideration.
- Provide the recommended variance with the appropriate terms and conditions, including a threshold of significance (meaning that the water use has a material effect on an urban retail water supplier's UWUO).
- Describe guidelines and methodologies for calculating the estimated efficient water use under this variance for inclusion in an urban retail water supplier's UWUO.

California is a vast state, with substantial diversity of landscapes, hydrology, climate, and community characteristics (such as population size, access to resources, and institutional and financial capabilities). These differences contribute to the ability of a community and its urban retail water supplier(s) to adapt to changing conditions and its means, leaving some areas more acutely vulnerable to drought. The 2018 Legislation recognizes the need to consider that diversity, and it is reflected in DWR's directive related to recommending standards (WC Section 10609.6).

Throughout development of standards and adoption of regulations pursuant to WC Chapter 9 (WC Section 10609.18), DWR and the State Water Board are required to solicit broad public participation from stakeholders and other interested persons. This is inclusive of related studies, investigations, and development of the recommendations. Input and feedback provided through the public engagement process was considered by DWR in its development of recommendations, including evaluation of potential new variances. In addition, the State Water Board is directed to hold at least one public meeting before taking any action on any standard or variance recommended by DWR. DWR's recommendations were due no later than October 1, 2021, but no due date is specified for adoption by the State Water Board.

DWR has prepared a detailed report for each of its recommended variances, and those reports include the specific work that was undertaken to support variance development. Variance recommendations are summarized herein, and the following variance reports are incorporated by reference:

- *Recommendations for Variance for Significant Water Use of Evaporative Coolers, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-05) (from WC Section 10609.14).

- *Recommendations for Deferring Variance for Significant Water Use of Home Use Medical Devices* (WUES-DWR-2021-06) (from stakeholder engagement process).

- *Recommendations for Variance for Significant Populations of Horses and Other Livestock, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-07) (from WC Section 10609.14).

- *Recommendations for Variance for Significant Fluctuations in Seasonal Populations, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-08) (from WC Section 10609.14).

- *Recommendations for Variance for Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-09) (from WC Section 10609.14).

- *Recommendations for Variance for Significant Use of Water for Dust Control for Horse Corrals and Animal Exercising Arenas, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-10) (modified from WC Section 10609.14).

- *Recommendations for Variance for Significant Use of Water to Supplement Ponds and Lakes to Sustain Wildlife, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-11) (from WC Section 10609.14).

- *Recommendations for Variance for Significant Use of Water During Major Emergencies, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-12) (modified from WC Section 10609.14).

- *Recommendations for Variance for Significant Use of Water for Commercial or Noncommercial Agricultural Use, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-13) (from WC Section 10609.14).

- *Urban Water Use Efficiency Recommendation Package: Glossary and Abbreviations and Acronyms* (WUES-DWR-2021-21).

3.0 Approach

3.1 Technical Considerations

The DWR approach to developing variance recommendations involved an iterative process of research, discussions with stakeholders and experts, consideration of stakeholder feedback and information, and then developing and revising options. For each variance, DWR began by investigating, collecting, and evaluating available literature, reports, data/information, methodologies, and lessons learned. That work informed the variance design approach, proposed thresholds, and options brought by DWR for review and discussion in the Water Use Studies (WUS) working group workshops and public stakeholder meetings. Variance recommendations made by DWR reflect this iterative approach and consider the level of accuracy, feasibility in terms of availability of data and resources, and stakeholder feedback. How this approach was applied and adapted for the needs of each variance is described in detail in the individual variance reports.

3.2 Stakeholder Engagement

As required in the WC (Section 10609.18), DWR convened WUS working group workshops and public stakeholder meetings on variance development. WUS working group members are listed at the beginning of this report. Input and feedback provided through this engagement process was considered by DWR in development of variance recommendations, including evaluation of potential additional variances.

WUS working group workshops allowed DWR to engage working group members in:

- In-depth discussions to inform specific topics/questions related to variance development.
- Breakout discussions to promote interactions with other working group members and the DWR team on specific variances.

Public stakeholder meetings were forums for DWR to engage with the public to:

- Review ongoing research and analyses that informed variance development.
- Present key themes that were identified and discussed during the workgroup workshop.
- Solicit additional input from interested stakeholders.

Workshop and meeting dates and the variance topics covered are listed below. Typically, there were 100-200 participants in each workshop or meeting. (Note that

other related topics – for example, the bonus incentive and the CII classification system – were also covered in some workshops and meetings, but they are not listed below.)

- November 18, 2019, WUS working group workshop (overview of potential variances).
- February 12, 2021, WUS working group workshop (WUS workgroup overview, potential variances, schedule).
- March 22, 2021, WUS working group workshop (variance topics for discussion: seasonal populations, evaporative coolers, soil compaction and dust control, next steps).
- April 8, 2021, WUS working group workshop (variance topics for discussion: horses and livestock, fire protection, updates on other variance topics, next steps).
- May 13, 2021, WUS working group workshop (variance topics for discussion: landscape irrigation with recycled water with high total dissolved solids (TDS), supplement ponds and lakes to sustain wildlife, commercial and noncommercial agriculture in residential lots, updates on other variance topics, next steps).
- June 10, 2021, WUS working group workshop (variance topics for discussion: seasonal populations, dust control, emergency expansion from fire protection, next steps).
- June 10, 2021, stakeholder meeting (working group report out on variance topics: seasonal populations, dust control, emergency expansion from fire protection, next steps).
- July 21, 2021, WUS working group workshop (overview of variance development process and variance topics for discussion: evaporative coolers; horses and livestock; irrigation with high TDS recycled water; supplemental water for sustaining wildlife, commercial and noncommercial agriculture; next steps).
- July 21, 2021, stakeholder meeting (working group report out on variance topics: evaporative coolers; horses and livestock; irrigation with high TDS recycled water; supplemental water for sustaining wildlife, commercial and noncommercial agriculture; next steps).
- November 17, 2021, WUS Recommendations Final Meeting (variance recommendations, guidelines, and methodologies for calculating UWUO).

For the development of individual variances, DWR also met with representatives from various organizations (e.g., urban retail water suppliers, stakeholders, industries,

academic institutions) to gather information and data, discuss potential approaches, and receive feedback. Details on these meetings are included in the specific variance reports and *Stakeholder Outreach Summary for Developing Urban Water Use Efficiency Standards, Variances, and Performance Measures* (WUES-DWR-2021-20).

3.3 State Water Resources Control Board Coordination and Collaboration

As directed in the 2018 Legislation and described in WC Section 10609.14, DWR coordinated with the State Water Board on the development of recommended variances. State Water Board representatives participated in the WUS working group workshops and public stakeholder meetings listed above. DWR also held regular coordination meetings and periodic briefings with State Water Board staff related to variance development and recommendations.

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4.0 Variance Recommendations

As required in the WC, DWR developed variance recommendations for submittal to the State Water Board. DWR prepared a detailed report for each recommendation, and those reports include the specific work that was undertaken to support variance development. This section begins with summaries of each recommended variance, including the following information:

- Variance scope (confirmation of unique use, potential for a material effect, use of variance, limitations).
- Variance recommendation and associated specifications.
- Guidelines and methodologies for calculating aggregated efficient water use of each variance (the Variance Efficient Water Use Volume).

This section also addresses recommendations for deferred variances, redirected variances, and consideration of future variances. All recommendations are subject to approval and adoption by State Water Board.

4.1 Recommended Variance: Significant Water Use of Evaporative Coolers

Variance Scope

Confirmation of Unique Use

The Indoor Residential Water Use Efficiency Standard (IRWUS) applies to residential water use only. Water use by non-standard home water-using devices, including evaporative coolers (EC), is excluded from the IRWUS.

In extremely hot and dry climate zones, and in certain communities, the use of ECs is more widespread than other cooling methods. (Note that the climate zones are based on energy use, temperature, weather, and other factors, as described in the California Energy Code Title 24 energy efficiency standards glossary section.) ECs are not effective in cold and humid environments because they cool air by water evaporation. In certain communities, the cost of electricity far exceeds the cost of water, making air cooling by EC more attractive than air cooling using traditional air conditioners (AC).

Potential for a Material Effect

Studies have estimated that water use for EC systems in different climates across the State could range from 52 to 132 gallons per day. This is equivalent to the water use of between 1 to 2.5 extra people in the household.

In addition to the water consumed by the process of evaporative cooling, some EC systems require water for a maintenance process of flushing the system to remove mineral build up that has accrued with use. This process has been found to increase water consumption by 10 to 50 percent. Varying age and types of ECs may result in different efficiencies. The continued use of these units is likely, because of the difference in cost for operating an EC versus an air conditioner.

Use of Variance

If adopted, any urban retail water supplier that would like to use this variance would need to request it from the State Water Board and receive specific approval on an individual urban retail water supplier level in order to use the variance in calculating its UWUO.

Use of this variance against IRWUS is allowed when meeting the criteria and approved by the State Water Board.

Limitations

ECs used in CII facilities, including warehouses and data centers, are excluded from the UWUO and a variance is not applicable. (Note that CII water use is not within the scope of UWUO. It is redirected to CII performance measures and best management practices.)

Recommendations for Variance and Associated Specifications

An urban retail water supplier will be allowed to include the variance for significant use of ECs in calculating its UWUO when all the following conditions are satisfied.

- The use of this variance by the urban retail water supplier is previously approved by the State Water Board. (Note that the State Water Board's approval is for using the variance but not for the quantity, which varies every year.)
- The Variance Efficient Water Use Volume is greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards: IRWUS; Outdoor Residential Water Use Efficiency Standard (ORWUS); Commercial, Industrial, and Institutional Outdoor Irrigation of Landscape Areas with DIMs Water Use Efficiency Standard (CII-DIMWUS); and Water Loss Standard (WLS).
- These conditions should be verified by the urban retail water supplier every other year before using the variance in calculating UWUO.
- The minimum air temperature for calculating efficient water use for evaporative coolers is 72 degrees Fahrenheit.

- The variance will specify the water use allowance for use of ECs at residential properties.

The calculation of aggregated efficient water use for significant use of ECs (Variance Efficient Water Use Volume) should follow psychrometric principles, which requires the urban retail water supplier to have a proper understanding of the EC systems used in its service area. The information required from its customers include:

- Proof of EC use with a picture and unit specification.
- Cubic feet per minute (CFM) rate for the specific unit. The number of air change per minute is used to determine air movement in a room (in CFM). For all ECs, it is usually marked on the front of the cooler, which shall be reported to the urban retail water supplier by customers.

In addition to the information related to available ECs, an urban retail water supplier must obtain the number of EC Operating Hours in each residential property in its service area to calculate the Variance Efficient Water Use Volume. The collected information is the basis for supporting data for urban retail water suppliers to claim the variance. The information should be publicly accessible and verified by the urban retail water supplier.

A representative EC performance efficiency is set at 80 percent (0.8) for calculating the estimated water use by EC. (Note that based on research and consultation with Western Cooling Efficiency Center (WCEC), typical residential direct evaporative coolers have a range of efficiency between 80 to 95 percent (0.8 to 0.95). The experts at WCEC recommended using 80 percent (0.8) as a representative efficiency for this purpose.)

All ECs consume water via evaporation to provide cooling. Therefore, the amount of water consumed by any given EC is expressed using an evaporation rate. Evaporation rate depends on dry-bulb temperature, wet-bulb temperature, EC performance efficiency rate, and size (volume) of the room/home that is being cooled using the EC. Wet-bulb temperature, if not available directly from the official weather websites, is to be determined based on dry-bulb temperature and relative humidity, as explained in Section 4. (Note that DWR will provide a tool for urban retail water suppliers to do this calculation.)

The Variance Efficient Water Use Volume is to base it on the desired air temperature in a specific room of 72 degrees Fahrenheit.

The calculation of Variance Efficient Water Use Volume should follow the guidelines and methodologies provided in the *Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B) and in the individual variance report *Recommendations for Variance for Significant Water Use of Evaporative Coolers,*

Methods of Calculation, and Supporting Data Requirements (WUES-DWR-2021-05). Note that:

- DWR, in coordination with the State Water Board, may make revisions to the guidelines in the future, as needed.
- The Variance Efficient Water Use Volume should be calculated based on data applicable to the condition of the previous year.
- Use of alternative data is allowed if the urban retail water supplier can provide evidence that the alternative data is equal to or superior to DWR-provided data or DWR-suggested referenced data.
- Urban retail water suppliers should provide all necessary data and information to support the use of this variance and associated calculated amount of estimated water use to be included in UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for data use.

Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and methodologies are presented below in Table 4-1. Considerations for this variance include:

- The urban retail water supplier will calculate the Variance Efficient Water Use Volume based on the information collected from its customers. DWR recommends that urban retail water suppliers make the information publicly accessible and periodically verify the data with follow-up surveys or update requirements for its customers.
- DWR recommends that the urban retail water supplier establish a report form or a survey to obtain the required information from customers.
- The calculation is based on hourly weather information, as temperatures may fluctuate throughout a day.
    - Calculating the water use will require the urban retail water supplier to obtain and maintain a substantial amount of data. The urban retail water supplier should consider the system requirements to store that information.
    - Alternative data for hourly dry-bulb temperature, hourly wet-bulb temperature, and relative humidity can be used if the urban retail water supplier provides evidence that the alternative data are superior to DWR-provided data or DWR-suggested referenced data.

