

Expert Report and Recommendations of

Peter Mayer, P.E.

**Regarding Water Supply and Demand in the
California American Water Company's Monterey
Main System**

Prepared for:

The Marina Coast Water District

April 21, 2020



EXHIBIT 12-B



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INTRODUCTION

My name is Peter Mayer. I am the Principal of Water Demand Management, LLC (WaterDM) based in Boulder, Colorado.

WaterDM is a water consulting firm providing expertise and services in the following areas:

- Municipal and industrial water use, research, and analysis
- Water conservation and demand management planning and implementation
- Integrated water resources planning
- Water loss control
- Analysis of municipal water rates and rate structures
- Drought preparedness and response
- Demand forecasting
- Evaluation of changes in demand
- Statistical analysis of water demand and modeling
- Meter technology implementation
- Meter and service line sizing

I have a Master of Science in Engineering (1995) from the University of Colorado, Boulder and a Bachelor of Arts (1986) from Oberlin College. I am a registered and licensed Professional Engineer in Colorado.

I am a civil engineer and the focus of my career for over 25 years has been on urban water systems and demand management including conservation planning and implementation, rate analysis, water demand research, demand forecasting, drought preparation, utility metering, and water loss control.

Since 1995, I have served as a consultant and researcher to urban water providers, US EPA, the Water Research Foundation, the Alliance for Water Efficiency, state governments, and municipal and industrial water users in the US and Canada.

Over my 25 -year engineering and consulting career, I have worked with and advised hundreds of water providers and organizations such as the California Department of Water Resources; Tucson Water; New York City Water Board; the Colorado Water Conservation Board; Hilton Head, SC; Denver, CO; Scottsdale, AZ; San Antonio, TX; Metropolitan Water District of Southern California; US EPA; the US Department of Justice; the Alliance for Water Efficiency and many others. I have served as the principal investigator and lead or co-author of numerous national and state-level water demand research studies including: Residential End Uses of Water (2016, 1999); Assessing Water Demand Patterns to Improve Sizing of Water Meters and Service Lines (2020); Peak Demand Management (2018); Colorado Water Plan and Update (2010, 2018); National Submetering and Allocation Billing Program Study (2004); Water Budgets and Rate Structures (2008); Commercial and Institutional End Uses of Water (2000); and many others.

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I was Chair of the subcommittee and lead author of the American Water Works Association (AWWA) M22 Sizing Water Service Lines and Meters 3rd. ed. (2014). I am co-author of the AWWA G480 Water Conservation Standard and co-author of the Colorado Best Practices Guidebook for Municipal Water Conservation (2010). I served as Trustee of the AWWA Water Conservation Division from 2001-2007 during which time I worked with EPA to create the WaterSense™ program and helped establish the Alliance for Water Efficiency. I have been a Senior Technical Advisor to the Alliance for Water Efficiency since 2007. I am a member of the American Water Works Association, the Alliance for Water Efficiency, the American Water Resources Association, the American Society of Civil Engineers (ASCE) and the Colorado River Water Users Association.

In 2016, I testified as an expert witness on municipal and industrial water use at the US Supreme Court (FL v. GA, 142 Original) on behalf of the State of Georgia.

A copy of my curriculum vitae is attached to this report.

SCOPE OF INVESTIGATION

I was retained by the Marina Coast Water District to review and respond to the recommendations in the staff report of the California Coastal Commission related to Application 9-19-0918 / Appeal A-3-MRA-19-0034 (California American Water Co.). Specifically, I was asked to investigate if the California-American Water Company (“Cal-Am”) has a feasible, reasonable, and reliable alternative to its proposed Monterey Peninsula Water Supply Project (“MPWSP”) desalination project that will allow it to reduce its water withdrawals from the Carmel River in accordance with provisions of a cease-and-desist order from the State Water Resources Control Board. I was also asked to respond to the analyses and opinions contained in reports prepared by the Monterey Peninsula Water Management District (MPWMD) and a peer review report prepared by Hazen and Sawyer as they relate to future water supply and water demand of the Cal-Am Monterey Main system.

My opinions are based on my understanding of the information available as of the date of this report and my experience evaluating municipal and industrial water supplies and demands and conservation measures. In forming my opinions, I also considered the documents, testimony, and other materials listed in Appendix A. Should additional information become available to me, I reserve the right to supplement this report based on any additional work that I may conduct based on my review of such materials.

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SUMMARY OF OPINIONS AND CONCLUSIONS

I have reviewed the following reports and documents:

- *Staff Report: Recommendation on Appeal Substantial Issue & De Novo Hearing and Consolidated Coastal Development Permit, California Coastal Commission, Application 9-19-0918 / Appeal A-3-MRA-19-0034 (California American Water Co.).* (Staff Report) (10-28-2020)
- *Supply and Demand for Water on the Monterey Peninsula prepared by David Stoldt, General Manager, MPWMD.* (MPWMD Report) (3-13-2020, 12-3-2019, and 9-16-2019)
- *California American Water Peer Review of Supply and Demand for Water on the Monterey Peninsula prepared by Kevin Alexander and Cindy Miller, Hazen and Sawyer* (Hazen Report) (1-22-2020)
- *MPWMD's March 6 response to the Hazen Report including supporting exhibits prepared by David Stoldt* (MPWMD Response) (3-6-2020)

As result of my review of these and other related and relevant documents and reports, my own independent analysis, and my expertise in municipal and industrial water use, water management, and engineering, I offer the following opinions and conclusions:

a) California Coastal Commission staff have correctly concluded that the Pure Water Monterey Expansion project provides an available, feasible¹ water supply alternative for Cal-Am.

The Staff Report concludes, *“the Commission finds that there is a feasible and less environmentally damaging alternative that would meet all or most of the proposed project’s objectives in a timely manner.”* I concur with this finding as it relates to the feasibility of the Pure Water Monterey Expansion project and the forecast adequacy of the future water supply provided by the combination of sources available to Cal-Am. I offer no opinion on the environmental components of the Staff Report.

I conducted an analysis of the historic demand trends in the Cal-Am service area and forecast growth in the service area. I developed an independent demand forecast based on the Associated Monterey Bay Area Governments (AMBAG) 2018 forecast of future population growth for the Cal-Am service area. My analysis supports the conclusions in the Staff Report projecting 2040 demands in the Cal-Am service area to be much lower than the California Public Utility Commissions (CPUC) certificating decision.

¹ Coastal Act Section 30108 states *“‘Feasible’ means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors.”*

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With the addition of the Pure Water Monterey Expansion project providing an additional 2,250 acre-feet per year of supply to Cal-Am, the combination of Cal-Am's available and reliable water resources provides sufficient supply potential to meet annual future demand in 2040 by more than 1,200 acre-feet (an 11.9% surplus).

The CPUC, in its September 2018 Decision accepted that Cal-Am's "current" demand was 12,350 acre-feet per year and the future demand in 2040 will be approximately 14,000 acre-feet per year.² This appears outdated and therefore unreasonably high based on my analysis, the MPWMD Report, and Cal Am's own most recent forecasts. Over the most recent five-year period, 2015 – 2019, water demand in the Monterey Main service area averaged 9,885 AF per year. Cal-Am, in its most recent General Rate Case Application, forecast demand for 2021 and 2022 at 9,789 acre-feet per year.³ Thus Cal Am's own most recent forecast estimates 2022 demand to be 20% lower than "current" demand in the CPUC decision. Independent estimates of demand developed for the MPWMD Report and developed separately for this report, align closely with Cal Am's recent rate case forecast.

My analyses show that the staff of the California Coastal Commission correctly utilized more recent information on available future water supplies and likely future demands in its analysis. I agree with the staff findings that concluded there exists an available, feasible water supply alternative to Cal-Am's proposed desalination project.

b) Cal-Am's per capita use is likely to decrease between now and 2040 due to ongoing conservation program implementation, conservation pricing, and statewide policy directives to reduce indoor and outdoor use and improve utility water loss control measures.

The Monterey region has been regarded as a model for water conservation programs for many years. The Monterey Peninsula Water Management District implements an array of effective demand management policies and programs that are likely to extend water efficiency gains.⁴ Cal-Am implements an active water conservation program including a steeply inclining block rate pricing structure and customer incentives for installing drought tolerant landscapes and high-efficiency fixtures and appliances. Cal-Am also implements a rigorous utility-scale water loss control program aimed at reducing real losses in its distribution system. Regional development regulations ensure that all new and remodeled buildings are equipped with high-efficiency fixtures.

Cal-Am acknowledged the level of effort, significance, and impact of this conservation program in recent testimony. "California American Water has expended significant effort and resources

² CPUC Decision 18-09-017, September 13, 2018

³ California-American Water Company. 2019. (U-210-W) Update to General Rate Case Application, A.19-07-004.

⁴ California-American Water Company. 2019. (U-210-W) Update to General Rate Case Application, A.19-07-004. Direct Testimony of Stephanie Locke. (pp.7-8)

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to encourage conservation in the Monterey County District through a variety of methods. Most important has been the tiered rate design, which features steeply inclining block rates to encourage efficient water use.” – Direct Testimony of Christopher Cook, July 1, 2019.⁵

Mr. Cook’s testimony is backed up by testimony from Stephanie Locke, Water Demand Manager for the Monterey Peninsula Water Management District, and the significant financial resources Cal-Am continues to apply toward water conservation in the region. In its most recent General Rate Case, Cal-Am proposed a \$1.845 million three-year budget (\$615,132 per year) to fund water conservation programs in the Monterey service area.⁶ Locke’s testimony notes that many of the conservation programs budgeted in the General Rate Case and in the prior Cal-Am rate filings focus on reductions in outdoor water use, on reductions in demand areas that have not previously been extensively targeted, and on maintaining the current low water use fixtures that have been installed to date.⁷

Cal-Am’s local efforts are in parallel to broader policy measures at the state level, designed to further increase efficiency. The State of California has implemented a series of laws and directives to ensure future water efficiency across the state including Assembly Bill 1668 and Senate Bill 60 which effectively mandate an ongoing reduction in per capita use. Cal-Am’s continued compliance with these regulations and its active efforts to reduce customer water demand in the future are likely to gradually further decrease per capita water use across the service area.

I have prepared two demand forecasts for the Cal-Am Monterey Main service area with growth rates based on AMBAG’s anticipated population increase in 2040 and the water usage of each sector – residential, commercial, public and re-sale and non-revenue water. In each forecast, demand in each of Cal-Am’s sectors is increased each year proportionally to the increase in population. The “Current gpcd” forecast assumes the current rate of daily per person water usage (based on annual production which includes residential, commercial, water loss, irrigation, etc.) continues into the future, without any increases in efficiency or conservation reductions. The “Continued efficiency” forecast includes the impacts of ongoing efficiency improvements by applying an indoor reduction factor.

Under both forecasts, the “Current gpcd” and “Continued efficiency”, Cal-Am will have sufficient and reliable water supplies to meet 2040 demand with the Pure Water Monterey Expansion. Even in the highly unlikely event that Cal-Am achieves no additional water efficiency reductions over the next 20 years, my analysis shows the portfolio of available reliable supplies will exceed demand.

⁵ California-American Water Company. 2019. (U-210-W) Update to General Rate Case Application, A.19-07-004. Direct Testimony of Christopher Cook. (p.10)

⁶ California-American Water Company. 2019. (U-210-W) Update to General Rate Case Application, A.19-07-004. Direct Testimony of Stephanie Locke. (p.9)

⁷ California-American Water Company. 2019. (U-210-W) Update to General Rate Case Application, A.19-07-004. Direct Testimony of Stephanie Locke. (p.10)

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- c) Cal-Am's existing peak capacity is sufficient to meet anticipated future maximum daily demand (MDD) and peak hour demand (PHD) and Cal-Am has yet to avail itself of low/no-cost peak demand management measures that could reduce future peaks, if necessary.**

Peak capacity planning is typically based on metered measurements of peak day and peak hour production maintained by the water provider. To my knowledge, Cal-Am does not publicly report its actual peak day or peak hour demands for the Monterey system. Rather than producing actual measurements, Cal-Am relies on a calculated approach to estimate future peak day usage. This approach was described and carried out in both the MPWMD Report and the MPWMD response, using slightly different assumptions.

Analyses in the MPWMD Report and MPWMD Response show that Cal-Am has the ability to produce 19.41 million gallons per day and 0.81 million gallons per hour. Calculations of future Maximum Daily Demand (MDD) and Peak Hour Demand (PHD) show that Cal-Am must support an MDD of 19.01 MG/day and a PHD of 0.792 MG/hour (based on a July 2012 maximum month demand). Revised analysis in the MPWMD Response using slightly different demand data showed that Cal-Am must support an MDD of 16.13 MG/day and a PHD of 0.672 MG/hour (based on an August 2014 maximum month demand). Under either demand assumption, from an infrastructure standpoint alone, Cal-Am has sufficient capacity to meet future peak day and peak hour demands even under the highly conservative assumptions embedded in the calculated approach.

If managing the peak day or peak hour becomes an issue in the future, Cal-Am has several options it has yet to implement. From an infrastructure standpoint, Cal-Am could increase pumping capacity and add finished water storage. Cal-Am could also choose to implement low-cost peak day and peak hour demand management measures such as prohibiting automatic irrigation at certain times or on certain days or by re-assigning irrigation days of the week to distribute the summertime peak. Sophisticated approaches using smart irrigation controllers could also be employed to ensure optimal irrigation scheduling (Mayer et. al. 2018).

- d) The Hazen Report contains numerous errors, mischaracterizations, and incorrect conclusions regarding Cal-Am's likely demand in 2040 and the availability and reliability of future water supply sources.**

The Hazen & Sawyer peer review report is rife with misleading statements leading to incorrect conclusions regarding California codes, Cal-Am's likely water demand in 2040, and the availability and reliability of future water supply sources. MPWMD's March 6 response to the Hazen Report identifies line by line these errors and misleading statements. In this report I focus on the following problems:

- The Hazen Report repeatedly confuses and conflates peak demand and annual demand planning requirements and offers numerous misleading statements about California codes and standards and AWWA water planning guidance.

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- The Hazen Report makes incorrect statements about water conservation programs and planning without offering data or analysis and states that per capita water use will increase substantially, despite Cal-Am's demand management efforts and prevailing state policy and regulations.
- The Hazen Report asserts that "current" demand in the Cal-Am Main System must be assumed to be 12,350 acre-feet per year. This is far higher than actual current demand and contradicts Cal-Am's own most recent General Rate Case filing which forecasts 2022 demand to be 9,789 acre-feet per year.
- The Hazen Report mischaracterizes the likely future reliability of water supplies available to Cal-Am and in particular the beneficial impacts of the ASR system over time.
- The Hazen Report reaches erroneous conclusions regarding the reliability of future water supplies based on inflated hypothetical demands, misleading statements about planning requirements, and inaccurate characterization of future water supply reliability.

Analysis and Recommendations

Overview

California-American Water Company proposes to construct and operate the Monterey Peninsula Water Supply Project to provide potable water from desalinated water for customers in its service area in the Monterey Peninsula region. One of the main project purposes is to provide an alternative water supply for Cal-Am that will allow it to reduce its water withdrawals from the Carmel River system in accordance with provisions of a cease-and-desist order from the State Water Resources Control Board.⁸

The California Public Utilities Commission has regulatory authority over Cal-Am and its infrastructure. In 2018 the CPUC approved Cal-Am’s application to construct and operate the desalination project. The CPUC approved a smaller overall project than Cal-Am had initially proposed, because of the availability of water from another project – the Pure Water Monterey recycling and aquifer storage and recovery project. The CPUC found the two projects together could produce more than enough water to meet Cal-Am’s expected water demands.

The California Coastal Commission also must review and approve the proposed desalination project under the California Coastal Act because portions of the project are within the coastal zone with the potential to impact environmentally sensitive habitat and other resources. The desalination plant itself would be located outside the coastal zone at a site about two miles inland within the jurisdiction of Monterey County, but components extend through the coastal zone to the Pacific Ocean and the project cannot be constructed without a Coastal Commission approved coastal development permit.⁹

The November 2019 California Coastal Commission staff review considered new information about water supplies and demands that were not available at the time of the 2018 CPUC decision. The Coastal Commission staff found that there is less need for water from new sources than previously determined. Significantly, another project alternative – the expansion of the above-referenced Pure Water Monterey project – has progressed from being too “speculative” for the CPUC to consider as a viable alternative, to now being a feasible, well-developed alternative. This Pure Water Monterey Expansion would occur entirely outside of the coastal zone and would cause far fewer environmental impacts than Cal-Am’s proposed project.

⁸ The original order, issued in 1995, determined that Cal-Am was extracting over 14,000 acre-feet per year from the river when it had a legal right to 3,376 acre-feet. The Board determined that these excess withdrawals were adversely affecting the river’s population of federally-threatened Central Coast steelhead. The Board ordered Cal-Am to develop or purchase alternative water supplies so it could end its excess withdrawals. Subsequent orders issued by the Board have included additional requirements, with Cal-Am currently required to end its excess withdrawals and be able to rely on a new source of water by December 2021.

