



July 19, 2023

**TO:** Utilities Advisory Committee  
**FROM:** Ron Munds, General Manager  
**SUBJECT:** **Agenda Item 4 – 07/19/2023 UAC Meeting**  
SLO County Water Offset Study Review

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### **DESCRIPTION**

The San Luis Obispo County (County) Planning and Building Department commissioned a study to evaluate the Water Offset Program (retrofit-to-build) for the community of Los Osos. The program requires that new development offset twice its estimate water demand (2:1) to avoid increasing groundwater pumping. This report summarizes the results of the study.

### **STAFF RECOMMENDATION**

Provide comments and direction to staff.

### **DISCUSSION**

#### **Background**

The County's Planning and Building Department (Department) commissioned a study in 2022 to evaluate the Water Offset Program, also known as the Retrofit-to-Build Program, for the community of Los Osos. The purpose of the study was to inform the Department's land use and water resource planning efforts in Los Osos. The primary objective was to identify the remaining retrofit opportunities in the community, evaluate and quantify the water savings potential of these retrofits and look at any improvements that could be made to the program to enhance its overall effectiveness.

Currently, the program is limited to project applications outside the sewer prohibition zone. This means offsets (retrofits) must come from existing developments outside of this area. The County's consultant, Maddaus Water Management (Maddaus), used fixture tracking data from various County water conservation programs dating back to 2008 to estimate the saturation level of higher efficiency plumbing fixtures basin-wide. Five years of water consumption data was provided by the three water purveyors in order to calculate a baseline for the different customer types, i.e. single family, multi-family, commercial, etc.

The study concludes that there is a 118 acre-feet per year (AFY) of water saving potential remaining in the community. Indoor accounts for 84 AFY and outdoor 34 AFY.

#### **Historical Water Conservation Measures Evaluation**

A saturation analysis for plumbing fixture retrofits was completed by Maddaus for residences with the Los Osos groundwater basin. The analysis was to help determine the effectiveness of past retrofit efforts and provide information to

assess the remaining water savings potential from future plumbing retrofits. The Section 3 report summarizes the results of the analysis and is summarized in the report as follows:

*Most toilets were documented to have a flow rate of 1.6 gpf (69% of total toilets for single-family and 75% for multi-family). Approximately 879 toilets remain outside of the sewer service area with a flow rate of 3.5 gpf or higher. Most showerheads have a flow rate of 2.0 gpm (73% of total showerheads for single-family and 80% for multi-family), with only approximately 479 remaining at a flow rate of 2.5 gpm or higher located outside of the sewer service area. Most clothes washers appear to have been retrofitted to an Energy Star Integrated Water Factor less than 4.0 (62% of total clothes washers for single-family and 86% for multi-family). Approximately 2,150 washers remaining at 4.0 or higher; these are found mostly within the sewer service area.*

### Average Annual Residential Water Use Estimates

Estimates for indoor and outdoor water use were established from the data with a unit of gallons per day per single and multi-family households. The self-source category refers to property served by private wells. Appendix C explains in detail how the estimates were derived. The following table from the study summarizes the results of the analysis:

| Residence Type <sup>1</sup> | Water Source   | Indoor <sup>2</sup> | Outdoor <sup>3</sup> | Total |
|-----------------------------|----------------|---------------------|----------------------|-------|
| SF                          | Water Purveyor | 92                  | 36                   | 128   |
|                             | Self-Source    |                     | 298                  | 390   |
| MF                          | Water Purveyor | 58                  | 43                   | 100   |
|                             | Self-Source    |                     | 54                   | 112   |

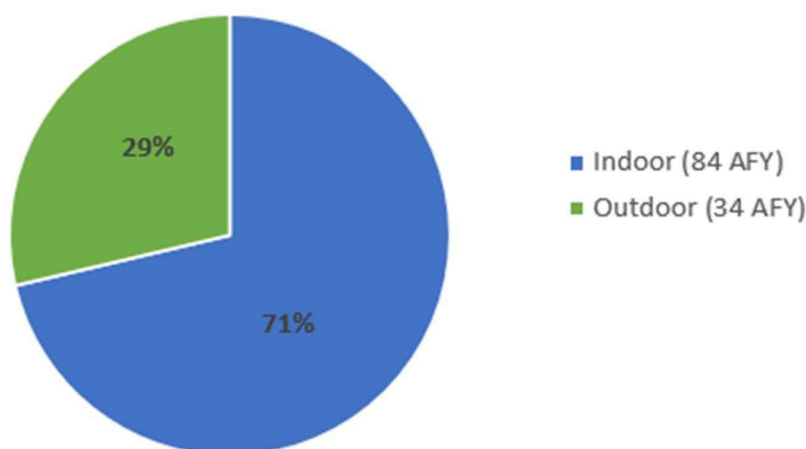
Notes:

1. SF = Single Family. MF = Multi-family. Mobile homes are considered MF units.
2. Indoor use is considered to be water use for lowest winter month based on billing consumption data analysis.
3. Reference Appendix C for basis of outdoor self-supplied water use estimates.

### Water Savings Potential

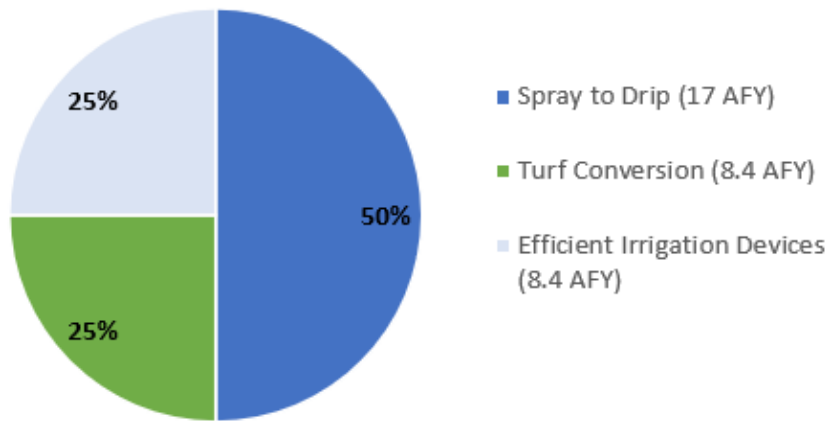
Section 5 of the report provides a detailed explanation of the methodology used to calculate the potential water savings for both indoor and outdoor water use. A summary of the results of the analysis is as follows:

#### Overall Water Saving Potential

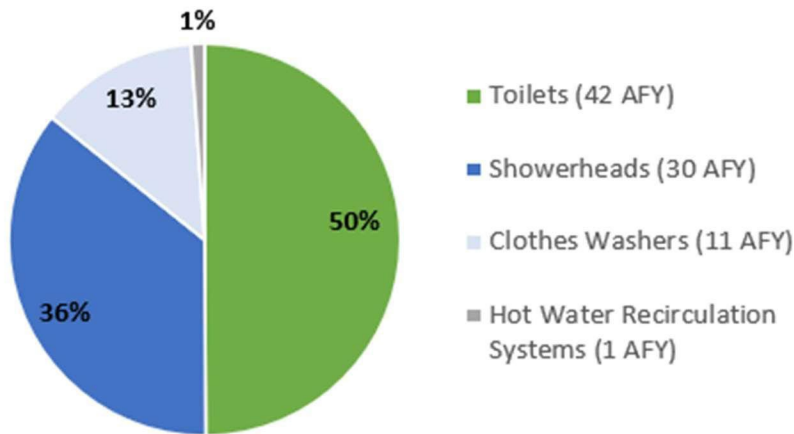


The report breaks down the estimated outdoor and indoor water savings as follows:

### ***Estimated Outdoor Residential Water Savings Potential***

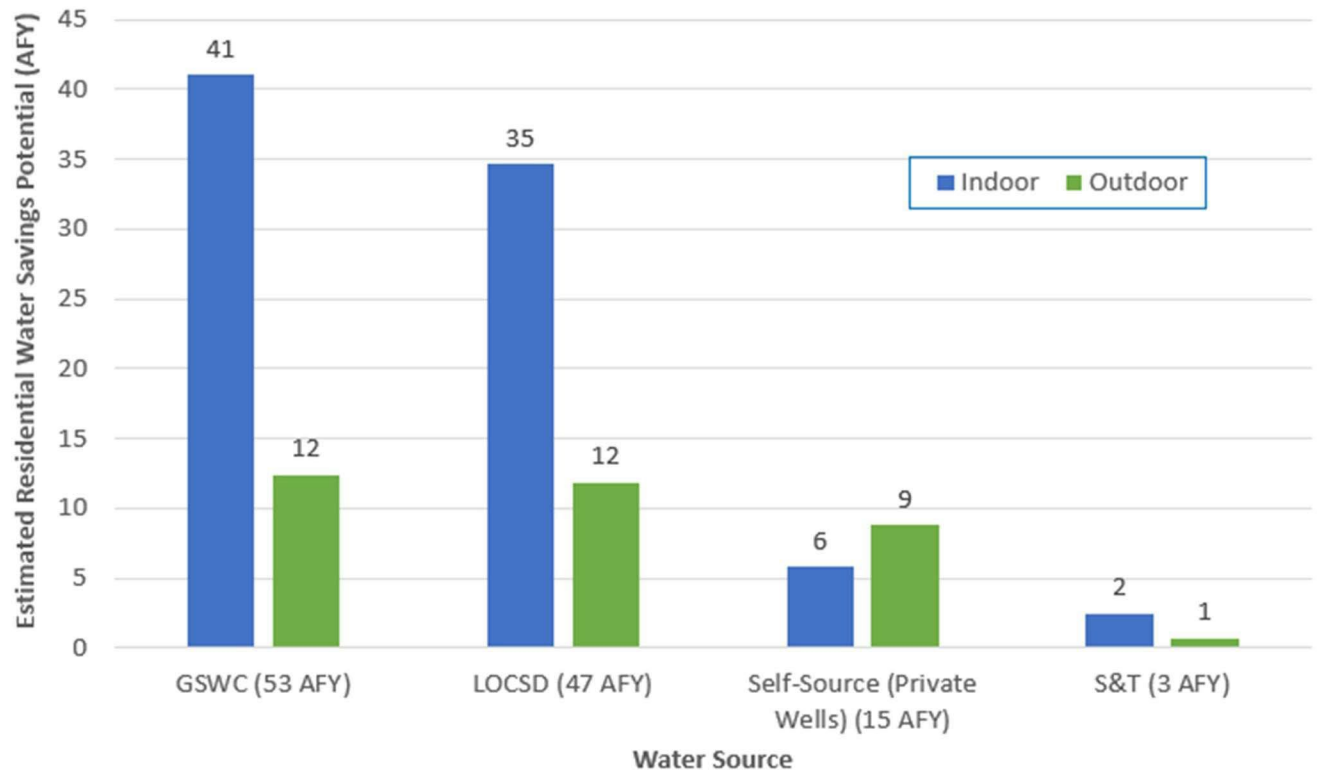


### ***Estimated Indoor Residential Water Savings Potential***



For comparison purposes, the report does provide water saving estimates for inside and outside the prohibition zone with the largest saving in the prohibition zone.

Finally, the report breaks out the estimated water savings by purveyor for indoor and outdoor uses. The following table summarizes the data:



### Offset Program Recommendations

In Section 6, Conclusions and Next Steps, Maddaus makes several recommendations to improve or enhance the program. They include:

- Update required water offset for new residences;
- Update estimated plumbing fixture daily use rates;
- Allow additional indoor toilet and showerhead retrofits within the PZ;
- Include outdoor water conservation measures with sufficient verification of continued water savings; and
- Monitor water use trends.

Also in Section 6, there are recommendations for verification of the water savings from the program. This has been a major point of discussion through the whole process and key to the program's future success.

### Attachment

Final Los Osos Water Offset Study



# Technical Memorandum

Date: June 28, 2023  
 To: San Luis Obispo County Planning and Building Department  
 From: Maddaus Water Management Inc.  
 Title: **Los Osos Water Offset Study**

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## Acronyms

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|            |  |       |                                      |
|------------|--|-------|--------------------------------------|
| AFY        | Acre-feet per year   | GPM   | Gallons per minute                   |
| BMC        | Los Osos Basin Management Committee                        | GSWC  | Golden State Water Company           |
| Basin      | Los Osos Groundwater Basin                                 | LUC   | Land Use Category                    |
| Department | San Luis Obispo County Department of Planning and Building | LOCSD | Los Osos Community Services District |
| GPD        | Gallons per day  | MF    | Multi-family                         |
| GPDA       | Gallons per day per account                                | PZ    | Prohibition Zone                     |
| GPF        | Gallons per flush  | S&T   | S&T Mutual Water Company             |
| GPHD       | Gallons per household per day                              | SF    | Single family                        |

## EXECUTIVE SUMMARY

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The San Luis Obispo County (County) Planning and Building Department (Department) commissioned this study to evaluate the retrofit-to-build program for the community of Los Osos. This study may inform the Department's land use and water resource planning efforts in Los Osos. To avoid increasing groundwater production from the Los Osos Groundwater Basin (Basin), the retrofit-to-build program requires new development to offset twice its estimated water demand (2:1) for all new development that uses groundwater from the Basin (including from private wells). Offsets are currently achieved via water savings projects at existing developments including credits for toilet and showerhead retrofits outside of the sewer service area, and for clothes washing machine and hot water recirculation retrofits basinwide. Annual groundwater production by Los Osos water purveyors has decreased almost 50% from 2008 to 2022, which can be partially attributed to the implementation of community-wide water conservation programs, including the County programs discussed in this study.

**The study estimates 118 acre-feet per year (AFY) of remaining residential water savings potential could be used to offset water use for new development, considering both indoor (84 AFY) and outdoor (34 AFY) water conservation measures.** The study considers residential water use within the Los Osos Basin Plan area, as defined by the Los Osos Basin Management Committee (BMC) adjudication documents and annual reports. This includes areas that use groundwater from the Basin, including approximately 2,365 acres within water purveyor service areas and 968 acres that self-source water from private wells.

This study consolidated water plumbing fixture tracking data from various County water conservation programs dating back to 2008 (including retrofit-on-sale and sewer connection retrofits) to estimate the level of saturation of higher efficiency plumbing fixtures basin-wide. This study also calculated an updated five-year average annual water use estimate for single family (SF) and multi-family (MF) dwellings in Los Osos, using water purveyors' historic consumption data for 2017-2022, excluding 2020 due to COVID-19 stay-at-home policies.

The study assumed the lowest winter monthly purveyor water use to be a proxy for indoor water use for residences basin-wide, including those using private wells. **The average estimated annual water use for SF and MF residences within water purveyor areas is 128 gallons per day (gpd) per residence and 100 gpd per residence, respectively.** Residences using private wells typically have larger parcel sizes and the potential for higher outdoor water use than those within water purveyor areas. As such, the County calculated an estimate of average outdoor water use for those residences based on estimated landscape area measurements using 2021 aerial imagery and evapotranspiration factors based on plant material type. **The average estimated annual water uses for SF and MF residences using private wells is 390 gpd per residence and 112 gpd per residence, respectively. 2020 census data includes an average household occupancy of 2.4 persons per residence.**

Indoor water savings potential is estimated at 84 AFY. This was determined both by capacity for savings and the ability or actions required to achieve those savings. The capacity was determined using the plumbing fixture saturation analysis, updated average water usage estimates, and best available industry estimates of residential end uses of water (the estimated percent of total water use per plumbing fixture per average residence). The ability and actions required to reach those savings are based on 1) the residential indoor water fixture retrofits currently included in the retrofit-to-build program, 2) allowing **high-efficiency toilet and showerhead retrofits within the sewer service area**, 3) an assumption that 70% of all bathroom fixtures and clothes washing machines are retrofitted to the highest available efficiency rating and 4) an assumption that 5% of residences install hot water recirculation systems.

The study estimates an additional 34 AFY of outdoor water savings potential available. This would require **the County to expand the retrofit-to-build program to include spray-to-drip, turf conversion, and efficient irrigation device retrofits and 10-20% of residences participate in each measure.** Future areas of study include a saturation analysis for outdoor water conservation measures, an analysis of commercial water savings potential, and water demand forecasting considering climate sensitivity.

Based on case studies of other jurisdictions, **program reliability may be increased through water savings verification procedures including pre- and post-inspections for outdoor water conservation measures, statistical analysis of water consumption data for participating properties, and enforcement actions for properties exceeding a designated water use allocation.** These are dependent on available staffing, funding, and political support.

# 1. INTRODUCTION

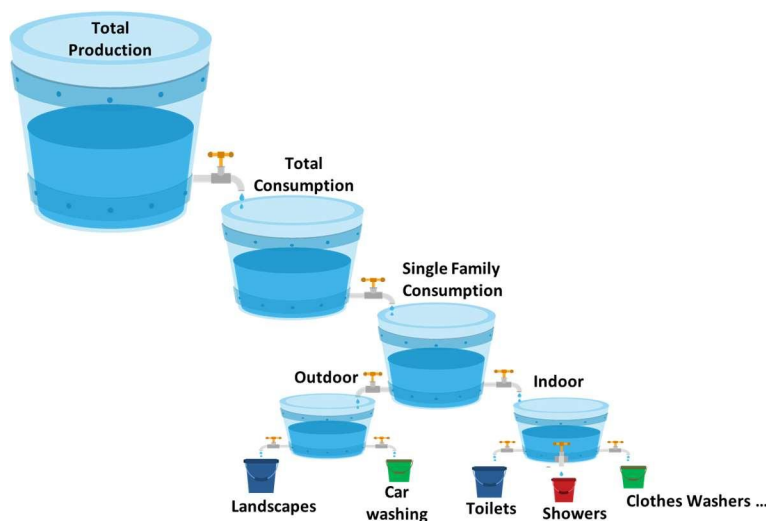
The San Luis Obispo County (County) Department of Planning and Building (Department) operates a retrofit-to-build program that requires new development using water from the Los Osos Groundwater Basin (Basin) to offset water demand at a 2:1 ratio by funding water conservation projects for existing development. The purpose of this study is to:

- Provide a detailed analysis of completed retrofits to gauge saturation of higher efficiency plumbing fixtures;
- Determine the basis for conservation savings potential on indoor water end uses;
- Strengthen the retrofit-to-build program by updating residential water usage estimates;
- Propose next steps to investigate County supported investments in new water conservation measures; and
- Provide preliminary estimates of remaining water savings potential for the community.

The community's water use profile is approximately 49% residential (32% indoor and 17% outdoor) and 34% agricultural, with the remaining 17% divided primarily between commercial, community, and irrigation.<sup>1</sup> As such, a key focus of the study was to understand the total volume of water savings possible and which conservation measures are needed to further reduce residential indoor water savings (32% of total community water use). The study also looked at the value of expanding the conservation program to include outdoor water savings. County land use policies require water offsets for new non-agricultural development to be sourced from non-agricultural uses, so this study did not consider potential for agricultural water savings.<sup>2</sup>

The indoor water savings potential estimates in this study are based on fixture use on a per person basis, often referred to as the 'end use' concept. This study uses both a bottom-up fixture count method and a top-down reasonable check on end uses by fixture type to further validate the findings. This concept of getting at the end use analysis from a top-down approach can be illustrated as breaking down total water production into various end uses, illustrated in Figure 1-1. This approach provides the ability to incorporate industry studies on indoor household water use into an analysis of local water production and consumption data. It enables an estimate of water savings on a percentage basis and can prevent double counting water savings from multiple conservation measures. The bottom-up approach uses the known or estimated number of fixtures per parcel to estimate the savings potential. Estimated fixtures per parcel were extrapolated using County provided data such as the date of construction and documented replacements. The outdoor water savings potential estimates are based on industry average percent savings applied to average annual outdoor water use rates that were calculated from water purveyor data.