- DWR will develop an Excel-based utility program for urban retail water suppliers' use.

Table 4-1 Significant Water Use of Evaporative Coolers: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Calculation for 5 Percent Threshold Use
Data needed for calculation	• Hourly weather data (dry-/wet-bulb air temperature, relative humidity, dew point temperature). • EC indicator (does a home use EC or AC?). • Number of EC Operating Hours. • *CFM* of reported EC systems (*CFM* is usually marked on the front of the cooler, which shall be reported to the urban retail water supplier by customers).
Wet-bulb temperature	$Tw = T \times \arctan[0.151977 \times (\text{square root of } (rh+8.313659)]$ $+\arctan(T+rh)$ $-\arctan(rh-1.676331)$ $+0.00391838 \times (rh \text{ to the power of } 1.5)$ $\times \arctan(0.023101 \times rh)-4.686035$ where, • arctan is the mathematical operation to calculate Arc Tangent. • *Tw* is wet-bulb temperature in degrees Fahrenheit (the equation is an approximation method based on dry-bulb temperature and relative humidity; DWR will provide a tool to calculate this parameter). • *T* is dry-bulb temperature in degrees Fahrenheit (from CIMIS). • *rh* is relative humidity as a percentage (from CIMIS).
Operating Day Average EC Evaporation Rate (gallons per hour)	$\frac{CFM \times Operating\ Day\ Average\ \Delta T \times efficiency\ rate}{8700}$ where, • *CFM* is cubic feet per minute (to be reported by customers to the urban retail water supplier). • *ΔT* is the difference between wet-bulb temperature and dry-bulb temperature for each hour, with dry-bulb temperature greater than 72 in degrees Fahrenheit. • Representative efficiency rate is 0.80 (80%). • 8700 is the unit conversion factor that is based on 8.34 pounds of water per gallon.

Table 4-1 Significant Water Use of Evaporative Coolers: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume (contd.)

Guidelines and Methodologies	Calculation for 5 Percent Threshold Use
Equation	$$\text{Variance Efficient Water Use Volume (gallons)} = \sum_{customers}\left[\sum_{i=1}^{operating\ \ days} Number\ of\ Operating\ Hours \times Operating\ Day\ Average\ EC\ Evaporation\ Rate\left(\frac{gallons}{hour}\right)\right]$$
Source(s) of data	**National Weather Service and others (to be determined):** • Hourly dry-bulb air temperature. • Hourly relative humidity. • Hourly dew point temperature. **CIMIS** (when used, recognize that the gauge setting for CIMIS data collection may not reflect the conditions of individual houses): • Hourly dry-bulb air temperature. • Hourly relative humidity. • Hourly dew point temperature. **To be obtained/developed by urban retail water supplier:** • Hourly wet-bulb temperature (to be calculated based on the DWR tool). • EC indicator (does a home use EC or AC?). • Total number of EC Operating Hours per residential properties. • Air exchange factor of ECs (*CFM*).
Reporting requirements (provided to DWR by urban retail water supplier)	• Hourly weather data (dry-/wet-bulb air temperature, relative humidity, dew point temperature, vapor pressure). • EC indicator (does a home use EC or AC?). • Total number of EC Operating Hours per residential properties • Air exchange factor of ECs (*CFM*). • All other supporting data and documentation used to calculate the Variance Efficient Water Use Volume.

Key:
AC = air conditioner
CFM = cubic feet per minute
CIMIS = California Irrigation Management Information System
DWR = California Department of Water Resources
EC = evaporative cooler

4.2 Recommended Variance: Significant Populations of Horses and Other Livestock

Variance Scope

Confirmation of Unique Use

Water use for horses and other livestock is categorically excluded from ORWUS as it only includes landscape irrigation. Water use for horses and other livestock is also categorically excluded from IRWUS as it only includes water use based on regular residents (i.e., humans) in the service area.

Note that different definitions of livestock were considered. The U.S. Code of Federal Regulations Section 780.328 defines “livestock” as, “cattle, sheep, horses, goats, and other domestic animals ordinarily raised or used on the farm. Turkeys or domesticated fowl are considered poultry and not livestock.” California Civil Code Section 3080 states “livestock means any cattle, sheep, swine, goat, or horse, mule or other equines.”

Potential for a Material Effect

Horses and other livestock are allowed to reside in urban areas in many parts of the State. Horses and other livestock could consume substantial volumes of water, depending on size, activity level, washing and sanitation needs, and climatic conditions. The water use likely continues as a preferred quality of life in certain regions in the State.

Use of Variance

If adopted, any urban retail water suppliers that would like to use this variance would need to petition to the State Water Board and receive specific approval on an individual urban retail water supplier level to use the variance in calculating its UWUO.

Use of this variance against IRWUS is allowed when meeting the criteria and approved by the State Water Board.

Use of this variance against ORWUS is allowed when meeting the criteria and approved by the State Water Board.

Limitations

This variance does not set, rescind, or modify existing or future law and regulations on populations of horses and other livestock that can be kept on residential properties, or the standard of care of horses and other livestock. Commercial feedlots or similar operations with horses and other livestock are not qualified for this variance and are excluded from UWUO.

Recommendations for Variance and Associated Specifications

An urban retail water supplier will be allowed to include the variance for significant populations of horses and other livestock in calculating its UWUO when all the following conditions are satisfied:

- The use of this variance for the urban retail water supplier is previously approved by the State Water Board. (Note that the State Water Board's approval is for using the variance, but not for the quantity, which varies every year.)
- The types of livestock have been allowed on residential properties per local codes and ordinances.
- The residential accounts of an urban retail water supplier provide water supply to horses and other livestock, which consume significant water individually in comparison with a human. The qualified livestock are listed below.
  - Milking cows.
  - Horses, mules.
  - Cattle, bulls, other livestock greater than 500 pounds.
  - Sheep, llamas, donkeys, swine, other livestock between 200 and 500 pounds.
- The Variance Efficient Water Use Volume by large livestock is greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards: IRWUS, ORWUS, CII-DIMWUS, and WLS.
- These conditions should be verified by the urban retail water supplier every year before using the variance in calculating its UWUO.

The maximum water allowance for horses and other livestock is based on similar water consumption needs, weight, and climate zones.

Maximum water allowances are based on variations in horses and other livestock type-classes and their climate zone locations as follows:

- Sheep, llamas, donkeys, swine, and other livestock between 200 to 500 pounds (e.g., large goat): 8 gallons per day water use per animal.
- Cattle, bulls, and other livestock greater than 500 pounds: 11 gallons per day water use per animal.
- Horses, mules: 13 gallons per day water use per animal.

- Milking cows: 16 gallons per day water use per animal.

The maximum water allowances listed for each horse and other livestock type-class are reflective of the California Climate Zones (as defined in California Energy Code Title 24) that were used to determine statewide average effects and variations in water consumption rates.

The calculation of Variance Efficient Water Use Volume should follow the guidelines and methodologies provided in the *Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B) and in the individual variance report *Recommendations for Variance for Significant Populations of Horses and Other Livestock, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-07). Note that:

- DWR, in coordination with the State Water Board, may make revisions to the guidelines in the future, as needed.
- Use of alternative data is allowed if the urban retail water supplier can provide evidence that the alternative data is equal to or superior to DWR-provided data or DWR-suggested reference data.
- Urban retail water suppliers should provide all necessary data and information to support the use of this variance and associated calculated amount of the Variance Efficient Water Use Volume to be included in UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for data use.

Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and methodologies are presented below in Table 4-2. The urban retail water supplier will need to determine the populations and types of horses and other livestock in its service area using data collected from customers, as that information is not readily available.

Table 4-2 Significant Populations of Horses and Other Livestock: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Calculation for 5 Percent Threshold Use
Data needed for calculation	• Number of livestock per Animal Type-Class. • Gallons of daily water use for Animal Type-Class.
Maximum allowable water use	Daily Water Use by Animal Type-Class in gallons: • Sheep, llamas, donkeys, swine, and other livestock between 200 and 500 pounds: 8 gallons per day per animal. • Cattle, bulls, and other livestock greater than 500 pounds: 11 gallons per day per animal. • Horses, mules: 13 gallons per day per animal. • Milking cows: 16 gallons per day per animal. The values for Daily Water Use by Animal reflect climate conditions averaged across the State.
Equation	$\text{Variance Efficient Water Use Volume (gallons)} = \sum_{Animal\ Type-Classes} \left((Service\ Area\ Total\ Number\ of\ Animals\ in\ Animal\ Type\ Class) \times (Gallons\ of\ Daily\ Water\ Use\ for\ Animal\ Type\ Class) \right) \times Days/Year$
Source(s) of data	**Provided by DWR**: • Gallons of Daily Water Use for Animal Type-Class. **To be obtained/developed by urban retail water supplier**: • Number of Livestock per Animal Type-Class.
Reporting requirements (provided to DWR by urban retail water supplier)	• Number of livestock by Animal Type-Class with associated documentation. • Proof of compliance with all existing laws and regulations regarding populations of horses and other livestock in the urban retail water supplier's service area.

Key:
DWR = California Department of Water Resources

4.3 Recommended Variance: Significant Fluctuations in Seasonal Populations

Variance Scope

Confirmation of Unique Use

Occasional occupants in rental residential properties or second homes are not captured in the U.S. Census Bureau data as regular residents, which are the basis for the IRWUS calculation. Therefore, occasional occupants and their associated indoor water use are categorically excluded from that calculation. (Note that this remains to be true even if

the U.S. Census Bureau population data are adjusted based on the Department of Finance data, as used in the SB X7-7 reporting needs.)

The U.S. Census Bureau provides population estimates based on the concept of “usual residence,” which is the place where a person lives and sleeps most of the time (more than 50 percent of the time).

Research showed that most of the urban retail water suppliers in the State have less than 20 percent of homes in their service areas defined as seasonally occupied. Densely populated areas tend to have less seasonally occupied homes, but popular tourist destinations in rural areas experience significant fluctuations in seasonal occupations. These data highlight the importance to address the challenge in estimating efficient water use for seasonal populations in those communities.

Potential for a Material Effect

In some vacation communities, the majority of homes (in some cases up to 74 percent) are seasonally occupied and yet, the resulting water use is not captured in indoor residential standard reporting. The material effects on water use can be substantial for those urban retail water suppliers.

The increasing trend of travel and destination locations could mean the trend of seasonal populations might be more prevalent in the future in service areas of more urban retail water suppliers. The effects of COVID-19 and resulting changes in preference in work arrangements could also have permanent effects, although it is still an evolving development.

Use of Variance

If adopted, any urban retail water suppliers that would like to use this variance would need to petition to the State Water Board and receive specific approval on an individual urban retail water supplier level in order to use the variance in calculating its UWUO.

Use of this variance in IRWUS is allowed when meeting the criteria and approved by State Water Board.

Limitations

The estimates of seasonal populations described in this variance will not be applicable to estimate permanent resident populations that will be used with IRWUS. The calculation of IRWUS water use should follow the standard and associated guidelines and methodologies.

Recommendations for Variance and Associated Specifications

An urban retail water supplier will be allowed to include the variance for significant fluctuations in seasonal populations in calculating its UWUO when all the following conditions are satisfied:

- The use of this variance for the urban retail water supplier is previously approved by the State Water Board. (Note that the State Water Board's approval is for using the variance but not for the quantity, which varies every year.)
- The Variance Efficient Water Use Volume is greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards: IRWUS, ORWUS, CII-DIMWUS, and WLS.
  - The significant threshold is reduced to 1 percent if the urban retail water supplier uses detailed daily/hourly advanced metering infrastructure (AMI) data for the estimate that results in effective identification of units with seasonal populations. The allowable lower threshold is to recognize the use of high-resolution data, detailed methodology, and advanced technologies by the urban retail water supplier. Implementation of this variance should not force them to use only the lesser detailed data or methods for compliance purposes.
- These conditions should be verified by the urban retail water supplier every year before using the variance in calculating UWUO.

The variance will specify the annual aggregated water use for seasonal populations in an urban retail water supplier's service area.

Urban retail water suppliers have varying access to water use and additional data to assist with the identification of units with seasonal populations. Tracking the number of occupants in each individual rental or second-home unit for each day during a year is not required. Two seasonally occupied units' identification methods are allowed.

- Standard Method using monthly water use data for units' identification:
  - The Variance Efficient Water Use Volume will be based on a number of units identified using monthly water bill data. The number of occupants and number of identified days with occupants are determined based on U.S. Census Bureau data (see next subsection). Using monthly water use data will result in uncertainty of identification.
  - Therefore, this identification method comes with higher significance of threshold of 5 percent.

- Detailed Method using AMI data for units' identification:
  - The Variance Efficient Water Use Volume will be based on a number of units identified using hourly/daily AMI data. The number of occupants and number of identified days with occupants are determined based on U.S. Census Bureau data and average number of rooms per unit (see next subsection).
  - Using daily/hourly AMI data will result in less uncertainty of identification. Therefore, this identification method comes with lower significance of threshold of 1 percent.