⁹ California Coastal Act, Sections 30108, 30260

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The recently developed Pure Water Monterey Expansion along with revised water supply and demand information were considered and included in the Staff Report¹⁰ of October 28, 2019. The Staff report recommended denying Cal-Am's permit request to construct elements of the desalination project in the coastal zone due to its inconsistency with the Local Coastal Program's habitat protection and hazards policies, its failure of the three tests of Coastal Act Section 30260, and its failure of the alternatives consideration of Section 30233.

The California Coastal Commission has yet to approve or deny Cal-Am's proposal.

Coastal Commission 2019 Staff Report

Cal-Am's proposed desalination project is subject to the Coastal Act and the City of Marina Local Coastal Plan that require the California Coastal Commission to determine among other things, "whether there is a feasible and less environmentally damaging alternative to the proposed project".

The Staff Report provides the Coastal Commission staff's assessment of the proposed project's conformity to the City of Marina Local Coastal Plan (LCP) and Coastal Act's public access and recreation policies for purposes of the Commission's *de novo* review. The report also provides staff's assessment of the project's conformity to relevant Coastal Act provisions for those project components proposed within the Commission's consolidated permit jurisdiction.

Inconsistent Project

The Staff Report recommended that the California Coastal Commission deny both the *de novo* and consolidated permit aspects of the proposed project because the proposed desalination project is inconsistent with the Coastal Act and/or Local Coastal Plan including the following.¹¹

1. **Environmentally Sensitive Habitat Areas (ESHA)** - The proposed project could adversely affect up to about 35 acres of ESHA. The project is inconsistent with requirements of both the City LCP and the Coastal Act that allow uses in ESHA only if they are dependent on those habitat resources.
2. **Coastal hazards** - The proposed project's well field would be sited at a location where it could be adversely affected by coastal erosion and the associated inland movement of foredunes that could bury the well heads.
3. **Protection of coastal water quality** - The proposed project would involve placement of fill in coastal waters in the form of new or modified outfall diffusers and monitoring buoys. In this case there is a feasible and less damaging alternative to the proposed fill, so the project would not conform to the alternatives requirement of Section 30233.

¹⁰ Staff Report: Recommendation on Appeal Substantial Issue & De Novo Hearing and Consolidated Coastal Development Permit, California Coastal Commission, Application 9-19-0918 / Appeal A-3-MRA-19-0034 (California American Water Co.). (p 7)

¹¹ Staff Report (pp. 4-5)

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Three-Part Test for an Inconsistent Project

Coastal Act Section 30260, which is incorporated into the Local Coastal Plan, provides that the Coastal Commission may approve a permit for a coastal-dependent facility that is otherwise inconsistent with other Coastal Act Chapter 3 policies if it meets a three-part test. The three test components that must be met are:

- 1) Alternative locations are infeasible or more environmentally damaging
- 2) Denial of the permit would not adversely affect the public welfare
- 3) The project's adverse effects are mitigated to the maximum extent feasible

The Staff Report addresses each of these three tests as outlined below.¹² The Staff Report concluded that the Cal-Am's proposed desalination project failed each test.

Test 1: Are alternative locations infeasible or more environmentally damaging?

The Staff Report states that, "another project, known as the Pure Water Monterey Expansion, would provide enough water to meet Cal-Am's needs for the next twenty years or more and would cause fewer adverse environmental impacts, including few, if any, on coastal resources, since it would be located outside the coastal zone."¹³

The Staff Report recommends the Commission find that Cal-Am's proposed project does not meet this first test of Section 30260, since there is a feasible, less environmentally damaging alternative to the proposed project that could be constructed in a different location.

Test 2: Would denying the project adversely affect the public welfare?

The Staff Report agrees there is a "clear need" for additional water supply to serve the Monterey Peninsula region and concludes that there is a "feasible and less environmentally damaging alternative that can supply sufficient water to allow Cal-Am to meet its legal obligations and to supply its customers for the coming decades."¹⁴

The Staff Report concluded that the costs of the proposed desalination project are substantially higher than other water sources, including the PWM Expansion, and would be borne by ratepayers and visitors to this coastal area.

From an environmental justice perspective the Staff Report notes, "Several communities of concern would be burdened by Cal-Am's project due to the higher costs for water it would impose or due to expected or potential impacts resulting from the construction and operation of some project components in areas of sensitive habitat or that provide public access to the shoreline."¹⁵

¹² Staff Report (pp. 5-6)

¹³ Staff Report (p.6)

¹⁴ Staff Report (p.6)

¹⁵ Staff Report (p.6)

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The Staff report concluded that Cal-Am’s proposed desalination project would “result in adverse effects to coastal resources – for example, sensitive habitat areas – that would diminish the public benefit from those coastal resources. The alternative project would entirely avoid those coastal resource impacts.”¹⁶

Test 3: Are the project impacts mitigated to the maximum extent feasible?

Here the Staff Report concludes that “because the proposed project does not meet either of the first two tests of Section 30260, there is no need to determine whether it meets the third test. Nonetheless, Commission staff have determined that the proposed project’s impacts are not mitigated to the maximum extent feasible. For example, the project could adversely affect up to several dozen acres of sensitive habitat, but the mitigation proposed thus far would result in a net loss of that sensitive habitat. Similarly, the proposed project would result in adverse effects to coastal water quality, but those effects, and the measures needed to avoid or minimize them, are not yet known.”¹⁷

Feasible Alternative that Meets All or Most Objectives

The November 2019 California Coastal Commission staff review considered new information about water supplies and demands that were not available for the 2018 CPUC decision. The Coastal Commission staff found that there is less need for water from new sources than previously determined. Significantly, another project alternative – the Pure Water Monterey project – has progressed from being too “speculative” for the CPUC to consider as a viable alternative, to now being a feasible, well-developed alternative. This Pure Water Monterey Expansion would occur entirely outside of the coastal zone and would cause far fewer environmental impacts than Cal-Am’s proposed project.

The Pure Water Monterey Expansion along with revised water supply and demand information were considered and included in the Staff Report of October 28, 2019 which concluded based on data and analyses, “that there is a feasible and less environmentally damaging alternative that would meet all or most of the proposed project’s objectives in a timely manner.”¹⁸

This conclusion relies on three core components:

- 1) A feasible alternative exists.¹⁹
- 2) The alternative is less environmentally damaging.
- 3) The alternative would meet all or most of the proposed project’s objectives in a timely manner.

¹⁶ Staff Report (p.6)

¹⁷ Staff Report (pp.6-7)

¹⁸ Staff Report (p. 7)

¹⁹ The Coastal Act Section 30108 states “‘Feasible’ means capable of being accomplished in a successful manner with a reasonable period of time, taking into account economic, environmental, social, and technological factors.”

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The Staff Report relied on analyses and opinions contained in reports and applications prepared by the Monterey Peninsula Water Management District (MPWMD) as they relate to future water supply and water demand of the Cal-Am on the Monterey Peninsula.

Cal-Am Monterey System

The Cal-Am Monterey water system serves most of the population on the Monterey Peninsula, located along the coast of Central California. The Monterey Main system encompasses greater than 90-percent of the Monterey County District service area and is the area to be served with the proposed desalination plant. The Monterey Main system and includes the incorporated cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, and Seaside as well as unincorporated communities of Pebble Beach, Carmel Valley East and West, Carmel Highlands, and the Presidio of Monterey.²⁰

Cal-Am also serves a number of unincorporated satellite systems, including the communities of Hidden Hills, Ryan Ranch, Bishop, Ambler, Ralph Lane, Chualar, Garrapata, and Toro. These satellite systems encompassed an area greater than 7,000 acres and service a total population of 5,313 in 2010. Other than Garrapata, Ralph Lane and Chualar, the satellite systems border the Monterey Main system. By 2022, Hidden Hills, Ryan Ranch, and Bishop will be interconnected to the Monterey Main system.

A map delineating the service area of Cal-Am Monterey prepared by the MPWMD is shown in Figure 1.

²⁰Cal-Am 2010 Urban Water Management Plan. 9/7/2012. Water Systems Consulting, Inc.

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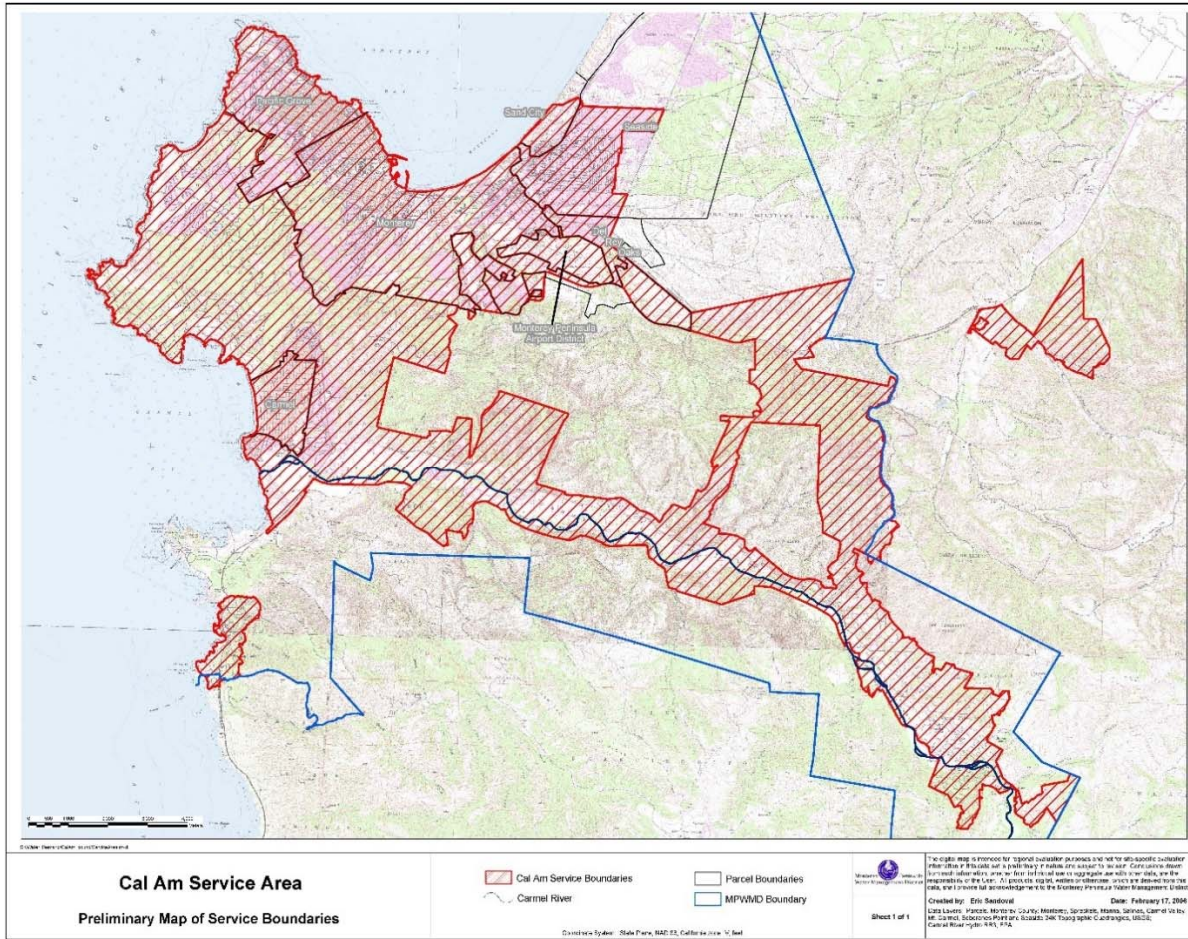


Figure 1: Cal-Am Monterey service area boundaries²¹

Population Served

The Association of Monterey Bay Area Governments (AMBAG) prepares regional population and growth forecasts for the region. The most recently available forecast, the AMBAG 2018 Regional Growth Forecast, estimates the 2020 service area population of the Cal-Am Monterey Main service area to be 91,884.²² This population is forecast to increase to 100,814 in 2040. These population estimates include Monterey, Pacific Grove, Carmel-by-the-Sea, Sand City, Seaside, Del Rey Oaks, and portions of the unincorporated County.²³ The MPWMD Report notes that the population estimates likely overstates growth to 2040 because portions of the cities of

²¹ Monterey Peninsula Water Management District. Map created by Eric Sandoval. 2/17/2006

²² Association of Monterey Bay Area Governments. 2018 Regional Growth Forecast. Table 8, page 32.

²³ Unincorporated county estimates based on Cal-Am service area population reported to the State Water Resources Control Board June 2014 – September 2019 Urban Water Supplier Monthly Reports (Raw Dataset), minus urban areas, escalated at 5%.

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Monterey, Seaside, and Del Rey Oaks within the Fort Ord Buildout will be served water by the Marina Coast Water District.²⁴

Water Production and Demand

Annual Production

Annual water production for the Monterey System from 2000 – 2019 are shown in Figure 2 along with shaded periods added to indicate the influence of mandatory drought restrictions and recession. For this purposes of this report, total water production is assumed to be equivalent to the total annual water demand in the system inclusive of all water use, non-revenue water, and treatment losses.

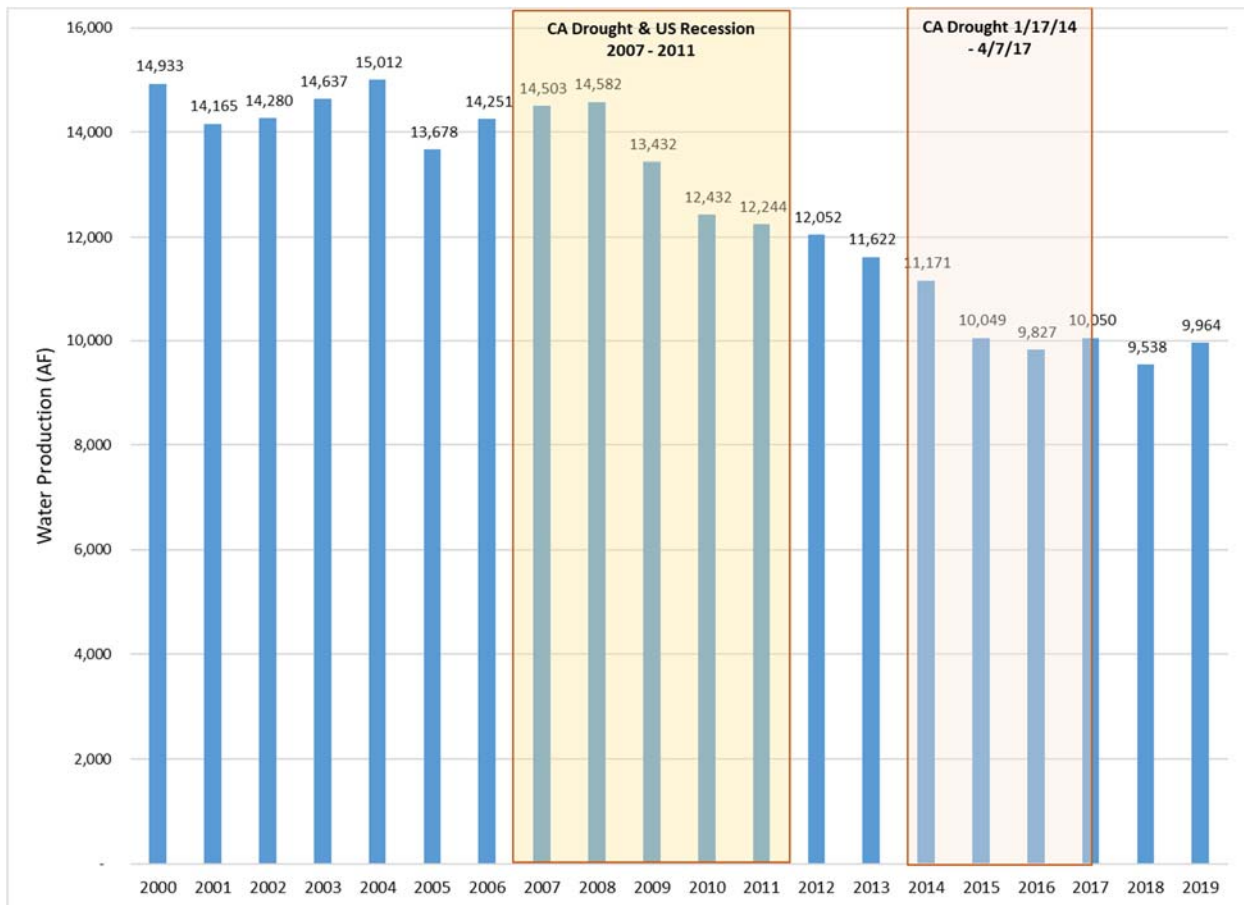


Figure 2: Cal-Am Monterey Main water production, 2000 - 2019²⁵

²⁴ Monterey Peninsula Water Management District. 2020. Supply and Demand for Water on the Monterey Peninsula prepared by David Stoldt, General Manager. Appendix A.

²⁵ 2017 – 2019 From Cal-Am quarterly reports to the California State Water Resources Control Board. 2000 – 2016 From Monterey Peninsula Water Management District. 2019. Supply and Demand for Water on the Monterey Peninsula prepared by David Stoldt, General Manager. Figure 1.