**Figure 1-1. "End Use" Concept for Water Planning**



<sup>1</sup> Considering residential water use within water purveyor areas and for areas served by private wells. Based on 4-year average of 2017-2019 and 2021 purveyor consumption data and private well outdoor water use estimates in Appendix C. See Figure 2-1.

<sup>2</sup> County of San Luis Obispo General Plan Agriculture Element, Agriculture Policy 11: Agricultural Water Supplies.

<https://www.slocounty.ca.gov/Departments/Planning-Building/Forms-Documents/Plans-and-Elements/Elements/Agriculture-Element.pdf>.



Source: Maddaus Water Management Inc.

This study is unique in that Los Osos has an extensive history of water conservation measures, spurred by regulatory requirements to address historic groundwater contamination from on-site wastewater treatment systems and reliance on groundwater as the sole source of community water. The Background section includes a summary of historic communitywide conservation measures, focusing on those implemented by the County. The County maintains parcel and fixture-specific records for its plumbing retrofit programs, which allowed this study to use a bottom-up approach to estimate remaining water savings potential based on the estimated number and flow rates of fixtures that could be retrofit. The study verified this bottom-up approach with a top-down approach as well, using water consumption and production data provided by the Los Osos water purveyors to make sure that the water savings potential was not overestimated per the end use concept.

The study area is the Los Osos Basin Plan Area, the planning area that sources water from the Basin. The following figure presents the Basin Plan Area; the service areas for three water purveyors: S&T Mutual Water Company (S&T), Golden State Water Company (GSWC), and Los Osos Community Services District (LOCSO); and the community sewer service area/septic system prohibition zone (PZ) boundary. This map is relevant to note which parts of the study area are subject to the PZ and its water fixture flow requirements. Approximately 2,365 acres are within a water purveyor service area, and approximately 968 acres self-source water from private wells.

**Figure 1-2. Los Osos Basin Plan Area, Water Purveyors, and PZ**

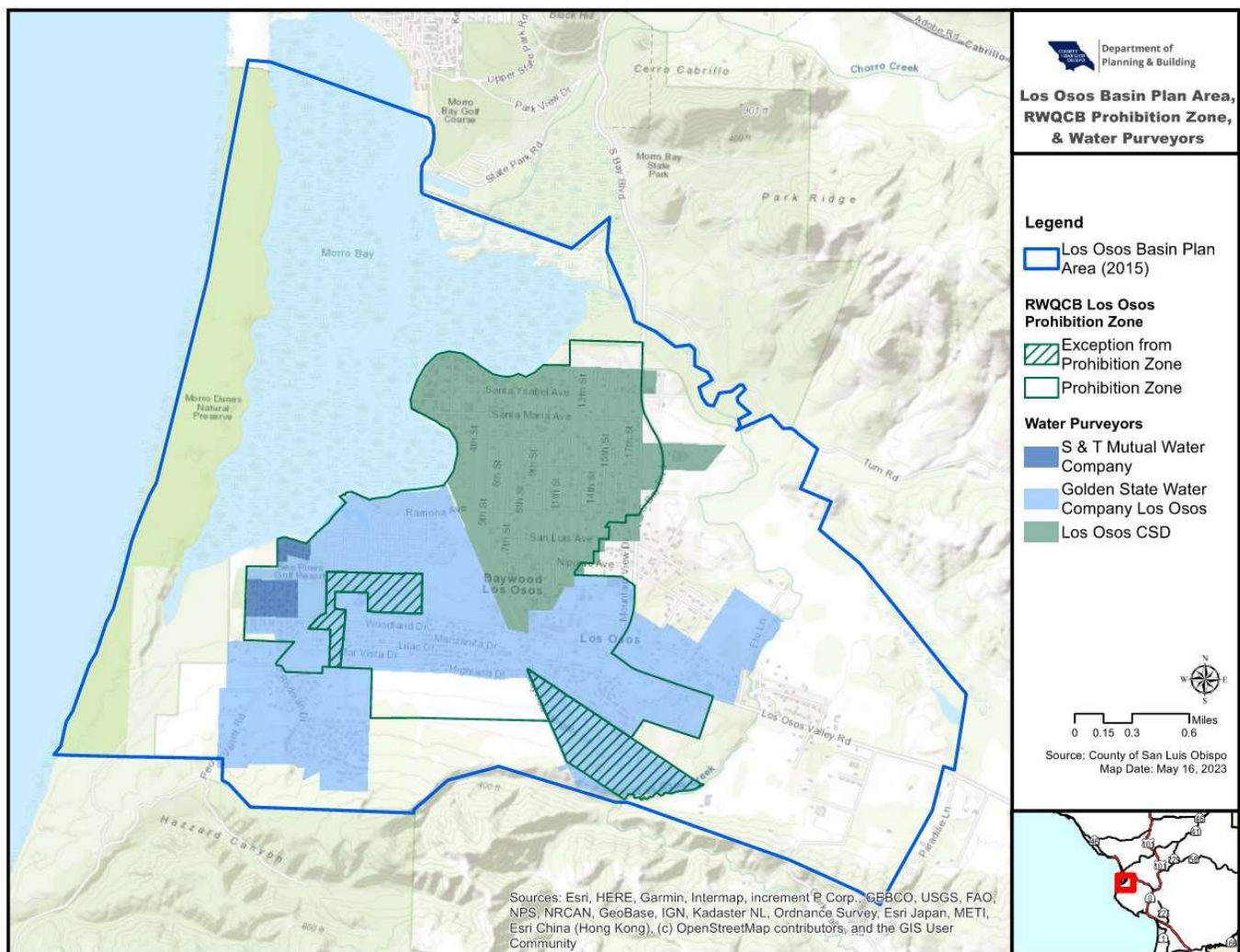


Table 1-1 presents the estimated number of parcels within and outside of the sewer service area, as of 2022, for each of the three purveyors in Los Osos. This information is valuable to contextualize the number and percent of parcels by purveyor which are subject to the sewer service area fixture flow requirements.

**Table 1-1. Parcels by Water Purveyor**

| Water Purveyor | Total Parcels | Vacant Parcels | Parcels Inside Sewer Service Area | Parcels Outside Sewer Service Area | % Outside Sewer Service Area (by No. of Parcels) |
|----------------|---------------|----------------|-----------------------------------|------------------------------------|--|
| GSWC           | 2,572         | 326            | 1,967                             | 605                                | 23.5%  |
| LOCSD          | 3,044         | 372            | 3,029                             | 15                                 | 0.5%   |
| S&T            | 213           | 30             | 213                               | 0                                  | 0.0%   |

Source: San Luis Obispo County Department of Planning and Building GIS data, accessed February 2022. Vacant parcel count based on residential address points, excluding parcels with land use category of Open Space or Public Facilities, where SF and MF residences are typically not allowed.

The study provides the methodology that was followed, based on County documented records, and the resulting saturation level for the three primary indoor water use fixtures: toilets, showerheads, and clothes washers. It also provides preliminary estimates on indoor and outdoor SF and MF water uses by residence, assuming 2.4 people on average per residence per 2020 Census data. The study includes a summary of estimated conservation savings potential based on analysis of best available data, including billing consumption data provided by the water purveyors, County parcel-level land use data, and 2020 Census data. The study concludes with recommendations on potential next steps for further analysis.

This study focuses on the Department’s retrofit-to-build program, but it is important to understand that this program is one of multiple overlapping efforts to manage water and wastewater sustainably. The Background section provides a brief overview of the water/wastewater management context for the community. The Department incorporated feedback from the community water purveyors to inform the study scope as well as the conclusions and recommendations. Appendix G includes a written response from the Department to comment letters submitted by the Los Osos water purveyors regarding concerns with the Department’s retrofit-to-build program. The Department may address broader concerns about new development and growth policies for Los Osos in future studies and specific policy proposals.

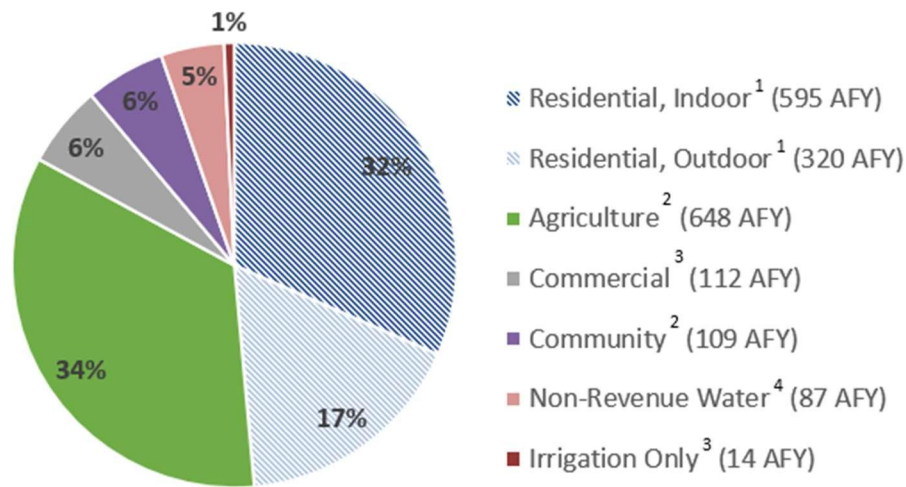
## 2. BACKGROUND

The Basin is the sole source of water for the community of Los Osos and surrounding agricultural lands. Los Osos has been subject to development restrictions for decades due to water quality and supply issues.

The water quality in the upper aquifer is impacted by nitrate contamination from historic on-site wastewater treatment systems. The nitrate contamination is projected to degrade naturally over time. In most of the urban areas of the community, on-site wastewater treatment systems have been replaced by the Los Osos Water Recycling Facility (“community sewer”) in operation since 2016. Most groundwater production has shifted to the lower aquifer to avoid nitrate contamination and, in effect, induced a decline in groundwater levels and seawater intrusion into the lower aquifer.

Three water purveyors pump and distribute water to most residents. Agricultural lands and residents in the eastern portion of the Basin primarily source their water from private wells. The County also serves as a groundwater producer for a community park. Figure 2-1 shows the breakdown of groundwater production for the Los Osos Basin Plan Area by different user categories based on a four-year average of water consumption and production data for 2017-2019 and 2021.

**Figure 2-1. Estimated Average Basin wide Groundwater Production by Use Category**



Source: San Luis Obispo County Department of Planning and Building, 2023 based on 4-year annual average of groundwater production data for 2017-2019 & 2021 from 2022 BMC Annual Report (Public Review Draft) and proprietary water purveyor consumption data by customer category.

1. Residential water use includes purveyor accounts and domestic private wells based on purveyor consumption data analysis outlined in Section 4 and domestic private well estimates outlined in Appendix C.
2. Agriculture and community water use estimates based on 2022 BMC Annual Report (Public Review Draft).
3. Commercial and irrigation only water use estimates based on water purveyor consumption data.
4. Non-revenue water estimate based on the calculated difference between water purveyor production and consumption data.

This study analyzed parcel-specific and fixture-specific retrofit verification tracking data from the following County programs to best estimate the remaining water savings potential within the Los Osos Basin Plan Area. The study scope did not include estimating the historic water savings attributed to the various programs.

- “Retrofit-on-sale” (Title 8);
- “Retrofit-to-build” (Title 19);
- Sewer connection retrofits; and
- Retrofit rebates.

See Appendix A for example verification forms for each program. The Department tracks initial installation verification by licensed professional certification for bathroom fixtures, and by self-certification with photos and receipts for clothes washers and hot water recirculation systems. Landowners agree that the retrofitted fixtures will remain with the property if sold. The Department does not currently inspect or track ongoing water use for participating properties.

**Department retrofit-on-sale (Title 8) and retrofit-to-build (Title 19) programs.** In 2008, the County adopted retrofit-to-build and retrofit-on-sale programs for Los Osos, administered by the Department. The retrofit-to-build program currently allows water offset credits for new development to be generated from toilet and showerhead retrofits outside of the sewer service area, clothes washing machine replacement (since July 2017), and hot water circulation system installation anywhere in the Basin. Applicants for new development are responsible for finding participating properties, installing/retrofitting fixtures, and submitting verification to the County for certification prior to issuance of a construction permit for a new residence. The retrofit-on-sale program requires all residences in Los Osos to meet bathroom fixture standards before the close of escrow. The fixture standards for the retrofit-to-build and retrofit-on-sale programs are as follows:

- Toilets over 1.6 gallons per flush (gpf) replaced with 1.28 gpf or less;
- Showerheads must be 2.0 gallons per minute (gpm) or less;
- Faucet aerators must be 1.0 gpm or less; and
- Clothes washing machines must have an Energy Star Integrated Water Factor (IWF) of 3.2 or better.

As of June 2023, the Department has issued 56 certificates verifying retrofit-to-build water offsets were completed to allow new development, primarily for applicants wanting to build SF residences outside of the sewer service area. The Department has issued construction permits for 36 new residences since the retrofit-to-build requirement took effect in 2008. Table 2-1 shows the retrofit-to-build certificate issuance and residential construction permit issuance annual activity from 2008 to 2022. As of June 27, 2023, the Department has issued 2,223 retrofit-on-sale verification certificates for Los Osos properties.

**Table 2-1. Summary of Retrofit-to-Build Program and New Residence Construction Activity in Los Osos, 2008-2022**

| Year | No. of Retrofit-to-Build Certificates Issued <sup>1</sup> |            | No. of New Residences Issued Construction Permits <sup>2</sup> |            |
|------|---|------------|--|------------|
|      | Annual  | Cumulative | Annual   | Cumulative |
| 2009 | 3   | 3          | 1  | 1          |
| 2010 | 3   | 6          | 3  | 4          |
| 2011 | 3   | 9          | 1  | 5          |
| 2012 | 4   | 13         | 0  | 5          |
| 2013 | 5   | 18         | 3  | 8          |
| 2014 | 9   | 27         | 2  | 10         |
| 2015 | 3   | 30         | 3  | 13         |
| 2016 | 5   | 35         | 1  | 14         |
| 2017 | 7   | 42         | 4  | 18         |
| 2018 | 4   | 46         | 5  | 23         |
| 2019 | 3   | 49         | 5  | 28         |
| 2020 | 1   | 50         | 3  | 31         |
| 2021 | 4   | 54         | 2  | 33         |
| 2022 | 2   | 56         | 3  | 36         |

Source: San Luis Obispo County Department of Planning and Building, June 2023. Construction permit records and Title 19 Retrofit-to-Build Program records.

1. All certificates are for single family dwellings except for three certificates. Thirteen certificates are for properties within the PZ. Retrofit certificates issued up to 2014 required 900 gpd of offset credits for a SF dwelling. In 2014, the requirement was lowered to 300 gpd of offset credits in response to increased conservation in the Los Osos community and increased water

efficiency building code standards. Certificates issued prior to the change in 2014 are tied to the credit table in use at the time of their issuance. Certificates run with the property and may not be transferred.

- Does not include permits for replacement residences or for those with applications submitted before the County’s water offset requirement took effect on May 22, 2008.

**County sewer connection retrofits.** In 2012, the County started requiring properties to retrofit bathroom fixtures to the following standards before connecting to the new wastewater treatment facility as a condition of its sewer Coastal Development Permit.

- Toilets over 1.6 gpf replaced with 1.28 gpf or less
- Showerheads over 2.0 gpm replaced with 1.5 gpm or less
- Faucet aerators must be 1.5 gpm or less

The County amended the retrofit-to-build program to restrict retrofits required for sewer connection from counting toward offsets for new development. This amendment is still in effect.

**Retrofit rebates.** The County offered rebates to help properties meet the sewer connection retrofit requirements. In 2017, the County expanded its rebate program to promote outdoor conservation measures, including installation of graywater systems and rainwater catchment barrels. The County also operated a program encouraging the repurposing of abandoned septic tanks to be used for rainwater catchment. The two larger water purveyors in Los Osos – LOCSO and GSWC - also offer rebates for high-efficiency fixture retrofits and some outdoor water conservation measures within their service areas.

**Smart water meters and leak detection.** LOCSO and GSWC incentivize the self-installation of Flume smart home water monitors to help detect leaks and estimate a breakdown of water use by individual household appliances and water fixtures.<sup>3</sup> This study included an analysis of Flume data available for the community of Los Osos, including 2022 consumption data for approximately 100 SF residences, about half served by LOCSO and half by GSWC. See Appendix B for the calculated average usage trends for this dataset. In addition, the users within the smallest water purveyor in Los Osos – S&T – paid to upgrade their connections to Advanced Metering Infrastructure (AMI) to allow real-time monitoring of water use and leak detection. Quick detection and leak repair can save large volumes of water. This study did not analyze water savings from leak detection measures implemented by the water purveyors.

Table 3-1 summarizes the water efficiency rebates and smart water monitor programs administered by the County and water purveyors. This summary may not include other water conservation measures undertaken by the individual water purveyors, such as water audits, tiered metering, etc.

**Table 2-2. Summary of Los Osos Water Conservation Rebates and Smart Water Monitor Programs as of May 2023**

| Water Conservation Measure                  | County                                       | GSWC                                 | LOCSO                               | S&T |
|---|--|--------------------------------------|-------------------------------------|-----|
| <b>High-Efficiency Toilets</b>              | \$160 each<br>1.28 gpf or less               | Up to \$80 each<br>1.0 gpf or less   | Up to \$100 each<br>1.0 gpf or less | -   |
| <b>High-Efficiency Showerheads</b>          | \$30 each<br>1.5 gpm or less                 | Free<br>1.5 gpm                      |                                     | -   |
| <b>High-Efficiency Clothes Washers</b>      | \$450 each<br>Tier 3, Water Factor 3 or less | \$80 each                            | \$200 each                          | -   |
| <b>Hot Water Recirculation Systems</b>      | \$350 each                                   | -                                    | -                                   | -   |
| <b>Weather-Based Irrigation Controllers</b> | -  | \$80 each<br>CalWEP/Rachio<br>Rebate | -                                   | -   |
| <b>Efficient Sprinkler Nozzles</b>          | -  | \$4 each<br>15 minimum               | -                                   | -   |
| <b>Rain Barrels</b>                         | -  | \$35 each<br>50 gal minimum          | Up to \$100                         | -   |

<sup>3</sup> More information about Flume smart home water monitors is available at: <https://flumewater.com/about/>.