Agencies planning on moving to the use of daily/hourly AMI data in two years may use a significance threshold of 3 percent. Commitment to convert to daily/hourly AMI data must be certified by the agency board or equivalent governing body.

The calculation of Variance Efficient Water Use Volume should follow the guidelines and methodologies provided in the *Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B) and in the individual variance report *Recommendations for Variance for Significant Fluctuations in Seasonal Populations, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-08). Note that:

- DWR, in coordination with the State Water Board, may make revisions to the guidelines in the future, as needed.
- Use of alternative data is allowed if the urban retail water supplier can provide evidence that the alternative data is superior to DWR-provided data or DWR-suggested referenced data.
- Urban retail water suppliers must provide all necessary data and information to support the use of this variance and associated calculated amount of estimated water use to be included in UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for certain data use.

DWR recommends technical assistance including additional guidance and training sessions for identifying seasonally occupied homes using the proposed methodologies. The methodologies that were developed and incorporated in recommendations are relatively complex. Therefore, additional technical assistance was highly requested by affected urban retail water suppliers.

Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and methodologies are presented below in Tables 4-3 and 4-4. Considerations for this variance are as follows.

- DWR recommends that the urban retail water supplier that intends to use AMI data for this variance consider including the need for using the data in their contract with the vendor.
- The specific steps and tools for identification methods using Standard Method or Detailed Method will be provided to urban retail water suppliers.

Table 4-3 Significant Fluctuations in Seasonal Populations, Standard Calculation: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Standard Calculation for 5 Percent Threshold Use

Data needed for calculation	• Number of units with seasonal population.
	• Monthly water use data to determine:
	  – *Number of occupants.*
	  – *Number of days with occupants.*
	• IRWUS (gpcd).
	• The water use billing data/mailing addresses that are maintained by urban retail water suppliers.
	• Other specific data needs per identification method (all in public domain or urban retail water supplier data).

Equation of the volume for seasonal populations	$Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = Number\ of\ Identified\ Units\ with\ Seasonal\ Population \times Occupancy\ Rate\ (person\ days\ per\ year) \times Indoor\ Residential\ Water\ Use\ Standard\ (gpcd)$
Number of units with seasonal population	• Number of units identified with seasonal population using monthly water use data (refer to technical report, *Methods for Estimating Seasonal Populations with Water and Energy Data* [WUES-DWR-2021-08.T1]). • ACS information will be used for validation and as a reference for adjustments to the unit detection method.

Table 4-3 Significant Fluctuations in Seasonal Populations, Standard Calculation: Guidelines and Methodologies for Calculating Aggregated Estimate of Water Use (contd.)

Guidelines and Methodologies	Standard Calculation for 5 Percent Threshold Use
Occupancy rate	(Average number of rooms for ACS units with seasonal population / Average number of rooms for ACS units with usual residents) x Household size of usual residents x Average number of days with occupancy **OR**, (Annual water use for all identified units with seasonal population / Annual water use for all units with usual residents) x U.S. Census Bureau population for usual residents x Average number of days with occupancy
Source(s) of data	**To be obtained/developed by urban retail water supplier**: • ACS data. • Monthly water use data. • Determine IRWUS (gpcd). • The water use billing data/mailing addresses that are maintained by urban retail water suppliers. • Other specific data needs per identification method (all in public domain or urban retail water supplier data).
Reporting requirements (provided to DWR by urban retail water supplier)	• All data used to do the identifications and calculations, along with supporting documentations.

Key:
ACS = American Community Survey
DWR = California Department of Water Resources
gpcd= gallons per capita per day
IRWUS = Indoor Residential Water Use Efficiency Standard

Table 4-4 Significant Fluctuations in Seasonal Populations, Detailed Calculation: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Detailed Calculation for 1 Percent Threshold Use

Data needed for calculation	• Number of units with seasonal population.
	• Hourly AMI water use data to determine:
	  – *Number of occupants.*
	  – *Number of days with occupants.*
	• IRWUS (gpcd).
	• The water use billing data/mailing addresses that are maintained by urban retail water suppliers.
	• Specific data needs per identification method (all in public domain or urban retail water supplier data).

Equation of the volume for seasonal populations	$$Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = Number\ of\ Identified\ Units\ with\ Seasonal\ Population \times Occupancy\ Rate\ (person\ days\ per\ year) \times Indoor\ Residential\ Water\ Use\ Standard\ (gpcd)$$
Number of units with seasonal population	• Number of units identified with seasonal population using monthly water use data (refer to technical report, *Methods for Estimating Seasonal Populations with Water and Energy Data* [WUES-DWR-2021-08.T1]). • ACS information will be used for validation and as a reference for adjustments to the unit detection method.
Occupancy rate	(Average number of rooms for ACS units with seasonal population / Average number of rooms for ACS units with usual residents) x Household size of usual residents x Average number of days with occupancy **OR**, (Annual water use for all identified units with seasonal population / Annual water use for all units with usual residents) x U.S. Census Bureau population for usual residents x Average number of days with occupancy
Source(s) of data	**To be obtained/developed by urban retail water supplier**: • ACS data. • The hourly AMI data may be obtained internally or from vendor. • IRWUS (gpcd). • The water use billing data/mailing addresses that are maintained by urban retail water suppliers. • Other specific data needs per identification method (all in public domain or urban retail water supplier data).

Table 4-4 Significant Fluctuations in Seasonal Populations, Detailed Calculation: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume (contd.)

Guidelines and Methodologies	Detailed Calculation for 1 Percent Threshold Use
Reporting requirements (provided to DWR by urban retail water supplier)	All data used to do the identifications and calculations, along with supporting documentations.

Key:
ACS = the American Community Survey
AMI = advanced metering infrastructure
DWR = California Department of Water Resources
gpcd= gallons per capita per day
IRWUS = Indoor Residential Water Use Efficiency Standard

4.4 Recommended Variance: Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids

Variance Scope

Confirmation of Unique Use

Although recycled water typically contains higher TDS than potable water does, recycled water can be used to irrigate plants if irrigation practices are managed effectively to prevent the buildup of excess salts in the root zone and if appropriate salt-tolerant landscape species are selected. The use of recycled water is encouraged through separate State policies for improving regional self-reliance and drought resiliency.

Landscape areas using recycled water for irrigation purposes are considered a Special Landscape Area (SLA) under the current 2015 Model Water Efficient Landscape Ordinance (MWELO). The MWELO relies on a quantitative approach based on reference evapotranspiration (*ETo*) rates to calculate the maximum applied water allowance (MAWA). For SLA, MWELO allows the use of 1.0 for the evapotranspiration factor (*ETAF*) on an individual landscape basis.

The MWELO regulations did not consider TDS concentration of recycled water in its calculation of MAWA. The allowable amount is limiting the potential applications of recycled water with high TDS, which requires additional water to avoid inappropriate salt

buildup in the root zone. Therefore, the unique use is confirmed, as it is not covered by any existing efficient water use guidelines or standards.

Potential for a Material Effect

Recycled water use is an important strategy for improving water resiliency against drought. The prospect for future growth in recycled water use is significant.

Use of Variance

If adopted, any urban retail water suppliers that would like to use this variance would need to petition to the State Water Board and receive specific approval on an individual urban retail water supplier level in order to use the variance in calculating UWUO.

Use of this variance in CII landscape with CII-DIMWUS is allowed when irrigated with a commercial, industrial, and institutional dedicated irrigation meter (CII-DIM) or a residential DIM that was reclassified to a CII-DIM for UWUO accounting purposes. (Note that recycled water use is required to have a separate and dedicated meter.)

Limitations

This variance does not set, rescind, or modify existing or future law and regulations on recycled water use for water quality and environmental protection. Recycled water use for irrigation (landscape or agricultural uses) is regulated to protect surface water and groundwater quality. There are existing regulations applicable to the use of recycled water, including:

- Local Salt and Nutrient Management Plans (SNMP).
- Waste Discharge Permits (California Code of Regulations, Title 27, Section 20005 and Section 20090).
- Anti-Degradation Policies (State Water Board Resolution No. 68-16).
- Federal Antidegradation Policy (Clean Water Act, 40 Code of Federal Regulations Section 131.12).
- State Water Board Recycled Water Policy and Regulations.
- Other applicable law and regulations.

This variance does not change the existing 2015 MWELO or its implementation, including the definition of *SLA* and the use of *ETAF* of 1.0 for *SLA* in MAWA calculation. MWELO is subject to amendments in the future. The variance provides no constraint or limitations for future MWELO amendments. Future amendments of MWELO may consider this variance for inclusion in relevant specifications and use.

Recommendations for Variance and Associated Specifications

An urban retail water supplier will be allowed to include the variance for significant landscaped areas irrigated with recycled water having high levels of TDS in calculating its UWUO when all the following conditions are satisfied.

- The use of this variance for the urban retail water supplier is previously approved by the State Water Board. (Note that the State Water Board's approval is for using the variance but not for the water quality or quantity, which varies every year.)

- The estimated efficient water use under this variance is greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards: IRWUS, ORWUS, CII-DIMWUS, and WLS.

  - The significant threshold is reduced to 1 percent if the urban retail water supplier uses detailed, plant-based leaching requirements (*LR*) for the estimate that takes into consideration the potential use of salt-tolerant plants, where practical. The allowable lower threshold is to recognize the use of high-resolution data, detailed methodology, and advanced technologies by the urban retail water supplier. Implementation of this variance should not force them to use only the lesser detailed data or methodologies for compliance purposes.

- The TDS concentration of recycled water is above 900 milligrams per liter (mg/L). Any use of recycled water with a TDS concentration below or equal to 900 mg/L follows only the existing MWELO regulations for *SLA* in calculating MAWA. Therefore, there is no additional water allowable under this variance for TDS concentration below or equal to 900 mg/L.

- The urban retail water supplier demonstrates the compliance with all existing laws and regulations regarding recycled water use, including the protection of surface water and groundwater quality.

- These conditions should be verified by the urban retail water supplier every year before using the variance in calculating UWUO.

The additional water use allowance under this variance will be capped by the condition where recycled water with a TDS concentration of 1,600 mg/L is used.

- Based on the current available literature, irrigation with water that has a TDS concentration of more than 1,600 mg/L is harmful to plants. An urban retail water supplier can use recycled water of more than 1,600 mg/L if all other laws and regulations are satisfied; however, no additional water use allowance will be granted beyond the cap to ensure the safe application of recycled water for

irrigation (refer to *Recommendations for Variance for Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids, Methods of Calculation, and Supporting Data Requirements* [WUES-DWR-2021-09] for supporting information and references).

The variance will specify the additional water use allowance for irrigating with recycled water with high TDS in addition to the volume that is allowed by MWELO for recycled water use, as amended.

- Consistent with MWELO, a landscape area irrigated using recycled water with high TDS is considered an SLA; however, another class of SLA is defined as total special landscape area irrigated with high TDS recycled water (*SLA_htds)*, to avoid confusion with SLA using recycled water with a TDS concentration less than 900 mg/L.

The Variance Efficient Water Use Volume is expressed using the evapotranspiration factor (*ETF*) on the urban retail water supplier level to be consistent with the legislative directive for considering water use efficiency on the urban retail water supplier level and that is sensitive to potential limitations in the authority an urban retail water supplier may have on individual landscape. (Note that *ETAF* is a design standard under MWELO for individual landscape.)

The Variance Efficient Water Use Volume can be derived using a Standard Method (the minimum requirement) and a Detailed Method. The additional allowance is based on the MWELO allowance of *ETF* for special landscape irrigation with recycled water (*ETF_SLA*). Should the specification change in a future MWELO, only the *ETF_SLA* may need to be adjusted in these two methods accordingly.

- Standard Method for *ETF* determination:
  - The additional water allowance will be based on *ETF_SLA* and a varying *ETF* that increases from 0.0 to 0.26 above the current *ETF-SLA* allowed by MWELO in a linear relationship to TDS concentration between 900 mg/L and 1,600 mg/L. Based on the current available literature and research, various turfgrass species found throughout the State may require an *ETF* anywhere between 0.83 to 1.45 when using recycled water. The 90th percentile of *ETF* using high TDS recycled water is 1.26 (i.e., 0.26 greater than the current 1.0 *ETF_SLA* allowed by MWELO for recycled water use).
- Detailed Method for *ETF* determination:
  - The volume of water for irrigation of an individual landscape area irrigated with high TDS recycled water is to be calculated based on plant-based *LR*s for the representative plant that is present in at least 30 percent of the

landscaped area. The *ETF* is still used on the urban retail water supplier level, not on individual landscape area level.

- There is no limit on the *ETF* adjustment above *ETF_SLA* that can be used in this method. However, the recycled water TDS is still capped at 1,600 mg/L.
- Consistent with MWELO, irrigation efficiency will be 0.75 for sprinkler systems and 0.81 for drip or micro-spray irrigation systems.

The calculation of the Variance Efficient Water Use Volume should follow the guidelines and methodologies provided in the *Recommendations for Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B) and in the individual variance report *Recommendations for Variance for Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-09). Note that:

- DWR, in coordination with the State Water Board, may make revisions to the guidelines in the future, as needed.
- The water use allowance should be calculated based on data applicable to the conditions of the previous year.
- Use of alternative data is allowed if the urban retail water supplier can provide evidence that the alternative data is equal to or superior to DWR-provided data or DWR-suggested referenced data.
- Urban retail water suppliers should provide all necessary data and information to support the use of this variance and associated calculated amount of estimated water use to be included in its UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for certain data use.

Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and methodologies are presented below in Tables 4-5 and 4-6. Considerations for this variance include:

- Where possible, salt-tolerant plants should be considered for landscape areas when recycled water is applied.
- Certain urban retail water suppliers have recycled water use in residential parcels with residential meters. DWR encourages these urban retail water suppliers to report the use under CII-DIMWUS and subtract them from ORWUS reporting.

This variance for irrigating with recycled water of high TDS is equally applicable under that condition, given all other necessary conditions specified in the variance are met.

- Some urban retail water suppliers may receive recycled water from different sources with their unique water quality and apply that water to different landscape areas with different plant mixes. In such cases, the water use calculation should be done separately for each landscape area with a different plant mix or irrigated using different sources of recycled water, if they have significantly different water qualities.

Table 4-5 Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids, Standard Method: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Standard Method for 5 Percent Threshold Use
Data needed for calculation	• *ETo.* • Evapotranspiration factor for SLA irrigation with recycled water as amended by MWELO (*ETF_SLA*). • *Adjusted ETF.* • Landscape area irrigated with high TDS (*SLA_htds*).
Adjusted ETF	• Recycled water with TDS of 900 mg/L or less will receive 0.0 increment above *ETF_SLA* provided under MWELO for landscapes irrigated with recycled water. • Recycled water with TDS of 1,600 mg/L and greater will receive 0.26 increment above *ETF_SLA* provided under MWELO for landscapes irrigated with recycled water. • Recycled water with TDS between 900-1,600 mg/L will be provided a linear increment between 0.0 and 0.26 (a variable *ETF* that averages Plant-Specific *LR*s).
Equation	Variance Efficient Water Use Volume (gallons) = *Adjusted ETF* x *ETo* (inches) x *SLA_htds* (square feet) x 0.62
Allowable variance volume	**For 900 < TDS ≤ 1,600 mg/L**: $Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = [(0.000371 \times (\text{TDS (mg/L)} - 900)) + (1 - ETF\_SLA)] \times ETo\ (\text{inches}) \times SLA\_htds\ (\text{square feet}) \times 0.62$ **For TDS > 1,600 mg/L**: Variance Efficient Water Use Volume (gallons) = [0.26 + (1 – *ETF_SLA*)] x *ETo* (inches) x *SLA_htds* (square feet) x 0.62 where, *Adjusted ETF* term > 0.

Table 4-5 Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids, Standard Method: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume (contd.)

Guidelines and Methodologies	Standard Method for 5 Percent Threshold Use
Source(s) of data	**Provided by DWR**: • *ETo.* • *ETF_SLA.* **To be obtained/developed by urban retail water supplier**: • Landscape area irrigated with high TDS (*SLA_htds*). • *ETF_SLA* urban retail water supplier info.
Reporting requirements (provided to DWR by urban retail water supplier)	• Landscape area (*SLA_htds*), in square feet. • ETo. • ETF_SLA. • Recycled water annual average TDS, in mg/L or dS/m. • Proof of compliance with SNMP, WDRs, and all other regulatory requirements and laws. • *Adjusted ETF.* • Variance Efficient Water Volume (gallons per year). • Standards-based UWUO (sum of IRWUS, ORWUS, CII-DIMWUS, and WLS).

Key:
dS/m = decisiemens per meter
DWR = California Department of Water Resources
ETF = evapotranspiration factor (on urban retail water supplier level)
ETF_SLA = evapotranspiration factor for special landscape areas' irrigation with recycled water per MWELO, as amended
ETo = reference evapotranspiration
LR = leaching requirement
mg/L = milligrams per liter
MWELO = Model Water Efficient Landscape Ordinance
SLA_htds = total special landscape area irrigated with high TDS recycled water
SNMP = Salt and Nutrient Management Plan
TDS = total dissolved solids
WDR = Waste Discharge Requirement

Table 4-6 Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids, Detailed Method: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Detailed Method to Qualify for 1 Percent Threshold Use
Data needed for calculation	• *ETo.* • *Adjusted ETF.* • Evapotranspiration factor for SLA irrigation with recycled water as amended by MWELO (*ETF_SLA*). • Landscape area irrigated with high TDS (*SLA_htds*). • *ECiw.* • *ECe.* • *PF.* • *LR.* • Irrigation efficiency.
Adjusted ETF	• Based on representative plant (>30 percent of landscaped area) information *Adjusted ETF* is determined using: – *ECiw.* – *ECe.* – *PF:* • 0 to 0.1 (for very low water use plants). • 0.2 to 0.3 (for low water use plants). • 0.4 to 0.6 (for moderate water use plants). • 0.7 to 1.0 (for high water use plants). – *LR = ECiw / [5 x (ECe-ECiw)]* • Irrigation efficiency (0.75 for sprinkler systems and 0.81 for drip or micro-spray irrigation systems). • For sprinkler irrigation systems: $Adjusted\ ETF = \left(\frac{PF}{0.75 \times (1-LR)} - ETF\_SLA\right)$ • For micro-spray irrigation systems: $Adjusted\ ETF = \left(\frac{PF}{0.81 \times (1-LR)} - ETF\_SLA\right)$
Equation	Variance Efficient Water Use Volume (gallons) = *Adjusted ETF* x *ETo* (inches) x *SLA_htds* (square feet) x 0.62

Table 4-6 Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids, Standard Method: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume (contd.)

Guidelines and Methodologies	Detailed Method to Qualify for 1 Percent Threshold Use
Allowable variance volume	**For sprinkler irrigation systems**: $Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = \left(\frac{PF}{0.75\ \times\ (1-LR)} - ETF\_SLA\right) \times ETo \times SLA\_htds \times 0.62$ **For drip or micro-spray systems**: $Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = \left(\frac{PF}{0.81\ \times\ (1-LR)} - ETF\_SLA\right) \times ETo \times SLA\_htds\ \times 0.62$
Source(s) of data	**Provided by DWR**: • *ETo.* • *ECe.* • *PF.* • *ETF_SLA.* **To be obtained/developed by urban retail water supplier**: • *ECiw.* • Landscape area irrigated with high TDS (*SLA_htds*). • *ETF_SLA* based on urban retail water supplier info. • Representative plant type. • *Adjusted ETF.* • Irrigation system type.

Key:
DWR = California Department of Water Resources
dS/m = decisiemens per meter
ECe = plant threshold salinity
ECiw = salinity of irrigation (recycled) water
ETF = evapotranspiration factor (on urban retail water supplier level)
ETF_SLA = evapotranspiration factor for SLA irrigation with recycled water per MWELO, as amended
ETo = reference evapotranspiration
LR = leaching requirement
MWELO = Model Water Efficient Landscape Ordinance
mg/L = milligrams per liter
PF = plant factor
SLA_htds = total special landscape area irrigated with high TDS recycled water
TDS = total dissolved solids

4.5 Recommended Variance: Significant Use of Water for Dust Control for Horse Corrals and Animal Exercising Arenas

Variance Scope

Confirmation of Unique Use

Water used for dust control and performance for horse corrals and animal exercising arenas, paddocks, or other non-vegetated exercise and riding areas (collectively, "corrals") on residential properties is excluded from ORWUS. In other words, the corrals are not included in the residential DWR's landscape area measurement LAM. Therefore, the unique use for corral dust control is confirmed.

Note that WC Section 10609.14(b)(5) includes both "soil compaction and dust control" in this variance. Water is not typically used for soil compaction except for certain specific construction activities, if conditions warrant. It was considered that soil compaction in the WC may have been intended to address soil stabilization. Significant water could be used for soil stabilization as it pertains to maintaining vegetation on bioengineered slopes.

Potential for a Material Effect

Some urban retail water suppliers' service areas have relatively large acreage in corrals. Many of these corrals are located in climate zones with low humidity and that receive low amounts of precipitation, requiring application of water to control dust to ensure the function and performance of corrals.

Horse corral surfaces are important to maintaining horse health. Providing moisture on the corral surface, up to 3 inches in depth, creates better air quality for the horse and rider as well as a safer and more suitable ground for the horse to move over by providing more traction than a dry horse corral.

Over 1,700 acres of horse corrals have been identified in the DWR's LAM dataset as a separate corral mask. Although horse corrals are present in all hydrologic regions throughout the State, the largest concentrations are in the Southern California region: Riverside County (490 acres), San Diego County (392 acres), and San Bernardino County (129 acres). This use of water is likely to continue in the future.

Use of Variance

If adopted, any urban retail water suppliers that would like to use this variance would need to petition to the State Water Board and receive specific approval on an individual urban retail water supplier level in order to use the variance in calculating its UWUO.

Use of this variance in ORWUS is allowed when meeting the criteria and approved by the State Water Board.

Limitations

This variance does not set, rescind, or modify existing or future law and regulations on water use for air quality and environmental protection. Water use for dust control is regulated to protect air quality. There are existing regulations applicable to the use of water for dust control, which may include but are not limited to:

- Air Quality Management Districts and Air Quality Control Districts.
- Local ordinances and regulations.
- Other applicable laws and regulations.

The following water uses for dust control are not considered qualified for this variance, for the reasons stated below. Urban retail water suppliers should modify their practices, if applicable, to reflect proper classifications of water use.

- Water use for dust control at construction sites should be under CII water use and excluded from UWUO. In certain situations, where an unused residential meter was used for such a purpose, urban retail water suppliers should temporarily reclassify the meter as a CII meter so that the associated water use is excluded from UWUO. The practice is fully under the control of an urban retail water supplier and thus, the use is not considered a variance against ORWUS.
- Dust control at vacant lots (which are excluded from ORWUS) by using water should be discouraged. The situation can be managed through use of alternatives to water application such as planting native vegetation, mulch, or other materials.
- Water use for vegetation on bioengineered slopes for soil stabilization purposes should be provided by a CII-DIM and follow CII-DIMWUS. (Refer to *Recommendations for Commercial, Industrial, and Institutional Outdoor Irrigation of Landscape Areas with Dedicated Irrigation Meters Water Use Efficiency Standard* [WUES-DWR-2021-03] for the designation of engineering slopes as SLAs.)
- Commercial horse arenas are not qualified for this variance.

Recommendations for Variance and Associated Specifications

An urban retail water supplier will be allowed to include the variance for dust control in calculating its UWUO when all the following conditions are satisfied.

- The use of this variance for the urban retail water supplier is previously approved by the State Water Board. (Note that the State Water Board's approval is for using the variance but not for the quality, which varies every year.)

- The Variance Efficient Water Use Volume is greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards: IRWUS, ORWUS, CII-DIMWUS, and WLS.

- An urban retail water supplier either uses (1) the acreage of corrals in its service area provided by DWR from the LAM dataset as a separate corral mask, or (2) alternative data that are equal to or superior to DWR-provided data or DWR-suggested referenced data.

- These conditions should be verified by the urban retail water supplier every year before using the variance in calculating UWUO.

The application of water for corral dust control will be subject to all the following conditions.

- The Variance Efficient Water Use Volume should be calculated based on daily precipitation data from the previous year and California Energy Code Title 24 Climate Zone.

  - If daily precipitation is greater than 0.10 inches, corral and arenas would not be watered for the next 2 days, due to the rainfall irrigating those areas.

  - For more than 2 days following the rainfall event, the maximum allowable watering frequency for horse corrals and animal exercising arenas are reflective of California Climate Zones as follows:

    - California Climate Zones 1 through 5, and 7: 2 days per week.

    - California Climate Zones 6, 8 through 10, 12, and 16: 3 days per week.

    - California Climate Zones 11, and 13 through 15: 4 days per week.

- Urban retail water suppliers must examine precipitation records, identify the rainfall events exceeding 0.10 inches in a day, then determine the number of allowable application days between rainfall events exceeding 0.10 inches per day.

- Each application of water for corral dust control is up to a maximum depth of 0.25 inches.

The calculation of the Variance Efficient Water Use Volume should follow the guidelines and methodologies provided in the *Guidelines and Methodologies for Calculating Urban*

Water Use Objective (WUES-DWR-2021-01B) and in the individual variance report *Recommendations for Variance for Significant Use of Water for Dust Control for Horse Corrals and Animal Exercising Arenas, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-10). Note that:

- DWR, in coordination with the State Water Board, may make revisions to the guidelines in the future, as needed.
- Use of alternative data is allowed if the urban retail water supplier can provide evidence that the alternative data is equal to or superior to DWR-provided data or DWR-suggested referenced data.
- Urban retail water suppliers should provide all necessary data and information to support the use of this variance and associated calculated amount of estimated water use to be included in UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for certain data use.

Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and methodologies are presented below in Table 4-7. Considerations for this variance include:

- The estimate should be an aggregate on an urban retail water supplier level. When multiple Climate Zones exist within the urban retail water supplier's service area, the Climate Zone with the largest portion of the service area is considered representative for calculating the estimate of water use under this variance.
- The use of alternative data for this variance should maintain consistency with that for ORWUS, as the DWR-provided referenced data are from the same source: Residential LAM. It is not acceptable to use a portion of the data but not the other.