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From Figure 2 it is evident water production in the Monterey System was reasonably steady from 2000 – 2008, with the exception of the steep decline in 2005. In 2009 production began to steadily decrease and the decline didn't stop until 2016. During this 8-year period, steep demand reductions occurred during years when California was in an officially declared drought paired with an economic recession, but production reductions also occurred in 2012 and 2013 which were non-drought and recession influenced years. Over the most recent five-year period, 2015 – 2019, water production in the Monterey Main service area averaged 9,885 AF per year.

Comment on Data Sources

Cal-Am publishes and regularly updates monthly and annual water deliveries for Monterey Main, Hidden Hills, Ryan Ranch & Bishop on its website for the desalination project.²⁶ Monthly data going back to 2007 are available from the testimony of Ian Crooks (2012)²⁷. I compared these published records with the production data set used in the MPWMD Report and (for 2017-19) with Cal-Am's quarterly and annual reports to the California State Water Resources Control Board.

The monthly data published on Cal-Am's website and in Ian Crooks testimony, while very similar was generally lower than the annual values in the MPWMD Report. Production from Cal-Am's quarterly and annual reports to the California State Water Resources Control Board for the three most recent years (2017-2019) was higher than either the delivery values published on Cal-Am's web site or the values in the MPMWD Report.

For the purposes of the demand forecasts prepared in this report, WaterDM used the higher production values reported to the State Water Resources Control Board and the higher production values from the MPMWD Report to establish the starting point for the demand forecast, rather than the lower delivery values from Cal-Am. WaterDM's forecasts are therefore conservative in that they are based on the highest published values of annual water production for the Monterey Main System.

Monthly Deliveries

While not relied upon as the starting point for WaterDM's demand forecasts, Cal-Am's published delivery data were used to analyze the seasonality of demand on the Monterey Main System. Monthly production is shown in Figure 3 with the period of recent drought declaration highlighted. A linear trendline is also added.

²⁶ <https://www.watersupplyproject.org/system-delivery> (accessed 3/25/2020)

²⁷ Direct Testimony of Ian Crooks Before the Public Utilities Commission of the State of California. Application 12-04-019 (Filed April 23, 2012) (p.9)

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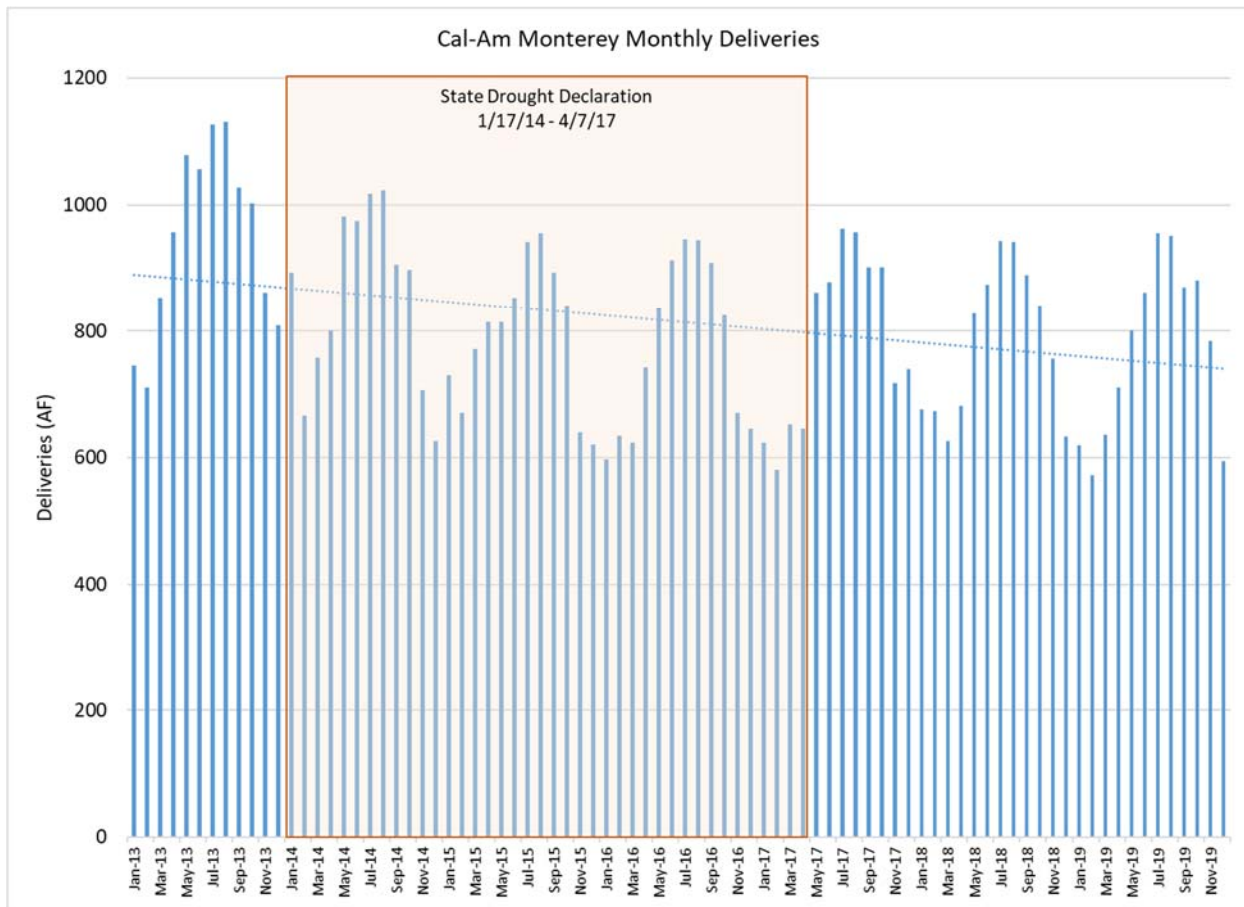


Figure 3: Cal-Am Monterey monthly deliveries

Using these published monthly data, I found the minimum and maximum month of delivery for each year. The average annual non-seasonal (predominantly indoor) deliveries for each year was calculated as the average water use in January, February, November and December multiplied by 12. Seasonal production for each year was calculated by subtracting non-seasonal from total production. These data and results are shown in as a chart in Figure 4 and in Table 1.

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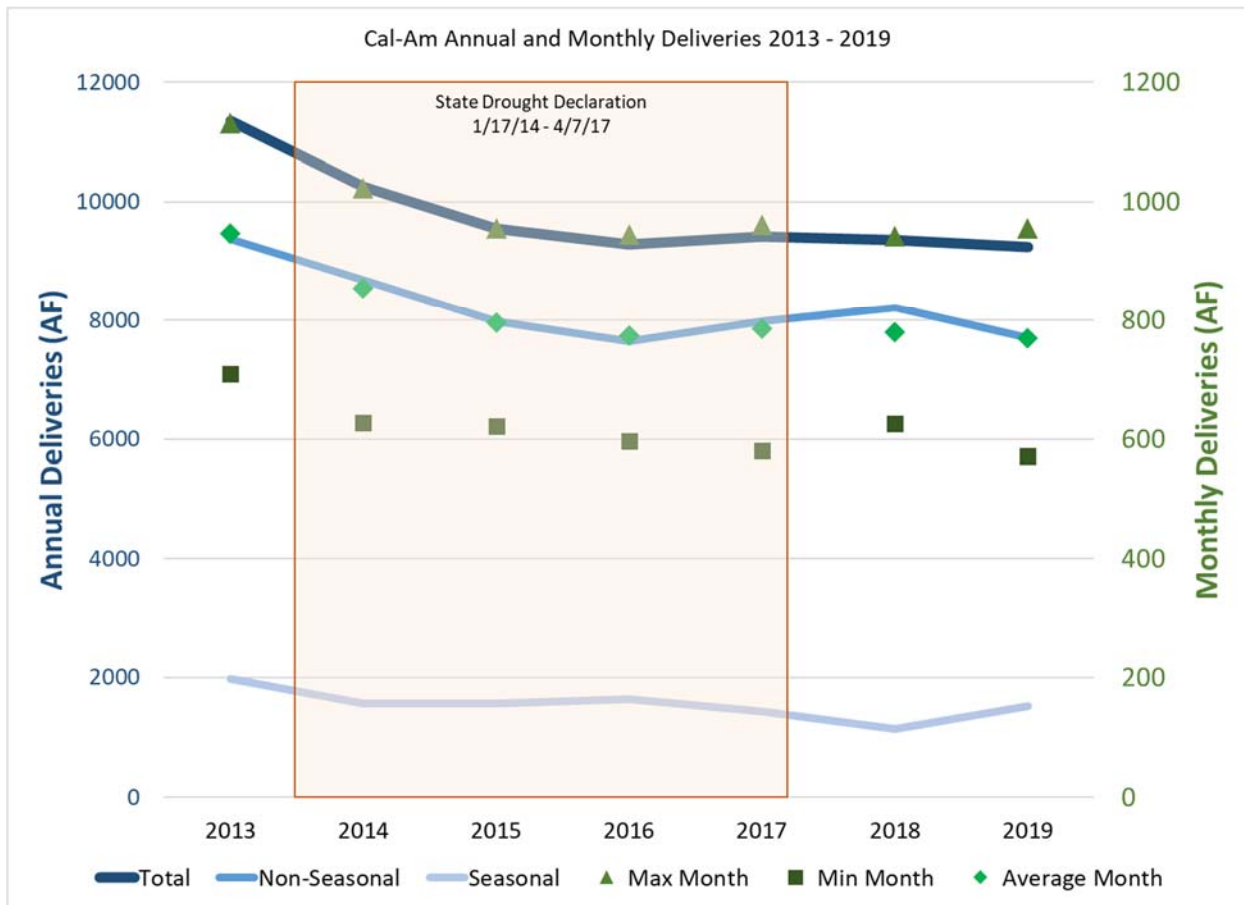


Figure 4: Cal-Am Monterey annual and Monthly Deliveries, 2013 - 2019²⁸

Seasonal deliveries provide an estimate of summertime demand including outdoor irrigation and summertime tourism use. Non-seasonal deliveries provide an estimate of baseline indoor use and non-revenue water that occur throughout the year.

On average, seasonal deliveries accounted for 15.8% of Cal-Am’s total across these seven years and ranged between 12.3% and 17.7%. Non-seasonal deliveries accounted for between 82.3% and 87.7% of usage from 2013 – 2019.

This analysis shows that the demand reductions achieved from 2013 - 2016 were largely in the non-seasonal (predominantly indoor use) category. Seasonal demand did decline during this period, but not nearly as much as non-seasonal demand.

Both the minimum and the maximum month deliveries for each year has also been declining since 2013. The minimum month of delivery in 2019 was the lowest of any of the past seven years. Notably, 2019 also had the higher annual precipitation in the region than any of the other years shown.

²⁸ From production data published at: <https://www.watersupplyproject.org/system-delivery> (accessed 3/25/2020)

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Table 1: Cal-Am monthly deliveries and annual statistics²⁹

Month	2013	2014	2015	2016	2017	2018	2019	2020
Jan	745	893	730	597	624	676	620	628
Feb	710	667	671	635	581	673	572	650
Mar	853	757	771	623	653	626	636	
Apr	957	800	814	742	645	682	710	
May	1079	982	814	836	861	828	801	
Jun	1056	975	853	912	878	874	861	
Jul	1127	1018	942	946	962	943	955	
Aug	1131	1023	956	944	957	941	951	
Sep	1027	906	893	909	902	889	870	
Oct	1002	897	840	826	901	841	881	
Nov	861	707	640	670	717	756	784	
Dec	809	627	621	646	740	633	594	
Total Annual Deliveries	11,356	10,250	9,545	9,285	9,421	9,362	9,234	
Maximum Month	1131	1023	956	946	962	943	955	
Minimum Month	710	627	621	597	581	626	572	
Average Month	946.4	854.3	795.4	773.8	785.1	780.2	769.6	
Annual Non-Seasonal	9,375	8,682	7,986	7,644	7,986	8,214	7,710	
Annual Seasonal	1,981	1,568	1,559	1,641	1,435	1,148	1,524	
%Seasonal	17.4%	15.3%	16.3%	17.7%	15.2%	12.3%	16.5%	
Total Annual Production (from Figure 2)	11,622	11,171	10,049	9,827	10,050	9,538	9,964	
Difference between Production and Deliveries	266	921	504	542	629	176	730	
% Difference	2.3%	8.2%	5.0%	5.5%	6.3%	1.8%	7.3%	

Note on Data Differences

The volume of water produced by Cal-Am annually as shown in Figure 2 are based on Cal-Am’s quarterly and annual reports to the State Water Resources Control Board (2017-2019) and the

²⁹ From delivery data published at: <https://www.watersupplyproject.org/system-delivery> (accessed 3/25/2020) Includes: Monterey Main, Hidden Hills, Ryan Ranch & Bishop.

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MPWMD Report and are higher than the delivery values reported on Cal-Am’s website (Figure 3, Figure 4, and Table 1).

As noted above, for the purposes of forecasting future production reflecting the needs of the community, WaterDM used the higher values reported to the State Water Resource Control Board for 2017, 2018, and 2019. For Years 2000- 2016 WaterDM used the MPWMD Report values (also higher than Cal-Am’s monthly reports) so that the highest reported baseline production values were used to consider baseline consumption.

Per Capita Water Use

WaterDM prepared an independent calculation of per capita water use based on the production volumes shown in Figure 2 and population data from AMBAG. System per capita use is calculated as the total volume of water produced at the source divided by the service area population and the number of days in the year. This calculation of system per capita use is based on production and thus inclusive of all water use, non-revenue water, and treatment losses.

System per capita use in the Cal-Am Monterey Main System in 2010 was 127.0 gpcd. This was highest level of gpcd over the past 10 years. In 2019, system per capita use was 97.3 gpcd and in 2018 it was 93.6 gpcd. Ten years of daily system per capita use for the Monterey Main System in shown in Table 2.

Table 2: Per capita water use, 2010 - 2019

Year	Population	Production	Per Capita	Source of Production Data
2010	87,419	12,432	127.0	MPMWD Report
2011	87,866	12,244	124.4	MPMWD Report
2012	88,312	12,052	121.8	MPMWD Report
2013	88,759	11,622	116.9	MPMWD Report
2014	89,205	11,171	111.8	MPMWD Report
2015	89,652	10,049	100.1	MPMWD Report
2016	90,098	9,827	97.4	MPMWD Report
2017	90,545	10,050	99.1	SWRCB Quarterly Reports
2018	90,991	9,538	93.6	SWRCB Quarterly Reports
2019	91,438	9,964	97.3	SWRCB Quarterly Reports

Water Demand by Sector

Cal-Am’s 2019 water demand by sector is shown as a pie chart in Figure 5, based on data presented in 2019 testimony.³⁰ As shown in Figure 2, 2019 was not a drought year nor was it

³⁰ Direct Testimony of David Mitchell Before the Public Utilities Commission of the State of California. Application 19-07-004 (Filed July 1, 2019)

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impacted by economic recession. Residential use including single- and multi-family customers used 58% of the total produced in 2019. Commercial and industrial customers used 30%, the public / other sector used 5%, and non-revenue was 7%. Non-revenue water includes real and apparent water loss as well as authorized and unauthorized uses for which the utility does not collect revenue.³¹

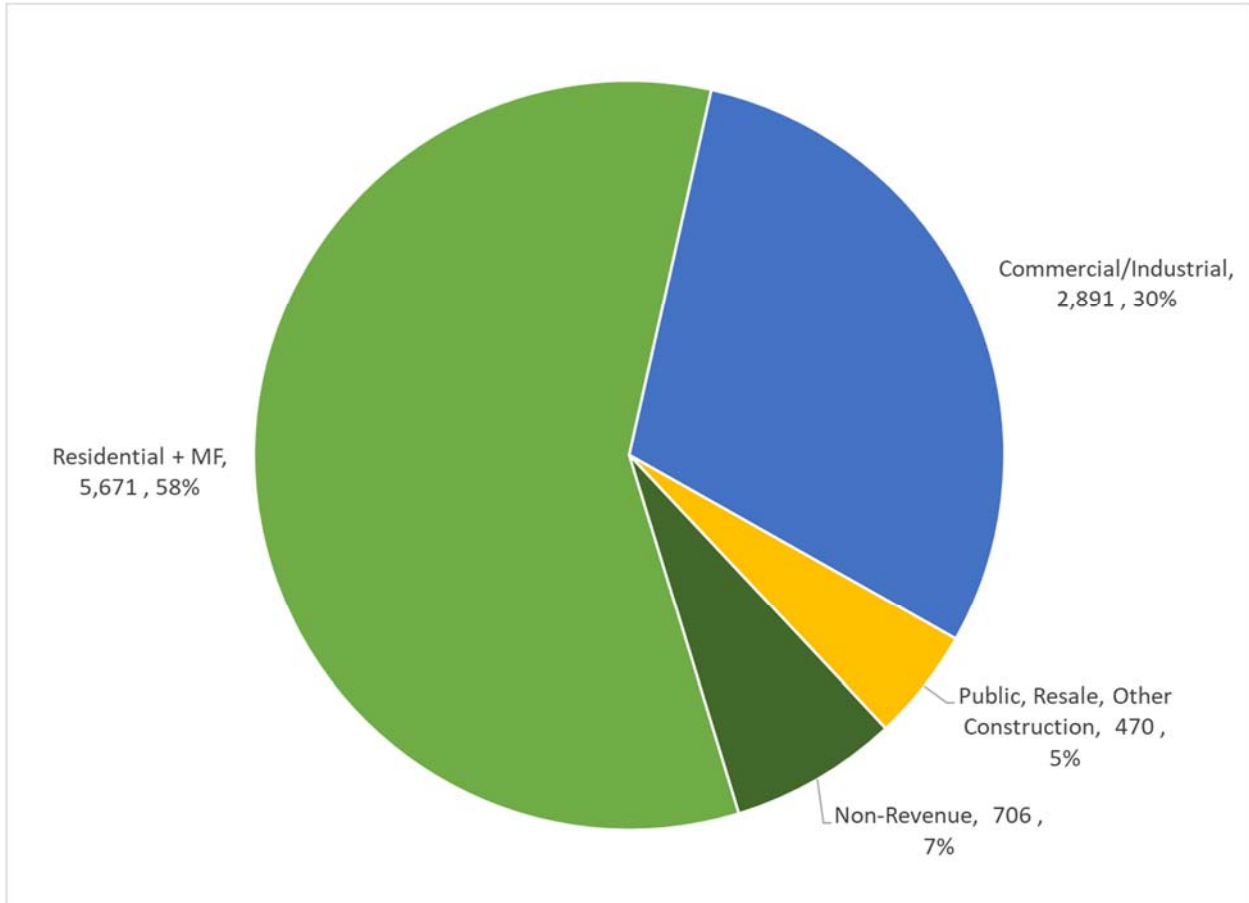


Figure 5: 2019 Cal-Am Monterey Main System demand by sector³²

³¹ In 2009 the residential sector used 59%, commercial/industrial sector 22%, non-revenue 9%, public/other 8%, golf course irrigation 2%.