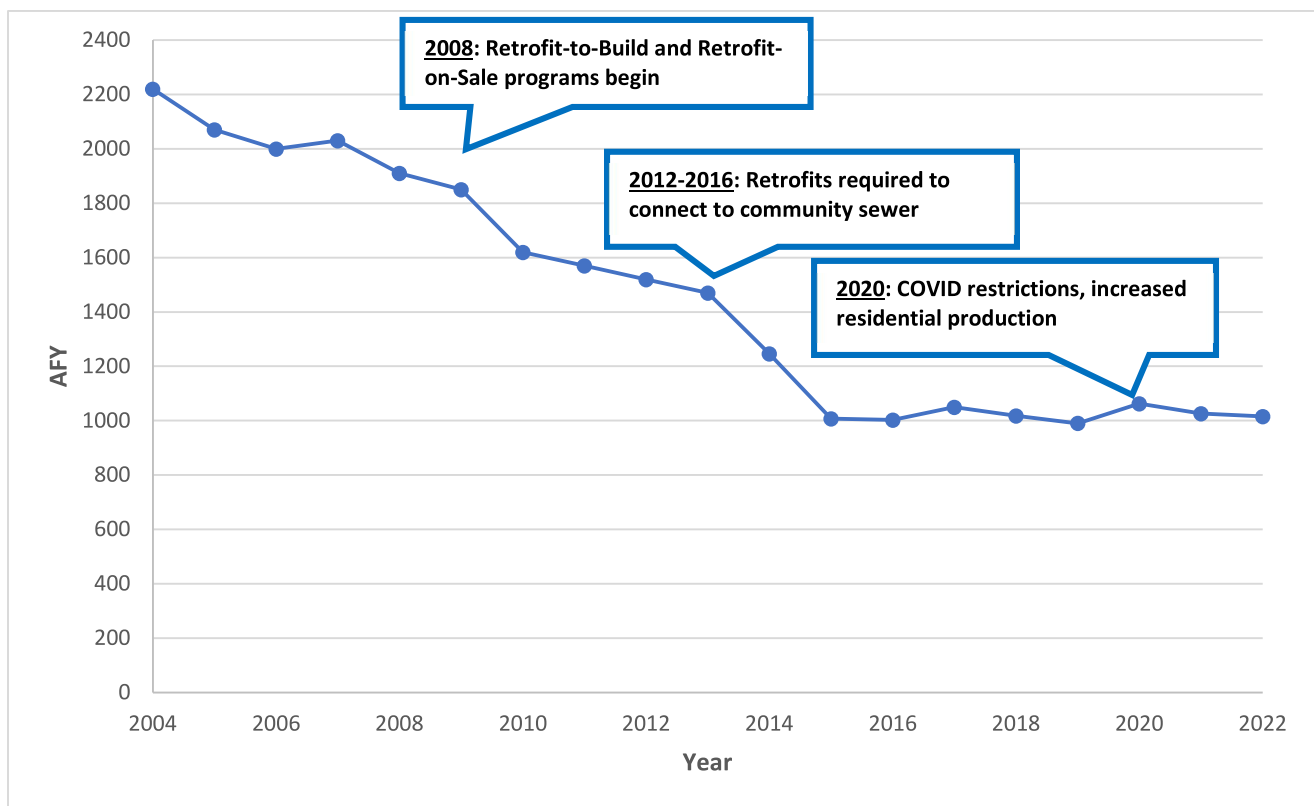
| Water Conservation Measure | County                              | GSWC  | LOCS   | S&T  |
|----------------------------|-------------------------------------|---|--|--|
|                            |                                     | 3 barrels max   |  |  |
| Graywater Systems          | \$500 complete<br>\$50 laundry only | -   | -  | -  |
| Smart Water Monitors       | -                                   | \$100 per account for Flume smart home water monitors | \$99 per account for Flume smart home water monitors | Advanced Metering Infrastructure installed for all connections |

Sources: <https://www.slocounty.ca.gov/Departments/Public-Works/Services/Programs-Outreach/Los-Osos-Water-Conservation-Rebate-Program-For-Hom.aspx>, <https://www.losososcsd.org/district-rebate-program>, <https://www.gswater.com/sites/main/files/file-attachments/los-osos-csa-022020.pdf?1604342677>, accessed July 2022; GSWC | Los Osos Rebates and Programs (gswater.com), accessed April 2023; Conversation with Charlie Cote, S&T Chief Operator, December 16, 2021.

**Decrease in residential groundwater production.** Groundwater production by the three water purveyors, which includes the majority of residential development using water from the Basin, has declined significantly since retrofit requirements took effect, as illustrated in Figure 2-2. Estimated annual groundwater production by Los Osos water purveyors has decreased almost 50% from 2008 to 2022, which can also be attributed to the implementation of community-wide water conservation programs including the County programs discussed in this study, as well as changes in State law, economic conditions, and consumer behavior influenced by public education campaigns and other external factors (e.g., increased water and sewer rates, drought-friendly water usage in dry years<sup>4</sup>, etc.).

There was not a significant rebound water demand noted after the dry conditions from 2007-2009, the economic recession of 2008-2011, or the drought period from 2013-2016, indicating that these changes in water demand reductions are more long term and sustainable. Further study on the resilience of these demand reductions would be useful to understand the reliability of these water savings to meet future County water demands under Title 19.

**Figure 2-2. Annual Groundwater Production by Los Osos Water Purveyors, 2004-2022**



<sup>4</sup> Knuth, M., Behe, B. K., Hall, C. R., Huddleston, P. T., & Fernandez, R. T. (2018). Consumer Perceptions, Attitudes, and Purchase Behavior with Landscape Plants during Real and Perceived Drought Periods, *HortScience horts*, 53(1), 49-54. Retrieved Jun 20, 2023, from <https://doi.org/10.21273/HORTSCI12482-17>.

Source: Los Osos BMC Annual Report 2022, Public Review Draft (2013-2022 data) and 2015 Los Osos Basin Plan (2004-2012 data), County Retrofit-to-Build Tracking Database, access July 2022

**Groundwater production management.** Per a 2015 court-approved Stipulated Judgement, the Los Osos Basin Management Committee (BMC) is implementing a Basin Plan to manage groundwater pumping to combat seawater intrusion and provide a sustainable groundwater supply for the overlying users. The BMC consists of representatives from the three water purveyors in Los Osos (GSWC, LOCSD, and S&T) and the County. Basin Plan implementation projects include shifting pumping demand from the western area of the lower aquifer to the central and eastern areas of the lower aquifer and the upper aquifer. The BMC prepares annual reports summarizing groundwater monitoring and Basin Plan implementation efforts. This study will help update water demand modeling efforts for the BMC.

**Wastewater management.** The County operates the Los Osos Water Recycling Facility and returns treated wastewater back to the Basin at Broderson (437 AFY in 2022) and Bayridge Estates (17.4 AFY) leach fields to help halt seawater intrusion. The County also delivers recycled water to Sea Pines Golf Course (66 AFY in 2022), two existing agricultural customers (3.1 AFY used in 2022), a median on Los Osos Valley Rd (negligible volume in 2022), and construction water trucks (0.5 AFY in 2022). The County is working to deliver recycled water to Los Osos schools and the Los Osos Community Park by 2026, funded by an American Rescue Plan Act grant, pending contract agreements with the schools and water purveyors. The County has 90% design plans for the community park and Los Osos Middle School and anticipates finishing initial plans for the park and all schools by August 2023 to be submitted to the State for review and approval. The estimated annual usage volumes for recycled water for each facility are 5 AFY for Monarch Grove Elementary School, 5 AFY for Sunnyside School, 5 AFY for the community park, 7 AFY for Baywood Elementary School, and 25 AFY for Los Osos Middle School (subject to change depending on final design plans and contract agreements). The BMC annual reports include summaries of delivered annual recycled water volumes.<sup>5</sup>

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<sup>5</sup> County Public Works, Los Osos Recycled Water Update June 9, 2023. 2022 BMC Annual Report (Public Review Draft).

## 3. HISTORICAL WATER CONSERVATION MEASURES EVALUATION

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A saturation analysis for plumbing fixture retrofits was completed for residences within the Los Osos Basin Plan Area, considering toilets, showerheads, and clothes washers (see the bottom-up approach discussion in the Introduction section). This analysis is meant to assess the effectiveness of historic water conservation efforts as well as assess the remaining water savings potential from plumbing retrofits.

### 3.1 Methodology

A detailed methodology for saturation analysis can be found in Appendix A. A summary of the steps taken to determine the saturation of fixtures is as follows:

1. **Parcel Profile.** Created a profile of parcels within the Los Osos Basin Plan area, indicating LOCP land use designation, water supply (purveyor or self-source), and within/outside sewer service area/Prohibition Zone (PZ).
2. **Residence Count.** Estimated the number of existing residences per parcel based on Department and County Assessor records.
3. **SF or MF.** Estimated if existing residences are SF or MF based on water purveyor customer class (if provided) or LOCP land use designation and number of residences per parcel. Mobile homes are considered multifamily.
4. **Fixture Count.** Estimated the number of plumbing fixtures per parcel based on bedroom/bathroom/half-bathroom counts per County Assessor records. Assume one toilet and shower per bathroom, one toilet per half-bathroom, and one clothes washer per residence.<sup>6</sup>
5. **Flow Rates.** Estimated flow rates for the estimated fixture count per parcel, based on the estimated age of housing per County Assessor records, average fixture replacement rates, and CA building code requirements and parcel-specific and fixture-specific retrofit verification tracking from the following County programs:
  - a. Retrofit requirements to connect to the sewer,
  - b. Retrofit requirements to receive rebates from County Public Works,
  - c. "Retrofit-on-Sale" (Title 8), and
  - d. "Retrofit-to-Build" (Title 19).

### 3.2 Results

The estimated fixture count for toilets, showerheads, and clothes washers of various flow rates within the study area is shown in Figure 3-1 (SF residences) and Figure 3-2 (MF residences) below, sorted by both water source and location with respect to the PZ.

Most toilets were documented to have a flow rate of 1.6 gpf (69% of total toilets for SF and 75% for MF). Approximately 879 toilets remain outside of the sewer service area with a flow rate of 3.5 gpf or higher. Most showerheads have a flow rate of 2.0 gpm (73% of total showerheads for SF and 80% for MF), with approximately 479 remaining at a flow rate of 2.5 gpm or higher - located outside of the sewer service area. Most clothes washers appear to have been retrofitted to an Energy Star Integrated Water Factor less than 4.0 (62% of total clothes washers for SF and 86% for MF). Approximately 2,150 washers remaining at 4.0 or higher; these are found mostly within the sewer service area.<sup>7</sup>

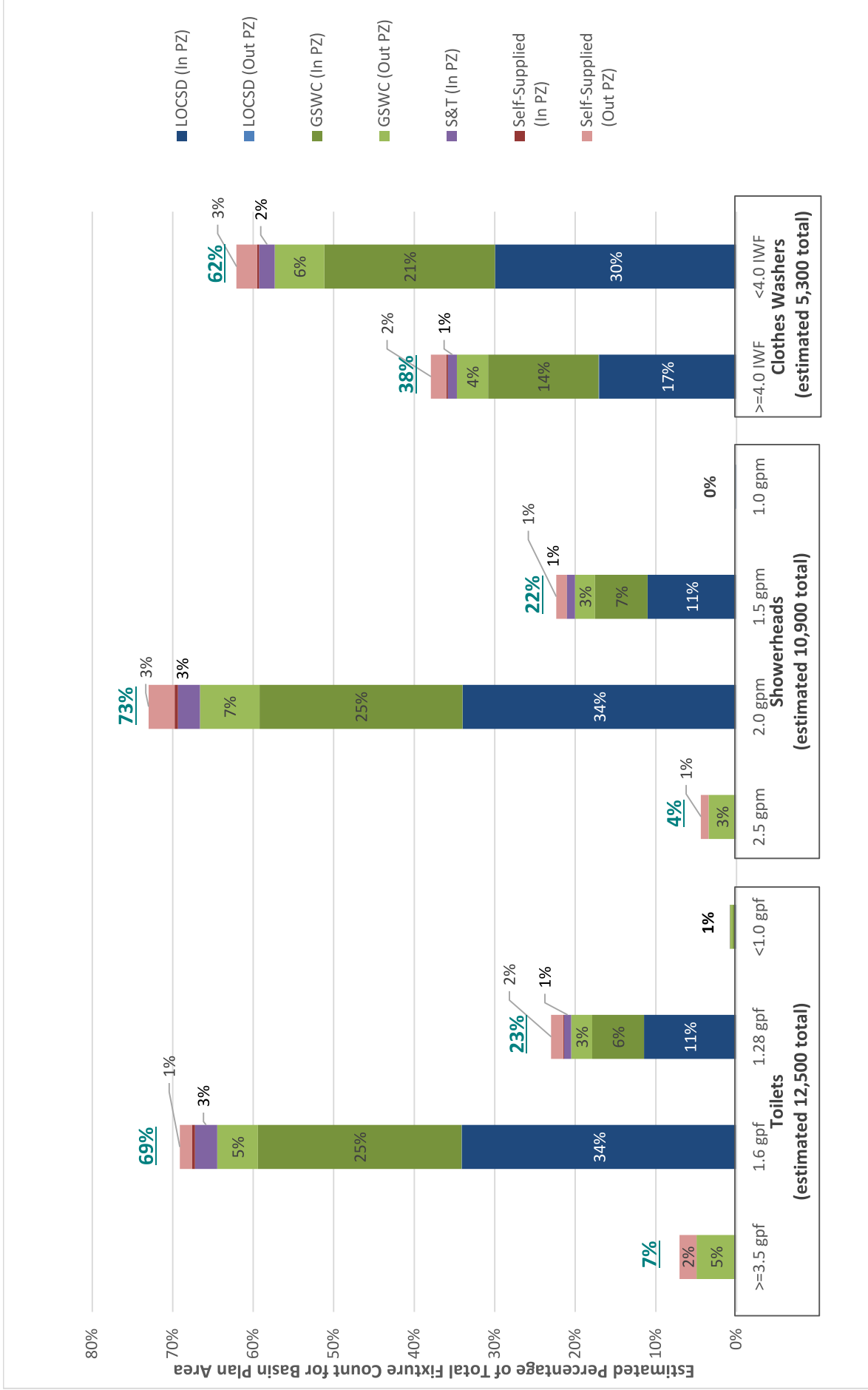
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<sup>6</sup> Note: The average clothes washer per household assumption was updated for the water savings potential estimates in Section 5 to be 0.8 clothes washers per residence on average. See detailed citation in Appendix D.

<sup>7</sup> Calculations based on methodology detailed in Appendix A.

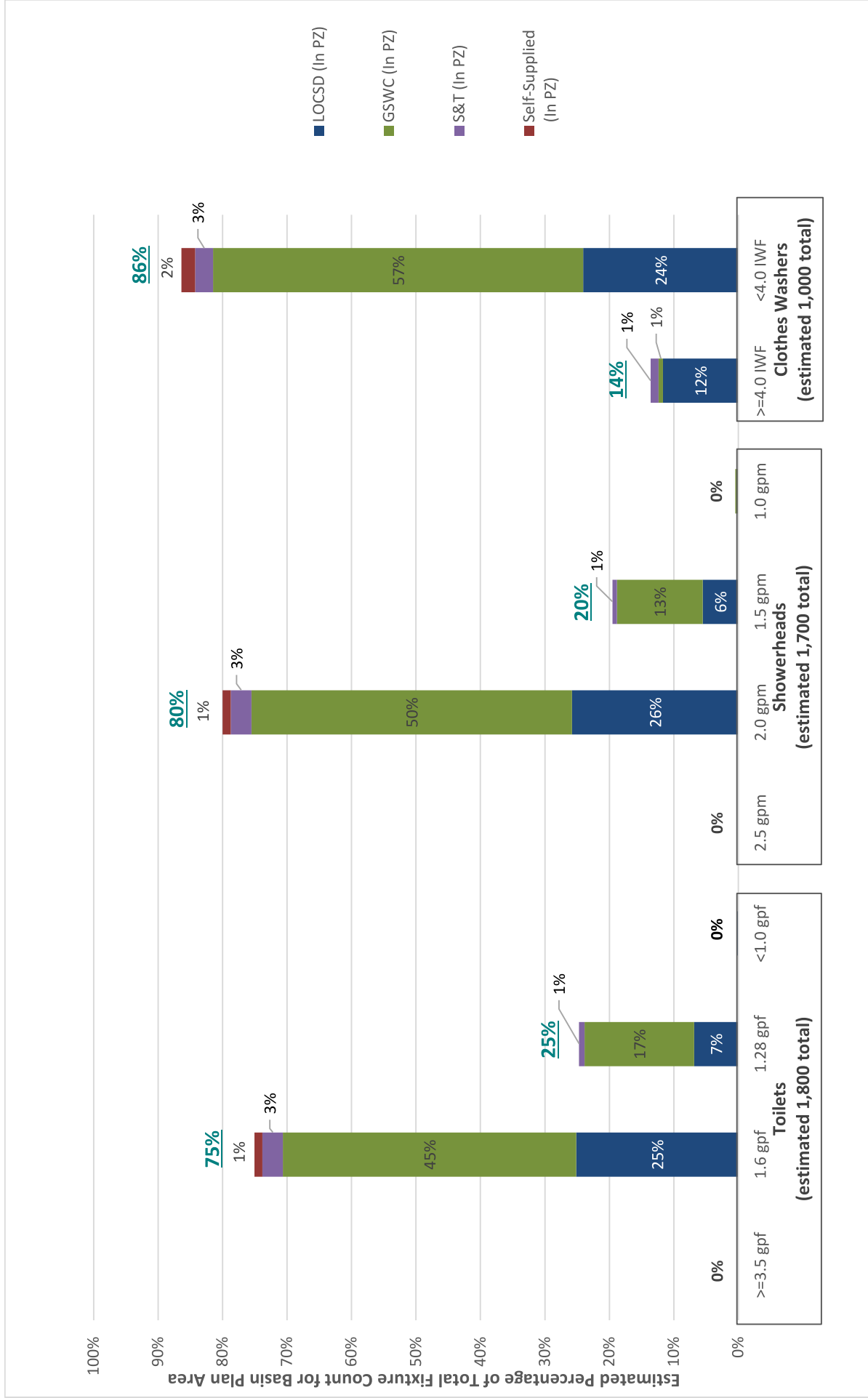


Figure 3-1. Estimated Fixture Retrofit Saturation for SF Residences



Source: Analysis per methodology in Appendix A.

Figure 3-2. Estimated Fixture Retrofit Saturation for MF Residences



Source: Analysis per methodology in Appendix A.

## 4. AVERAGE ANNUAL RESIDENTIAL WATER USAGE ESTIMATES

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The Department water offset program uses estimates of average consumption per household to determine the volume of consumable groundwater that must be offset for new construction. The program currently assumes 150 gpd per SF household and 112.5 gpd per MF household (75% of SF usage). A deliverable of this study is to update these consumption estimates.

A consumption estimate per household type (not per account) is needed to improve the program parameters. The consumption data provided by the water purveyors is per water service account. Accounts do not necessarily equal one housing unit, especially for accounts associated with multifamily residence properties. Rather, this analysis assumes that residential address points are a proxy for housing units. Address points, as provided by the Department per parcel data in July 2022, are assumed to be representative for occupancy through baseline years, given minimal changes to the housing stock due to the Los Osos building moratorium.

The 2020 United States Census estimate of people per unit in the Los Osos Census Designated Place was adjusted for the Basin Plan Area boundary. The Census value of 2.4 people/unit was utilized to derive average annual residential water usage estimates from water purveyor consumption data.

### 4.1 Methodology

The three Los Osos water purveyors provided monthly or bimonthly water consumption data totals sorted by SF, MF, commercial, and irrigation only accounts. The County does not require private well metering and reporting in Los Osos.