Table 4-7 Significant Use of Water for Dust Control for Horse Corrals and Animal Exercising Arenas: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Calculation for 5 Percent Threshold Use
Data needed for calculation	• Amount of applied water (0.25 inches). • Horse corral acreage (based on urban retail water supplier's service area). • Local precipitation data.
Allowable corral watering frequency	Determine the number of days/year horse corrals are watered based on: • Calculate allowable irrigation days using records of days of precipitation. • If daily precipitation is greater than 0.10 inches, the horse corral would not be watered for the next 2 days, due to the rainfall irrigating the horse corral. • For more than 2 days following the rainfall event, the maximum application (irrigation) frequency is as shown below (based on California Energy Code Title 24 Climate Zones): – *Climate Zones 1-5 and 7: 2 days/week.* – *Climate Zones 6, 8 -10, 12, and 16: 3 days/week.* – *Climate Zones 11 and 13-15: 4 days/week.*
Equation	Variance Efficient Water Use Volume (gallons) = *corral area* (square feet) x *number of allowable watering days per year* x 0.021 (feet of water per watering day) x 7.48 (gallons per cubic foot)
Source(s) of data	**Provided by DWR**: • Total amount of horse corral acreage in an urban retail water supplier's residential service area (from the DWR's LAM dataset). • Precipitation records from CIMIS. **To be obtained/developed by urban retail water supplier**: • Horse corral acreage calculated based on the urban retail water supplier's GIS data or precipitation data, in accordance with the alternative data requirements if the urban retail water supplier intends to use its data.
Reporting requirements (provided to DWR by urban retail water supplier)	• Aggregate corral and arena acreage in urban retail water supplier's residential service area. • Precipitation records. • Climate zone(s) in which the urban retail water supplier is located. • Calculated number of allowable irrigation days in previous year. • Associated documentation for all the supporting data and information. • Proof of compliance with all applicable existing laws and regulations.

Key:
CIMIS = California Irrigation Management Information System; DWR = California Department of Water Resources; GIS = geographic information system; LAM = landscape area measurement

4.6 Recommended Variance: Significant Use of Water to Supplement Ponds and Lakes to Sustain Wildlife

Variance Scope

Confirmation of Unique Use

Regulatory requirements may require maintaining a certain water elevation in some ponds and lakes within residential neighborhoods to sustain wildlife. Examples of such requirements include ponds that are registered with the State Water Board to maintain a certain water level, or those located on individual properties registered as sanctuaries. Residential lakes and ponds receive no special allowances in ORWUS.

Lakes and ponds with DIMs can be classified as CII-DIMs for the purposes of the UWUO and are considered SLAs under CII-DIMWUS. CII-DIMWUS relies on a quantitative approach based on *ETo* rates to calculate the allowable efficient water use volume. For *SLA*s, CII-DIMWUS allows the use of 1.0 for the *ETF*. The *SLA ETF* of 1.0 is not sufficient to calculate evaporation from open water surfaces such as lakes and ponds. Therefore, the unique use is confirmed as it is not covered by any existing efficient water use guidelines or standards.

Potential for a Material Effect

The prospect for future growth to maintain lakes and ponds to sustain wildlife for environmental benefits is significant. Multi-benefit projects are also highly promoted, where feasible.

Use of Variance

If adopted, any urban retail water supplier that would like to use this variance would need to petition to the State Water Board and receive specific approval on an individual water supplier level in order to use the variance in calculating its UWUO.

Use of this variance is allowed against ORWUS when meeting the criteria and approved by State Water Board. (Note that some accounts use mixed-use meters, in which case a variance is needed even if a DIM is later used for supplemental water use in ponds or lakes.)

Use of this variance is allowed against CII-DIMWUS when meeting the criteria and approved by the State Water Board.

Limitations

Maintaining ponds and lakes within a residential neighborhood may be instructed by a private association or entity. Since this water use may provide public benefits, DWR recommends to (1) not recognize the required water use, or (2) convert it to CII-DIM to receive the privilege of using an SLA specification in water use reporting under CII-DIMWUS and thus, it is not further qualified for this variance, or (3) convert it to a regular CII account, which is not included in the scope of the UWUO and annual reporting requirements.

Stormwater retention facilities for flood control purposes without any regulatory requirements for maintaining water level do not need supplemental water. Note that incidental contributions of water from overirrigation at nearby residential parcels or CII-DIM are not allowed and thus, this water use is not qualified for this variance.

Maintaining ponds and lakes for recreational purposes in public areas (e.g., parks), which are under CII water use, is not qualified for this variance. If the public pond is receiving water from multiple sources (e.g., CII-DIM and CII mixed-use meter), but there is no regulatory requirement to supplement the water, a variance does not apply. (Note that incidental use of water is not justified.)

Recommendations for Variance and Associated Specifications

An urban retail water supplier will be allowed to include the variance for significant use of water to maintain ponds and lakes to sustain wildlife in calculating its UWUO when all of the following conditions are satisfied.

- The use of this variance for the urban retail water supplier is previously approved by the State Water Board. (Note that the State Water Board’s approval is for using the variance but not for the quantity, which may vary every year.)
- The water body is required to be maintained per regulatory requirements or local ordinances.
- The Variance efficient Water Use Volume is 0 percent of the sum of the aggregated estimates of efficient water uses based on four established standards: IRWUS, ORWUS, CII-DIMWUS, and WLS because maintaining this function is a regulatory requirement. These conditions should be verified by the urban retail water supplier every year before using the variance in calculating UWUO.

The variance will specify the aggregate efficient water use to maintain ponds and lakes to sustain wildlife per regulatory requirements to offset evaporation loss from the surface of the ponds and lakes.

Total landscape area in residential parcels required to be maintained by regulatory requirements is qualified for this variance. The existence of open water in any data set or mapping product does not imply the need for supplemental water to maintain them. Local knowledge and supporting documentation of specific regulatory requirements to supplement water for sustaining wildlife are required for using this variance.

The maintenance of ponds or lakes per the preference of residents and local homeowners' associations, without any specific regulatory requirements for maintaining levels for wildlife purposes, is not qualified for this variance. Urban retail water suppliers should convert the use to a DIM, and report under CII-DIMWUS, if they would like to use the SLA allowance.

Consistent with MWELO, the variance water use is expressed using an evaporation factor (*EF*) to adjust *ETo* in relation to the total qualified open water (ponds and lakes) surface area. The suggested statewide average number for adjustment of evaporation from open water surfaces is 1.1 (per the UC Cooperative Extension, University of California, Division of Agriculture and Natural Resources, Leaflet 21427).

The calculation of the Variance Efficient Water Use Volume should follow the guidelines and methodologies provided in the *Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B) and in the individual variance report *Recommendations for Variance for Significant Use of Water to Supplement Ponds and Lakes to Sustain Wildlife, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-11). Note that:

- DWR, in coordination with the State Water Board, may make revisions to the guidelines in the future, as needed.
- Use of alternative data is allowed if the urban retail water supplier can provide evidence that the alternative data is equal to or superior to DWR-provided data or DWR-suggested referenced data.
- Urban retail water suppliers should provide all necessary data and information to support the use of this variance and associated calculated amount of estimated water use to be included in UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for certain data use.

Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and methodologies are presented below in Table 4-8. Considerations for this variance include:

- It is up to the urban retail water supplier to ensure that the claimed usage rates are not in violation of any existing regulations or policies and are appropriate for accounting setups.

- The existence of open water in any data set or mapping product does not imply the need for water to maintain all of them. Local knowledge and supporting documentation for specific regulatory requirements to supplement water for sustaining wildlife are required for using this variance.

Table 4-8 Significant Use of Water to Supplement Ponds and Lakes to Sustain Wildlife: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Calculation of Variance Efficient Water Use Volume
Data needed for calculation	• *ETo.* • *EF* (statewide average = 1.1). • Total open water area required to be maintained per regulatory requirements.
Equation	Variance Efficient Water Use Volume (gallons) = *ETo* (inches) x 1.1 x Total Open Water Area (square feet) x 0.62
Source(s) of data	**Provided by DWR**: • *ETo.* • *EF* (statewide average = 1.1). **To be obtained/developed by urban retail water supplier**: • Total open water area required to be maintained per regulatory requirements. • Urban retail water suppliers can use local information as alternative data to determine *EF.*
Reporting requirements (provided to DWR by urban retail water supplier)	• Regulatory requirements for the applicable water bodies, including the purposes and the specific terms and conditions that require supplemental water. • Total open water area required to be maintained per regulatory requirements and associated documentation.

Key:
DWR = California Department of Water Resources
EF = evaporation factor
ETo = reference evapotranspiration

4.7 Recommended Variance: Significant Use of Water During Major Emergencies

Variance Scope

Confirmation of Unique Use

WC Section 10609.14(b)(7) includes “significant use of water to irrigate vegetation for fire protection.” The intent of this variance is to accommodate the extra water needed for fire protection. Through investigation of available data and stakeholder input, DWR concluded that “significant use of water to irrigate vegetation for fire protection” would only cover unique use of water during fire events, and it overlooks other significant emergency events such as earthquakes. To cover all potential unique uses of water during qualified major emergencies, the variance was refined to “significant use of water during major emergencies.”

Vegetative pre-fire protection is better managed through clearing space around structures and irrigating to maintain plant health to reduce dry fuel and is not different than normal landscape irrigation.

Irrigating vegetation for fire protection during normal conditions is already included in ORWUS or CII-DIMWUS. Research and literature suggest that fire-resistant vegetation requires no more water than regular landscape vegetation. The primary focus of defensible space is not water focused, but clearance and removal of dead leaves and branches.

Water use in major emergencies is considered a unique use because it is contingent upon the occurrence of these major emergencies only.

- Prior to, during, and after a wildfire event, residents may turn on their sprinkler systems to keep landscape areas wet for property protection or to clean the property and burnt areas; exterior sprinkler systems for structure protection will be turned on where installed. (Note that this water use is for fire protection during major emergencies, such as major wildfires, within residential parcels.)

- Water loss may occur due to water system damages after major emergencies, such as major earthquakes. Depending on the locations of damage in the water distribution system, abnormal water loss can happen.

Potential for a Material Effect

The number and severity of serious wildfire events has been increasing in recent years.

Earthquake events may result in abnormal water loss depending on the severity of the event and location of the damage. Due to inevitable uncertainty associated with these

natural disasters, the future impact on water supply cannot be determined. However, historical data show that earthquakes greater than 5.0 in magnitude with severe impacts have repeatedly occurred in certain areas of the State and may occur again.

Use of Variance

If adopted, any urban retail water suppliers that would like to use this variance would need to petition to the State Water Board and receive specific approval on an individual water supplier level in order to use the variance in calculating its UWUO.

Use of this variance in ORWUS, CII-DIMWUS, or WLS is allowed when meeting the criteria and approved by State Water Board.

Limitations

Using private firefighter teams for selected residential areas and businesses should still be categorized under CII water use. The temporary or permanent installation of sprinklers, promoted by insurance companies, will further increase the use of water from residential and CII-DIM accounts, when a wildfire event becomes imminent.

Irrigating vegetation for fire protection is not a unique water use during nonqualified emergencies, and it is covered by ORWUS or CII-DIMWUS. Fire-resistant plants do not require more water than other plants. Also, the California Department of Forestry and Fire Protection (CAL FIRE) recommends wildfire protection practices for homes that focus on clearing the ground and removal of dead leaves and bushes without the use of water.

Major emergencies covered in this variance are those specified in the recommendation and do not include drought emergencies.

Recommendations for Variance and Associated Specifications

An urban retail water supplier will be allowed to include the variance for significant use of water during major emergencies in calculating its UWUO when all the following conditions are satisfied. (Note that these conditions should be verified by the urban water retail water supplier every year before using the variance in calculating UWUO.)

- The use of this variance for the urban retail water supplier is previously approved by State Water Board. (Note that the State Water Board’s approval is for using the variance but not for the quantity, which varies every year.)
- Only water use or water loss during qualified major emergencies on residential parcels or CII landscapes that are supplied with residential meters or CII-DIMs are considered under this variance.

- The water use (controlled or uncontrolled) attributable to a major emergency is greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards: IRWUS, ORWUS, CII-DIMWUS, and WLS.