³² Direct Testimony of David Mitchell Before the Public Utilities Commission of the State of California. Application 19-07-004 (Filed July 1, 2019)

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Water Demand Management

Water demand management includes five core components:³³

1. **Technical efficiency** - reducing the quantity or quality of water required to accomplish a specific task (e.g. a high-efficiency toilet).
2. **Behavioral efficiency** - Adjusting the nature of the task so it can be accomplished with less water or lower quality water (e.g. take a shorter shower).
3. **Water loss and leakage control** - Reducing losses in movement from source through use to disposal including reducing leakage in the distribution system and customer-side leaks.
4. **Peak management** - Shifting time of use to off-peak periods.
5. **Drought response** - Increasing the ability of the system to operate during droughts.

Both Cal-Am and the Monterey Peninsula Water Management District implement active, far-reaching, and effective water demand management programs that address all five of these core components. The water demand data presented in the previous section of this report and in particular Figure 2 show a steady reduction in water demand in the Cal-Am Monterey Main system which was achieved through the active and intentional water demand management efforts implemented in the region. The reduction in per capita use over the past 10 years shown in Table 2 is further indication of increased water use efficiency.

The Monterey region has been regarded as a model for water conservation programs for many years. Cal-Am and the Monterey Peninsula Water Management District implement an array of effective demand management policies and programs that are likely to extend water efficiency gains. Cal-Am implements an active water conservation program including a steeply inclining five-tier block rate pricing structure and customer incentives for installing drought tolerant landscapes and high-efficiency fixtures and appliances. Cal-Am also implements a rigorous utility-scale water loss control program aimed at reducing real losses in its distribution system. Local development regulations ensure that all new and remodeled buildings are equipped with high-efficiency fixtures and appliances.

Cal-Am acknowledged the level of effort, significance, and impact of this conservation program in recent testimony. “California American Water has expended significant effort and resources to encourage conservation in the Monterey County District through a variety of methods. Most important has been the tiered rate design, which features steeply inclining block rates to encourage efficient water use.” – Direct Testimony of Christopher Cook, July 1, 2019.

Mr. Cook’s testimony is backed up by testimony from Stephanie Locke, Water Demand Manager for the Monterey Peninsula Water Management District, and the significant financial resources Cal-Am continues to apply toward water conservation in the region. In its most

³³ Adapted from Brooks, D.B. 2007. An Operational Definition of Water Demand Management. International Journal of Water Resources Development. Volume 22, 2006 - Issue 4

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recent General Rate Case, Cal-Am proposed a \$1.845 million three-year budget (\$615,132 per year) to fund water conservation programs in the Monterey service area. Locke's testimony notes that many of the conservation programs budgeted in the General Rate Case and in the prior Cal-Am rate filings focus on reductions in outdoor water use, on reductions in demand areas that have not previously been extensively targeted, and on maintaining the current low water use fixtures that have been installed to date.

Cal-Am's local efforts are in parallel to broader policy measures at the state level, designed to further increase efficiency. The State of California has implemented a series of laws and directives to ensure future water efficiency across the state including Assembly Bill 1668 and Senate Bill 60 which effectively mandate an ongoing reduction in per capita use. Cal-Am's continued compliance with these regulations and its active efforts to reduce customer water demand in the future are likely to gradually further decrease per capita water use across the service area.

Peak demand management to shift the timing to off peak periods is already being practiced to some degree in the Cal-Am service area but could be expanded and adjusted if necessary. Peak demand days usually occur during the hot and dry part of the year when outdoor irrigation occurs simultaneously across the service area. Currently Cal-Am restricts outdoor irrigation between 9 a.m. and 5 p.m. on any day. Irrigation is only permitted on two specific days per week (Wednesdays and Saturdays) unless the customer is equipped with a weather-responsive "smart" controller that automatically adjusts irrigation to meet prevailing climate conditions. These are all effective measures but focusing some irrigation demand on Wednesdays and Saturdays could have the unintended impact of creating peaks on those particular days. Cal-Am does not report measured peak day demand data so it was not possible to determine if this is in fact the case.

Should peak demands become a concern, Cal-Am could choose to implement low-cost peak day and peak hour demand management measures such as requiring automatic irrigation to be scheduled at certain times or on certain days by re-assigning irrigation days of the week to distribute the summertime peak. If smart irrigation controllers are widespread, then more sophisticated approaches to irrigation scheduling and timing could also be employed to harmonize demand with water production and finished water storage conditions (Mayer et. al. 2018).

Water Demand Forecasts

WaterDM prepared two forecasts for the Cal-Am Monterey Main System to estimate future average annual production, inclusive of treatment losses and non-revenue water. The growth rate in each forecast is based on AMBAG's anticipated population increase from 2020 to 2040.³⁴

³⁴This likely over-estimates Cal-Am's future growth because it includes new population in portions of the cities of Monterey, Seaside, and Del Rey Oaks within the Fort Ord Buildout that will be served water by the Marina Coast Water District.

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Each component of Cal-Am’s demand – residential, commercial, public/other/re-sale, non-revenue water, and treatment losses was increased each year proportionally to the increase in population to produce a forecast of future average annual production, inclusive of treatment losses and non-revenue water.

- The “Current gpcd” forecast assumes the current rate of daily per person water usage continues into the future, without any increases in efficiency or conservation reductions.
- The “Continued efficiency” forecast includes the impacts of ongoing efficiency improvements by applying an indoor reduction factor.

These annual demand projections were built up from the analysis of historical production and deliveries presented above. The year 2020 is the first year of the projection, which then continues for 20-years to produce average annual demands in 2040. Over the most recent five-year period, 2015 – 2019, water production in the Monterey Main service area averaged 9,885 AF per year. This level of production was the starting point for the WaterDM forecasts.

Production was split out by sector and future demand was increased proportionally with population increases to 2040. The four sectors included in the model are:

- Residential (single-family + multi-family)
- Commercial and industrial
- Public, resale, other, construction
- Non-revenue water

The summed annual demand of these four categories equals the estimated water supply requirement under average future conditions. The model allows specific factors to be applied to the non-seasonal or seasonal component of annual demand for each demand category, to simulate the impacts of water efficiency and conservation programs.

The two forecasts prepared by WaterDM – “Current gpcd” and “Continued efficiency” are shown in Figure 6 along with the forecast demands included in Cal-Am’s filings provided to the CPUC. Notably, WaterDM’s 2020 – 2022 forecasts are higher than the forecasts Cal-Am General Rate Case Application forecast which estimated demand for 2021 and 2022 at 9,789 acre-feet per year.

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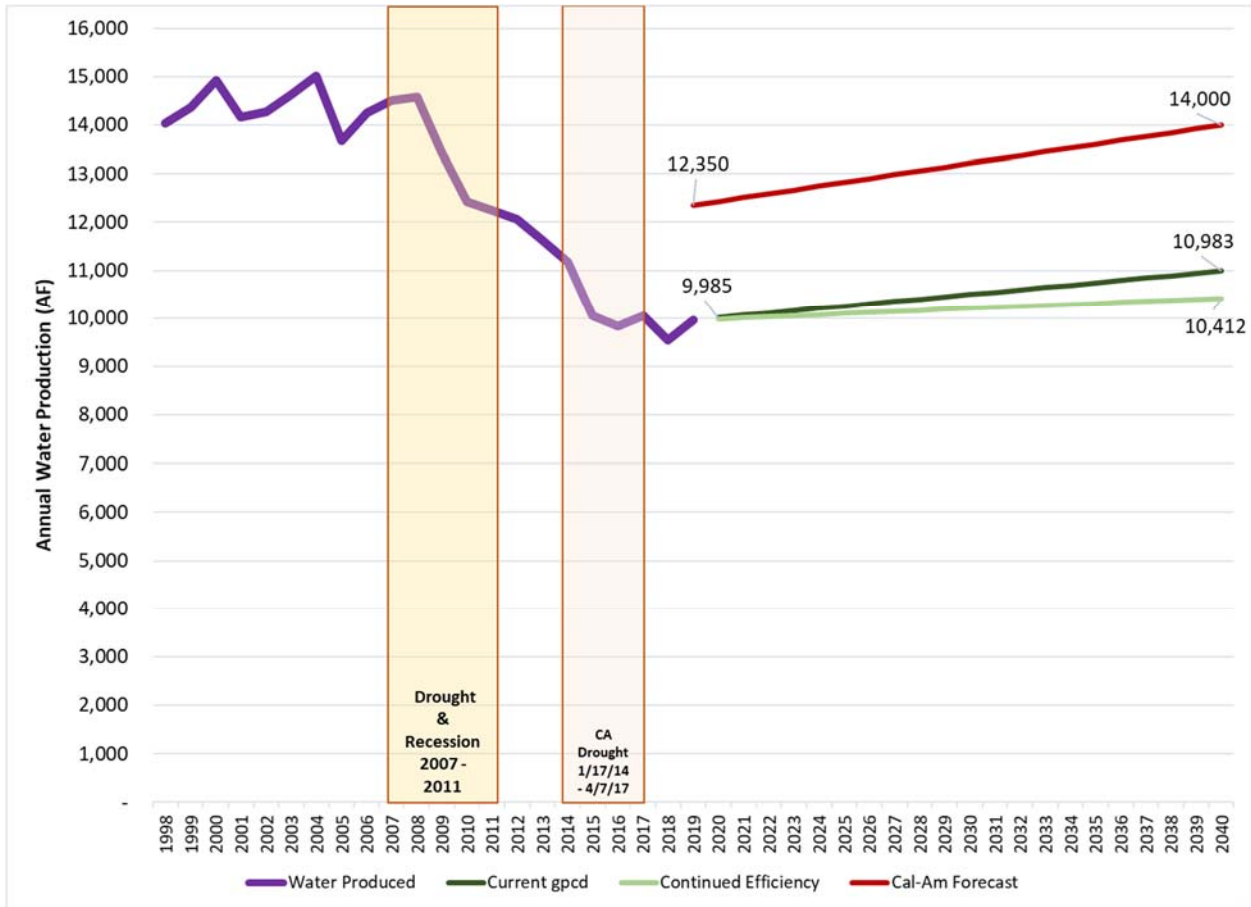


Figure 6: WaterDM forecasts of future average annual production

Current GPCD Forecast

The “Current gpcd” forecast includes ongoing conservation efforts only at levels required to maintain current per-capita water use with no additional savings. This forecast results in a future per-capita water use that is identical to the current level. The 2020 and 2040 statistics for the forecast are shown in Table 3.

Table 3: Current GPCD Forecast

	2020	2040
Population	91,884	100,814
Production Forecast	9,985 AF	10,983 AF
Per Capita Use Forecast	97.3	97.3

Continued Efficiency Forecast

The “Continued efficiency” forecast represents future production assuming slow, steady ongoing demand reductions from existing conservation activities relative to current per-capita use. This forecast results in a per-capita water use in 2040 that is 5.2% lower than current level.

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Specifically, the “Continued efficiency” forecast includes the anticipated impacts of continuing the long-term water conservation program measures described in published documents and recent testimony from Cal-Am and MPWMD. It does not assume any drought restrictions or mandatory demand curtailments are applied.

The “Continued efficiency” forecast incorporates a modest level of increased efficiency of about 0.26% per year over 20 years. In my professional judgement, the “Continued efficiency” forecast represents the most likely forecast of future average annual production, inclusive of treatment losses and non-revenue water.

Table 4: Continued Efficiency Forecast

	2020	2040
Population	91,884	100,814
Production Forecast	9,985 AF	10,412 AF
Per Capita Use Forecast	97.3 gpcd	92.2 gpcd

Cal-Am Demand Forecast

The demand forecast provided to the CPUC as part of Cal-Am’s application for the proposed desalination plant are included with the AMBAG population forecast and per capita use for comparison. The Cal-Am forecast includes an estimate of “current” demand and a forecast of demand in 2040.

Table 5: Cal-Am Forecast

	2020	2040
Population	91,884	100,814
Production Forecast	12,350 AF	14,000 AF
Per Capita Use Forecast	120.0 gpcd	124.0 gpcd

Water delivery patterns have changed substantially in the region and perhaps as a result, Cal-Am has produced conflicting forecasts. The Cal-Am forecast submitted to the CPUC differs substantially from Cal-Am’s own more recent General Rate Case Application forecast which estimated demand for 2021 and 2022 at 9,789 acre-feet per year.³⁵ The magnitude of the changes in demand and the differences in the forecasts is significant and has implications for water planning. Cal Am’s own most recent forecast estimates 2022 demand to be 20% lower than “current” demand in the CPUC decision.

The Cal-Am forecast also results in an inflated value for gpcd. Using the “current” Cal-Am forecast of 12,350 AF and the current AMBAG population results in a calculated current gpcd of

³⁵ California-American Water Company. 2019. (U-210-W) Update to General Rate Case Application, A.19-07-004.

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120.0 which is 23% higher than WaterDM's fully inclusive calculation of Cal-Am Monterey Main system gpcd in 2019 which was 97.3 gpcd. This forecast doesn't square with Cal-Am's stated intent to spend more than \$1.8 million over three years on its water conservation programs and with state regulations and policies that incentivize demand reductions. The Cal-Am forecast doubles down on the problem and inflates per capita use up to 124 gpcd in the year 2040.

A 2040 level of 124 gpcd is extremely unlikely and such a dramatic and remarkable reversal in water use efficiency is inconsistent with the state and local directives and contradicts recent sworn testimony from Cal-Am in its current General Rate Case. Customers in the Cal-Am Monterey service area are among the most water efficient in the state. The outdated Cal-Am forecast unreasonably assumes that these customers will go from being the most efficient to becoming among the least water efficient in California over the next 20 years.

Water Supply

Introduction

The November 2019 California Coastal Commission staff analysis considered new information about water supplies (and demands) that were not available for the 2018 CPUC decision. As a result of this new information, the Coastal Commission staff found that there is less need for water from new sources than previously determined and that a project alternative – the expansion of the above-referenced Pure Water Monterey project – had progressed from being too “speculative” for the CPUC to consider as a viable alternative, to being a feasible, well-developed alternative. This Pure Water Monterey Expansion would occur entirely outside of the coastal zone and would cause far fewer environmental impacts than Cal-Am's proposed project.

The recently developed Pure Water Monterey Expansion along with revised water supply and demand information were considered and included in the Staff Report³⁶ of October 28, 2019 in which the Staff report recommended denying Cal-Am's permit request to construct elements of the desalination project in the coastal zone due to its inconsistencies with the Coastal Act and the Local Coastal Program's habitat protection and hazards policies, its failure of the three tests of Coastal Act Section 30260, and its failure of the alternatives consideration of Section 30233.

I considered the available, reliable water supply sources for Cal-Am Monterey to utilize out to the year 2040 including the existing Pure Water Monterey project and its expansion. Based on this analysis I agree with the conclusions in the 2019 Staff Report. With the addition of the Pure Water Monterey Expansion providing an additional 2,250 acre-feet per year of supply to Cal-Am, the combination of Cal-Am's available and projected water resources total 11,650 acre-feet of reliable supply. This provides sufficient supply potential to meet annual future demand in 2040 by more than 1,200 acre-feet above WaterDM's most-likely “Continued efficiency” forecast.