**Total Consumption.** Total estimated average annual household water usage was determined by dividing annual total consumption volumes by address points to calculate an estimated total consumption per household for SF and MF customer categories. An average of 2017, 2018, 2019, 2021, and 2022 consumption data was used as the base years; 2020 data is excluded due to the elevated indoor water use due to the pandemic stay-at-home policies. Separate water use average estimates were calculated for both SF and MF customers in the LOCSD, S&T, and combined basin plan (LOCSD+S&T) areas. The estimated percentage of indoor water use was applied to the average water use per unit (based on 2021 number of units divided by the average annual use for the selected five years (“5-year average”) to calculate the estimated indoor water use per unit. GSWC data (consumption and address points) is not included in these SF and MF averages since an unknown number of their many MF units are included in their SF consumption reporting. GSWC is limited by customer privacy protocols. Self-source parcel consumption data is not available.

**Indoor Consumption.** Utilizing the provided consumption data for Los Osos CSD and S&T service areas, the percent indoor water use was estimated based on the difference between the average monthly gallons per day per account (gpda) and the lowest monthly gpda for the previously defined 5-year average. Also, wet water year 2017 was considered as the basis for indoor water with its likely low winter watering. However, for the MF categories, alternative years presented lower winter water use, and so these values were used. Indoor consumption estimates were divided by the number of address points to calculate estimated indoor consumption per household for both SF and MF customers in the LOCSD, S&T, and combined basin plan (LOCSD+S&T) areas. Sewer inflow data is not used since there is no way of sorting SF from MF units. Separate water use averages were determined for SF and MF. Again, GSWC data (consumption and address points) is not included in these SF and MF indoor averages since many of their MF units are included in their SF consumption reporting. The number is unknown and GSWC is limited by customer privacy protocols. It was assumed that indoor water use for parcels served by water purveyors is representative of indoor water use for self-source parcels. Self-source parcel indoor water use was calculated using a weighted average of LOCSD and S&T consumption data.

**Outdoor Consumption.** Department staff calculated and provided average outdoor consumption estimates for parcels with self-source water based on parcel-specific aerial imagery analysis (see Appendix C for detailed methodology). For parcels within purveyor areas, the estimated outdoor water use per unit is the difference between the total average water use per unit (for the 5-year average) and the indoor water use per unit.

## 4.2 Results

The update to average annual residential water usage estimates is displayed in Table 4-1, with a unit of gallons per day per household (gpd/household) for SF and MF dwelling units. The results are sorted by residence type and water source. Indoor and outdoor water usage is distinguished from total water usage.

The analysis reveals that self-source residential parcels, on average, use more estimated total water than those parcels served by water purveyors, with a higher proportion of outdoor water use. The updated average annual water use estimates for SF and MF units served by water purveyors are lower than the estimates currently used for the retrofit-to-build program (128 gpd/SF unit instead of 150 gpd/SF unit, and 100 gpd/MF unit instead of 112.5 gpd/MF unit). The average annual water use estimate for MF units using private wells is 112 gpd/unit, which is about the same as the current program estimate. The average annual water use estimate for SF units using private wells is 390 gpd/unit, which is 2.6 times more than the current program estimate.

**Table 4-1. Estimated Average Residential Annual Water Use (gpd/dwelling unit)**

| Residence Type <sup>1</sup> | Water Source   | Indoor <sup>2</sup> | Outdoor <sup>3</sup> | Total | Percent Indoor and Outdoor |
|-----------------------------|----------------|---------------------|----------------------|-------|----------------------------|
| SF                          | Water Purveyor | 92                  | 36                   | 128   | 72% indoor<br>28% outdoor  |
|                             | Self-Source    |                     | 298                  | 390   | 24% indoor<br>76% outdoor  |
| MF                          | Water Purveyor | 58                  | 43                   | 100   | 58% indoor<br>43% outdoor  |
|                             | Self-Source    |                     | 54                   | 112   | 52% indoor<br>48% outdoor  |

Source: Analysis per methodology described above.

Notes:

1. SF = Single Family. MF = Multifamily. Mobile homes are considered MF units.
2. Indoor use is considered to be water use for lowest winter month based on billing consumption data analysis.
3. Reference Appendix C for basis of outdoor self-supplied water use estimates.

Appendix C also includes a recommended update to the total indoor and outdoor water use estimates for residences served by private wells (26 AFY indoor and 80 AFY outdoor for a total of 106 AFY), which is a 52% decrease in the total estimated residential water use for private wells included in the 2022 BMC Annual Report.

## 5. WATER SAVINGS POTENTIAL ESTIMATE

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This section estimates remaining water savings potential for the study area. Savings are based on the saturation analysis for fixtures already included in the offset program, and additional water conservation measures that could be added to target outdoor as well as indoor water use. Verification measures for these estimated savings are discussed in Section 6. See the introduction section for an explanation of the end use concept, including a bottom-up fixture count and top-down reasonable per capita water use approach, which has been applied in this section.

### 5.0 Potential New Water Conservation Measures

This study is limited in scope to consider additional water savings potential that could be amenable to the Department's existing retrofit-to-build program. Table 5-1 lists the range of water conservation measures available to public and private agencies. Many of the listed measures are within the purview of water purveyors and are therefore excluded from consideration for the Department's retrofit-to-build program. This study does not comment on individual water purveyor efforts towards water conservation, outside of the purveyor rebates referenced in Table 2-2. These efforts may include water loss audits, tiered water rates, sub-metering, etc.

The following criteria were used to select potential new water conservation measures. These applied only to those not already excluded for being outside of the Department's purview. Those selected were included in the remaining water savings potential analysis. Table 5-1 shows a summary of the conservation measures evaluation.

1. **Quantifiable.** Water savings must be able to be estimated ahead of time with a reasonable amount of certainty.
2. **Verifiable.** Department staff must be able to verify that the measure is completed and remains in effect for an agreed upon period.
3. **Feasible.** Applicants for new development are responsible for coordinating the implementation of Title 19 offset program measures. New measures must be of a scale reasonable for individual applicants to coordinate with participating landowners within Los Osos.
4. **Available.** Measures must have enough water savings potential to be worthwhile.
5. **Palatable.** Landowners must be willing to implement the measures on their properties.

Estimated water savings potential for rainwater catchment was not considered due to difficulty verifying consistent use once installed. Savings potential for gray water systems was not considered because the Department directed that the indoor use would be more beneficial to the Basin once treated through the wastewater treatment plant for groundwater recharge and seawater intrusion mitigation. It is also difficult to confirm long-term savings for gray water systems given the building code requirement to have a sewer diversion installed for each system.

**Table 5-1. Screening Potential New Water Conservation Measures.**

| Type                                 | Specific Measures  | Evaluation Criteria                    |            |  |                                |                                       |
|--------------------------------------|--|--|------------|--|--------------------------------|---------------------------------------|
|                                      |  | Quantifiable                           | Verifiable | Feasible   | Available                      | Palatable                             |
| Residential Indoor Plumbing Fixtures | Voluntary water surveys, Leak repair assistance, Bathroom fixture retrofits, Remove garbage disposals, Ion exchange-based water softeners, Hot water on demand pumps, Clothes washer retrofits, Dishwasher retrofits | Yes.                                   | Yes.       | Yes; high existing consumer participation.           | Yes.                           | Yes; existing consumer participation. |
| Residential Landscape Demand         | Custom outdoor water surveys, Outdoor water audits for high users, Water budgets for high users, Landscape retrofits   | Yes.                                   | Yes.       | Yes; existing framework in other County communities. | Yes.                           | Yes.                                  |
| Commercial                           | Individualized water use audits for top water users; restaurant spray nozzles; retrofitting inefficient equipment such as ice machines, steamers, spray valves   | No, minimal baseline consumption data. | Yes.       | Yes.   | Unknown; sparse baseline data. | Yes.                                  |

Source: San Luis Obispo County Department of Planning and Building, 2023.

## 5.1 Methodology

Indoor water savings potential estimates for bathroom fixtures and clothes washers are based on the end use concept presented in Section 1 Introduction:

- 1) The conversion of 70% of estimated high-water using fixtures to their high-efficiency device counterpart (<1.0 gpf toilets, 1.5 gpm showerheads, <4.0 IWF clothes washers); this 70% adjustment factor is to account for potential error in the fixture retrofit saturation analysis and estimated average daily fixture use per household; the 70% adjustment factor was selected based on comparing the estimated water savings volume to the estimated total water use per fixture based on estimated indoor water use per water source from purveyor data and industry average residential end of use water assumptions<sup>8</sup> to ground-truth the savings estimates;
- 2) The fixture saturation analysis from Section 3, modified to assume only 0.8 clothes washers per residence instead of one per residence;
- 3) Average water use per dwelling unit from Section 4;
- 4) The estimated average daily fixture use per household, as displayed in Table 5-2; and
- 5) The assumption that retrofitting a standard clothes washer to an Energy Star certified clothes washer with IWF of 4.0 or better changes the water use from 23 to 13 gallons per load<sup>9</sup> (43% savings per load), which is conservative since older clothes washers may use significantly more water per load.

<sup>8</sup> [https://www.circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](https://www.circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf)

<sup>9</sup> <https://www.epa.gov/watersense/start-saving#:~:text=The%20average%20family%20spends%20%241%2C100,used%20by%20a%20standard%20machine.>

**Table 5-2. Assumptions for Average Daily Fixture Use**

| Fixture Type             | Average Fixture Use | Units per Household         |
|--------------------------|---------------------|-----------------------------|
| Toilets                  | 5.75 <sup>10</sup>  | flushes per person per day  |
| Showerheads              | 6.3 <sup>11</sup>   | minutes per person per day* |
| Clothes Washing Machines | 0.82 <sup>11</sup>  | loads per day               |

\*Based on the assumption that 8.7-minute showers occur 0.7 times per day per person <sup>12</sup>

Source: See referenced footnotes. Assuming 2.4 persons per household per 2020 Census Data for Los Osos.

Water savings potential estimates for installing hot water recirculation systems are based on an estimated percent savings (3% of indoor water use<sup>13</sup>) and 5% of units targeted.

Outdoor water savings potential estimates are based on the average outdoor water use estimates per unit per Section 4 findings and an estimated percentage savings and number of units targeted for each measure, summarized in Table 5-3. It is assumed that the Department would implement sufficient verification procedures to ensure ongoing maintenance of the outdoor water savings.

**Table 5-3. Assumptions for Outdoor Water Conservation Measures**

| Outdoor Water Conservation Measure | Estimated Savings Rate (% of Irrigation*) | Targeted Residences <sup>14</sup> |
|------------------------------------|---|-----------------------------------|
| Spray to Drip                      | 30% <sup>15</sup>                         | 20%                               |
| Turf Conversion                    | 30% <sup>16</sup>                         | 10%                               |
| Efficient Irrigation Devices       | 15% <sup>17</sup>                         | 20%                               |

\*Assuming irrigation is 83% of average outdoor water use.

Source: Assumptions recommended by Maddaus Water Management Inc., 2023.

See Appendix D for detailed methodology of water savings potential estimates analysis.

<sup>10</sup> Industry average per [https://www.circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](https://www.circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf).

<sup>11</sup> Assumption based on EPA national average use rate of 300 loads per year, or 0.82 loads per day.

[https://www.energystar.gov/products/clothes\\_washers](https://www.energystar.gov/products/clothes_washers).

<sup>12</sup> [https://www.epa.gov/sites/default/files/2017-02/documents/ws-ourwater-shower-better-learning-resource\\_0.pdf](https://www.epa.gov/sites/default/files/2017-02/documents/ws-ourwater-shower-better-learning-resource_0.pdf)

<sup>13</sup> Assuming 33% of indoor residential water use is hot water use and 20% of residential indoor hot water use is wasted and that half of wasted hot water could be saved by efficient recirculation systems (33% \* 20% \* 50% = 3%). Sources: [https://www.circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](https://www.circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf); Lutz, J. (2005). Estimating Energy and Water Losses in Residential Hot Water Distribution Systems (No. LBNL-57199). Lawrence Berkeley National Lab. (LBNL), Berkeley, CA (United States).

<sup>14</sup> Conservative estimate recommended by MWM based on industry experience of what are reasonable participate rates.

<sup>15</sup> Drip/micro-irrigation have an efficiency of 80-95%, compared to landscape spray systems which ranges from 40-65% efficiency (Irrigation Association). Thus, switching from the spray to the drip irrigation, water savings could be between 15-55%. It really depends on initial irrigation efficiency, but on average, drip saves 30-50% more water when compared to conventional sprinkler irrigation. Assume 30% savings to be conservative per MWM recommendation.

<sup>16</sup> Research by Southern Nevada Water Authority (source: Public Policy Institute of California, Lawns and Water Demand in California) estimates that conversion from turf to low-water landscaping resulted in up to a 76% savings. Other savings estimates range from 15% to over 50%. Santa Clarita Water Agency estimates 25%. Liberty Utilities (Park Water Company) estimates 18%. Assume 30% savings to be conservative per MWM recommendation.

<sup>17</sup> Per MWM experience, participating fixtures typically save between 5%-35% of irrigation water use. Assume average of 15%.

## 5.2 Results

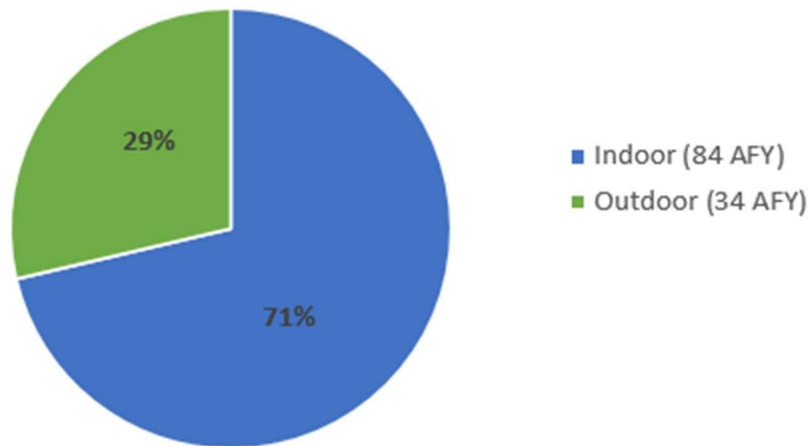
The water savings potential estimates are visualized according to the following distinctions:

- indoor versus outdoor potential savings (Figure 5-1),
- indoor potential savings inside and outside the PZ (Figure 5-2),
- outdoor potential savings by conservation measure (Figure 5-3),
- indoor potential savings by fixture type (Figure 5-4),
- indoor potential savings by fixture type inside and outside the PZ (Figure 5-5),
- indoor potential savings by fixture type and water source inside and outside the PZ (Table 5-4),
- indoor potential savings as a portion of estimated water use by fixture type (Figure 5-6), and
- indoor and outdoor potential savings by water source (Figure 5-7).

### *Indoor vs. Outdoor*

The findings indicate that there is potential to reduce water use by an estimated 118 AFY on residential parcels across the Basin area, with 71% sourced from indoor use and 29% from outdoor use, shown in Figure 5-1 below.

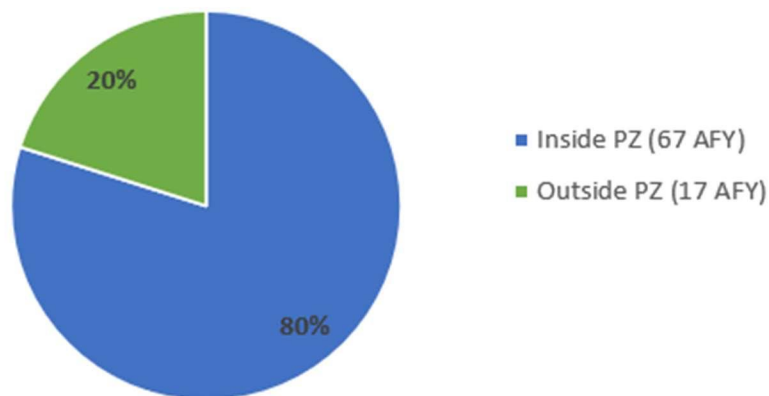
**Figure 5-1. Estimated Residential Water Savings Potential, Indoor vs. Outdoor**



Source: Analysis per methodology in Appendix D.

The estimated indoor savings, inside and outside the PZ, are shown in Figure 5-2. The majority of estimated indoor water savings potential is inside the PZ (80%).

**Figure 5-2. Estimated Indoor Residential Water Savings Potential (84 AFY), Inside and Outside PZ**



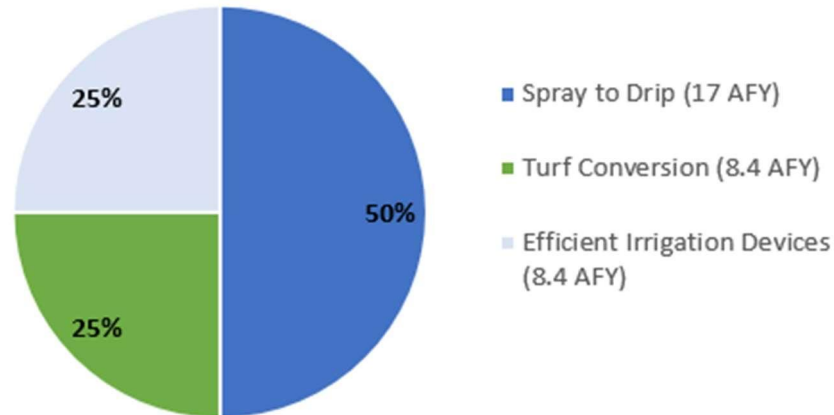
Source: Analysis per methodology in Appendix D.



### Outdoor Water Savings Potential

Outdoor water use could be reduced by an estimated 34 AFY on residential parcels, based on the assumptions described in Section 5.2 and Appendix D. Half of the total potential for outdoor water conservation (17 AFY) could be accomplished through switching spray emitters or sprinklers to drip emitters to irrigate landscapes. The remaining potential for outdoor water conservation could be attained through equal parts turf conversion (8.4 AFY) and installing efficient irrigation devices (8.4 AFY).

**Figure 5-3. Estimated Outdoor Residential Water Savings Potential (34 AFY)**

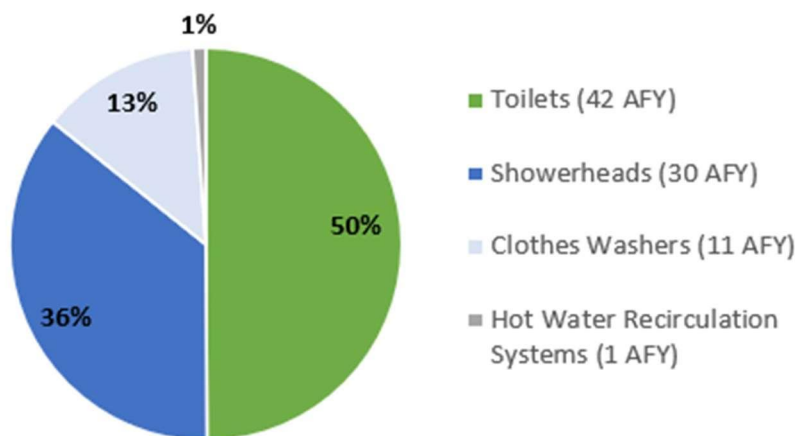


Source: Analysis per methodology in Appendix D.