  - The major emergency qualified for this variance ("qualified major emergency") is based on the conditions or degrees of emergency defined in California Government Code (GC) Section 8558(b) that has a direct connection to water use or water loss:

    a. *"State of war emergency" means the condition that exists immediately, with or without a proclamation thereof by the Governor, whenever this state or nation is attacked by an enemy of the United States, or upon receipt by the state of a warning from the federal government indicating that such an enemy attack is probable or imminent.*

    b. *"State of emergency" means the duly proclaimed existence of conditions of disaster or of extreme peril to the safety of persons and property within the state caused by conditions such as air pollution, fire, flood, storm, epidemic, riot, drought, cyberterrorism, sudden and severe energy shortage, plant or animal infestation or disease, the Governor's warning of an earthquake or volcanic prediction, or an earthquake, or other conditions, other than conditions resulting from a labor controversy or conditions causing a "state of war emergency," which, by reason of their magnitude, are or are likely to be beyond the control of the services, personnel, equipment, and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat, or with respect to regulated energy utilities, a sudden and severe energy shortage requires extraordinary measures beyond the authority vested in the California Public Utilities Commission.*

    c. *"Local emergency" means the duly proclaimed existence of conditions of disaster or of extreme peril to the safety of persons and property within the territorial limits of a county, city and county, or city, caused by conditions such as air pollution, fire, flood, storm, epidemic, riot, drought, cyberterrorism, sudden and severe energy shortage, plant or animal infestation or disease, the Governor's warning of an earthquake or volcanic prediction, or an earthquake, or other conditions, other than conditions resulting from a labor controversy, which are or are likely to be beyond the control of the services, personnel, equipment, and facilities of that political*

subdivision and require the combined forces of other political subdivisions to combat, or with respect to regulated energy utilities, a sudden and severe energy shortage requires extraordinary measures beyond the authority vested in the California Public Utilities Commission.

- A "water shortage emergency" is declared by local water agencies (per WC Section 350).
- It is not a drought emergency.
- For wildfire events, the attributable period for this variance is limited by the mandatory evacuation orders and subsequent repopulation orders.
- The qualified major emergency has a material effect on water use pattern of urban retail water suppliers.

This variance is event-driven and quantity-driven. The quantity is out of the control of urban retail water suppliers. Therefore, the variance application is focused on the administrative process to receive approval from the State Water Board to either exclude the water use or water loss during major emergencies from the calculation of UWUO or include the amount as is in the UWUO to neutralize the effect. The administrative process to receive the approval for the variance can be through one of two processes: a Pre-Approval Process or an Exemption Process.

Pre-Approval Process:

- Urban retail water suppliers with known high-risk factors for qualified major emergencies may preemptively apply for the variance for significant use of water during major emergencies.
- The pre-approved status will grant the urban retail water supplier up to six months for deferring the submittal of its Annual Water Use Report when the urban retail water supplier provides a notification to the State Water Board regarding the occurrence of a qualified major emergency.

Exemption Process:

- Urban retail water suppliers with known high-risk factors that have not applied for Pre-Approval Process, or those experiencing unexpected major emergencies may apply for a variance for significant use of water during major emergencies during or after the events.
- After the State Water Board approval, the urban retail water supplier can include this water use in the UWUO calculations.

- Application for using this variance may result in delaying Annual Water Use Report filing up to six months. Before reporting the annual water use, the urban retail water supplier needs to supplement the application with the quantity for which it is seeking exemption. The State Water Board will need to review the application for approval of the use of this variance and an up to six months for deferring the submittal of its Annual Water Use Report. Only after the State Water Board has approved the quantity can the urban retail water supplier use it in the annual water use reporting.

The administrative procedure under this variance should follow the guidelines and methodologies provided in the *Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B) and in the individual variance report *Recommendations for Variance for Significant Use of Water During Major Emergencies, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-12). Note that:

- DWR, in coordination with the State Water Board, may make revisions to the guidelines in the future, as needed.
- Urban retail water suppliers should provide all necessary data and information to support the use of this variance and associated volume of estimated water use to be included in UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for certain data use.

Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and methodologies are presented below in Tables 4-9 and 4-10. Considerations for this variance include:

- Major emergencies could occur in areas with known high-risk factors or unexpectedly in areas that have never experienced them before. Therefore, these major emergencies may have very different impacts on the water systems. To account for these uncertainties, two administrative processes were recommended for this variance. The only difference between the two processes is the timing of the application. The urban retail water suppliers can follow any of the recommended administrative processes that works best for their conditions. Note that all urban retail water suppliers, regardless of being located in high-risk areas, can always use the Exemption Process. The consideration of the Pre-Approval Process is to alleviate the stress and uncertainties that urban retail water suppliers may experience during major emergencies and the associated crisis management.

- Although the volume of water use or water loss during the qualified major emergency period can be exempted from the UWUO calculation, urban retail water suppliers still need to report the duration and volume of water use or water loss.

- For wildfire events, note that County Evacuation Apps by Esri maintains real-time evacuation and other related information. It does not provide options for downloading information or changes that occurred previously. Other referenced data (such as a county's emergency service office's orders) are available post event. If urban retail water suppliers would rely on GIS information for water use reporting and variance application, periodic downloads of information from County Wildfire Evacuation Applications are advised.

Table 4-9 Significant Use of Water During Major Emergencies, Pre-Approval Process: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Pre-Approval Process
Reference data for receiving pre-approval	**Wildfires**: CAL FIRE Incident Report (SRA) for historic event, or CAL FIRE Fire Siege Report (SRA, some LRA, and FRA events in which CAL FIRE cooperated) for historic event. In addition, information from InciWeb can be helpful. **Earthquakes**: California Department of Conservation Seismic Hazards Maps, Reports, GIS Data. **Other supporting documents** may be used to support the qualified major emergency occurrence, duration, and zone provided they meet the qualifications and receive approval for use from DWR.
Qualified major emergency	1. Major emergencies are as defined in GC Section 8558(b). 2. Water shortage emergencies are declared by local official water agencies per WC Section 350. 3. Based on local official information (for example). **Wildfires**: From the date evacuation order is issued to the date evacuation order is lifted. Sources of information: County Evacuation Apps by Esri,[1] InciWeb,[2] or a county's emergency service office's orders for mandatory evacuation and repopulation. **Earthquakes**: County's emergency service office's orders or delineation of damaged areas.
Variance Efficient Water Use Volume	$Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = \sum_{Qualified\ Major\ Emergency\ Zones} \sum_{Qualified\ Major\ Emergency\ Period} (Total\ Residential\ Water\ Use + CIIDIM\ Water\ use + Water\ Losses) - UWUO\_EP$

Table 4-9 Significant Use of Water During Major Emergencies, Pre-Approval Process: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume (contd.)

Guidelines and Methodologies	Pre-Approval Process
Information required for application	1. Proof of the service area (in part or in full) of the urban retail water supplier being in a high-risk area. 2. Notification of major emergency occurrence. 3. Application for delay, if seeking a delay in the submission of the Annual Water Use Report. This application must contain volume of water for which the urban retail water supplier is seeking the pre-approved status.
Reporting requirements (provided to DWR by urban retail water supplier)	Proof of the qualified major emergency period allowed for this variance (see above), including, but not limited to, the following: 1. Official evacuation order and when order is lifted (wildfire), or the time from shutting down the valves in water transmission system for maintenance purposes until the valves are reopened for normal operation (earthquake). 2. Official incident report from CAL FIRE or local agencies. 3. Document or map showing impacted residential parcels. 4. Records of total volume of water from impacted residential accounts and CII landscape with dedicated meters during the length of the major emergency.

Notes:
[1] https://www.arcgis.com/apps/dashboards/e5cc0d2bd29f444a87f7589793d55b37
[2] https://inciweb.nwcg.gov/
Key:
CAL FIRE = California Department of Forestry and Fire Protection
CII = commercial, industrial, and institutional
DWR = California Department of Water Resources
FRA = Federal Responsibility Area
GC = California Government Code
GIS = geographic information system
LRA = Local Responsibility Area
SRA = State Responsibility Area
UWUO_EP = the standards-based UWUO during qualified emergency period(s) for the qualified emergency zone(s)

Table 4-10 Significant Use of Water During Major Emergencies, Exemption Process: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Exemption Process
Reference data for receiving pre-approval	N/A
Qualified major emergency	1. Major emergencies are as defined in GC Section 8558(b). 2. Water shortage emergencies are declared by local official water agencies (per WC Section 350). 3. Based on local official information (for example). **Wildfires**: From the date evacuation order is issued to the date evacuation order is lifted. County Evacuation Apps by Esri. **Earthquakes**: County's emergency service office's order or delineation of damaged areas.
Variance Efficient Water Use Volume	$Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = \sum_{Qualified\ Major\ Emergency\ Zones} \sum_{Qualified\ Major\ Emergency\ Period} (Total\ Residential\ Water\ Use + CIIDIM\ Water\ use + Water\ Losses) - UWUO\_EP$
Information required for application	1. Notification of major emergency occurrence. 2. Application for delay, if seeking a delay in the submission of the Annual Water Use Report. This application must contain volume of water for which the urban retail water supplier is seeking exemption.
Reporting requirements (provided to DWR by urban retail water supplier)	Proof of the qualified major emergency period allowed for this variance (see above), including, but not limited to, the following: 1. Official evacuation order and when order is lifted (wildfire), or the time from shutting down the valves in water transmission system for maintenance purposes until the valves are reopened for normal operation (earthquake). 2. Official incident report from CAL FIRE or local agencies. 3. Document or map showing impacted residential parcels. 4. Records of total volume of water from impacted residential accounts and CII landscape with dedicated meters during the length of the major emergency.

Key:
CAL FIRE = California Department of Forestry and Fire Protection
CII = commercial, industrial, and institutional
DWR = California Department of Water Resources
GC = California Government Code
N/A = not applicable
UWUO_EP = the standards-based UWUO during qualified emergency period(s) for the qualified emergency zone(s)
WC = California Water Code

4.8 Recommended Variance: Significant Use of Water for Commercial or Noncommercial Agricultural Use

Variance Scope

Confirmation of Unique Use

Backyards and small farms in residential parcels are sometimes used for food production with commercial and noncommercial intentions. Areas with a large agricultural component within residential parcels are not uniformly distributed in the State; they are clustered in locations such as Northern California in the Sierra Nevada foothill area, and Southern California outside the metropolitan area. Agricultural use of water on residential areas that is excluded from ORWUS is a unique use.

Potential for a Material Effect

Water requirements for crop growth and production could exceed water use allowable under ORWUS, depending on the type and quantity of crop(s) grown. Nearly 62,000 acres of urban agriculture has been identified in the DWR LAM dataset (Ag LAM Mask). The majority of these urban agricultural areas are located in Nevada County (11,000 acres), San Diego County (10,200 acres), San Joaquin County (5,400 acres), Riverside County (3,800 acres), and El Dorado County (3,100 acres).

The use is expected to continue into the future because of the locally preferred quality of life.

Use of Variance

If adopted, any urban retail water supplier that would like to use this variance would need to petition to the State Water Board and receive specific approval on an individual water supplier level in order to use the variance in calculating its UWUO.

Use of this variance against ORWUS is allowed when meeting the criteria and approved by State Water Board.

Limitations

Because CII non-DIM or agricultural water meter accounts are excluded from the UWUO, this variance is not applicable in those cases. Agricultural use of water in areas with commercial or agricultural land use designations are excluded from the UWUO. If these areas are served by an undesignated meter (i.e., not designated commercial or for agricultural purposes), the corresponding water use needs to be quantified before it can be excluded from the UWUO. (Note that to streamline UWUO reporting, urban retail

water suppliers should consider establishing separate CII or agricultural accounts for water use in areas with commercial or agricultural land use designations.)

If the agricultural areas on residential parcels are supplied with DIMs, the water use is included in CII-DIMWUS as an SLA with an *ETF* of 1.0 without using the variance.

DWR recommends that urban community gardens on public, commercial, or residential areas should be served by CII-DIMs and water use should be reported under CII-DIMWUS as SLAs. See *Recommendations for Commercial, Industrial, and Institutional Outdoor Irrigation of Landscape Areas with Dedicated Irrigation Meters Water Use Efficiency Standard* (WUES-DWR-2021-03).

DWR also recommends that agricultural use of water on residential parcels that are supplied from a recycled water source be reported under CII-DIMWUS for UWUO accounting purposes in order to use SLAs provisions. See *Recommendations for Commercial, Industrial, and Institutional Outdoor Irrigation of Landscape Areas with Dedicated Irrigation Meters Water Use Efficiency Standard* (WUES-DWR-2021-03).

Recommendations for Variance and Associated Specifications

An urban retail water supplier will be allowed to include the variance for commercial or noncommercial agricultural use of water in calculating its UWUO when all the following conditions are satisfied.

- The use of this variance for a particular urban retail water supplier is previously approved by the State Water Board. (Note that the State Water Board's approval is for using the variance but not for the quantity, which may vary every year.)
- The Variance Efficient Water Use Volume for significant use of water for commercial or noncommercial agricultural use (Variance Efficient Water Use Volume) is greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards: IRWUS, ORWUS, CII-DIMWUS, and WLS.
    - The significant threshold is reduced to 1 percent if the urban retail water supplier uses a detailed, crop-based growing season and reference evapotranspiration for the estimate that takes into consideration crop type and regional climate in calculating water use.
    - The allowable lower threshold is to recognize the use of high-resolution data, detailed methodology, and advanced technologies by the urban retail water supplier. Implementation of this variance should not force them to use only the lesser detailed data or methodologies for compliance purposes.

  - These conditions should be verified by the urban retail water supplier every year before using the variance in calculating UWUO.

- The irrigated residential area is excluded from ORWUS.

The variance will specify the water use allowance for commercial or noncommercial agricultural use of water in residential parcels, which is excluded from ORWUS.

The agricultural practices on residential properties can produce fruits and vegetables for personal use, community consumption or sale in local markets, as well as pasture for livestock that live on the residential property.