³⁶ Staff Report: Recommendation on Appeal Substantial Issue & De Novo Hearing and Consolidated Coastal Development Permit, California Coastal Commission, Application 9-19-0918 / Appeal A-3-MRA-19-0034 (California American Water Co.). (p 7)

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Water Supply for the Monterey Main System

Cal-Am delivers water to its Monterey Main system from a diverse collection of water sources. This will remain true into the future, even with the Pure Water Monterey Expansion or the proposed desalination plant. Figure 7 shows historic and projected deliveries in the Monterey Main system including the Pure Water Monterey projects along with the two water demand forecasts prepared by WaterDM. All of the supply sources shown in Figure 7 and are documented in Table 6. The anticipated available reliable water supply in 2040 from each source is included and the total is 11,650 AF. Each source of water and the volume of available reliable supply is described in detail in the sections below.

Cal-Am has historically relied heavily on withdrawals from the Carmel River water and Seaside Basin groundwater to provide water to the Monterey Main system. In the future withdrawals from both sources must be reduced. Cal-Am must carefully manage its supply portfolio in the coming years regardless of the Coastal Commission's ruling regarding the desalination project. Even under the best of circumstances it will be at least 2022 before either the Pure Water Monterey Expansion or the proposed desalination project are online.

The focus of the Coastal Commission staff analysis and recommendations was on the availability of sufficient water supply to meet the community needs twenty years from now in 2040, and less on how Cal-Am will manage the transition from its reliance on the Carmel River in 2022. The water supply analysis summarized in Figure 7 indicates that with the addition of the full Pure Water Monterey project Cal-Am does have available water supply both in the near term (2020 – 2025) and twenty years from now in 2040. In keeping with the Staff Report, the primary focus of the WaterDM analysis was on the determining the volume of reliable supply available in 2040.

The Pure Water Monterey project with the expansion would provide enough available supply to meet the likely 20-year requirements, but it is still reasonable to expect Cal-Am may need to seek to secure additional supplies in the future beyond 2040. Much will depend upon what happens to the local economy and climate over the coming decade. Over-building infrastructure such as desalination (at its current size) would be an expensive error. The future is uncertain and the impact of COVID 19 and other economic unknowns could well be to reduce future demand in the Monterey Main System from current levels, lessening or eliminating the need for securing additional supply.

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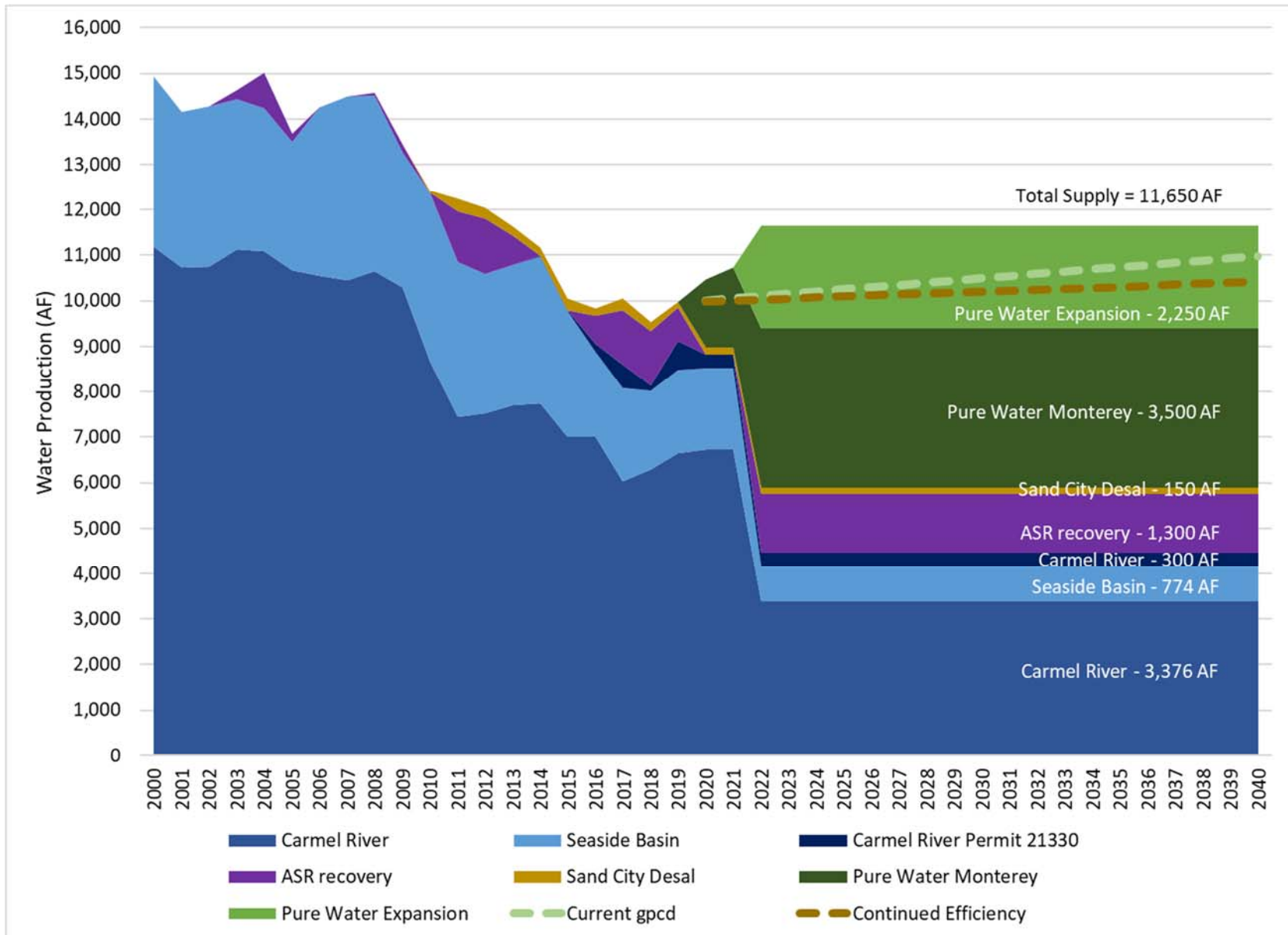


Figure 7: Cal-Am historic water production (2000 – 2019) and future water supply and demand (2020 – 2040)

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Table 6: Cal-Am Monterey Main System water supply sources

Water Source	AF/Year	Notes	Regulator	Data Source
Carmel River – Cease and Desist Order	3,376 AF.	2,179 AF from License 11866; 1,137 AF of pre-1914 appropriative rights; and 60 AF of riparian rights.	SWRCB Order 2016-0016	Cal-Am reports to the SWRCB
Carmel River – Permit 21330	300 AF	Only available Dec. – May.	SWRCB	Cal-Am reports to the SWRCB
Seaside Basin Native Groundwater	774 AF	Reflects Cal-Am’s 25-year obligation to leave 700 AF of the 1,474 AF it is entitled.	Seaside Basin Watermaster	Watermaster’s annual reports.
ASR Recovered Water	1,300 AF	Based on long-term historical precipitation and streamflow, ASR system may be capable of recovering an average of 1,920 AF per year.	SWRCB Water Rights Permits 20808A & C	Cal-Am reports to the SWRCB
Sand City Desalination Plant	150 AF	300 AF capacity. Has averaged 209 AF over life of plant.	SWRCB Order 2016-0016 & Division of Drinking Water	Cal-Am reports to the SWRCB
Pure Water Monterey	3,500 AF	Withdrawals prior to 2022 will reduce Effective Diversion Limit from the Carmel River.	Division of Drinking Water & Seaside Basin Watermaster	TBD
Pure Water Monterey Expansion	2,250 AF		Division of Drinking Water & Seaside Basin Watermaster	TBD
TOTAL	11,650 AF			

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Carmel River

Withdrawals from the Carmel River, Cal-Am's primary water source, must be reduced in accordance with a cease-and-desist order from the State Water Resources Control Board. The original order, issued in 1995, determined that Cal-Am was extracting over 14,000 acre-feet per year from the river when it had a legal right to 3,376 acre-feet. The State Water Resources Control Board determined that these excess withdrawals were adversely affecting the river's population of federally threatened Central Coast steelhead and riparian habitat. The Board ordered Cal-Am to develop or purchase alternative water supplies so it could end its excess withdrawals. Subsequent orders issued by the Board have included additional requirements, with Cal-Am currently required to end its excess withdrawals and be able to rely on a new source of water by December 2021.

Figure 7 and Table 6 show Carmel River production reducing to the mandated 3,376 AF in 2022. This is the volume to which Cal-Am has a legal right and is comprised of 2,179 AF from License 11866; 1,137 AF of pre-1914 appropriative rights; and 60 AF of riparian rights.³⁷

Figure 7 also shows an additional 300 AF of Carmel River supply based on Permit 21330.³⁸ Cal-Am's annual reports to the State Water Resources Control Board show that it has withdrawn an average of 428 AF per year from 2017-2019 under this permit.

Seaside Groundwater Basin – Native Groundwater

Along with the Carmel River, the withdrawals of native groundwater from the Seaside Groundwater Basin must also be reduced soon which impacts Cal-Am Monterey. The Seaside Basin was over pumped for many years prior to the issuance of the 2006 Seaside Groundwater Basin adjudication which imposed triennial reductions in operating yield until the basin's "Natural Safe Yield" is achieved. For Cal-Am, the last reduction will occur in 2021 and Cal-Am will have rights to 1,474 acre-feet per year.

Figure 7 and Table 6 show 774 AF of supply available from the Seaside Basin from 2022 – 2040. This reflects the agreement with the Watermaster to leave 700 AF per year of the 1,474 AF it is entitled to for at least 25 years as payback for Cal-Am's over-pumping in the Seaside Basin. For the purposes of this analysis it was assumed that this obligation is triggered once Cal-Am obtains a permanent replacement supply of water (e.g. Pure Water Monterey Expansion or the proposed desalination project).

³⁷ MPWMD Report (p.3)

³⁸ "In 2013, Cal-Am received Permit 21330 from the State Water Board for 1,488 AFA from the Carmel River. However the permit is seasonally limited to December 1 through May 31 each year and subject to instream flow requirements." MPWMD Report (p.3)

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The Seaside Basin Watermaster states Cal-Am’s “payback amount is currently estimated to be 18,000 acre-feet”, thus 25.7 years of 700 AF per year re-payments would complete the payback.³⁹

The Seaside Basin Watermaster’s 2019 report to the Court overseeing the groundwater adjudication states that the total usable storage space in the entire Seaside Groundwater Basin is 52,030 AF. The report also describes the current allocation of that usable storage space among the Seaside Basin pumps and Cal-Am is allocated 28,733 acre-feet.⁴⁰ The annual report aligns with the Watermaster’s January 2020 letter regarding the Pure Water Monterey Expansion which reiterates the importance of the groundwater payback program. The letter also notes the direct ties between the Seaside Basin and the Pure Water Monterey Expansion project and identifies that “on the order of 25,000 acre-feet of additional storage would need to be injected and left in the Seaside Basin over a period of years in order to achieve protective elevations along the coastline.”⁴¹

After the payback is complete, Cal-Am will be able to produce the full 1,474 AF if needed. During a drought or in the event another supply became impaired, Cal-Am could (with permission from the Seaside Basin Watermaster) utilize its full 1,474 AF in any year or series of years and then extend the payback period.

Aquifer Storage and Recovery

Cal-AM participates in an aquifer storage and recovery (ASR) project that allows for the capture of excess Carmel River winter flows through wells along the river. This river water is then transferred through existing conveyance facilities, including the new Monterey Pipeline and Pump Station, and stored in the Seaside Groundwater Basin for later extraction. This project operates with four ASR well sites capable of both injection and extraction. Ownership and operation of this source water project has various components split between Cal-Am and the Monterey Peninsula Water Management District.⁴²

There are two water rights that support the ASR system: Permit 20808A which allows maximum diversion of 2,426 AF and Permit 20808C which allows up to 2,900 AF for a total potential maximum annual diversion of 5,326 AF.⁴³ But in reality Cal-Am will only be able to divert, inject, and store the maximum permitted volume in the wettest of years.

³⁹ Seaside Basin Watermaster Jan. 8, 2020 Letter to Rachel Gaudion. Subject: Draft Supplemental Environmental Impact Report for the Proposed Modifications to the Pure Water Monterey Groundwater Replenishment Project (Draft Supplemental EIR)

⁴⁰ Seaside Basin Watermaster Annual Report – 2019, December 5, 2019

⁴¹ Seaside Basin Watermaster Jan. 8, 2020 Letter to Rachel Gaudion.

⁴² California-American Water Company. 2019. (U-210-W) Update to General Rate Case Application, A.19-07-004. Direct Testimony of Christopher Cook. (p.7)

⁴³ MPWMD Report (p.3)

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Based on long-term historical precipitation and streamflow data, the ASR system is designed to allow an average of 1,920 AF per year to be recovered. Figure 7 and Table 6 assume a more conservative 1,300 AF of ASR production per year for 2020 – 2030 as does the MPWMD Report. With the addition of the Pure Water Expansion, Cal-Am will have additional opportunity to inject and store water in the Seaside Groundwater Basin which may allow for increased annual recovery over time.

Cal-Am is allocated 28,777 AF of total storage in the Seaside Groundwater Basin.⁴⁴ Careful management of the Seaside Groundwater Basin and optimizing the storage opportunities it provides will help ensure a long-term reliable supply for the Cal-Am Monterey service area. Once the storage reserve is established, Cal-Am could withdraw 1,920 AF (or more) on a regular basis.

Sand City Desalination Plant

Cal-Am has an operating agreement for the Sand City Desalination Plant, a small facility designed to produce 300 acre-feet of water per year. Due to source water quality issues and discharge permit requirements to date the Sand City plant has never produced the full 300 AF and the maximum that it has ever produced was 276 AF in 2011. Over the life of the plant it has averaged 209 AF of production per year but it has only averaged 188 AF per year of production from 2016 – 2019.⁴⁵ Figure 7 and Table 6 conservatively includes 150 AF per year of production well below the long-term average of 209 AF per year.

Pure Water Monterey

Monterey One Water in partnership with the Monterey Peninsula Water Management District developed the Pure Water Monterey Groundwater Replenishment Project to create a reliable source of water supply to replace existing water supply sources for the Monterey Peninsula.

The primary objective of the Pure Water Monterey Project is to replenish the Seaside Groundwater Basin with 3,500 acre-feet per year of purified recycled water to compose a portion of Cal-Am's water supply and to assist in complying with the State Water Resources Control Board orders. The source water for the Pure Water Monterey Project is wastewater flows from the members of Monterey One Water.

The Pure Water Monterey Project (as initially approved and constructed) includes a 4 million gallon per day capacity water purification facility for treatment and production of purified recycled water that is conveyed and stored in the Basin using a series of shallow and deep injection wells. Project conveyance facilities include ten miles of pipeline from the purification facility to injection wells in the Seaside Groundwater Basin. This pipeline is owned and operated by the Marina Coast Water District.

⁴⁴ Seaside Basin Watermaster Annual Report – 2019, December 5, 2019

⁴⁵ MPWMD Report

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Once injected, the purified recycled water augments existing groundwater supplies and is capable of providing 3,500 acre-feet per year of water for extraction. Pure Water Monterey is operational in 2020 and Figure 7 includes 3,500 AF per year from the Pure Water Monterey project starting in 2022.

Pure Water Monterey Expansion

Monterey One Water and the MPWMD have proposed expansion of the Pure Water Monterey project to increase the capacity available to Cal-Am. The Pure Water Monterey Expansion is expected to provide an additional 2,250 acre-feet per year to augment existing groundwater supplies.

The source water for the Pure Water Monterey Expansion is municipal wastewater and agricultural drainage water. Analysis of the water sources under four conditions including drought concluded that the project can reliably produce water under each circumstance.⁴⁶

The analysis concluded Monterey One Water would have rights to a sufficient quantity of source water to produce the yield in advanced treated, product water that is anticipated to be produced by the Pure Water Monterey Expansion regardless of whether or not the conditions precedent are met and whether or not it is a dry or drought year or a normal or wet year.⁴⁷

The analysis shows that the Pure Water Monterey Expansion can reliably produce water as proposed. Figure 7 includes 2,250 acre-feet per year from the Pure Water Monterey Expansion project becoming available to Cal-Am in 2022.

With the addition of the Pure Water Monterey Expansion project providing an additional 2,250 acre-feet per year of supply to Cal-Am, the combination of Cal-Am's available and projected water resources total 11,650 acre-feet of reliable supply. This provides sufficient supply potential to meet annual future demand in 2040 by more than 1,200 acre-feet than WaterDM's most-likely "Continued efficiency" demand forecast.

Peak Capacity

Peak capacity planning is typically based on metered measurements of peak day and peak hour production maintained by the water provider. To my knowledge, Cal-Am does not publicly report its actual peak day or peak hour demands for the Monterey system. Rather than producing actual measurements, Cal-Am relies on a calculated approach to estimate future peak day usage. This approach was described and carried out in both the MPWMD Report and the MPWMD response, using slightly different assumption.