### Indoor Water Savings Potential

The findings indicate that indoor water use could be reduced by an estimated 84 AFY by retrofitting toilets, showerheads, and clothes washers and installing hot water recirculation systems. The breakdown of indoor savings by fixture type is shown in Figure 5-4. The largest potential indoor savings (50%) come from retrofitting toilets to 1.0 gpf or less (42 AFY). Retrofitting showerheads down to 1.5 gpf is estimated to save 30 AFY (38% of indoor potential). Retrofitting clothes washers to IWF of 4.0 or better is estimated to save 11 AFY (13%). Installing hot water recirculation systems (targeting 5% of residences) is estimated to save 1 AFY (1% of indoor potential).

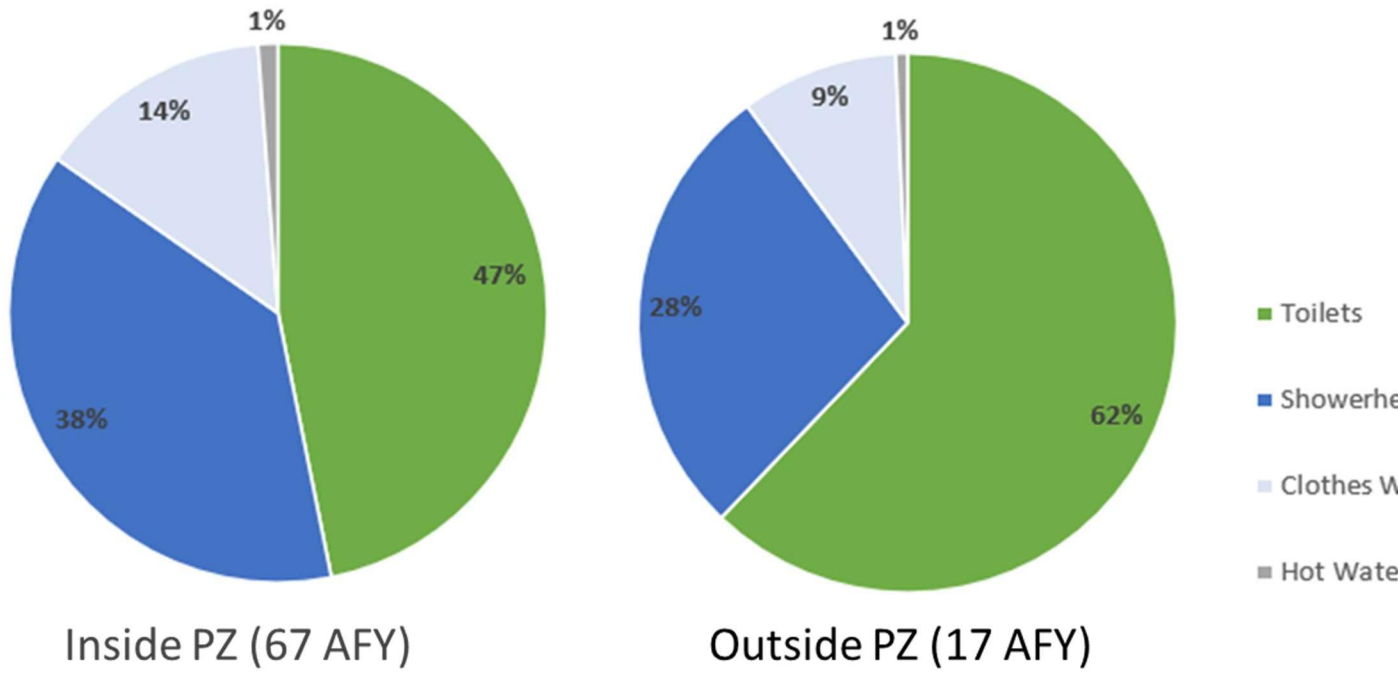
**Figure 5-4. Estimated Indoor Residential Water Savings Potential by Fixture (84 AFY)**



Source: Analysis per methodology in Appendix D.

The breakdown of estimated indoor water savings potential by fixture type inside and outside the PZ is shown in Figure 5-5. Most savings potential is for toilets and showerheads inside the PZ.

**Figure 5-5. Estimated Indoor Residential Water Savings Potential by Fixture, Inside and Outside PZ**



Source: Analysis per methodology in Appendix D.

A detailed breakdown of indoor water savings potential estimates by water source and location relative to the PZ is shown in Table 5-4. Note that there are no residences that lie in the S&T Mutual Water Company service area *and* outside of the PZ.

**Table 5-4. Estimated Residential Indoor Savings Potential by Water Source and Inside/Outside the PZ**

| Indoor Water Conservation Measure                        | Estimated Residential Indoor Savings Potential (AFY) |                         |                |                 |               |                         |                          |            | Basinwide Total |
|--|--|-------------------------|----------------|-----------------|---------------|-------------------------|--------------------------|------------|-----------------|
|  | Los Osos CSD Inside PZ                               | Los Osos CSD Outside PZ | GSWC Inside PZ | GSWC Outside PZ | S&T Inside PZ | Self-Supplied Inside PZ | Self-Supplied Outside PZ |            |                 |
| <i>Toilets</i> <sup>1</sup>                              |  |                         |                |                 |               |                         |                          |            |                 |
| 3.5 to <1.0 gpf  | 0.0  | 0.0                     | 0.0            | 5.4             | 0.0           | 0.0                     | 0.0                      | 2.7        | <b>8.1</b>      |
| 1.6 to <1.0 gpf  | 13.9   | 0.0                     | 12.3           | 1.3             | 1.0           | 0.3                     | 0.3                      | 0.4        | <b>29.3</b>     |
| 1.28 to <1.0 gpf   | 2.1  | 0.0                     | 1.6            | 0.3             | 0.1           | 0.0                     | 0.0                      | 0.2        | <b>4.4</b>      |
| Total  | 16.0   | 0.1                     | 14.0           | 7.1             | 1.1           | 0.3                     | 0.3                      | 3.3        | <b>41.9</b>     |
| <i>Showerheads</i> <sup>2</sup>                          |  |                         |                |                 |               |                         |                          |            |                 |
| 2.5 to 1.5 gpm   | 0.0  | 0.0                     | 0.0            | 1.6             | 0.0           | 0.0                     | 0.0                      | 0.5        | <b>2.1</b>      |
| 2.0 to 1.5 gpm   | 12.8   | 0.0                     | 11.4           | 1.7             | 0.9           | 0.3                     | 0.3                      | 0.8        | <b>28.0</b>     |
| Total  | 12.8   | 0.0                     | 11.4           | 3.3             | 0.9           | 0.3                     | 0.3                      | 1.3        | <b>30.1</b>     |
| <i>Clothes Washers</i> <sup>3</sup><br>>=4.0 to <4.0 IWF | 5.3  | 0.0                     | 3.8            | 1.1             | 0.4           | 0.1                     | 0.1                      | 0.5        | <b>11.1</b>     |
| <i>Hot Water Recirculation Systems</i> <sup>4</sup>      | 0.4  | 0.0                     | 0.3            | 0.1             | 0.0           | 0.0                     | 0.0                      | 0.0        | <b>0.9</b>      |
| <b>Total</b>   | <b>34.5</b>  | <b>0.1</b>              | <b>29.5</b>    | <b>11.6</b>     | <b>2.5</b>    | <b>0.6</b>              | <b>0.6</b>               | <b>5.2</b> | <b>84.0</b>     |

Source: Analysis per methodology in Appendix D.

1. Toilets – Assuming 70% of fixtures retrofitted, a use rate of 5.75 flushes per person per day,<sup>18</sup> and 2.4 persons per residence.<sup>19</sup>
2. Showerheads – Assuming 70% of fixtures retrofitted, a use rate of 0.7 showers per person per day lasting 8.7-minutes each,<sup>20</sup> and 2.4 persons per residence.<sup>10</sup>
3. Clothes Washers – Assuming 70% of fixtures retrofitted, a use rate of 300 loads per year,<sup>21</sup> and 10 gallons per load water savings.<sup>22</sup>
4. Hot Water Recirculation Systems – Assuming 5% of residences are targeted and that each system saves half of hot water loss per household. Hot water use is assumed to be 33% of indoor water use per household,<sup>9</sup> and 20% of hot water use is assumed to be wasted.<sup>23</sup>

<sup>18</sup> Industry average per [https://www.circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](https://www.circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf).

<sup>19</sup> 2020 Census Data.

<sup>20</sup> [https://www.epa.gov/sites/default/files/2017-02/documents/ws-ourwater-shower-better-learning-resource\\_0.pdf](https://www.epa.gov/sites/default/files/2017-02/documents/ws-ourwater-shower-better-learning-resource_0.pdf).

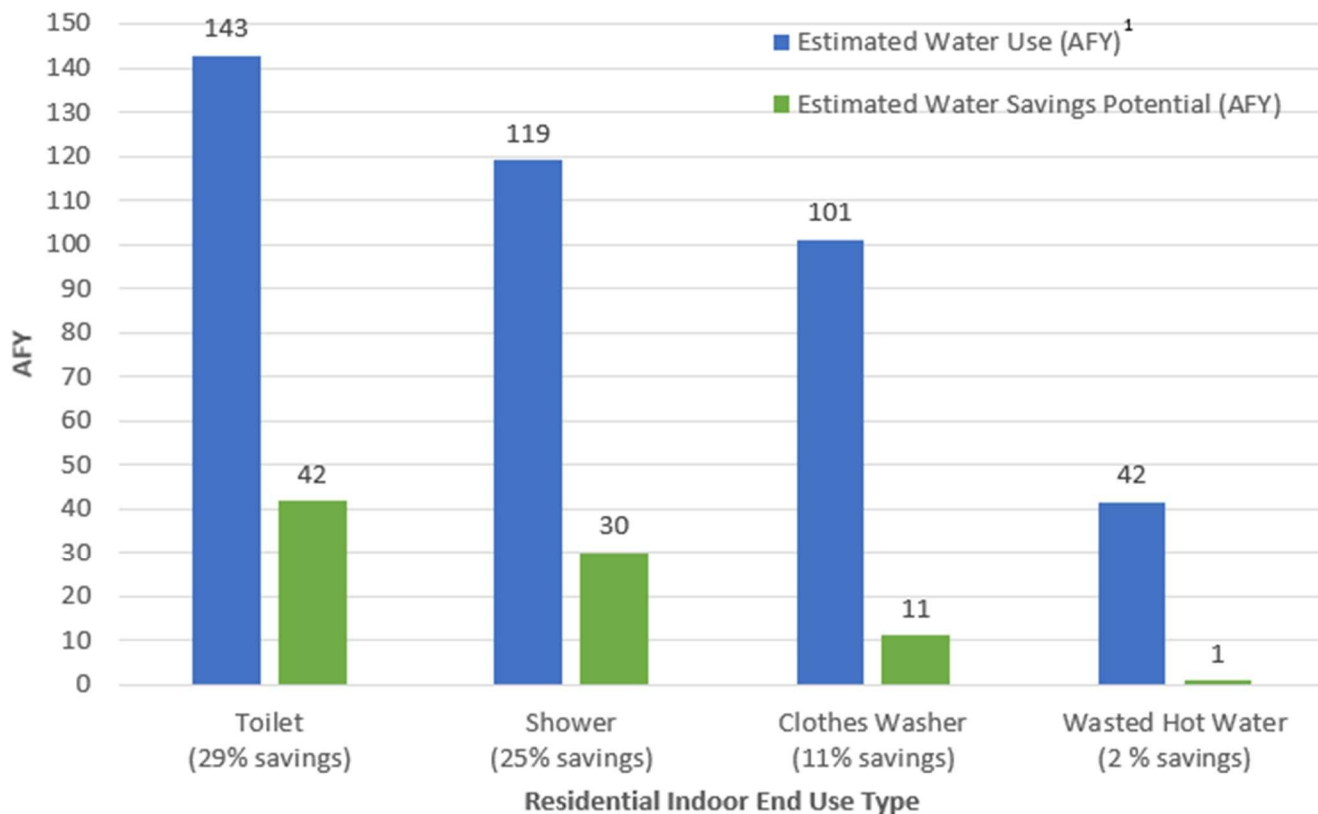
<sup>21</sup> National average per [https://www.energystar.gov/products/clothes\\_washers](https://www.energystar.gov/products/clothes_washers).

<sup>22</sup> <https://www.epa.gov/watersense/start-saving#:~:text=The%20average%20family%20spends%20%24%2C100,used%20by%20a%20standard%20machine.>

<sup>23</sup> Lutz, J. (2005). Estimating Energy and Water Losses in Residential Hot Water Distribution Systems (No. LBNL-57199). Lawrence Berkeley National Lab. (LBNL), Berkeley, CA (United States).

To help make intuitive sense of the indoor water savings potential results, Figure 5-6 below shows the estimated water savings potential compared to the estimated water use per corresponding residential indoor end use type. Estimated water use is based on the industry average indoor end use percentages listed in Appendix D and average indoor residential water use as estimated in Figure 2-1 using 4-year averages of purveyor consumption and BMC annual reporting data, combining indoor water use for purveyor parcels and self-source parcels with private wells.

**Figure 5-6. Estimated Water Savings Potential as a Portion of Estimated Water Use for Indoor End Use Types (Basinwide, Combining Purveyors and Private Wells)**



Source: Analysis per methodology in Section 5.2 and Appendix D for estimated water savings potential for indoor retrofits.

1. Analysis for the estimated water use is based on industry average end use percentages of indoor water use listed in Appendix D multiplied by the estimated basinwide residential indoor water use from Figure 2-1 – the 4-year average of 2017-2019 and 2021 consumption and production data from water purveyors and estimated total indoor water use for private wells from Appendix C.

The estimated water savings potential remaining for retrofitting toilets is 29% of the estimated water use associated with toilets. This is plausible given that most of the estimated toilet profile (see Figures 3-1 and 3-2) is 1.6 gpf toilets (69% for SF and 75% for MF). Retrofitting from 1.6 to 1.0 gpf is a 37.5% savings per toilet. Retrofitting from 1.28 to 1.0 gpf is 22% savings per toilet. Approximately 23% of SF toilets and 25% of MF toilets are 1.28 gpf, respectively. Total estimated savings for toilets of 29% of estimated use is within the 37.5% and 22% savings associated with retrofitting 1.6 and 1.28 gpf toilets to 1.0 gpf, consistent with the fixture retrofit saturation analysis profile from Section 3.

The estimated water savings potential remaining for retrofitting showerheads is 25% of the estimated water use associated with showers. Retrofitting a showerhead from 2.5 to 1.5 gpm is a 40% savings and from 2.0 to 1.5 gpm is a 25% savings. The fixture retrofit saturation profile from Section 3 estimates most showerheads are 2.0 gpm (73% for SF and 80% for MF), so it is to be expected that the percent savings for showerhead retrofits basinwide would be closer to 25% than 43%. Only 4% of SF showerheads are estimated to have 2.5 gpm rating, and 22% of SF and 20% of MF showerheads to already be at 1.5 gpm rating.

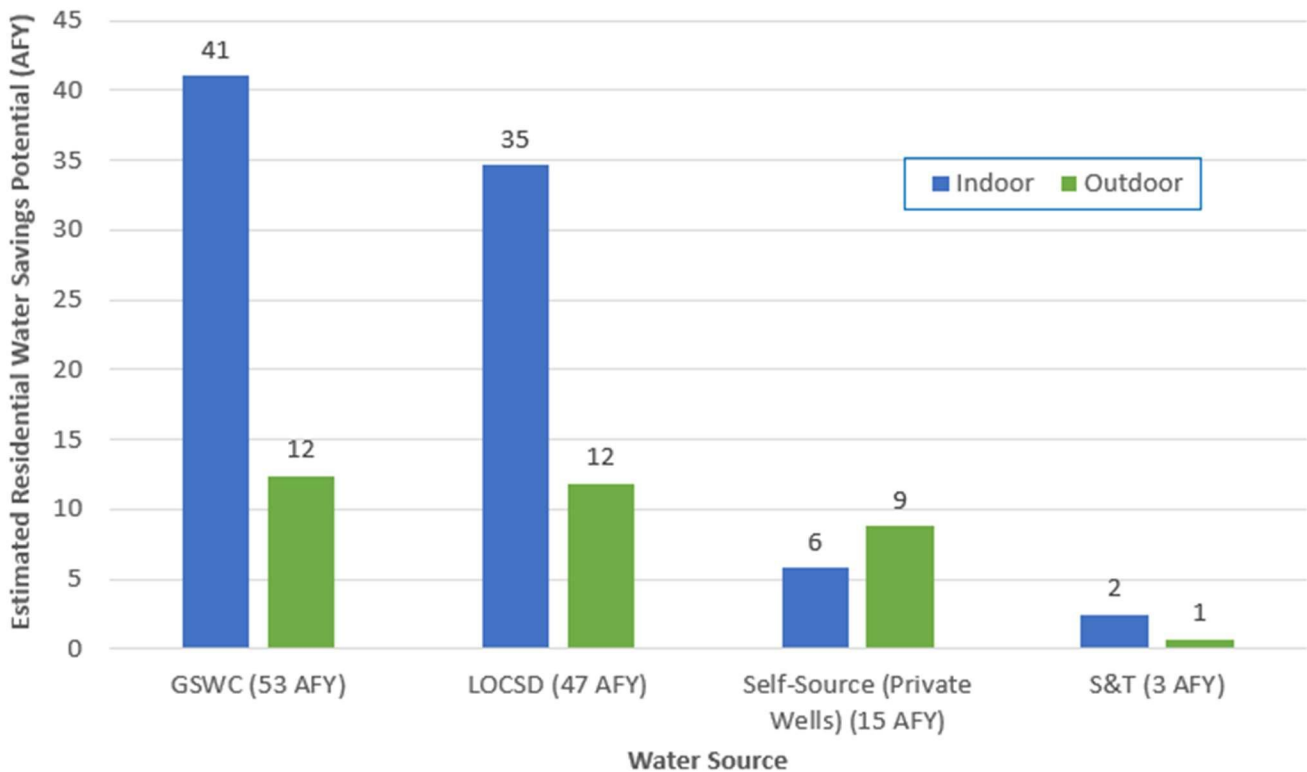
The estimated potential water savings remaining for retrofitting clothes washers is 11% of the estimated water use associated with clothes washers. This study assumed an average retrofit reduced the gallons of water used per load from 23 to 13, a savings of 43%. The fixture saturation profile from Section 3 estimated only 38% of SF residences and 14% of MF residences have clothes washers rated above Energy Star IWF of 4.0 that could be retrofitted. The estimated 11% savings of residential clothes washer water use basinwide is 74% lower than the estimated 43% water savings per clothes washer retrofit, which is consistent with the percentages of residences estimated to have clothes washers with an IWF of 4.0 or better already (62% for SF and 86% for MF), which would not be eligible for a retrofit.

The estimated water savings potential for installing hot water recirculation systems to reduce wasted hot water is 2% of the estimated hot water use basinwide. The analysis assumed only 5% of residences to be targeted for this efficiency measure and that each system would save 50% of wasted hot water per residence, so an estimated 2% savings of wasted residential hot water use basinwide is reasonable.