The calculation of Variance Efficient Water Use Volume should follow agronomic principles. Crop water requirements are expressed as *ETF* for the duration of a growing season on an urban retail water supplier level, which can be derived using a Standard Method (the minimum requirement) and a Detailed Method (the crop-specific method). Effective precipitation needs to be accounted for in the water use calculations, if it is required by the local agency. The two methods for *ETF* determination are as follows.

- Standard Method: The Variance Efficient Water Use Volume to irrigate all agriculture lands in residential areas is to be calculated based on the average regional growing season for all the available crops in their respective service areas on an urban retail water supplier level (based on hydrological region). For each urban retail water supplier, an average regional growing season, an annual average *ETF* during growing season (*ETF_gs*), and the latest Agricultural Lands Mask from DWR's LAM dataset (OR_LAM-Ag-Mask) area is used.

- Detailed Method: The Variance Efficient Water Use Volume to irrigate individual agriculture lands in residential areas is to be calculated based on a crop-specific growing season, irrigation efficiency, crop coefficient, and irrigated area associated with each crop or crop type. Irrigation efficiency is to be determined based on crop type and hydrologic region. Therefore, for each urban retail water supplier, crop-specific growing seasons, crop-specific *ETF* during growing season (*ETF_gsCrop*), and crop-specific *IE* are used to determine the Variance Efficient Water Use Volume.

The calculation of the Variance Efficient Water Use Volume should follow the guidelines and methodologies provided in the *Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B) and in the individual variance report Recommendations for Variance for Significant Use of Water for *Recommendations for Variance for Significant Use of Water for Commercial or Noncommercial Agricultural Use, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-13). Note that:

- DWR, in coordination with the State Water Board, may make revisions to the guidelines in the future, as needed.
- The Variance Efficient Water Use Volume should be calculated based on data applicable to the condition of the previous year.
- Use of alternative data is allowed if the urban retail water supplier can provide evidence that the alternative data is equal to or superior to DWR-provided data or DWR-suggested referenced data.
- Urban retail water suppliers should provide all necessary data and information to support the use of this variance and associated calculated amount of estimated water use to be included in UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for certain data use.

Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and methodologies are presented below in Tables 4-11 and 4-12. Considerations for this variance include:

- Urban retail water suppliers may consider installing a separate agricultural meter for this commercial and noncommercial agricultural use under this variance, even if the areas are within residential parcels.
- Note that if a separate agricultural meter is used, the resulting water use is excluded from the UWUO calculation.

Table 4-11 Significant Use of Water for Commercial or Noncommercial Agricultural Use, Standard Calculation: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Standard Method for 5 Percent Threshold
Data needed for calculation	• Urban retail water supplier–specific growing season. • Average service area reference evapotranspiration coefficient for the duration of growing season (*ETo_gs*) (inches). • Average service area crop coefficient for the duration of growing season (*Kc_gs*). • Average service area irrigation efficiency (*IE*) qualifying irrigated land acreage on residential parcels (*LA*) (square feet).
Evapotranspiration factor (*ETF_gs*)	$$ETF\_gs = \frac{Kc\_gs}{IE}$$

Table 4-11 Significant Use of Water for Commercial or Noncommercial Agricultural Use, Standard Calculation: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume (contd.)

Guidelines and Methodologies	Standard Method for 5 Percent Threshold
Equation	$$Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = 0.62 \times \frac{Service\ Area\ Average\ Kc\_gs}{Service\ Area\ Average\ Irrigation\ Efficiency} \times Service\ Area\ Average\ ETo\_gs \times Total\ Irrigated\ Ag\ Land\ Area$$ where, $$Service\ Area\ Average\ ETo\_gs = \sum_{growing\ season\ start\ date}^{growing\ season\ end\ date} Service\ Area\ Average\ Daily\ ETo$$
Source(s) of data	**Provided by DWR:** • Urban retail water supplier–specific growing season. • Daily reference evapotranspiration coefficient for the duration of the year, *ETo* (inches). • Crop coefficient for the duration of growing season (*Kc_gs*). • Qualifying agricultural land area (*LA*) based on the latest LAM (square feet); urban retail water suppliers can provide input to adjust DWR Agricultural Lands Mask. • Effective precipitation for urban retail water supplier–specific growing season, *Peff_gs* (inches), if needed. **To be obtained/developed by urban retail water supplier:** • Growing season reference evapotranspiration (*ETo_gs*). • Evapotranspiration factor for the duration of growing season (*ETF_gs*).

Key:
DWR = California Department of Water Resources
ETF_gs = evapotranspiration factor based on the average reference evapotranspiration for an average growing season in the service area of an urban retail water supplier
ETo_gs = average reference evapotranspiration during growing season in the service area of an urban retail water supplier
IE = irrigation efficiency
Kc_gs = crop coefficient during growing season
LA = landscape area
OR_LAM_Ag Mask = Outdoor Residential Landscape Area Measurement Agricultural Mask
Peff_gs = effective precipitation during growing season

Table 4-12 Significant Use of Water for Commercial or Noncommercial Agricultural Use, Detailed Calculation: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume

Guidelines and Methodologies	Detailed Method for 1 Percent Threshold
Data needed for calculation	• Urban retail water supplier–specific growing season per crop. • Reference evapotranspiration coefficient for the duration of growing season per crop or crop type (*ETo_gsCrop)* (inches). • Crop coefficient for the duration of growing season for each crop or crop type (*Kc_gsCrop).* • Crop or crop-type irrigation efficiency (*IE_Crop*). • Qualifying irrigated land acreage on residential parcels per crop *(LA_Crop*) (square feet).
Evapotranspiration factor (*ETF_gsCrop*)	$$ETF\_gsCrop = \frac{Kc\_gsCrop}{IE\_Crop}$$
Equation	$$Variance\ Efficient\ Water\ Use\ Volume\ (gallons) = 0.62 \times \sum_{crop} \frac{Kc\_gsCrop}{Crop\ type\ Irrigation\ Efficiency} \times ETo\_gsCrop \times Irrigated\ Crop\ Area$$ where, $$ETo\_gsCrop = \sum_{growing\ season\ start\ date}^{growing\ season\ end\ date} Daily\ ETo\ per\ Crop$$

Table 4-12 Significant Use of Water for Commercial or Noncommercial Agricultural Use, Detailed Calculation: Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume (contd.)

Guidelines and Methodologies	Detailed Method for 1 Percent Threshold
Source(s) of data	**Provided by *DWR***: • Urban retail water supplier–specific growing season per crop. • Daily reference evapotranspiration coefficient for the year, *ETo* (inches). • Crop coefficients for the duration of growing season (*Kc_gsCrop*) based on list requested by urban retail water supplier or common regional crops lists. • Irrigation efficiency for different types of crops and irrigation systems in the region *(IE_Crop*). • Qualifying agricultural land area (*LA*) based on the latest OR_LAM_Ag Mask (square feet); urban retail water suppliers can provide input to adjust the OR_LAM_Ag Mask. • Effective precipitation for urban retail water supplier–specific growing season per crop, *Peff_gs* (inches), if needed. **To be *obtained/developed by urban retail water supplier***: • Crop types and associated land areas. • Growing season reference evapotranspiration per crop or crop type (*ETo_gsCrop*). • Evapotranspiration factor for the duration of growing season (*ETF_gsCrop*). • Qualifying irrigated land area per crop (*LA_Crop*).

Key:
DWR = California Department of Water Resources
ETo_gsCrop = crop-specific reference evapotranspiration per crop during growing season
ETF_gsCrop = evapotranspiration factor based on the crop-specific growing season and reference evapotranspiration in the service area of an urban retail water supplier
IE_Crop = crop-specific irrigation efficiency
LA = landscape area
LA_Crop = irrigated land area per crop
OR_LAM_Ag Mask = Outdoor Residential Landscape Area Measurement Agricultural Mask
Peff_gsCrop = crop-specific effective precipitation during growing season

4.9 Recommended Deferred Variance: Significant Use of Water for Home Use Medical Devices

Variance Scope

Confirmation of Unique Use

This potential variance was the product of the stakeholder engagement and a feedback process used by DWR in the development of variance recommendations.

Water use by home use medical devices, if proven substantial in volume, is not included in IRWUS. Home dialysis machines have the highest water use among home use medical devices. There are two types of dialysis that a person can receive for treatment of end-stage kidney disease: hemodialysis (HD) and peritoneal dialysis (PD).

PD machines use pre-prepared fluid packs, and their water need is provided by the center that takes care of their case (U.S. Department of Health and Human Services Agency for Healthcare Research and Quality). In other words, the use of PD machines does not impact indoor residential water use.

Home use HD machine water use could have significant effects on individual indoor residential water use. For HD, water use is determined based on dialysate flow rate, session length, and dialysis frequency. An estimate of the annual water requirement for a typical HD patient based on these numbers, ranges from 2,219 to 8,290 gallons per year. (Note that the average water consumption varies and ranges from 190 to 600 liter per week according to Center for Disease Control and Arbor Research Collaborative for Health.)

Potential for a Material Effect

Until 2018, the State had 70,000 HD patients (United States Renal Data System Annual Report, 2020). From the list of all HD patients, 767 patients received at-home HD treatment. Total water use across all HD patients based on the 2018 United States Renal Data System data is equal to 414,750 gallons per year (or 1.3 acre-feet per year).

The potential for future growth is evident. The rate of people starting voluntary at-home PD rose from 15 percent to 34 percent over 10 years, according to Kaiser Permanente in Northern California (Journal of the American Medical Association Internal Medicine). At-home HD treatment can also increase, although likely in a lesser rate due to its costs and complexity of setup.

Material effects of this water use are not evident at this time.

Use of Variance

Not applicable at this time.

Limitations

Dialysis centers, where most patients receive regular treatments, are considered CII water use, and thus, do not need to be reported under the UWUO.

Recommendations for Variance and Associated Specifications

This specific variance is deferred until more substantial use is established in the State or in service areas of specific urban retail water suppliers. At such time, the variance may be submitted for consideration (see Section 4.11 Future Variance Considerations).

4.10 Recommended Redirection of Variances

At this time, DWR is not recommending the redirection of any variances. However, during the initial evaluation conducted for each variance to confirm the unique use of water, some uses were redirected to other standards as described in the individual variance sections where applicable.

4.11 Future Variance Considerations

With the WC language stating "…may include, but are not limited to…" in relation to appropriate variances, it is recognized that allowances for unique water uses that can have a material effect on an urban retail water supplier's UWUO may differ from the initial list in the WC (Section 10609.14). DWR recommends that urban retail water suppliers, stakeholders, and other interested parties bring forth potential future variances for its consideration. Preliminary scoping information that supports the potential future variance – unique use, material effects, use of variance, and limitations – should be included in the request for consideration. DWR, in coordination with the State Water Board, will consider potential future variances on an as-submitted basis. Accordingly, DWR will conduct necessary studies and investigations to recommend for adoption by the State Water Board appropriate variances for unique uses that can have a material effect on an urban retail water supplier's UWUO. Similar to the process used to develop the variance recommendations included herein, DWR would conduct the necessary studies and research in coordination with the State Water Board to evaluate the potential future variance along with public participation and stakeholder engagement. After the adoption of future variances, it is expected that the State Water Board will follow the protocols described in WC Section 10609.14(e).

4.12 Additional Input from Stakeholders Related to Variance Recommendations

Several suggestions and recommendations were proposed by some stakeholders in the various working groups and the public meetings. These are not specific recommendations, but are included as suggestions, since improving urban water use efficiency depends on the successful implementation of the final water use standards adopted by the State Water Board. These suggestions and recommendations also recognize that the successful implementation of the new water use standards and objectives requires complementary actions by the State to assist local agencies as they implement the new framework. DWR heard repeatedly from stakeholders that technical and financial support for urban retail water suppliers is key for the successful implementation of the new framework.

The following suggestions and recommendations were raised by the DWR stakeholder working group during the public process. DWR includes them here to underscore their importance for future consideration. However, these ideas are not recommendations from DWR to the State Water Board. DWR may consider these suggestions raised by stakeholders once new standards are approved by the State Water Board. It will require time, effort, and funding to implement these suggestions, and the pace of implementation will depend upon the feasibility and availability of resources and competing priorities.

Stakeholder suggestions and recommendations included:

- **Technical Assistance**
  - The State should consider providing technical assistance to urban retail water suppliers, in particular, smaller urban retail water suppliers with limited resources for implementation and reporting on water use objectives, variances, actual water use, and other progress reports to DWR.
  - The State should consider providing technical assistance and guidance to urban retail water suppliers on measuring landscapes associated with CII-DIMs.
  - The State should consider providing technical assistance to urban retail water suppliers on how customers can improve outdoor water use efficiency while protecting existing landscapes. This includes landscapes with higher plant factors, urban wildlife habitat, and urban shade trees.