⁴⁶ April 11, 2020. Source Water Operational Plan Technical Memorandum. Prepared by Bob Holden, PE, and Alison Imamura, PE, Monterey One Water

⁴⁷ April 2020. Comments on Water Supply and Source Water Availability. FINAL Supplemental Environmental Impact Report for the Proposed Modifications to the Pure Water Monterey Groundwater Replenishment Project. P 3-8

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Analyses in the MPWMD Report and MPWMD Response show that Cal-Am has the ability to produce 19.41 million gallons per day and 0.81 million gallons per hour. Calculations of future Maximum Daily Demand (MDD) and Peak Hour Demand (PHD) show that Cal-Am must support an MDD of 19.01 MG/day and a PHD of 0.792 MG/hour (based on a July 2012 maximum month demand). Revised analysis in the MPWMD Response and Final analysis using slightly different demand data showed that Cal-Am must support an MDD of 16.13 MG/day and a PHD of 0.672 MG/hour (based on an August 2014 maximum month demand). Under either demand assumption, from an infrastructure standpoint alone, Cal-Am has sufficient capacity to meet future peak day and peak hour demands even under the highly conservative assumptions embedded in the calculated approach.

If managing the peak day or peak hour becomes an issue in the future, Cal-Am has several options it has yet to implement. From an infrastructure standpoint, Cal-Am could increase pumping capacity and add finished water storage. Cal-Am could also choose to implement low-cost peak day and peak hour demand management measures such as prohibiting automatic irrigation at certain times or on certain days or by re-assigning irrigation days of the week to distribute the summertime peak. Sophisticated approaches using smart irrigation controllers could also be employed to ensure optimal irrigation scheduling (Mayer et. al. 2018).

The Hazen Peer Review Report

As part of my investigation I was asked to review and comment on a peer review report prepared by Hazen and Sawyer (Hazen Report) which critiqued the MPWMD Report and the subsequent MPWMD Response.

- *California American Water Peer Review of Supply and Demand for Water on the Monterey Peninsula prepared by Kevin Alexander, P.E. and Cindy Miller, P.E., Hazen and Sawyer (Hazen Report)*
- *MPWMD's March 6 response to the Hazen Report including supporting exhibits prepared by David Stoldt (MPWMD Response)*

The Hazen & Sawyer peer review report is rife with misleading statements leading to incorrect conclusions regarding California codes, Cal-Am's likely water demand in 2040, and the availability and reliability of future water supply sources. MPWMD's March 6 response to the Hazen Report identifies line by line these errors and misleading statements. In this report I focus on the following problems:

Water Planning

The Hazen Report repeatedly confuses and conflates peak demand and annual demand planning requirements and offers numerous misleading statements about California codes and standards and AWWA water planning guidance.

Throughout the Hazen Report the authors confuse and conflate requirements for meeting the peak demand and annual demand planning practices. Planning the infrastructure and treatment capacity requirements for a community to meet the peak day and peak hours of

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demand is distinctly different from planning for an adequate long-term water supply for the same community. In my judgement, the MPWPD Report and Response adhered to all applicable codes and industry standards and practices.

I will specifically address the Hazen Report's assertions regarding the following:

- California Code of Regulations (CCR) section 64554
- California Health and Safety Code (CHSC) section 116555
- California Water Code (CWC) sections 10635 and 10631
- American Water Works Association "Water Resource Planning" guidance M50

CCR §64554

On page 3 the Hazen Report states, "CCR §64554(b), establishes the requirements that California water utilities must use to project demands. This regulation requires that the public water system identify the day, month, and year with 'the highest water usage during at least the most recent ten years of operation.'"⁴⁸

CCR §64554 specifically establishes the requirements for "New and Existing Source Capacity" and provides methods for calculating the Maximum Daily Demand (MDD) for a water system. MDD or peak capacity planning is typically based on metered measurements of peak day and peak hour production maintained by the water provider and 64554 states that, "If daily water usage data are available, identify the day with the highest usage during the past ten years to obtain MDD".⁴⁹

To my knowledge, Cal-Am does not publicly report its actual peak day or peak hour demands for the Monterey system. Rather than producing actual measurements, Cal-Am relies on the calculated approach (method 2 in CCR 64554) to estimate future peak day usage. This approach was described and carried out in both the MPWMD Report and the MPWMD Response, using slightly different assumptions. I reviewed these calculations and under both sets of assumptions Cal-Am has sufficient capacity to meet MDD.

If peak day or peak hour demands were to increase in the Cal-Am system over the next 20 years, additional pumping and local storage capacity could be added to the system to meet the requirements of CCR §64554.

The Hazen Report repeatedly confuses the peak capacity calculation of MDD as specified in CCR §64554 with the very different task of planning for an adequate future water supply on an annual basis. CCR 64554 does not make any provisions for estimating current annual demand or future annual demand. The Hazen Report improperly connects 64554 with annual demand

⁴⁸ Hazen Report (p. 3).

⁴⁹ CCR §64554(b)(1)

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planning on page 3 and page 6 and lacks proper specificity when referring to peak vs. annual supply and demand.

CHSC 116555

California Health and Safety Code section 116555 states simply that California water suppliers must provide, “a reliable and adequate supply of pure, wholesome, healthful, and potable water.”⁵⁰

The MPWMD Report correctly concluded that either project could provide the reliable water supply for the region. The MPWMD’s revised analysis shows that even under conservative, randomized climate assumptions, ASR storage will build up a sufficient reserve to meet a 5-year drought.⁵¹

CWC Sections 10635 and 10631

Section 10635 of the California Water Code states that, “every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years.”

Section 10631 reiterates this requirement in the plan and also requires analysis by the utility of (i) Water waste prevention ordinances; (ii) Metering; (iii) Conservation pricing; (iv) Public education and outreach; (v) Programs to assess and manage distribution system real loss; (vi) Water conservation program coordination and staffing support; and (vii) Other demand management measures.⁵²

The Hazen Report implies that the Pure Water Monterey Expansion is speculative and unproven and suggests it should not be considered “as a permanent reliable water source” and instead should be considered a “backup” supply.⁵³ There are many problems with this analysis specifically:

- i. The Hazen Report notably fails to apply the same scrutiny regarding reliability to the proposed desalination project. Frequently desalination delivers less supply than promised at a higher cost than anticipated.⁵⁴
- ii. The Hazen Report considers unrealistic and unsubstantiated current and future demand projections based on outdated demand information.

⁵⁰ CHSC 116555 <https://codes.findlaw.com/ca/health-and-safety-code/hsc-sect-116555.html>

⁵¹ MPWMD Response (Note 15)

⁵² http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT§ionNum=10631

⁵³ Hazen Report (p.8)

⁵⁴ <https://www.voiceofsandiego.org/topics/science-environment/desal-plant-producing-less-water-promised/>

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- iii. Revised analysis from the MPWMD, which I have confirmed, shows that even under conservative, randomized climate assumptions, ASR storage will be built-up and sufficient to deliver forecast volumes through a 5-year drought. If Pure Water Monterey Expansion is completed there will likely be additional water available for injection and carryover storage.
- iv. The Hazen Report fails to take into consideration Cal-Am's compliance with Section 10631 and implementation of effective efficiency and conservation measures that have successfully reduced demands and will continue to do so in the future.

American Water Works Association (AWWA)⁵⁵ Manual M50, Water Resource Planning

The Hazen Report repeatedly asserts that analysis in the MPWMD Report is inconsistent with "engineering best-practices" published in the AWWA Manual M50 Water Resources. The M50 is planning guidance manual which offers a broad range of approaches and invites utilities to choose the one that best fits their needs, requirements, and available data. As it strains to defend Cal-Am's outdated "current demand" forecast, the Hazen Report manages to misrepresent both the framework and content of the M50 manual. The Hazen Report assertions are incorrect and misleading for the following reasons.

First, the Hazen Report misrepresents the M50 as a set of "engineering best practices."⁵⁶ AWWA Manuals are not "best-practices" documents, but rather are "Manuals of Water Supply Practices" which are distinct and different from "best-practices" in that they offer utilities a wide range of solutions rather than a single "best" approach. AWWA Manuals are "consensus documents focused on providing strategies and steps for water system optimization. They are written, reviewed and approved by members of AWWA volunteer committees."⁵⁷

Second, the Hazen Report cites an old and outdated version of the M50. The most current AWWA Manual M50 Water Resources, 3rd edition was published in 2017, but the citations in the Hazen Report are from the discontinued 2nd edition published in 2007.

Third, regardless of the outdated citation, the Hazen Report critically misinterprets and misrepresents identical guidance provided in the both versions of the M50 manual. Both editions of M50 include the same following language regarding the need for a variety of methods to forecast demand:

"No single method of forecasting will satisfy the varied needs of all utilities. The forecasting method used and the data needed to correctly apply the method depend on the situation.

⁵⁵ The American Water Works Association (AWWA) is an international non-profit, scientific and educational association founded to improve water quality and supply. Established in 1881, it has a membership (as of 2012) of around 50,000 members worldwide, including the author of this report.

⁵⁶ Hazen Report (p.3)

⁵⁷ <https://www.awwa.org/Publications/Manuals-of-Practice>

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For example, when a forecast of average annual demand is the primary requirement, a simple per capita approach might be sufficient.”⁵⁸

Both versions of the M50 describe the same six approaches to preparing a demand forecast. Based on my review, the MPWMD Report incorporated four of the accepted methods to some degree:

- per capita models
- extrapolation models
- disaggregate water use models
- land-use models

The forecast prepared by WaterDM described earlier in this report also incorporate three of these approaches:

- per capita models
- extrapolation models
- disaggregate water use models

Similar forecasting approaches are regularly employed by Cal-Am as described in sworn Testimony from Ian Crooks.⁵⁹

Finally, the Hazen Report asserts that the M50 manual specifies a 10-year or even 20-year retrospective analysis to establish a demand baseline for a forecast. The Hazen Report then uses this unfounded notion to defend Cal-Am’s “current demand” forecast of 12,350 AF submitted to the CPUC in support of the desalination plant application. The quote cited in the Hazen Report in support of this approach⁶⁰ appears only in the 2007 edition and was not included in the current edition of M50. Furthermore, the Hazen Report misinterprets the meaning which does not specify a calculation method or planning period, but instead recommends the analysis of 10 years or more of historic data to understand trends and drought impacts.

Water Conservation and Demand Management

The Hazen Report makes incorrect statements about water conservation programs and planning and without offering data or analysis and even suggests that per capita water use will increase substantially despite Cal-Am’s demand management efforts and prevailing state policy and regulations.

⁵⁸ American Water Works Association (2017, 2007) Manual of Water Supply Practices-M50, Third Edition

⁵⁹ Direct Testimony of Ian Crooks Before the Public Utilities Commission of the State of California. Application 12-04-019 (Filed April 23, 2012) (p.7)

⁶⁰ Hazen Report (p.3)

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Starting on page 1, the Hazen Report makes factually incorrect statements about water conservation programs and policies in California and the Monterey region. The Hazen report states, “MPWMD staff also assumes continued implementation of tiered rates, conservation restrictions, and enforced water use reductions ... all of which have the potential to do continuing harm to the area’s businesses and residential customers.”⁶¹

This sentence confuses and conflates on-going water conservation measures such as tiered rates with mandatory curtailment measures that are only implemented when necessary during a declared drought. This error is repeated throughout the Hazen Report.

The MPWMD Report correctly assumed the continuation of tiered water rates and water conservation programs as described earlier in my report. These are ongoing features of the local water supply system and are mandated by California state law. Tiered rates have been implemented by Cal-Am in the Main system and across its other Cal-Am systems (and throughout California) for many years and the Hazen Report presents no evidence in support of the notion that continued implementation of tiered rates will cause “continuing harm” to the community.

The Hazen Report is also incorrect regarding “restrictions” and “enforced reductions”. Neither the MPWMD Report or the demand forecasts I prepared for in this report assumed demand restrictions or enforcement beyond the measures Cal-Am already implements during a normal year. Mandatory curtailment is typically only necessary during a declared drought such as 2014 -2017 and was not considered in the WaterDM forecasts or in the MPWMD Report.

On page 4 the Hazen Report repeats the error and includes additional unsupported and incorrect statements:

*“The conservation and moratorium measures that were implemented in response to drought conditions, including tiered rates, conservation restrictions, and enforced water use reductions, were effective in lowering demand. However, no additional methods are presented in the memo to indicate how further reductions in demands would occur; absent any, **it is reasonable to assume everything has already been done on the demand side to reduce levels and further reductions should not be considered in demand forecasting for determining water supply sufficiency.**”⁶²*

The Hazen Report is again incorrect regarding “restrictions” and “enforced reductions”. Neither the MPWMD Report or the demand forecasts I prepared for in this report assumed demand restrictions or enforcement beyond the measures Cal-Am already implements during a normal year. The moratorium on new connections was implemented in response to the cease and desist order. It can be lifted once Cal-Am certifies (and the State Water Resources Control Board concurs) that it has a sufficient permanent replacement supply for its illegal Carmel River diversions.

⁶¹ Hazen Report (p.1)

⁶² Hazen Report (p.4) *emphasis added.*

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The Hazen Report remarkably ignores the extensive on-going water conservation program being implemented across the Monterey Peninsula and California and the impact these measures are likely to have into the future. Both Cal-Am and the Monterey Peninsula Water Management District implement active, far-reaching, and effective water demand management programs that address all five of these core components outlined earlier in this report. The Monterey region has been regarded as a model for water conservation programs for many years.

Cal-Am acknowledged the level of effort, significance, and impact of this conservation program in recent testimony. “California American Water has expended significant effort and resources to encourage conservation in the Monterey County District through a variety of methods. Most important has been the tiered rate design, which features steeply inclining block rates to encourage efficient water use.” – Direct Testimony of Christopher Cook, July 1, 2019.

Mr. Cook’s testimony is backed up by testimony from Stephanie Locke, Water Demand Manager for the Monterey Peninsula Water Management District, and the significant financial resources Cal-Am continues to apply toward water conservation in the region. In its most recent General Rate Case, Cal-Am proposed a \$1.845 million three-year budget (\$615,132 per year) to fund water conservation programs in the Monterey service area. Locke’s testimony notes that many of the conservation programs budgeted in the General Rate Case and in the prior Cal-Am rate filings focus on reductions in outdoor water use, on reductions in demand areas that have not previously been extensively targeted, and on maintaining the current low water use fixtures that have been installed to date.

Cal-Am’s local efforts are in parallel to broader policy measures at the state level, designed to further increase efficiency. The State of California has implemented a series of laws and directives to ensure future water efficiency across the state including Assembly Bill 1668 and Senate Bill 60. These laws and directives effectively mandate an ongoing reduction in per capita use. Cal-Am’s continued compliance with these regulations and its active efforts to reduce customer water demand in the future are likely to gradually further decrease per capita water use across the service area.

Current Annual Demand

The Hazen Report asserts that “current” demand in the Cal-Am Main System must be assumed to be 12,350 acre-feet per year. This is far higher than actual current demand and contradicts Cal-Am’s own most recent General Rate Case filing which forecasts 2022 demand to be 9,789 acre-feet per year.

The Hazen Report criticizes the MPWMD Report for developing a demand forecast based on a starting point (aka current annual demand) significantly lower than the value proposed by Cal-

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Am to the CPUC.⁶³ As shown in Figure 6, the Cal-Am “current annual demand” forecast of 12,350 acre-feet is about 2,500 acre-feet higher than Cal-Am’s actual annual demand. Based on demand trends in the region 12,350 acre-feet is a gross over-estimate of the actual demand in the Monterey Main System. The authors of the MPWMD Report has good reason to choose a different starting point for the demand forecast and there is nothing incorrect or wrong about their approach.

The “Current Annual Demand” section of the Hazen Report is another place where the authors confuse and conflate requirements for meeting the peak demand and annual demand planning practices as explained earlier in this section. Planning the infrastructure and treatment capacity requirements for a community to meet the peak day and peak hours of demand is distinctly different for planning for an adequate long-term water supply for the same community. In my judgement, the MPWMD Report and Response adhered to all applicable codes and industry standards and practices.

The Hazen Report fails to mention that Cal-Am, in its most recent General Rate Case Application, forecast demand for 2021 and 2022 at 9,789 acre-feet per year.⁶⁴ Thus Cal Am’s own most recent forecast estimates 2022 demand to be 20% lower than “current” demand in the CPUC decision. Independent estimates of demand developed for the MPWMD Report and developed separately for this report, align closely with Cal Am’s recent rate case forecast.

Water Supply Reliability

The Hazen Report mischaracterizes the likely future reliability of water supplies available to Cal-Am and in particular the beneficial impacts of the ASR system over time. The Hazen Report ignores the future reliability (and cost) of desalination

The Hazen Report expresses “concern” about the reliability of the ASR system which it seeks to dismiss as merely “an alternative or backup supply source” and not a reliable long-term supply and it also describes the Pure Water Monterey Expansion as “speculative”.⁶⁵ The Hazen Report contains inaccuracies and mischaracterizations and notably neglects to apply similar scrutiny to potential reliability issues and construction delays that could be part of the proposed desalination project.