*Total Water Savings Potential*

The water purveyors requested the County amend the Title 19 program to require water offset credits to come from within the water source area as proposed new development (see Appendix G). The estimated residential water savings potential (including both indoor and outdoor) for each water source – the three water purveyors and self-source private wells – is shown in Figure 5-7 below. GSWC and LOCSD are estimated to have 53 and 47 AFY remaining water savings potential, respectively, mostly from indoor efficiency measures. Self-source parcels with private wells are estimated to have 15 AFY of remaining water savings potential, with 9 AFY outdoors and 6 AFY indoors. S&T is estimated to have 3 AFY of remaining water savings potential, with 2 AFY indoors and 1 AFY outdoors.

**Figure 5-7. Estimated Residential Water Savings Potential by Water Source, Indoor and Outdoor**



Source: Analysis per the method in Section 5.2 and Appendix D.

## 6. CONCLUSIONS AND NEXT STEPS

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The results of this study provide foundational information for amendments to the Los Osos Water Offset Program codified in Title 19 of the County Code.

### 6.1 Significant Findings

Significant findings and results from this study:

- Historical verification and tracking of completed indoor fixture retrofits for the Department's retrofit-to-build, retrofit-on-sale, and sewer connection requirements has proven effective by serving as a basis for the fixture retrofit saturation analysis for this study.
- Annual groundwater production by Los Osos water purveyors has decreased almost 50% from 2008 to 2022 which can be attributed, in part, to the implementation of community-wide water conservation programs including the County programs discussed in this study.
- There was not a significant rebound in water demand noted after the dry conditions from 2007-2009, economic recession of 2008-2011, and or the drought from 2013-2016, indicating that these changes in water demand reductions are more long term and sustainable.
- Most toilets in both SF and MF dwellings in the Basin area have a flush volume of 1.6 gpf that was the state standard at the time of retrofits. Since January 1, 2014, the California Code of Regulations, Title 20 Appliance Efficiency Standards, has had a flush volume efficiency rating of 1.28 gpf.
- Most showerheads in both SF and MF dwellings in the Basin area have a flow rate of 2.0 gpm. EPA WaterSense rated showerheads require a 1.8 gpm efficiency level.
- Most clothes washers in both SF and MF dwellings in the Basin area have an Energy Star Integrated Water Factor of less than 4.0. This is at the highest national level of efficiency rating.
- SF dwelling average annual residential water use estimates (gpd/dwelling unit) total at 128 and 390 for water purveyor serviced and self-sourced, respectively.
- MF dwelling average annual residential water use estimates (gpd/dwelling unit) total at 100 and 112 for water purveyor serviced and self-sourced, respectively.
- There is greater potential for residential water savings through indoor measures (84 AFY) than outdoor measures (34 AFY).
- The majority of estimated residential indoor savings potential is for retrofitting toilets and showerheads to ultra-high-efficiency fixtures with <1.0 gpf and 1.5 gpm, respectively. Most of this potential is within the Prohibition Zone.

### 6.2 Offset Program Recommendations

The Title 19 Offset Program should continue the historical verification and tracking system of completed retrofits of indoor fixtures in the Basin area. The Department may elect continue to allow water savings for offset credits from the retrofit of toilets, showerheads, clothes washers, and hot water recirculation systems, as the study estimates remaining water savings potential for these conservation measures. Recommended program improvements are:

- Update required water offset for new residences;
- Update estimated plumbing fixture daily use rates;
- Allow additional indoor toilet and showerhead retrofits within the PZ;
- Include outdoor water conservation measures with sufficient verification of continued water savings; and
- Monitor water use trends.

**Update Required Water Offset for New Residences.** The Department should update the required volume of offset water savings for new residences based on the estimated average annual water use per residence per the results in Table 4-1, distinguishing between SF and MF residences and water source (purveyor or private well), based on the differences in water use on average for these different residence types.

**Update Estimated Plumbing Fixture Daily Use Rates.** The Department should update the water savings estimate calculations for the water conservation measures per the plumbing fixture average daily use rates in Table 5-2, which are based on best available residential end use studies.

**Allow Additional Indoor Toilet and Showerhead Retrofits within the PZ.** The majority of estimated indoor water savings potential is within the PZ (67 AFY) and is attributable to retrofitting toilets and showerheads to higher efficiency fixtures with <1.0 gpf and <1.5 gpm, respectively (see Table 5-3). The County Code currently prohibits toilet and showerhead retrofits within the PZ to be a source of offset credits for new development to avoid double counting water savings retrofits mandated to connect to the sewer. The sewer connection retrofits have been completed. The County Code ideally should be amended to allow offset credits for documented toilet and showerhead retrofits to <1.0 gpf and <1.5 gpm, respectively, within the PZ according to the County-defined verification requirements, which should include inspections pre- and post-retrofit.

**Include Outdoor Water Conservation Measures with Sufficient Verification of Continued Water Savings.** The Department could expand the offset program to include outdoor conservation measures to access an estimated 34 AFY of water savings potential, if willing to invest resources to monitor and enforce ongoing maintenance of outdoor measures to ensure ongoing water savings. The Department could adapt the existing Cash for Grass program framework operating in the Nipomo Mesa and Paso Basin areas to operate in Los Osos as well. The Cash for Grass program framework includes pre-and post-inspections to verify the area of turf removal and installation of water efficient irrigation technologies, including rain smart irrigation controllers with sensors. Inclusion of outdoor water conservation measures should include verification measures to ensure ongoing water savings. See discussion of outdoor water savings verification below.

**Monitor Water Use Trends.** The Department should monitor end user data trends and analysis for high efficiency water user rates to periodically update the average residential water use estimates and daily fixture use estimates used for the program to be consistent with best available data. The Department should in aggregate review the water demand trends of the water purveyors to ensure that water demands are remaining below the estimated permanent demand reduction for existing accounts and monitor new accounts are meeting the Department expectations for water demand by different residence types.

### 6.3 Water Savings Verification

Residential groundwater consumption in Los Osos is affected by occupancy density, consumer behavior, outdoor landscaping, efficiency and configuration of indoor plumbing fixtures and outdoor landscape design choices, including plant type along with irrigation technologies, and rainfall. Hardware installation (e.g., plumbing fixtures) is easiest to verify, sustainable as needed to meet domestic sanitation needs and tends not to change once installed. Outdoor landscaping is more difficult to verify as it has more nuance by property owner preferences, requires more maintenance, and is easier to change. Occupancy density and consumer behavior are most variable and difficult to track and verify.

The Los Osos water purveyors, Los Osos community members, and California Coastal Commission staff have raised concerns about the verification of water savings the Department allows to offset water use for new development. This study relied on the verification tracking system for indoor plumbing fixture retrofits for the Department's retrofit-to-build, retrofit-on-sale, and retrofit to connect to the sewer programs. The system in place is effective at verifying and tracking documentation for plumbing fixture installation per program requirements at the parcel-specific and fixture-specific levels, as demonstrated in the level of detail in the retrofit saturation analysis in Section 3.

The Department could improve its verification procedures by incorporating ongoing monitoring and inspections for indoor plumbing fixtures, such as inspecting to confirm that retrofitted clothes washing machines are still in place years after

initial installation. If the Department includes outdoor conservation measures, ongoing monitoring and inspections of installed landscaping and irrigation technologies are also recommended, as well as monitoring water consumption trends for participating residences and authorizing enforcement action if residential water use exceeds set thresholds. The Department may also require participating residences to install Flume water meters, or comparable smart meters (e.g., S&T connections all have AMI meters already installed) and agree to share water use data with the Department to have access to granular end use data to update daily fixture use estimates and indoor/outdoor water use estimates. The Department would need to consider staffing requirements for additional verification procedures.

The Department may look to other public agencies facing similar water resource constraints and pursuing similar water conservation measures for examples of effective verification measures. Several case studies are highlighted below.

### **Case Study: Municipal Water District of Orange County (MWDOC)**

The Municipal Water District of Orange County (MWDOC) purchases and distributes water to 27 member agencies, serving all of Orange County except for the Cities of Santa Ana, Fullerton, and Anaheim. MWDOC completed a statistical analysis of the changes in water consumption trends for properties participating in its landscape water savings program from 2015-2018, which offered rebates for weather-based irrigation controllers, turf removal, rotating nozzles, drip irrigation, and purple pipe recycled water. They selected sites randomly, weighted by the number of participating sites per water retailer area, and required participating sites to release their historic water consumption data. Their analysis verified a correlation between landscape water efficiency measures and a decrease in water use. MWDOC received grant funding to cover the administrative cost of preparing the statistical evaluation and highlights the co-benefits of pollution prevention for outdoor conservation measures, which reduce stormwater runoff.

See the evaluation report at:

<https://www.mwdoc.com/wp-content/uploads/2019/05/Comprehensive-Landscape-Water-Savings-Evaluation.pdf>.

Takeaway ideas: Water savings amounts from outdoor water conservation measures may be verified with statistical evaluation of water consumption data, if customers agree to release their data. Grant funding may be available to support the additional administrative cost to verify water savings.

### **Case Study: City of Foster City**

The City of Foster City recently adopted a Water Neutrality Growth Ordinance in May 2023 with provisions to establish a 5-year baseline water demand, track ongoing water demand, and penalize exceeding an allocated water budget for properties implementing water conservation measures.

See the ordinance text at:

[https://www.fostercity.org/sites/default/files/fileattachments/communications/\\_city\\_clerk/page/14452/emid\\_water\\_neutrality\\_ordinance.pdf](https://www.fostercity.org/sites/default/files/fileattachments/communications/_city_clerk/page/14452/emid_water_neutrality_ordinance.pdf)

Takeaway ideas: Properties installing water conservation measures to offset water demand for new development may be required to share water consumption data to establish a baseline water demand and allowed water budget post-installation and track ongoing water use, with penalties for exceeding a designated water budget to ensure no net increase in water demand.

### **Case Study: City of Bozeman**

The City of Bozeman, Montana is developing vigorous irrigation standards for new development to address water resource constraints.



See standards at:

<https://www.bozeman.net/departments/utilities/water-conservation/new-development-standards>

Takeaway ideas: San Luis Obispo County Code already requires water efficiency landscaping plans for new development per California State Law. See detail at: [https://www.slocounty.ca.gov/Departments/Planning-Building/Department-Services/Agriculture,-Water,-and-Energy/Water-Programs/Programs-and-Services/Model-Water-Efficiency-Landscape-Ordinance-\(MWELO\).aspx](https://www.slocounty.ca.gov/Departments/Planning-Building/Department-Services/Agriculture,-Water,-and-Energy/Water-Programs/Programs-and-Services/Model-Water-Efficiency-Landscape-Ordinance-(MWELO).aspx)

## 6.4 Future Studies

Recommended future studies:

- Outdoor irrigation demand study based on current planted landscape for water purveyor areas, including residential, commercial, and irrigation-only accounts.
- Saturation analysis for outdoor conservation measures.
- Commercial indoor water use demand study.
- Saturation analysis for commercial conservation measures.
- Beneficial use study for gray water considering on-site re-use for indoor flushing or landscape irrigation vs. use as treated effluent at leach fields (e.g., Broderson).
- More detailed study on future demand forecasting scenarios to validate the growth ordinance projection of future demand and offset, including climate sensitivity assessment.

## 7. ACKNOWLEDGEMENTS

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Maddaus Water Management Inc. (MWM) would like to thank the participants for supporting the Los Osos Water Offset Study report. The project was developed as a partnership between the Department and MWM. The authors would like to acknowledge the following parties for their contributions to this study:

- Department staff, for collaborative contributions to data analysis and writing;
- The Los Osos water purveyors – Los Osos Community Services District, Golden State Water Company, and S&T Mutual Water Company - for sharing historical water consumption and production data and advising on factors affecting historic trends in groundwater production;
- Golden State Water Company, for analyzing historic consumption data to verify the County’s estimates of outdoor water use by domestic wells (see Appendix C);
- Dan Heibel, Executive Director of the Los Osos Basin Management Committee (BMC), for facilitating discussion of the study with BMC staff and assisting with ensuring used datasets were consistent with other studies involving the Los Osos Groundwater Basin;
- Spencer Harris of Cleath-Harris Geologists, for reviewing Appendix C and the Section 4 methodology;
- Flume Inc., for providing 2022 data from smart water meters in Los Osos;
- County Department of Public Works staff, for sharing sewer retrofit tracking data and updates about recycled water projects; and
- SCI Consulting Group, for assistance obtaining County 2022 assessor data in a workable format.

# APPENDIX A – SATURATION ANALYSIS FOR PLUMBING FIXTURE RETROFITS METHODOLOGY

A saturation analysis for plumbing fixture retrofits was completed for residences within the Los Osos Basin Plan Area, considering toilets, showerheads, and clothes washers. This analysis was meant to assess the effectiveness of historic water conservation efforts as well as assess the remaining water savings potential from plumbing retrofits. This appendix details the methodology of this analysis as well as the sources of data inputs.

1. **Parcel Profile.** Create a profile of parcels within the study area based on Department data.<sup>24</sup>
  - a. Identify parcels within the Los Osos Basin Plan Area and their land use designation per the Los Osos Community Plan (LOCP).<sup>25</sup>
  - b. Designate each parcel as within or outside of the sewer service area/Prohibition Zone (PZ)
  - c. Designate the water supply for each parcel as Los Osos Community Services District (LOCS), Golden State Water Company (GSWC), S&T Mutual Water Company (S&T), or self-source from private wells.
  - d. Identify parcels within mobile homes parks.

| Mobile Home Park   | APN         |
|--------------------|-------------|
| Morro Shores       | 074-229-020 |
| Daisy Hill Estates | 074-224-016 |
| Sea Oaks           | 074-224-017 |
| Sunny Oaks         | 074-224-020 |

Source: County of San Luis Obispo, Department of Planning & Building GIS data, accessed February 2022.

2. **Residence Count.** Estimate the number of existing residences per parcel based on Department and County Assessor<sup>26</sup> data.

Note about available data for existing residences:

DepartmentGIS data includes residential address points based on construction and land use permits. County Assessors data<sup>3</sup> includes estimated bedroom/bathroom counts and year built for residences per parcel, but it is not a complete dataset. There are null values.

These two datasets are maintained independently.

- a. Assume residential address points from Department GIS data represent occupied dwelling units.
  - b. Assume one residence for parcels that do not have address points per Department data but do have bedroom/bathroom counts per County Assessor data.
3. **SF or MF Water Use.** Designate each parcel with existing residence(s) as either SF or MF residential water use.
  - a. For parcels within the LOCS service area, the designation is based on parcel-specific customer class information provided by the LOCS, with mobile homes included in the multifamily category.<sup>27</sup>
  - b. For parcels within the S&T service area,
    - i. Assume parcels with the LOCP land use designation of Residential Multifamily (RMF) that have more than one existing residence are Multifamily Residential water use.

<sup>24</sup> County of San Luis Obispo Department of Planning & Building GIS data, exported July 2022.

<sup>25</sup> Los Osos Community Plan (LOCP) adopted by the County Board of Supervisors in December 2020, still pending California Coastal Commission certification as of April 2023.

<sup>26</sup> County of San Luis Obispo Assessor’s Office lien roll data for Los Osos, July 2022.

<sup>27</sup> LOCS customer class parcel lists, provided January 2022.

- ii. Assume parcels with RMF land use designation that have only one existing residence are SF residential water use.
- iii. Assume parcels with the Residential Single Family land use designation with existing residences are SF residential water use.
- c. For parcels within the GSWC service area,
  - i. Assume SF residential water use for parcels with 1-2 existing residences and the land use designation of Residential Single Family, Residential Suburban, Commercial Retail, Commercial Service, or Residential Multi Family.
  - ii. Assume parcels within mobile home parks are MF residential water use.
  - iii. Assume parcels with Office Professional land use designation are MF residential water use, as mixed use is encouraged in this land use category.
- d. For parcels that self-source water, assume SF residential water use, unless in Residential Multifamily land use category; then assume MF residential water use.

4. **Fixture Count.** Estimate the number of plumbing fixtures per parcel based on Department and County Assessor data.
- a. Calculate averages to fill in null values in Assessor dataset. Exclude parcels with no existing residences from the analysis.

| Assessor Data with Null Values | SF      |                               | MF *    |                               | Mobile Homes |
|--------------------------------|---------|-------------------------------|---------|-------------------------------|--------------|
|                                | Average | % of Parcels with Null Values | Average | % of Parcels with Null Values | Average      |
| Year Built                     | 1976    | 13%                           | 1976    | 34%                           | Same as MF   |
| Bedrooms/Residence             | 2.72    | 7%                            | 2.05    | 8%                            | 3*           |
| Bathrooms/Residence            | 0.72    | 7%                            | 0.75    | 8%                            | 2*           |
| Half Bathrooms/Residence       | 0.06    | 7%                            | 0.01    | 7%                            | 0            |

\*No assessor data available for parcels with mobile homes. Assume 3 bedroom/2 bathroom on average based on plans submitted for Morro Shores expansion (DRC2020-00203) instead of using calculated multifamily averages.

Source: Analysis per methodology described above.

- b. Assume one toilet per bathroom and one toilet per half bathroom.
- c. Assume one showerhead per bathroom.
- d. Assume one clothes washer per residence<sup>28</sup>.

5. **Fixture Flow Rates.** Estimate the flow rates for the estimated fixtures per parcel based on County fixture retrofit tracking data<sup>29</sup>, estimated age of housing, average fixture replacement rates, and CA building code requirements.

<sup>28</sup> The fixture saturation analysis assumes one clothes washer per residence, but the water savings potential estimation calculations assume 0.8 clothes washers per residence, per studies that show the national average ranges from 0.8-0.85. See citations in Section 5.

<sup>29</sup> San Luis Obispo County Department of Planning and Building Title 8 “retrofit-on-sale” and Title 19 “retrofit-to-build” tracking sheet, August 2022. San Luis Obispo County Department of Public Works Los Osos Water Conservation Inspection reports (for sewer connections and rebates), August 2022.

Note about available data for historic water conservation retrofits:

The Department database tracks toilet, showerhead, and clothes washing machine fixture flow rates based on verification submitted for the Title 8 “retrofit-on-sale” and Title 19 “retrofit-to-build” programs. The database tracks the number of fixtures and flow rate for each fixture in the residence, per submitted verification forms.

The County Public Works database tracks toilet, showerhead, and clothes washing machine fixture flow rates based on verification submitted to meet the retrofit requirements to connect to the sewer and to receive water conservation rebates. The database tracks the number of fixtures and flow rate for each fixture in the residence, per submitted verification forms.

GSWC tracks the number of showerheads of various low flow rates distributed and the number of high efficiency clothes washer rebates issued per year, *but not by parcel*.

LOCSD tracks the number of high efficiency clothes washer rebates issued per year, *but not by parcel*.