- **Financial and Local Assistance**
  - The State should consider providing direct financial assistance programs, not rebates, for low-income communities to assist in potential water affordability and support human right to water.
  - The State should consider providing financial assistance to urban retail water suppliers, wastewater, and recycled water utilities to mitigate the financial impact of new UWUOs and support the implementation of water use efficiency programs.
  - The State should consider offering incentives to urban retail water suppliers to support customer water use efficiency via local assistance grants and loan programs.
- **Outreach and Messaging**
  - The State should augment efforts by Save Our Water to assist customers in understanding the need for water and wastewater rate changes.
  - The State should support additional statewide messaging to incentivize customers to participate in water use efficiency programs and upgrades.
- **Data**
  - The State should consider providing urban retail water suppliers updated landscape area measurement data every five years.
- **Other Considerations**
  - The State should consider how the plumbing code indoor residential efficiency requirements (SB 407 [Padilla]) can be best enforced to ensure passive conservation is implemented as expected.
  - The State should encourage local jurisdictions responsible for MWELO to improve MWELO implementation and enforcements.

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5.0 Implementation Considerations

Based on the State Water Board's final rulemaking, a process for variance implementation will be needed. This process should address topics such as:

- A variance application needs, guidance, and process (for urban retail water suppliers, DWR, and other responsible agencies), including potential templates and tools.
- A variance review and approval process for DWR and the State Water Board.
- An alternative data review and approval process for DWR.
- Variance adoption needs and and a variance process for the State Water Board.
- The use of approved variances and processes for subsequent years for urban retail water suppliers.
- A process focused on reviewing and addressing potential changes to variances as well as monitoring variance performance and efficacy.
- A process focused on reviewing and approving new variances for DWR and the State Water Board.

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6.0 Glossary

The following key terms are listed below for easy reference. Where applicable, existing definitions from statutes and regulations are provided.

bioengineered slope. A slope designed and constructed with live vegetation as an integral component of stability.

commercial agricultural use of water in residential parcels. Water used for products produced on residential parcels for commercial purposes.

commercial, industrial, and institutional parcels. For the purposes of variance development, commercial, industrial, and institutional parcels are property parcels with a commercial, industrial, and institutional land use designation under the governing general plans of counties and cities.

commercial, industrial, and institutional water use. Water used by commercial water users, industrial water users, institutional water users, and large landscape water users, as defined in California Water Code Section 10608.12(d).

commercial water user. A water user that provides or distributes a product or service, as defined in California Water Code Section 10608.12(e).

dedicated irrigation meter. A meter used only for irrigation of outdoor landscape areas. However, a mixed-use meter with no more than five percent of total delivered water serving non-landscape irrigation purposes can also be considered a dedicated irrigation meter for the purpose of the urban water use objective and actual water use calculations and reporting.

dew point temperature. The temperature at which water vapor in the air condenses into liquid water at the same rate at which it evaporates.

dry-bulb temperature. The ambient temperature, measured by a thermometer freely exposed to the air but shielded from radiation and moisture.

evaporative cooler. A device that cools air through the evaporation of water.

evaporative cooling. The process by which thermal energy transfers from hot, dry air to liquid water, causing some of that water to vaporize and create cool, moist air.

evapotranspiration. The amount of water transpired by plants, retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces.

evapotranspiration factor. An adjustment factor when applied to reference evapotranspiration that adjusts for plant factors and irrigation efficiency which are two major influences upon the amount of water that needs to be applied to the landscape.

high levels of total dissolved solids. For the purposes of variance development, high levels of total dissolved solids in recycled water were defined as between 900 and 1,600 milligrams per liter.

horse corral. An open space used for horse training exercises and activities. A horse corral can also be referred to as animal exercise arenas, paddocks, or other non-vegetated exercise and riding areas (collectively referred to as, “corrals”).

hydrologic region. A geographical division of the State of California based on the local hydrologic basins. The California Department of Water Resources divides the State of California into 10 hydrologic regions that correspond to the state’s major water drainage basins: North Coast, North Lahontan, Sacramento River, San Francisco Bay, Central Coast, San Joaquin River, Tulare Lake, South Coast, South Lahontan, and Colorado River.

industrial water user. A water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development, as defined in California Water Code Section 10608.12(i).

institutional water user. A water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions, as defined in California Water Code Section 10608.12(j).

irrigation efficiency. The efficiency of water application and use, calculated by dividing a portion of applied water that is beneficially used by the total applied water, expressed as a percentage. The two main beneficial uses are crop water use (evapotranspiration) and leaching to maintain a salt balance.

leaching requirement. Leaching is the basic means for controlling salinity. The leaching requirement is the extra amount of water applied to percolate (or move) salts below the plant root zone. Also known as the “leaching fraction.”

livestock. The U.S. Code of Federal Regulations Section 780.328 defines "livestock" as, "cattle, sheep, horses, goats, and other domestic animals ordinarily raised or used on the farm. Turkeys or domesticated fowl are considered poultry and not livestock." California Civil Code Section 3080 states "livestock means any cattle, sheep, swine, goat, or horse, mule or other equines." For the purposes of variance development, only livestock greater than 200 pounds were considered because they consume more water

on a daily basis than smaller livestock and could therefore have a material effect on an urban retail water supplier's water use.

local emergency. Local emergency is as established in California Government Code Section 8558(c). A "local emergency" means the duly proclaimed existence of conditions of disaster or of extreme peril to the safety of persons and property within the territorial limits of a county, city and county, or city, caused by conditions such as air pollution, fire, flood, storm, epidemic, riot, drought, cyberterrorism, sudden and severe energy shortage, plant or animal infestation or disease, the Governor's warning of an earthquake or volcanic prediction, or an earthquake, or other conditions, other than conditions resulting from a labor controversy, which are or are likely to be beyond the control of the services, personnel, equipment, and facilities of that political subdivision and require the combined forces of other political subdivisions to combat, or with respect to regulated energy utilities, a sudden and severe energy shortage requires extraordinary measures beyond the authority vested in the California Public Utilities Commission. California Government Code Section 8558 also defines two other conditions or degrees of emergency (state of emergency and state of war emergency).

major emergency. See "qualified major emergency."

material effect. Having real importance or great consequences. In the context of California Department of Water Resources' recommendations regarding the urban water use objective and variances, a material effect is an effect on the urban water use objective that could influence the compliance status of an urban retail water supplier.

noncommercial agricultural use of water in residential parcels. Water used to grow products on residential parcels with noncommercial intentions.

performance measures. Actions to be taken by urban retail water suppliers that will result in increased water use efficiency by commercial, industrial, and institutional water users. Performance measures may include, but are not limited to, educating commercial, industrial, and institutional water users on best management practices, conducting water use audits, and preparing water management plans. Performance measures do not apply to process water, as defined in California Water Code Section 10608.12(n).

potable reuse. Direct potable reuse, indirect potable reuse for groundwater recharge, and reservoir water augmentation, as defined in California Water Code Section 13561, as defined in California Water Code 10608.12(o).

psychrometrics. The study of thermodynamic properties of air-vapor mixtures.

qualified major emergency. Based on the conditions or degrees of emergency, defined in California Government Code Section 8558(b), that have a direct connection

to water use or water loss, or is declared by local water agencies as a “water shortage emergency” per California Water Code Section 350.

recycled water. Water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource, as defined in California Water Code Section 13050(n), as defined in California Water Code Section 10608.12(q).

reference evapotranspiration. The evapotranspiration rate from an extended surface of 3- to 6-inch-tall (8- to 15-centimeter-tall) green grass cover of uniform height, actively growing, completely shading the ground, and not short on water (the reference evapotranspiration rate reported by the California Irrigation Management Information System).

relative humidity. The amount of water vapor present in air expressed as a percentage of the amount needed for saturation at the same temperature.

reporting period. The years for which an urban retail water supplier reports compliance with the urban water use target, as defined in California Water Code Section 10608.12(s).

residential parcels. For the purposes of variance development, residential parcels are property parcels with a residential land use designation under the governing general plans of counties and cities.

seasonally occupied home. Homes occupied for part of the year, seasonally or for recreation, that include second homes, vacation homes, and vacation rentals, provided that the home is still categorized as a residence. It is not necessary for a seasonally occupied home to have any particular seasonal pattern of occupancy – only that it is not the usual residence for any individual. For the purposes of variance development, all residential homes with seasonal, recreational, or occasional occupants were counted as seasonally occupied.

Special Landscape Area. An area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface, as defined in California Code of Regulations, Title 23, Section 491(iii).

state of emergency. State of emergency is as established in California Government Code Section 8558(b). “State of emergency” means the duly proclaimed existence of conditions of disaster or of extreme peril to the safety of persons and property within the state caused by conditions such as air pollution, fire, flood, storm, epidemic, riot, drought, cyberterrorism, sudden and severe energy shortage, plant or animal infestation or disease, the Governor’s warning of an earthquake or volcanic prediction, or an

earthquake, or other conditions, other than conditions resulting from a labor controversy or conditions causing a “state of war emergency,” which, by reason of their magnitude, are or are likely to be beyond the control of the services, personnel, equipment, and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat, or with respect to regulated energy utilities, a sudden and severe energy shortage requires extraordinary measures beyond the authority vested in the California Public Utilities Commission. California Government Code Section 8558 also defines two other conditions or degrees of emergency (state of war emergency and local emergency).

state of war emergency. State of war emergency is as established in California Government Code Section 8558(a). “State of war emergency” is the condition that exists immediately, with or without a proclamation thereof by the Governor, whenever this state or nation is attacked by an enemy of the United States, or upon receipt by the state of a warning from the federal government indicating that such an enemy attack is probable or imminent. California Government Code Section 8558 also defines two other conditions or degrees of emergency (state of emergency and local emergency).

threshold of significance. A minimum volume of unique water use in an urban retail water supplier’s service area that could have a material effect on that urban retail water supplier’s urban water use objective.

total dissolved solids. The inorganic salts, metals, and minerals present in water. This term is usually expressed in parts per million or milligrams per liter.

urban retail water supplier. A water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes, as defined in California Water Code Section 10608.12(t).

urban water use efficiency standards. The standards effective through California Water Code Section 10609.4 (indoor residential use) or adopted by the State Water Resources Control Board (outdoor residential, water loss, and commercial, industrial, and institutional outdoor irrigation of landscape areas with dedicated meters) pursuant to California Water Code Section 10609.2.

urban water use objective. An estimate of aggregate efficient water use for the previous year based on adopted water use efficiency standards and local service area characteristics for that year, as described in California Water Code Section 10609.20, as defined in California Water Code Section 10608.12(u).

water loss. The total of apparent loss and real loss (California Code of Regulations, Title 23, Section 638.1(a) and Section 638.1(k), respectively) in an urban retail water supplier's system. Apparent loss means loss due to unauthorized consumption and/or

nonphysical (paper) loss attributed to inaccuracies associated with customer metering or systematic handling errors. Real loss means the physical water loss from the pressurized potable water system and the urban retail water supplier's potable water storage tanks, up to the point of customer consumption.

water salinity. Salinity can be described in terms of soluble salts, or in terms of total dissolved solids.

water shortage emergency. Water shortage emergency is as established in California Water Code Section 350: “The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, shall declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.”

wet-bulb temperature. The lowest temperature to which air can be cooled by the evaporation of water into the air at a constant pressure. It is measured by wrapping a wet wick around the bulb of a thermometer and the measured temperature corresponds to the wet-bulb temperature.

Appendix A – Urban Water Use Efficiency Recommendation Package Reports Incorporated by Reference

DWR (California Department of Water Resources). September 2022. Recommendations for Urban Water Use Efficiency Standards, Variances, Performance Measures, and Annual Water Use Reporting. DWR Report Number: WUES-DWR-2021-01A.

DWR (California Department of Water Resources). September 2022. Recommendations for Guidelines and Methodologies for Calculating Urban Water Use Objective. DWR Report Number: WUES-DWR-2021-01B.

DWR (California Department of Water Resources). September 2022. Recommendations for Commercial, Industrial, and Institutional Outdoor Irrigation of Landscape Areas with Dedicated Irrigation Meters Water Use Efficiency Standard. DWR Report Number: WUES-DWR-2021-03.

DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Water Use of Evaporative Coolers, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-05.

DWR (California Department of Water Resources). September 2022. Recommendations for Deferring Variance for Significant Water Use of Home Use Medical Devices. DWR Report Number: WUES-DWR-2021-06.

DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Populations of Horses and Other Livestock, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-07.

DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Fluctuations in Seasonal Populations, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-08.

DWR (California Department of Water Resources). September 2022. Methods for Estimating Seasonal Populations with Water and Energy Data. DWR Report Number: WUES-DWR-2021-08.T1.

DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Landscaped Areas Irrigated with Recycled Water Having High Levels of Total Dissolved Solids, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-09.

DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Use of Water for Dust Control for Horse Corrals and Animal Exercising Arenas, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-10.

DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Use of Water to Supplement Ponds and Lakes to Sustain Wildlife, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-11.

DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Use of Water During Major Emergencies, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-12.

DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Use of Water for Commercial or Noncommercial Agricultural Use, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-13.

DWR (California Department of Water Resources). September 2022. Stakeholder Outreach Summary for Developing Urban Water Use Efficiency Standards, Variances, and Performance Measures. DWR Report Number: WUES-DWR-2021-20.

DWR (California Department of Water Resources). September 2022. Urban Water Use Efficiency Recommendation Package: Glossary and Abbreviations and Acronyms. DWR Report Number: WUES-DWR-2021-21.