ASR

Cal-AM participates in an aquifer storage and recovery project that allows for the capture of excess Carmel River winter flows through wells along the river. WaterDM assumed a conservative 1,300 AF of ASR production per year for 2020 – 2030 like the MPWMD Report. The system has already proven capable of producing near this volume. Cal-Am chose to recover 1,196 acre-feet from the ASR system in 2017, 1,210 acre-feet in 2018, and 744 AF in 2019. Cal-

⁶³ Hazen Report (p.3)

⁶⁴ California-American Water Company. 2019. (U-210-W) Update to General Rate Case Application, A.19-07-004.

⁶⁵ Hazen Report (pp.6-9)

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Am ended 2019 with 1,317 acre-feet in ASR storage. With the addition of the Pure Water Monterey Expansion supply in many years Cal-Am will be able to inject and store additional carryover water through this system.

ASR systems, when managed properly, improve groundwater basin management by acting like an underground reservoir where water can be stored during periods of excess supply and withdrawn during periods of short supply.⁶⁶ Analysis in the MPWMD Response, confirmed by WaterDM, shows that a build-up of ASR storage based on historical data including wet, normal, and dry years would be sufficient to allow Cal-Am to recover at least 1,300 acre-feet each year during a hypothetical 5-year drought.⁶⁷ This analysis is further supported by a Technical Memorandum prepared by Montgomery Associates in late 2019.⁶⁸

During 2020 and 2021 Cal-Am must prepare to wean itself of reliance on the Carmel River and must manage its system differently as it comes to rely on the recently completed Pure Water Monterey supply. The ASR system provides Cal-Am the ability to store excess supply for the future. If the Monterey Peninsula were simultaneously to experience drought during the “buildup period” following the completion of new water supply and assuming the cease and desist order is lifted, ASR might be delayed in building up a drought reserve.⁶⁹ However, in reviewing the ASR system, the Hazen Report neglected to consider the impact of the Pure Water Monterey Expansion and the additional water it will make available for injection. Available excess water for injection from the Pure Water Monterey Expansion will enable Cal-Am to store additional water in the Seaside Basin.⁷⁰ The proper management of this storage potential and the water supply from the expansion could provide drought-resilience to the Monterey Peninsula for years to come.⁷¹

Pure Water Monterey Expansion

The sources of water for the Pure Water Monterey Expansion are municipal wastewater and agricultural drainage water which are currently discharged to the ocean. The mix of these sources may vary from year to year thus Monterey One Water prepared examples showing the likely annual mixes of source water. In one example the source water consisted of discharge

⁶⁶ American Water Works Association (2017) Manual of Water Supply Practices-M50, Third Edition

⁶⁷ MPWMD Response (Note 15)

⁶⁸ Montgomery and Associates. 2019. Technical Memorandum. Expanded PWM/GWR Project SEIR: Groundwater Modeling Analysis

⁶⁹ MPWMD Response (Note 15)

⁷⁰ The Seaside Basin Watermaster’s 2019 report to the Court overseeing the groundwater adjudication states that the total usable storage space in the entire Seaside Groundwater Basin is 52,030 AF. The report also describes the current allocation of that usable storage space among the Seaside Basin pumpers and Cal-Am is allocated 28,733 acre-feet.

⁷¹ This finding is confirmed by the Montgomery and Associates 2019 memo which demonstrates, ASR is drought-resilient and Pure Water Monterey Expansion provides an additional factor of safety against drought impacts to ASR.

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from the Regional Treatment Plant (54%), the Reclamation Ditch (5%), Blanco Drain (10%), wastewater outside the prior M1W boundaries (30%), and summer water rights from the County Water Resource Agency (1%).⁷²

The Hazen Report questions the reliability of the Monterey Pure Water Expansion project and ignores analysis by the staff of Monterey One Water. This analysis shows that none of the source water for expansion of Pure Water Monterey is speculative, nor comes from Salinas-area wastewater or Salinas valley sources for which Monterey One Water doesn't already have rights.⁷³

The source water for the Pure Water Monterey Expansion is municipal wastewater and agricultural drainage water. Analysis of the water sources under four conditions including drought concluded that the project can reliably produce water under each circumstance.⁷⁴ The analysis concluded Monterey One Water would have rights to a sufficient quantity of source water to produce the yield in advanced treated, product water that is anticipated to be produced by the Pure Water Monterey Expansion regardless of whether or not the conditions precedent are met and whether or not it is a dry or drought year or a normal or wet year.⁷⁵

The Hazen Report was prepared prior to the release of the April Final Supplemental Environmental Impact Statement for the Monterey Pure Water Expansion and thus the authors may not have had access to the full analysis of the reliability of supplies available.

Reliability and Cost of Desalination Not Considered

The Hazen Report applies intense scrutiny to the future reliability of the Pure Water Monterey Expansion yet fails to consider the future reliability and cost of the desalination facility Cal-Am has proposed.

Recent desalination projects in California have sometimes failed to produce expected volumes⁷⁶ and there are many examples world-wide of production problems associated with desalination projects. Cal-Am need look no farther than the local Sand City Desalination plant on which it relies for an example of a facility that has failed to produce at its designed capacity. WaterDM's forecast includes only 150 acre-feet of annual production from the Sand City facility designed to produce 300 acre-feet annually.

⁷² November 12, 2019 M1W presentation to the Monterey County Farm Bureau and the Grower-Shipper Association and the September 30-2019 M1W board meeting

⁷³ MPWMD Response (Note 19).

⁷⁴ April 11, 2020. Source Water Operational Plan Technical Memorandum. Prepared by Bob Holden, PE, and Alison Imamura, PE, Monterey One Water

⁷⁵ April 2020. Comments on Water Supply and Source Water Availability. FINAL Supplemental Environmental Impact Report for the Proposed Modifications to the Pure Water Monterey Groundwater Replenishment Project. P 3-8

⁷⁶ <https://www.voiceofsandiego.org/topics/science-environment/desal-plant-producing-less-water-promised/>

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Desalination is also the most expensive supply option currently available on the Monterey Peninsula and water from Cal-Am's proposed desalination project would cost at least three times as much as water from the Pure Water Monterey Expansion. The economic track record of desalination is problematic. Desalination plants must be paid for even if they do not produce any water. Victoria Australia's desalination facility, built in response to an intense drought, resulted in ongoing annual service payments of \$649 million (Australian dollars), and "annual service payments rise every year, even if no water is ordered."⁷⁷

The Hazen Report chooses to ignore the economic realities of desalination and is disingenuous when it asserts the recycled water proposal is less reliable than the desalination proposal without applying similar levels of scrutiny to both supplies.

Erroneous Findings in the Hazen Report

The Hazen Report reaches erroneous conclusions regarding the reliability of future water supplies based on inflated hypothetical demands, misleading statements about planning requirements, and inaccurate characterization of future water supply reliability.

The Hazen Report includes numerous misleading statements leading to incorrect conclusions regarding California codes, Cal-Am's likely water demand in 2040, and the availability and reliability of future water supply sources. MPWMD's March 6 response to the Hazen Report identifies line by line these errors and misleading statements. In this report I focused on the following problems:

- The Hazen Report repeatedly confuses and conflates peak demand and annual demand planning requirements and offers numerous misleading statements about California codes and standards and AWWA water planning guidance.
- The Hazen Report makes incorrect statements about water conservation programs and planning and without offering data or analysis, and it even suggests that per capita water use will increase substantially despite Cal-Am's demand management efforts and state policy requirements and regulations.
- The Hazen Report asserts that "current" demand in the Cal-Am Main System must be assumed to be 12,350 acre-feet per year. This is far higher than actual current demand and contradicts Cal-Am's own most recent General Rate Case filing which forecasts 2022 demand to be 9,789 acre-feet per year.
- The Hazen Report mischaracterizes the likely future reliability of water supplies available to Cal-Am and in particular the beneficial impacts of the ASR system over time.
- The Hazen Report applies intense scrutiny to the future reliability of the Pure Water Monterey yet fails to consider the future reliability and cost of the desalination facility Cal-Am has proposed.

⁷⁷ <https://www.dailymail.co.uk/news/article-5749621/Melbourne-desalination-plant-costs-tax-payers-eye-watering-649-million-year-operate.html>

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Conclusions

WaterDM conducted an analysis of the historic production trends in the Cal-Am service area and forecast growth in the service area. WaterDM developed an independent forecast of future water requirements based on the Associated Monterey Bay Area Governments (AMBAG) 2018 forecast of future population growth for the Cal-Am service area.

The WaterDM analysis supports the conclusions in the Staff Report projecting 2040 demands in the Cal-Am service area to be much lower than the CPUC's certificating decision. California Coastal Commission staff have correctly concluded that the Pure Water Monterey Expansion project provides an available, feasible water supply alternative for Cal-Am.

With the addition of the Pure Water Monterey Expansion project providing an additional 2,250 acre-feet per year of supply to Cal-Am, the combination of Cal-Am's available and projected water resources provides sufficient supply potential to meet annual future requirements in 2040 by more than 1,200 acre-feet (an 11.9% surplus).

The CPUC, in its September 2018 Decision accepted that Cal-Am's "current" demand was 12,350 acre-feet per year and the future demand in 2040 will be approximately 14,000 acre-feet per year. This appears outdated and therefore unreasonably high based on my analysis, the MPWMD Report and Cal Am's most recent forecasts. Cal-Am, in its most recent General Rate Case Application, forecast demand for 2021 and 2022 at 9,789 acre-feet per year. Cal Am's own most recent forecast estimates 2022 demand to be 20% lower than "current" demand in the CPUC decision. Independent estimates of demand developed for the MPWMD Report and developed separately for this report, align closely with Cal Am's recent rate case forecast.

The Pure Water Monterey Expansion provides enough available supply to meet the likely 20-year demands, but it is still reasonable to expect Cal-Am may need to seek to secure additional supplies in the future to meet demand beyond 2040. Much will depend upon what happens to the local economy and climate over the coming decade and over-building infrastructure such as the proposed desalination facility (at its current size) would be an expensive error. The future is uncertain and the impact of COVID 19 and other economic unknowns could well be to reduce future demand in the Monterey Main System from current levels, lessening or eliminating the need for securing additional supply.

Cal-Am's existing peak capacity is sufficient to meet anticipated future maximum daily demand (MDD) and peak hour demand (PHD) and Cal-Am has yet to avail itself of additional low/no-cost peak demand management measures that could reduce future peaks, if necessary.

Analyses in the MPWMD Report and MPWMD Response show that Cal-Am has the ability to produce 19.41 million gallons per day and 0.81 million gallons per hour. Calculations of future Maximum MDD and PHD show that Cal-Am must support an MDD of 19.01 MG/day and a PHD of 0.792 MG/hour (based on a July 2012 maximum month demand). Revised analysis in the

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MPWMD Response using slightly different demand data showed that Cal-Am must support an MDD of 16.13 MG/day and a PHD of 0.672 MG/hour (based on an August 2014 maximum month demand). Under either demand assumption, from an infrastructure standpoint alone, Cal-Am has sufficient capacity to meet future peak day and peak hour demands even under the highly conservative assumptions embedded in the calculated approach.

If managing the peak day or peak hour becomes an issue in the future, Cal-Am has several options it has yet to implement. From an infrastructure standpoint, Cal-Am could increase pumping capacity and add finished water storage. As an option, Cal-Am could also choose to implement low-cost peak day and peak hour demand management measures such as prohibiting automatic irrigation at certain times or on certain days or by re-assigning irrigation days of the week to distribute the summertime peak. Sophisticated approaches using smart irrigation controllers could also be employed to ensure optimal irrigation scheduling (Mayer et. al. 2018).

The Hazen Report contains numerous errors, mischaracterizations, and incorrect conclusions regarding Cal-Am's likely demand in 2040 and the availability and reliability of future water supply sources.

The WaterDM analyses show that the staff of the California Coastal Commission correctly utilized more recent information on available future water supplies and likely future demands in its analysis. Cal-Am's per capita use is likely to decrease between now and 2040 due to ongoing conservation program implementation, conservation pricing, and statewide policy directives to reduce indoor and outdoor use and improve utility water loss control measures. I agree with the staff findings that concluded there exists an available, feasible water supply alternative to Cal-Am's proposed desalination project.

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Appendix A – Materials Considered⁷⁸

Literature, Reports & Publicly Available Sources

American Water Works Association. 2017. Manual of Water Supply Practices-M50, Third Edition.

American Water Works Association. 2012. Manual of Water Supply Practices-M50, Second Edition.

American Water Works Association. <https://www.awwa.org/Publications/Manuals-of-Practice> (Accessed 4/10/2020).

Association of Monterey Bay Area Governments. 2018 Regional Growth Forecast.

Brooks, D.B. 2007. An Operational Definition of Water Demand Management. International Journal of Water Resources Development. Volume 22, 2006 - Issue 4

California Coastal Act Sections 30108, 30260 - <https://www.coastal.ca.gov/coastact.pdf>

California Coastal Commission Staff Report: Recommendation on Appeal Substantial Issue & De Novo Hearing and Consolidated Coastal Development Permit, California Coastal Commission, Application 9-19-0918 / Appeal A-3-MRA-19-0034 (California American Water Co.). Staff Report Date: 10-28-2019.

California Law. Conservation, Development, and Utilization of State Water Resources. http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT§ionNum=10631

California Public Utilities Commission. Decision 18-09-017, September 13, 2018

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California-American Water Company. 2012. Urban Water Management Plan. Water Systems Consulting, Inc.

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California-American Water Company. 2016-2020. Quarterly and Annual Reports, SWRCB Order WR 2016-0016 / WR 2009-0060. <https://amwater.com/caaw/customer-service-billing/billing-payment-info/water-rates/monterey-district> (accessed at various times)

⁷⁸ Materials Considered also includes all materials cited in the footnotes of this Report.

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Direct Testimony of David Mitchell Before the Public Utilities Commission of the State of California. Application 19-07-004(Filed July 1, 2019)

Direct Testimony of Ian Crooks Before the Public Utilities Commission of the State of California. Application 12-04-019 (Filed April 23, 2012)

Hazen and Sawyer. 2020. California American Water Peer Review of Supply and Demand for Water on the Monterey Peninsula prepared by Kevin Alexander and Cindy Miller. (1-22-2020)

Mayer, P.W., et. al. 2018. Peak Day Water Demand Management Study Heralds Innovation, Connection, Cooperation. Journal of the American Water Works Association. May 2018 110:5.

Montgomery and Associates. 2019. Technical Memorandum. Expanded PWM/GWR Project SEIR: Groundwater Modeling Analysis

Monterey One Water. May 28, 2010 Progress Report on Pure Water Monterey Expansion.

Monterey One Water. November 12, 2019 M1W presentation to the Monterey County Farm Bureau and the Grower-Shipper Association and the September 30-2019 M1W board meeting

Monterey One Water. April 2020. FINAL Supplemental Environmental Impact Report for the Proposed Modifications to the Pure Water Monterey Groundwater Replenishment Project.

Monterey One Water. April 11, 2020. Source Water Operational Plan Technical Memorandum. Prepared by Bob Holden, PE, and Alison Imamura, PE.

Monterey Peninsula Water Management District. 2020. Supply and Demand for Water on the Monterey Peninsula prepared by David Stoldt. (3-13-2020, 12-3-2019, and 9-16-2019)

Monterey Peninsula Water Management District. 2020. March 6 response to the Hazen Report including supporting exhibits prepared by David Stoldt.

Monterey Peninsula Water Management District. Map created by Eric Sandoval. 2/17/2006.

Seaside Basin Watermaster Annual Report – 2019, December 5, 2019

Seaside Basin Watermaster Jan. 8, 2020 Letter to Rachel Gaudion. Subject: Draft Supplemental Environmental Impact Report for the Proposed Modifications to the Pure Water Monterey Groundwater Replenishment Project (Draft Supplemental EIR)

Voice of San Diego. 8/29/2017. Desal Plant Is Producing Less Water Than Promised. <https://www.voiceofsandiego.org/topics/science-environment/desal-plant-producing-less-water-promised/> (Accessed 4/9/2020).

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Appendix B - Summary of Qualifications and Experience - Peter Mayer, P.E.

PETER W. MAYER, P.E.

Principal
Water Demand Management
1339 Hawthorn Ave.
Boulder, CO 80304
720-318-4232
peter.mayer@waterdm.com

WORK EXPERIENCE

Principal, WaterDM - 2013-present. (Registered Professional Engineer, Colorado, PE 0038126)
Vice President, Partner, and Senior Project Engineer, Aquacraft, Inc. 1995-2012
Editor, Calvert Independent, 1988-1990
Coordinator, University of Wisconsin, College Year in India Program, Madurai, India 1991-92
Educator-Fellow, Oberlin Shansi Memorial Association, Madurai, India 1986-88
Station Manager, WOBC-FM, Oberlin, Ohio 1985-86

AFFILIATIONS

American Water Works Association
Associate Editor AWWA Water Science
Member– Customer Metering Practices Committee, Distribution and Plant Operations Division
Chair – M22 manual 3rd and 4th ed. re-write sub-committee
Member – M6 manual 6th ed. Re-write sub-committee
Former Trustee – Water Conservation Division
American Water Resources Association
American Society of Civil Engineers
Alliance for Water Efficiency
Colorado River Water Users Association
Colorado Water Wise
Colorado Water Congress

EDUCATION

Master of Science, 1995, Water Resources Engineering, Department of Civil, Environmental and Architectural Engineering, University of Colorado, Boulder.