**Toilets and Showerheads:**

- a. For parcels within the sewer service area/Prohibition Zone, assumed that all toilets have flow rates of 1.6 gpf and all showerheads have flow rates of 2.0 gpm, based on the requirements to connect to the sewer enforced and tracked by the County Public Works, unless:
  - i. If the year built is 2014 or later, assume 1.28 gpf for toilets (per CA Green Building Code);
  - ii. If the year built is 2018 or later, assume 1.5 gpm for showerheads (per CA Green Building Code); and
  - iii. If the Department database and/or the County Public Works database lists a lower flow rate than 1.6 gpf for toilets or 2.0 gpm for showerheads, assume that lower flow rate, using the lowest flow rate if there are multiple entries. Assume multiple entries for parcels with mobile homes are each for a separate residence.
- b. For parcels outside the sewer service area/Prohibition Zone, estimate the flow rate for toilets and showerheads based on the estimated year built, conservatively assuming toilets have a fixture life of 50 years and showers have a fixture life of 30 years, unless:
  - i. If there are toilet and showerhead fixture records in the Planning & Building or Public Works databases, assume the listed flow rates for the parcel, using the lowest flow rate if multiple entries.

| Fixture            | Flow Rate | Year required in CA for new construction | Year required by County of San Luis Obispo                        |
|--------------------|-----------|--|---|
| <b>Toilets</b>     | 1.28 gpf  | 2014                                     | 2008 retrofit-on sale & 2016 to connect to sewer if above 1.6 gpf |
|                    | 1.6 gpf   | 1995                                     |   |
|                    | 3.5 gpf   | NA                                       |   |
| <b>Showerheads</b> | 2.5 gpm   | 1992                                     |   |
|                    | 2.0 gpm   | 2016                                     | 2008 retrofit-on-sale   |
|                    | 1.5 gpm   | 2018                                     | 2016 to connect to sewer if above 2.0 gpm                         |

Source: California Construction Code and San Luis Obispo County Code, Title 19, Section 19.07.042 and Title 8, Chapter 8.91.

***Clothes Washers:***

- c. For all parcels, estimate the most recent year the clothes washer was replaced per parcel, based on year built (truncating at 1940 since electric washers began to see widespread adoption in the United States from 1930-1950), assuming replacement every 15 years. Then assume any washer replaced 2015 or later has an Energy Star Integrated Water Factor (IWF) of 4.0 or lower (more efficient), and any washer replaced prior to 2015 has an IWF of greater than 4.0, per March 2015 Federal Energy Standard, unless:
  - i. If the Department database and/or the County Public Works database identifies the parcel as having received a clothes washer rebate or retrofit per the “retrofit-to-build” program, assume the IWF is 4.0 or lower.

Example verification form for sewer connection retrofit inspection program (County Public Works)

| Water Conservation Checklist |             | Inspected By | Date & Time        | Water Saver Compliant |                           |
|------------------------------|-------------|--------------|--------------------|-----------------------|---------------------------|
| Owner/Residence              | C. Mountain |              | 8/6/14             | Y                     |                           |
| Home Address                 | [Redacted]  |              | 11:15 AM           |                       |                           |
| Contact Phone Number         | [Redacted]  |              | APN                |                       |                           |
| Fixture                      | Rm          | Flow         | Retrofit Required? | Notes                 | Verification Date & Notes |
| Toilet                       | B1          | 1.28         | N                  |                       |                           |
|                              | B2          | 1.28         | N                  |                       |                           |
| Showerhead                   | B1          | 1.5          | N                  |                       |                           |
|                              | B2          | 1.5          | N                  |                       |                           |
| Faucet Aerators              |             |              |                    |                       |                           |
| Dishwasher                   |             |              |                    |                       |                           |
| Clothes Washer               |             |              |                    |                       |                           |
| House Meter                  |             |              |                    |                       |                           |

Notes pre-inspection says:  
 both toilets > 1.6 → 1.28 ✓  
 both showerheads > 2.0 → 1.5 ✓

Example verification form for retrofit rebate program (County Public Works)

**SAN LUIS OBISPO COUNTY WATER SAVER REBATE APPLICATION**

**IMPORTANT:** Please read the application instructions carefully and keep a copy for your records. Read the San Luis Obispo County Public Works Department website for more information on the rebate program. Rebates are available for residential, commercial, institutional and multi-family water saving devices. Rebates are processed in the order received. Funding is limited, therefore, rebates are not guaranteed.

ASSESSOR'S PARCEL NUMBER: 038 441 039  
 PROPERTY OWNER (REBATE CHECK PAYEE): [Redacted]  
 NAME AND ADDRESS OF PROPERTY WHERE FIXTURE WILL BE INSTALLED: 145 1505 [Redacted]  
 PROPERTY / SITE NAME (IF APPLICABLE): [Redacted]  
 ADDRESS: [Redacted] ZIP CODE: 93402

CITY: LAS CROSES

APPLICATION DATE: 6/20/15 RECEIVED  
 BEST TIME TO CALL: 9:00 - 3:00 PM  
 YEAR BUILT: COUNTY OF SAN LUIS OBISPO  
 STATE: CA DEPARTMENT OF PUBLIC WORKS  
 COUNTY: SAN LUIS OBISPO

| FIXTURE REMOVED | QUANTITY | FLOW | QUANTITY | QUANTITY | FLOW |
|-----------------|----------|------|----------|----------|------|
| TOILETS         | 2        | 1.6  | 1        | 2        | 1.28 |
| SHOWERHEAD      |          |      |          |          |      |
| FAUCET AERATOR  |          |      |          |          |      |
| CLOTHES WASHER  |          |      |          |          |      |
| OTHER           |          |      |          |          |      |

TYPE OF PROPERTY:  Single-Family Home  Apartment / Condominium  Business / Commercial  Mobile Home  Schools and Institutions

INSTALLER INFORMATION: I certify that I have removed and installed said fixture(s) at the subject property, attached are the original work order and invoice.  
 LICENSED PLUMBER/INSTALLER: [Redacted] LICENSE NO. [Redacted] PHONE NO. [Redacted]  
 SIGNATURE: [Redacted] DATE: 8/20/14

AGREEMENT: I have read and understand the program information as stated in the attached application materials. I certify that the said water saving fixture(s) at the subject property were installed. I also understand that I agree to have an official of my water provider verify the installation of the fixture(s) resulting from this program. I agree to hold San Luis Obispo County harmless from the installation of the fixture(s) or claims for damage to the property referred to in this program. I agree to hold San Luis Obispo County harmless from the installation of the fixture(s) or claims for damage to the property referred to in this program.

FOR OFFICIAL USE ONLY  
 Date Fixture Installed: 8/20/14  
 Received Original Receipt:   
 INSPECTION: Performed by: [Redacted] Date Inspected: 8/20/14  
 Reason for Denial: [Redacted]  
 Date Inspected: 8/20/14

APPROVED SIGNATURE OF PROPERTY OWNER: [Redacted] DATE: 8/20/14

Handwritten notes: "Given the flow is below 1.6, no punchy flow. 1.1 GPF. Had significant noise from the faucet aerator for the one toilet installed by the County." "CAVED PAYED & OKAYED BY RAY TONLIS PROBLEMS". "RD". "FP". "1st toilet was not inspected by County. Please discontinue. Can only allow one to be replaced."

Example verification form for "Retrofit-on-Sale" (Title 8) program (Department)

LNG-1013  
06/02/2017

Title 8: Los Osos Groundwater Basin Retrofit on Sale Ordinance

Los Osos Title 8: Retrofit Verification Form

PART 1

Date of Inspection: 2-10-2021 Seller's Name: [Redacted] (Printed First & Last)  
 Property Address: [Redacted] Assessor's Parcel Number: 074-174-042  
 Agent's Name: [Redacted] Agent's Phone Number: [Redacted] (Printed First & Last)  
 Inspector's Name: [Redacted] Inspector's Phone Number: [Redacted] (Printed First & Last)  
 Inspector Type: Plumber License #: CREIA (Circle One)

PART 2

*Don A. [Signature]*

|                               |        | Bathroom #1                                 |                    | Bathroom #2                                 |                    |
|-------------------------------|--------|---|--------------------|---|--------------------|
| Existing Toilet Low Flow?     | YES/NO | 1.28 gpf (Must replace if greater than 1.6) | New Toilet         | 1.28 gpf (Must replace if greater than 1.6) | New Toilet         |
| Existing Showerhead Low Flow? | YES/NO | 1.8 gpm (Must replace if greater than 2.5)  | New Showerhead     | 1.8 gpm (Must replace if greater than 2.5)  | New Showerhead     |
| Faucet Aerator Present?       | YES/NO | 1.0 gpm (1.0 or less)                       | New Faucet Aerator | 1.0 gpm (1.0 or less)                       | New Faucet Aerator |

E-MAIL COMPLETED FORM TO: [waterprograms@co.slo.ca.us](mailto:waterprograms@co.slo.ca.us)

**PLUMBING** Work Order/Invoice 20438  
 WORK TILL [Redacted]  
 WORK ORDER NO. [Redacted]  
 SHIPPING DATE: [Redacted]  
 JOB LOCATION: [Redacted]

WATERWAYS PLUMBING, INC.  
 416 Redwood Lane  
 ARROYO GRANDE, CA 93420  
 (805) 483-3500  
 CA License # 928834

TO: [Redacted]

TERMS: [Redacted]

DESCRIPTION OF WORK: *Installed Two 1.28 Round Toilets*

| LABOR                 | HRS.          | RATE | AMOUNT         |
|-----------------------|---------------|------|----------------|
| <i>Pro Fla Rained</i> | <i>160.62</i> |      | <i>3200.00</i> |
| <i>labor</i>          | <i>90.12</i>  |      | <i>1800.00</i> |

TOTAL LABOR UNIT: *250.74*

OTHER CHARGES: *6 gpf*

TOTAL: *4800.00*

WORK ORDERED BY: *Don A. [Signature]*

I hereby acknowledge the satisfactory completion of the above described work.

Signature: *Don A. [Signature]*



Example verification forms for "Retrofit-to-Build" (Title 19) program (Department)

# Title 19: Retrofit Certificate

Pursuant to the San Luis Obispo County Title 19 Retrofit Ordinance

This certifies that [REDACTED] hereby has at least 300 retrofit credits (sufficient to construct one Single Family Dwelling) pursuant to Title 19 of the County Code and may use this certificate at the following property address and assessor number: [REDACTED]

**Kylie Hensley**  
for the Department of Planning and Building

December 21, 2018  
Date

\*This certificate does not expire and may not be transferred to another property\*



LNG-1016  
06/06/2017

### Title 19: Retrofit Verification Table (Section I)

Part 1: Proposed Building Sites:

Property Address: [REDACTED] Assessor Parcel Number (APN): [REDACTED] Required Credits: 300 Total Credits: 532,900  
 (First & Last) Phone #: [REDACTED] Agent Name: [REDACTED] (First & Last) Phone #: [REDACTED]

Part 2: Retrofitted Properties:

| Address      | Assessor's Parcel Number (APN) | Property Owner Name (First & Last) | Date of Retrofit | Toilet Removed (gpf) | Toilet Installed (gpf) | Showerhead Removed (gpm) | Showerhead Installed (gpm) | Washer Removed (gpd) | Washer Installed (gpd) | Gallons per day saved |
|--------------|--------------------------------|------------------------------------|------------------|----------------------|------------------------|--------------------------|----------------------------|----------------------|------------------------|-----------------------|
| 1            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 2            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 3            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 4            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 5            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 6            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 7            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 8            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 9            | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| 10           | [REDACTED]                     | [REDACTED]                         |                  |                      |                        |                          |                            |                      |                        |                       |
| <b>Total</b> |                                |                                    |                  |                      |                        |                          |                            |                      |                        | <b>332,900</b>        |

\*Washer retrofits are allowed within the Los Osos Prohibition Zone.

975 OSOS STREET, ROOM 300 | SAN LUIS OBISPO, CA 93408 | (805) 781-5600 | TTY/TIS 71-1  
 www.sloplanning.org | planning@sloco.sloco.us

*[Signature]*  
12/20/18



COUNTY OF SAN LUIS OBISPO  
DEPARTMENT OF PLANNING & BUILDING

TITLE 19: WASHER RETROFIT VERIFICATION FORM

LNG-1016  
06/06/2017

**How to Count Washer Replacement Savings in Los Osos**

1. This form must be completed by the individual or professional who performs the installation. It must be signed by the property owner.
2. New washers must be on the list of [Energy Star Water Efficient Washers and have an Integrated Water Factor \(IWF\) of no more than 3.2.](#)
3. Water savings will be based on 392 loads per year, or 8 loads per week.
4. Retrofits must save at least **15 gallons** per washer.
5. Water credits will be directly correlated to the number of gallons saved per day.
6. Properties receiving the new washing machines must be located within the Los Osos Groundwater Basin.

**Required Attachments:**

- Receipt of purchase for new washer
- Photos of old washer prior to removal
- Photos of new washer after installation

PART 1-SENDING SITE

|  |                 |             |
|--|-----------------|-------------|
| <b>Builder/Owner Name:</b><br>(Printed First & Last) | <b>Address:</b> | <b>APN:</b> |
|  |                 |             |

PART 2-RETROFIT INFORMATION

|   |                          |                           |
|---|--------------------------|---------------------------|
| <b>Property Owner Name:</b><br>(Printed First & Last) | <b>Address:</b>          | <b>APN:</b>               |
|   |                          |                           |
| <b>Property Owner Phone Number:</b>                   | <b>Date Retrofitted:</b> | <b>Credits Generated:</b> |
|   | 10/10/18                 | 66,58                     |

TITLE 19: WASHER RETROFIT VERIFICATION FORM

**Old Washer**

Make: KENMORE Model: 110-27731600 Serial Number: CT 3631562

Volume of Tub (ft<sup>3</sup>): 3.3 x 7.48 = 24.664 (Gallons/Cycle)

Average Number of Wash and Rinse Cycles: 3

$$\frac{\text{Gallons}}{\text{Day}} = \left( \frac{\text{Gallons}}{\text{Cycle}} \right) \left( \frac{\# \text{ of Cycles}}{\text{Load}} \right) \left( \frac{1 \text{ Year}}{\text{Year}} \right) \left( \frac{365 \text{ Days}}{\text{Year}} \right)$$

Gallons Used per Day (calculate with formula above) = 79.53

**Installed (New) Washer**

\*Must be on Energy Star List\*

Make: SAMSUNG Model: WF4215CCAW Serial Number: 000D5NAK602452M

Integrated Water Factor (IWF): 3.2 Annual Water Use: 4129

$$\frac{\text{Gallons}}{\text{Day}} = \left( \frac{\text{Annual Water Use in Gallons}}{365 \text{ Days}} \right)$$

Gallons Used per Day (calculated with formula above) = 12.95

$$79.53 - 12.95 = 66.58$$

Gallons per day old washer    Gallons per day new washer    Savings per Day

**Property Owner Information**

To be completed by the person receiving the new washer

By signing below I certify that:

- I am the owner of the property above.
- The specifications listed above accurately represent the existing washing machine and the new washing machine that I have received and installed.
- I understand that the new washing machine must remain with the property if my house is sold, unless it is replaced with a model that is at least as efficient.
- I understand that I will be contacted and asked to verify that the information is correct.

Property Owner Signature: \_\_\_\_\_

976 OSOS STREET, ROOM 300 | SAN LUIS OBISPO, CA 93408 | (805) 781-5600 | TTY/TRS 7-1-1  
planning@co.slo.ca.us | www.sloplanning.org



## APPENDIX B – FLUME DATA ANALYSIS METHODOLOGY AND RESULTS

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Flume smart home water monitors to help detect leaks and estimate a breakdown of water use by individual household appliances and water fixtures.<sup>30</sup> Flume, Inc. provided 2022 data for the active smart water meters in the community of Los Osos. MWM staff analyzed the data per the methodology outlined below.

### Relevant data inputs from Flume:

- Flume Section 1b: contains monthly counts by provider
- Flume Section 2: contains customer details, including residents, lot size, irrigation type, and provider name. Address and APN available for rebate participants. The customer survey data is self-provided and not 100% complete for all participants.
- Flume Section 3: contains daily Gallons per Household per Day (GPHD) for indoor, outdoor, and combined.
- Flume Section 5: contains End Use data including flow rates, volumes, flow duration, and events per day

### Method:

1. Data preparation and filtering
  - a. Filtered all datasets to remove vacation rentals and multifamily (mobile homes)
  - b. Combined datasets using Location.ID field.
  - c. Parsed date variable into common format, to allow date-based filtering.
2. GPHD Summaries
  - a. Summarized GPHD data (Section 3) by month and by location, excluding partial months (with <25 days of Flume data)
  - b. Summarized GPHD data (Section 3) by year and by location, excluding partial years (with <350 days of Flume data)
  - c. Removed outliers by excluding indoor/outdoor records above or below 1.5 times the Interquartile Range for monthly and annual data.
  - d. Generate counts of included participants, join to summary tables
  - e. Generate Confidence Intervals using:  
 $x \pm t_{n-1, 1-\alpha/2} * (s/\sqrt{n})$   
x: sample mean  
t: the t-critical value (0.975, which generates 95% CIs)  
s: sample standard deviation  
n: sample size

Note: summaries produced for individual purveyor and combined (purveyor-agnostic)

3. Number of Residents analysis
  - a. Parsed Flume Section 2 data to generate average number of residents for Flume participants.
    - i. 2.39 Residents/HH based on 156/163 respondents
4. Use Type analysis
  - a. Summarized total volume and total number of events by use type
  - b. Estimate average Usage Rate by Type by dividing the total volume used by the total number of events, per use type
  - c. Generate counts of included participants, join to summary tables

---

<sup>30</sup> More information about Flume smart home water monitors is available at: <https://flumewater.com/about/>.

Note: estimates produced for individual purveyor and combined (purveyor-agnostic)

## Results

Gallons per Household per Day (GPHD) data is summarized in the table below, including a comparison of Flume and purveyor data. The percentage difference between average indoor and outdoor use for Flume participants and the entire purveyor dataset is also shown. Data from Flume users reflects more efficient indoor use, as Flume users are likely more aware of inefficiency issues due to the flow monitoring and notifications provided by Flume. Additionally, it is possible that Flume users engage in additional water efficiency practices/devices than non-Flume users. Data from Flume users also reflects higher outdoor use, and additional investigation is needed to confirm a theory that Flume users have larger outdoor landscapes than non-Flume users.

### Indoor and Outdoor Water Use Estimates & Comparison with Flume

| SF Water Use       | 5-Year Average, Water Purveyor Data | 2022, Water Purveyor Data | 2022 Flume Data | % Difference, 2022 Purveyor and Flume | % Difference, 5-Year Average and Flume |
|--------------------|-------------------------------------|---------------------------|-----------------|---------------------------------------|--|
| Indoor (gpd/unit)  | 92                                  | 108                       | 61              | 44%                                   | 34%                                    |
| Outdoor (gpd/unit) | 36                                  | 17                        | 34              | -96%                                  | 7%                                     |

*Water purveyor data based on weighted average for LOCSD and S&T. 5-year average includes data from 2017-2019, 2021, and 2022.*

Source: Flume Data, 2022

Average volume per usage and average events per day for each end use are shown in the table below, including counts for the number of SF residential units where each end use type was detected. The volumes and counts associated with each usage type are based on Flume's detection algorithms, which are derived from continuous flow monitoring volumes and patterns.