Bachelor of Arts, 1986, Oberlin College, Oberlin Ohio. Anthropology (Honors).

SELECTED PROJECTS

City of Tucson Water Conservation and Integrated Water Resources Plan (2019-2020)

Peter Mayer is working with Tucson staff to develop a 10-year water conservation implementation plan to integrate this work with the City's long-term integrated water resources plan being conducted by a large consulting team.

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California DWR Research and Development of Indoor Residential Water Use Standards (2019-2021)

Peter Mayer is advising the California Department of Water Resources on a series of research projects to investigate indoor residential per capita use for the purpose of reporting to the legislature on future efficiency standards.

Metropolitan Water District of Southern California Demand Management Cost Functional Assignment (2018 – 2019)

Peter Mayer developed an analysis of Metropolitan's demand management and local resources development programs for the purpose of functional cost assignment in the ratemaking process.

New York City Integrated Water Resources Plan (2018 – 22)

Peter Mayer is leading the water conservation task of this five-year planning project awarded to a team lead by Hazen and Sawyer.

Northglenn Colorado Integrated Water Resources Plan (2019-20)

WaterDM is teamed with ELEMENT Water Consulting to prepare an integrated water resources plan for the City of Northglenn, a suburb of Denver.

Northern Water Conservation Program Planning (2017-18)

Peter Mayer worked closely with the Northern Colorado Water Conservancy District to plan for the future of their regional conservation program.

Westminster Rate and Fee Cost of Service Study (2017-18)

Peter Mayer was a member of the Raftelis Consulting team which developed this extensive cost of service analysis for this Colorado utility.

Rachio Water Management Implementation and Research (2016 –18)

Peter Mayer served as an expert advisor and technical consultant to the Rachio irrigation control and technology company. Together, they implemented peak day water management programs.

FL v. GA, 142, Original (2016)

Peter Mayer testified as an expert witness on municipal and industrial water use on behalf of the State of Georgia at the US Supreme Court trial held in November 2016. Peter prepared an expert report, expert testimony, testified at the trial, and was deposed in this case.

Water Resource Foundation #4689 Assessing Water Demand Patterns to Improve Sizing of Water Meters and Service Lines (2016-20)

Peter Mayer was the Principal Investigator for this research study taking place in Colorado and Arizona that closely examined meter and service line sizing.

Austin Water Integrated Water Resources Plan (2016-17)

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Peter Mayer was an expert advisor to the CDM/Smith team on water demand and conservation and assisted in preparation of the Austin Integrated Water Resources Plan.

Colorado State Water Supply Initiative (2009-10, 2016-19)

Peter Mayer was part of a team that prepared technical analysis of future water demands and requirements in Colorado as part of the State's ongoing planning efforts.

New York City Water Board Water Demand Management Planning (2014 – 2019)

Peter Mayer was the lead for this project that prepared ten water conservation plans for wholesale customers of the NYC Water Board located in Westchester County and other upstate NY locations.

Outdoor Water Savings Initiative, Alliance for Water Efficiency (2014 – present)

Peter Mayer is the director of research for the Alliance for Water Efficiency's Outdoor Water Savings Initiative. Peter completed a literature review project in 2015, managed the landscape transformation study (2019) and is currently managing the drought response and water savings study (2020).

Residential End Uses of Water Study Update, Water Research Foundation (2010 – 2016)

Peter Mayer was the co-principal investigator of this research study that measured residential water use in 25 cities across the US and Canada. Final report is available from the Water Research Foundation.

Hilton Head PSD Water Demand Management Plan (2015)

Peter Mayer lead a team that prepared a long term water demand management plan for this coastal island community.

City of Arvada Expert Witness Services (2016)

Peter Mayer was hired as an expert witness on municipal and industrial water demands by the City of Arvada. Peter prepared and submitted an expert report in preparation for trial. The report was accepted by both sides and deposition and testimony were not required.

City of Arvada Water Supply and Demand Study (2014 –2016)

Peter Mayer led a team that evaluated future water supply and demands for this Denver suburb, under climate change conditions.

Roaring Fork Regional Water Conservation Planning (2014 - 2015)

Working with ELEMENT Water Consulting, Peter Mayer prepared a series of water conservation plans for Aspen, Basalt, Carbondale, and Glenwood Springs, Colorado and a regional conservation plan for the entire Roaring Fork Valley. An important goal of these plans was to ensure adequate environmental flows in local rivers and creeks.

City of Louisville Water Conservation Plan (2015)

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Peter Mayer worked with CH2M to prepare a state approved water conservation plan for the City of Louisville Colorado.

City of Greeley Water Conservation Plan and Avoided Cost Analysis (2014 –2015)

Peter Mayer worked closely with the City of Greeley staff to update their water conservation plan for the next 7 years and to complete an avoided cost analysis that evaluates the impact of Greeley’s water efficiency efforts since 1992 on customer water rates.

Senior Technical Advisor, Alliance for Water Efficiency (2007 – 2019)

The Alliance for Water Efficiency is a national NGO focused on promoting water conservation and efficiency. Peter Mayer helped found the organization and now served as a senior technical advisor and the newsletter editor for 12 years.

G480 Water Conservation Program Operation and Management Standard (2011-2013, 2018-19)

The G480 is a voluntary water conservation program operation and management standard approved by AWWA and ASNSI in 2013. Peter Mayer chaired the subcommittee that created the standard and was a key author of the document. He is a member of the subcommittee developing version 2.0.

Eastern Municipal Water District – Water Efficient Guidelines for New Development (2012-13)

Peter Mayer prepared a set of detailed, voluntary water efficiency guidelines for new construction in the Eastern Municipal Water District that go beyond current building codes and standards to increase water use efficiency.

City of Westminster Residential Demand Study and Conservation Plan Preparation (2012)

Peter Mayer and Aquacraft conducted a residential end use study in Westminster, Colorado to determine water use patterns and the level of water efficiency achieved. This information was then used in support of preparation of new water conservation plan for the City.

Northern Water Conservation Survey and Plan Development (2011)

The Northern Colorado Water Conservancy District hired Peter Mayer and Aquacraft to conduct a survey of its’ 45 municipal members. The results of the survey were used to update Northern’s water conservation plan for the Bureau of Reclamation.

Colorado Water Supply Initiative Municipal and Industrial Conservation Strategies (2010)

In support of the Statewide Water Supply Initiative (SWSI), the Interbasin Compact Committee (IBCC), and other water conservation efforts throughout the state, the CWCB contracted with Peter Mayer and Aquacraft to develop the conservation strategies section of the 2010 SWSI update.

Best Practices Guide for Colorado Water Conservation (2010)

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Colorado Water Wise contracted with Peter Mayer and Aquacraft to research and produce a guidebook on water conservation best practices for Colorado. The guide was published in 2010 and is available for free download.

Evaluation of California Weather-Based “Smart” Irrigation Controller Programs (2005-2009)

Smart irrigation controllers that use prevailing weather conditions to adapt water applications to the actual needs of plants represent a significant advancement. Peter Mayer was the principal investigator on this study for the California Department of Water Resources, the California Urban Water Conservation Council, and approximately 30 participating water agencies examined the impact of 3,112 smart controllers on water use in northern and southern California.

Water Conservation: Customer Behavior and Effective Communications (2006 – 2009)

Peter Mayer and Aquacraft subcontracted to ICF International on this AwwaRF research project which examined water conservation social marketing programs and measured the impact of utility outreach efforts on customer behavior. The study examined water conservation communication campaigns in terms of customer recognition, attitudinal changes, behavior modification, and verifiable water use reductions and recommended the most effective methods and techniques for designing and implementing water conservation social marketing campaigns.

Water Budgets and Rate Structures: Innovative Management Tools (2005-2007)

Water budget rate structures are an innovative and increasingly popular tool for water utilities trying to convey an effective water efficiency message. This AwwaRF Tailored Collaboration project co-lead by Aquacraft and A&N Technical Services examined all aspects of water budgets and how they fit into the pantheon of water rate structures.

Water Conservation Plan Development and Demand Forecasting (2006–2010)

The State of Colorado requires that utilities seeking loans file a water conservation plan that includes detailed demand forecasts that incorporate water conservation. Aquacraft has developed conservation plans and demand forecasts for the cities of Aurora, Fort Collins, Glenwood Springs, Westminster, and Greeley, Colorado. In addition, Peter Mayer was contracted by the Colorado Water Conservation Board to review submitted conservation plans for compliance with statute.

Expert Testimony NEORSW Wastewater Case (2008)

Working with the Department of Justice, Peter Mayer developed a detailed research plan for the City of Cleveland to help them determine the contribution of wastewater flows from single-family, multi-family, and non-residential customers.

US EPA National Water Efficiency Market Enhancement Program (2004-2005)

The EPA is interested in starting a water efficiency program comparable the Energy STAR program. This project involves investigating potential product categories and product lines that

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improve water efficiency and could be including the EPA program, such as weather-based irrigation control technology.

City of Carnation Water Conservation Demand Analysis (2004-2005)

In late 2004 Peter Mayer worked with the Pacific Institute, Carollo Engineers, and King County, Washington to determine the conservation potential evaluate the cost-effectiveness of water conservation in new and existing homes and businesses in the City of Carnation. Carnation is a small town that is currently not sewered. The County and the City are working together to provide a sanitary sewer system and treatment facility.

National Multiple Family Submetering and Allocation Billing Program Study (2002-2004)

Charging residents in multi-family house separately for water is growing trend in the United States. Peter Mayer was the principal investigator for this study which looked at the entire phenomena of submetering and allocation billing techniques and examined the potential water savings, regulatory issues, utility concerns, water rates, and regulatory climate.

Tampa Retrofit Project (2002-2003)

Colorado Department of Human Services Water Rights Study (2003)

Pinellas County Utilities Water Conservation Opportunities Study, (2002)

Virtual Water Efficient Home Web Site, (2001-2002)

East Bay MUD Conservation Retrofit Study, (2001-02)

CII Demand Assessment and Conservation Plan, Westminster, CO, (2000-01)

Seattle Home Water Conservation Study, Seattle Public Utilities and EPA, (1999-2000)

Commercial and Institutional End Uses of Water, AWWARF, (1998-2000)

Water Conservation Plan, City of Thornton, CO, (1998-2000)

Demand Analysis for the University of Colorado, (2000)

Water Conservation Futures Study, City of Boulder, CO, (1998-1999)

Water Efficiency in Water Wise and Standard New Homes, (1999-2000)

Residential End Uses of Water Study, AWWARF, (1996-1999)

Comparison of Demand Patterns among CI and SF Customers, Westminster, (1997-1998)

Analysis of Southern Nevada Xeriscape Project, (1998-2000)

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Westminster, Peak Use Study, (1996)

Westminster Residential Water Use Study, (1995-1996)

PUBLICATIONS AND PRESENTATIONS

Rupprecht, C., M.M. Hamilton, and P.W. Mayer. 2020. Tucson Examines the Rate Impacts of Increased Water Efficiency and Finds Customer Savings. Journal of the American Water Works Association. January 2020, pp. 33-39.

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<https://awwa.onlinelibrary.wiley.com/doi/abs/10.1002/aws2.1165>

Mayer, P.W. 2019. Water Demand Trends, Efficiency and the Future of American Water Use. Keynote Address. University Council on Water Resources (UCOWR) Annual Conference. Snowbird, UT.

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Mayer, P.W., et. al. 2018. Peak Day Water Demand Management Study Heralds Innovation, Connection, Cooperation. Journal of the American Water Works Association. May 2018 110:5.

Mayer, P.W. 2018. Water Demand Trends, Efficiency and the Future of Urban Water Use. Keynote Address. Next Generation Water Summit 2018. Santa Fe, NM.

Mayer, P.W., and R. Smith. 2017. Peak Day Water Demand Management Study. Alliance for Water Efficiency. Chicago, IL.

Mayer, P.W., et. al. 2017. Peer Review of the Water Conservation Programs of the Metropolitan Water District of Southern California. Alliance for Water Efficiency. Chicago, IL.

Mayer, P.W. 2017. Water Conservation Keeps Rates Low in Tucson, Arizona. Alliance for Water Efficiency. Chicago, IL.

Mayer, P.W. 2017. Water Conservation Keeps Rates Low in Gilbert, Arizona. Alliance for Water Efficiency. Chicago, IL.

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Mayer, P.W. 2016. Water Research Foundation Study Documents Water Conservation Potential and More Efficiency in Households. Journal of the American Water Works Association. October 2016 108:10.

Mayer, P.W. 2016. American Water Demand Trends and the Future of Conservation. Keynote Address- Gulf Coast Water Conservation Symposium, Houston, TX.

DeOreo, W.B., P. Mayer, J. Kiefer, and B. Dziegielewski. 2016. Residential End Uses of Water, Version 2. Water Research Foundation. Denver, CO.

Shimabuku, M., D. Stellar, and P. Mayer. 2016. Impact Evaluation of Residential Irrigation Audits on Water Conservation in Colorado. Journal of the American Water Works Association. May 2016, 108:5. Denver, Colorado.

Mayer, P.W., P. Lander, and D. Glenn. 2015. *Outdoor Water Use: Abundant Savings, Scant Research*. Journal of the American Water Works Association. February 2015, 107:2. Denver, Colorado.

Mayer, P.W. 2015. American Water Use Trends 1995-2015 and Future Conservation Potential. WaterSmart Innovations Conference. Las Vegas, NV.

Mayer, P.W. 2015. Introducing AWWA's New M22 Manual - Sizing of Water Service Lines and Meters. Proceedings of the AWWA Annual Conference and Exposition. Anaheim, CA. and North American Water Loss Conference. Atlanta, GA.

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Suero F., P.W. Mayer, and D. Rosenberg. 2012. *Estimating and Verifying United States Households' Potential to Conserve Water*. Journal of Water Resources Planning and Management. 138(3), 299-306.

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Mayer, P.W. 2010. Demand Hardening: Big Myth, Small Reality. WaterSmart Innovations Conference. Las Vegas, NV.

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Mayer, P.W., et. al. 2010. *Improving Urban Irrigation Efficiency By Using Weather-Based "Smart" Controllers*. Journal of the American Water Works Association. February 2010. Vol. 102, No. 2.

Mayer, P.W. 2009. Do Weather-Based Irrigation Controllers Save Water? Results from a large field study in California. American Water Works Association 2009 Annual Conference and Exposition. San Diego, CA.

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Mayer, P.W. et. al. 2009. Evaluation of California Weather-Based "Smart" Controller Programs Results and Perspective on a Large Field Study. WaterSmart Innovations Conference. Las Vegas, NV.

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Mayer, P.W., et. al. 2008. *Water Budgets and Rate Structures: Innovative Management Tools*. American Water Works Association Research Foundation. Denver, CO.

Mayer, P.W. et. al. 2008. The California Water Smart Irrigation Controller Project Results and Perspective on a Large Field Study of an Important Emerging Technology. WaterSmart Innovations Conference. Las Vegas, NV.

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Mayer, P.W., et. al. 2008. Cost Effective Conservation Programs. Proceedings of the AWWA Water Sources Conference. Reno, NV.

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Mayer, P.W. 2006. WaterWiser - Progress and Change, Benefits and Capabilities of an On-Going On-Line Resource. Proceedings of the Water Sources Conference 2006, Albuquerque, NM.

Mayer, P.W. 2005. End Uses of Water: Practical Data Collection, Analysis, and Utility. Arab Water World. May/June 2005.

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DeOreo, W.B., M. Gentili, and P.W. Mayer, 2004. *Advanced Cooling Water Treatment Pays for Itself in Urban Supermarkets*. Proceedings of the Water Sources Conference 2004, Austin, TX.

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AWARDS

- 2019 AWE Distinguished Service Award – “In Recognition and with Appreciation for His 12 Years as Editor of the Water Efficiency Watch Newsletter 2007 – 2019).
- 2013 AWWA Water Conservation Division Best Paper Award – “Insights into Declining Single Family Residential Water Demands.”
- 2013 Quentin Martin Best Research-Oriented Paper Award, ASCE-EWRI Journal of Water Resources Planning and Management, March 2013. Awarded for "Estimating and Verifying United States Households' Potential to Conserve Water" by Francisco J. Suero, A.M.ASCE;

EXHIBIT 12-B

Peter W. Mayer; David E. Rosenberg, A.M.ASCE

- 2010 AWWA Water Conservation Division Best Paper Award – “Improving Urban Irrigation Efficiency by using Weather-Based ‘Smart’ Irrigation Controllers.”
- 2008 AWWA Water Conservation Division Best Paper Award – “Water Budgets and Rate Structures: Innovative Management Tools.”
- 2006 AWWA Water Conservation Division Best Paper Award – “Third Party Billing of Multi-family Customers Presents New Challenges to Water Providers”
- 1996 Montgomery-Watson Master’s Thesis Award, Second Place
- 1996 American Water Works Association Academic Achievement Award, Honorable Mention