### Flume Data End Use Analysis for SF Residential Units

| End Use        | # SF Units Analyzed | Average Volume per Use (gal) | Average Events per Day |
|----------------|---------------------|------------------------------|------------------------|
| Clothes Washer | 102                 | 31.63                        | 0.43                   |
| Dish Washer    | 102                 | 3.66                         | 0.58                   |
| Faucet         | 105                 | 1.87                         | 6.73                   |
| Low Flow Leaks | 62                  | 15.20                        | 0.24                   |
| Misc. Indoor   | 103                 | 22.32                        | 0.39                   |
| Outdoor        | 102                 | 86.95                        | 0.76                   |
| Shower         | 105                 | 11.88                        | 3.41                   |
| Toilet         | 105                 | 1.93                         | 26.46                  |
| Water Softener | 13                  | 54.92                        | 0.05                   |

*Flume data available from SF residences within LOCSD and GSWC, about half in each purveyor area.*

Source: Flume Data, 2022

The Flume results were not used in the study to represent Basin averages for water use per residence or for fixture use rates (except for washers) for the following reasons:

- Flume estimates were only for SF parcels, not for MF parcels.
- Estimated Flume overall average, indoor and outdoor water use did not closely align with any purveyor's service area-wide estimated SF average, indoor and outdoor water use so didn't seem representative overall in such a way that use patterns would be applicable across the whole Basin.
- Small sample set from Flume.
- For most of the fixtures, Flume end use patterns would have yielded higher savings than the service area-wide based approach, assuming 2.4 people per household.

# APPENDIX C – WATER USE ESTIMATES FOR SELF-SOURCE (“DOMESTIC”) PARCELS METHODOLOGY AND RESULTS

---

Department staff provided this section to allow a more detailed estimate of outdoor water use for residences using private wells within the Los Osos Basin Plan Area. The Department relied on publicly available aerial imagery and proprietary consumption data provided by Golden State Water Company (GSWC) for a subset of comparison parcels within their service area to verify the aerial imagery analysis methodology. This section includes background information about previous similar estimates, a detailed methodology, results summary, and conclusions comparing these results with the 2009 comparable analysis currently referenced in the BMC Annual Reports. The conclusions section includes recommendations for updating the domestic water use estimates for BMC annual reporting for both indoor and outdoor water use.

## Background

The Los Osos Basin Plan annual monitoring reports estimate annual groundwater production for domestic wells based on the 2009 technical memo from Cleath-Harris Geologists, Inc (CHG). The 2009 memo’s methodology is summarized as follows:

1. Reviewed July 2007 aerial imagery and estimate turf area per parcel for domestic parcels served by private wells.
2. Classified parcels into three categories of outdoor water use: low (<1,000 sf turf), medium (1,000 – 3,000 sf turf), or high (3,000+ sf turf).
3. Estimated outdoor water use factors for each use category based on 2005-2008 water consumption data provided by Golden State Water Company (GSWC) for one representative parcel per outdoor water use category, selected by GSWC.
4. Estimated total outdoor water demand by multiplying demand factors by number of parcels for each outdoor water use category.
5. Estimated total indoor water demand by multiplying estimated number of residences by 0.33 AFY indoor water consumption factor.

The 2015 BMC Annual Report updated the domestic water use estimates to include an additional 19 residences assumed to have landscaping in the high outdoor water use category, increasing total estimated domestic water use from 200 AFY to 220 AFY<sup>31</sup>. The subsequent BMC annual reports have maintained this 220 AFY estimate for domestic water use.<sup>32</sup>

An anticipated outcome of this study was being able to update the water demand factors (indoor and outdoor) for domestic private wells for Los Osos Basin Plan annual reporting, groundwater modeling, and water resources planning. The indoor use estimates for residences using private wells may be assumed to be similar to those of residences served by water purveyors. The outdoor use estimates for residences using private wells are expected to be significantly higher on average than residences within water purveyor service areas because private well parcels are larger on average, with more irrigation demand for landscaping. The updated outdoor use estimates for this study also use aerial imagery analysis and comparison with purveyor consumption data.

## Methodology

### Part 1: Aerial Imagery and MWELO Analysis to Estimate Outdoor Water Use

1. Identified parcels outside water purveyor areas within Los Osos Basin Plan Area.
2. Identified parcels with residential uses. Exclude Recreation, and Open Space land use categories (LUC) and public lands.
3. Excluded community turf and irrigated crops, per Figure H1 from 2021 BMC Annual Report.
4. Referencing 2021 satellite imagery<sup>33</sup>, measured the estimated areas for the following landscaping categories for each parcel (1), rounding to the nearest 5 square-feet.
  - a. Turf

---

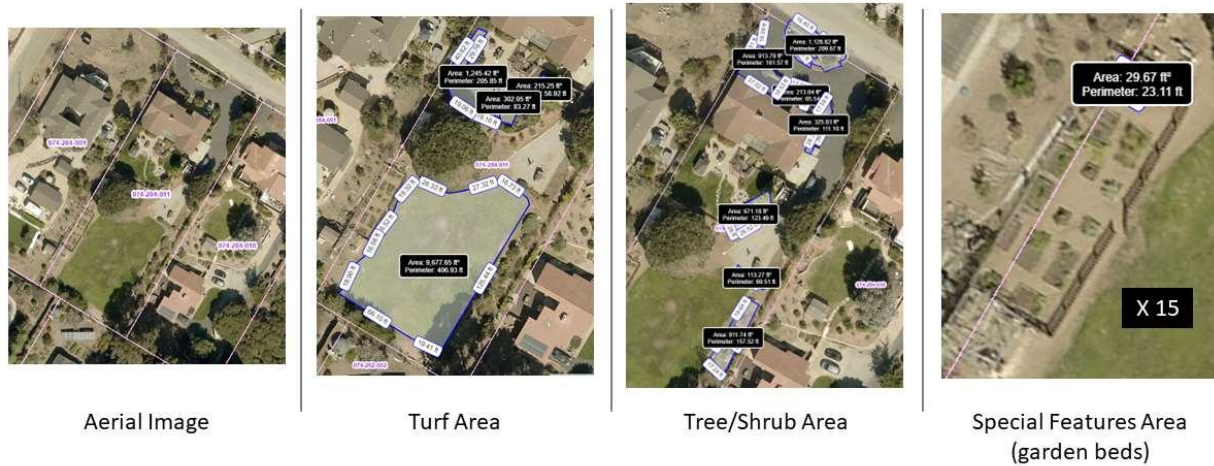
<sup>31</sup> 2015 BMC Annual Report.

<sup>32</sup> 2022 BMC Annual Report.

<sup>33</sup> 2021 Aerial, County Geoview, June -November 2021 mosaic, accessed July 2022.

- b. Shrub/trees (excluding native plants and oak trees)
- c. Special features (e.g., vegetable gardens)

**Figure C 1. Example Measurement of Estimated Landscaping Area Referencing Aerial Imagery**



Source: County GeoView 2021 Aerial Imagery, compiled 2023.

5. Estimated total landscaping water demand per parcel by calculating and adding up the estimated water use for each landscape category per parcel using the State’s Model Water Efficient Landscaping Ordinance (MWELo) methodology.<sup>34</sup> Note: This formula is conservative in that it does not account for annual rainfall and likely would not underestimate water use.

$$ETWU = ETo \times 0.62 \times [ SF \times PF/IE ]$$

**ETWU** = estimated total water use (gal/yr)

**ETo** = reference evapotranspiration (annual in/yr) = 55.72<sup>35</sup>

**0.62** = conversion factor from in/yr to gal/yr/sf

**SF** = hydrozone area/landscape category area = Measured area from Step 4.

**PF** = plant factor

Turf = 0.8<sup>36</sup>

Shrub/trees = 0.5 (assume moderate water use)

Special features = 1.0 (e.g., ponds, vegetable gardens)

**IE** = irrigation efficiency = 0.75 for sprinklers<sup>37</sup>

$$ETWU = 55.72 \times 0.62 / 0.75 \times (0.8 \times SF_{turf} + 0.5 \times SF_{shrub/trees} + SF_{special} )$$

6. Estimated total landscaping water demand per land use category by adding water demand estimates per parcel for all parcels per land use category. Calculate averages by parcel and acreage.

<sup>34</sup> <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/MWELo-Files/MWELo-Guidebook/C--Landscape-Irrigation-Water-Budget-Overview.pdf>, accessed March 2022

<sup>35</sup> CIMIS Data Station 160 San Luis Obispo West – Central Coast Valleys, July 2021-June 2022, Total ETo. [Monthly Report \(ca.gov\)](https://www.water.ca.gov/), accessed July 19, 2022.

<sup>36</sup> UC Center for Landscape and Urban Horticulture, Turfgrass Crop Coefficients, [https://ucanr.edu/sites/UrbanHort/Water Use of Turfgrass and Landscape Plant Materials/Turfgrass Crop Coefficients Kc/](https://ucanr.edu/sites/UrbanHort/Water%20Use%20of%20Turfgrass%20and%20Landscape%20Plant%20Materials/Turfgrass%20Crop%20Coefficients%20Kc/), accessed March 2022.

<sup>37</sup> Assume sprinklers to be conservative, potentially overestimating water use



Part 2: Comparison with Purveyor Historical Consumption Data to Ground Truth the Part 1 Methodology

GSWC provided aggregated water consumption data for Residential Suburban parcels within their service area to help vet the outdoor water use estimates for private wells methodology. The data analysis method is as follows:

Completed by GSWC staff per methodology developed with Department staff:

1. Identified parcels/purveyor accounts within water purveyor areas with comparable characteristics to parcels within the study area using private wells.
  - a. Land Use Designation – Included only parcels designated Residential Suburban (RS) land use. Residential parcels served by private wells are designated as Agriculture (AG), Rural Residential (RR), Residential Suburban (RS), and Residential Multifamily (RMF). No parcels within purveyor areas are designated as AG or RR. Residences on RMF parcels are assumed to be multifamily water use. Therefore, only include RS parcels.
  - b. SF Residential Use - Excluded parcels with 0 address points and accounts with more than 1 address point.
  - c. Representative Data – Excluded parcels with bimonthly consumption data gaps and outliers for 2017-2022.
2. Calculated estimated 5-year average annual outdoor water use per account for identified parcels based on bimonthly consumption data for 2017-2022, excluding 2020, for identified accounts.
  - a. Calculated the total average bimonthly water use per account by averaging bimonthly consumption for 2017-2022 excluding 2020, for identified parcels/purveyor accounts.
  - b. Found the lowest average bimonthly water use per account for 2017-2022, excluding 2020, and assumed this value is an estimate of bimonthly indoor water use per account.
  - c. For each bimonthly period for 2017-2022, excluding 2020, calculated the total average water use per account minus the estimated indoor water use (from previous step). Assumed these values are estimates of bimonthly outdoor water per account.
  - d. Calculated the sum of estimated bimonthly outdoor water use per account (from previous step) for each calendar year for 2017, 2018, 2019, 2021, and 2022. Assumed these values are estimated annual outdoor water use per account.
  - e. Calculated the 5-year average estimated annual outdoor water use per account (averaging values from the previous step).

Completed by MWM staff:

3. Calculated the confidence interval for the 5-year average outdoor water use per account estimate provided by GSWC.
  - a. Population size: 248 parcels analyzed in Part 1.
  - b. Margin of error: 10%.
  - c. Sample size: 48 parcels/accounts identified by GSWC for Part 2 (19% of population).
  - d. 87% confidence interval.

Completed by Department staff:

4. Applied the method from Part 1 (using aerial imagery measurements and the MWELo formula) to the parcels identified by GSWC to estimate outdoor water use per account.
5. Calculated the average outdoor water use per account for parcels identified by GSWC.
6. Compared the estimated average outdoor water use from the previous step with the estimate provided by GSWC based on 5-year average per consumption data. Calculated the percent difference.

Part 3: Estimate Indoor Water Use for Self-Source Parcels

1. Assume the 5-year average annual indoor water use calculated from purveyor data for SF and MF residences (see Section 4 above) represents self-source domestic parcels (92 gpd indoor water use for SF and 58 gpd indoor water use for MF).

**Results**

The results of the analysis are summarized in Table C-1 (Part 1) and C-2 (Part 2) below. Part 1: aerial imagery analysis was completed for 248 parcels with average estimated irrigation as 0.22 AFY/acre and total estimated irrigation as 80 AFY. Part 2: verification with GSWC consumption data resulted in a percent difference less than 5%, which is acceptable to ground truth the Part 1 methodology.

**Table C 1. Estimated Irrigation Use for Residential Parcels Served by Private Wells**

| LUC          | # parcels outside water purveyor areas | # dwelling units outside water purveyor areas | Average parcel size (acres) | Average estimated irrigation per parcel (AFY/parcel) | Average estimated irrigation per acre (AFY/acre) | Total estimated irrigation (AFY) | Total turf area (acres) |
|--------------|--|---|-----------------------------|--|--|----------------------------------|-------------------------|
| AG           | 22                                     | 30  | 26.38                       | 0.54   | 0.13   | 12                               | 1.1                     |
| RMF          | 27                                     | 44  | 0.50                        | 0.06   | 0.06   | 2                                | 0.0                     |
| RS           | 183                                    | 178   | 2.03                        | 0.31   | 0.25   | 56                               | 4.5                     |
| RR           | 16                                     | 18  | 6.75                        | 0.64   | 0.29   | 10                               | 0.7                     |
| <b>Total</b> | <b>248</b>                             | <b>270</b>                                    | <b>4.30</b>                 | <b>0.32</b>  | <b>0.22</b>                                      | <b>80</b>                        | <b>6.3</b>              |

Note: Land use category (LUC) abbreviations are as follows: Agriculture (AG), Residential Multifamily (RMF), Residential Suburban (RS), Residential Rural (RR)

Source: San Luis Obispo County Department of Planning and Building, 2022

**Table C-2. Verification of Aerial Imagery and MWELO Method with GSWC Consumption Data**

| Outdoor Water Use Estimation Method                       | No. of parcels included in analysis | No. of SF residences included in analysis (one per parcel) | Percent difference in estimated average annual outdoor water use per SF residence |
|---|-------------------------------------|--|---|
| Aerial Imagery and MWELO Formula (County)                 | 48                                  | 48   | 4.6%  |
| 5-Year Average per GSWC Bimonthly Consumption Data (GSWC) | 48                                  | 48   |   |

**Conclusions**

Table C-3 compares the updated results of this study so far with the CHG 2009 memo, and Table C-4 summarizes the number of parcels, outdoor water use categories, and outdoor water use factors used for the 2009 study for reference.

**Table C-3. Comparison of 2023 and 2009 Estimates of Outdoor Water Use for Domestic Private Wells**

| Analysis | No. of parcels included in analysis | No. of dwelling units included in analysis | Estimated total outdoor water use (AFY) | Average outdoor water use per parcel (AFY/parcel) |
|----------|-------------------------------------|--|---|---|
| 2009     | 184                                 | 214  | 124                                     | 0.7   |
| 2023     | 248                                 | 270  | 80                                      | 0.3   |

Source: San Luis Obispo County Department of Planning and Building, 2023; 2009 Cleath-Harris Geologists Tech Memo: Water Use Estimates for Private Domestic Wells.

**Table C-4. Summary of 2009 TM Outdoor Water Use Categories**

| Outdoor Water Use Category | No. of Parcels | Outdoor Water Use Factor (AFY/parcel) |
|----------------------------|----------------|---------------------------------------|
| Low-use                    | 39             | 0.23                                  |
| Medium-use                 | 61             | 0.44                                  |
| High-use                   | 84             | 1.05                                  |
| Vacant                     | 15             | 0                                     |

Source:: 2009 Cleath-Harris Geologists Tech Memo: Water Use Estimates for Private Domestic Wells.

The updated estimate of average outdoor water use per parcel in the study area is half for this 2023 study than for the 2009 study. The main reason for the lowering of estimated water use per parcel is a change in landscaping patterns. There is a significant reduction in irrigated turf area over the 14 years between the aerial images referenced for each study (2007 and 2021). The CHG 2009 memo reports 84 high-use parcels (each with >3,000 square feet of turf), which would be at least 6 acres of turf, or roughly equivalent to the total amount of turf listed for the 248 parcels analyzed in 2023. When adding the low-use and medium-use turf areas from the 2009 analysis, there was roughly 11 acres of turf on the 184 parcels surveyed. The resulting average turf area per parcel in 2007 is estimated at approximately 2,600 square feet, compared to approximately 1,100 square feet of turf area per parcel in 2021. This 60 percent reduction in average turf area between 2007 and 2021 matches the reduction in estimated average outdoor water use per parcel.

The updated study also includes a more granular analysis of outdoor water use than the 2009 TM. This 2023 study aerial imagery analysis measured the estimated area for three different landscape types per parcel (turf, shrub/trees, and special features) and calculated an estimated outdoor water use per parcel based on these parcel-specific landscape area measurements. The 2009 study used aerial imagery analysis to classified parcels into three outdoor water use categories based on measured areas of turf per parcel (<1,000, 1,000-3,000, or 3,000+ sf). The 2009 study did not measure specific turf areas or calculate estimated outdoor water use per parcel and instead assigned one of three outdoor water use factors to each parcel. Using three categories of outdoor water use factors rather than estimating specific outdoor water use per parcel could account for differences in water use estimates between the two studies.

The updated average indoor and outdoor water use per parcel estimates are referenced in Section 4 of the TM. The BMC may choose to use these results to update the consumption estimates for private wells in BMC annual reporting. Recommended updates to the domestic water use estimates for BMC annual reporting purposes are summarized below in Table C-5.

**Table C-5. Recommended Updates to Domestic Water Use Estimates for BMC Annual Reporting**

| Estimate           | No. of dwelling units included in analysis | Estimated indoor water use rate  | Estimated total indoor water use (AFY) | Estimated total outdoor water use (AFY) | Estimated total water use (AFY) | Percent indoor and outdoor water use (for domestic total water use) |
|--------------------|--|----------------------------------|--|---|---------------------------------|---|
| BMC Annual Reports | 233  | 294 gpd/unit                     | 77                                     | 143                                     | 220                             | 35% indoor<br>65% outdoor   |
| Recommended Update | 270 Total<br>226 SF<br>44 MF               | 92 gpd/SF unit<br>58 gpd/MF unit | 26                                     | 80                                      | 106                             | 25% indoor<br>75% outdoor   |

Source: 2009 Cleath-Harris Geologists Tech Memo: Water Use Estimates for Private Domestic Wells, 2015 Los Osos Basin Plan, 2015-2022 BMC Annual Reports, Analysis per above methodology for recommended update.

## APPENDIX D – WATER SAVINGS POTENTIAL ESTIMATE METHODOLOGY

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MWM staff prepared the estimated water savings potential for toilets, showerheads, clothes washers, and outdoor conservation measures. Department staff prepared the estimated water savings potential for hot water recirculation systems, with guidance and review from MWM staff.

- Outdoor savings potential:
  - Based on the assumption that approximately 83% of outdoor water use is used for irrigation<sup>38</sup> and the calculated estimated outdoor water use in Table 4-1, an estimated irrigation water use per unit per day was calculated. Indoor water use is considered to be water use for the lowest winter month based on billing consumption data analysis; outdoor water use is all remaining water use from consumption data; and irrigation is 83% of the outdoor water use volume.
  - The potential annual savings for implementing various landscape and irrigation measures was calculated by multiplying the irrigation water use per unit by an estimated percentage savings by number of units targeted (see Table 5-3).
- Indoor fixture savings potential:
  - For toilets, showerheads, and clothes washers, an estimated annual water savings from the conversion of all high-water using fixtures to their high-efficiency device counterpart (<1.0 gpf toilet and 1.5 gpm showerheads, and <4.0 IWF clothes washers, respectively) was calculated by estimating the number of uses per day per person (per device) multiplied by the assumed number of people per unit (2.4) and the assumed number of devices within the service area.
    - Number of fixtures by type was determined in the November 2022 project effort (see Appendix A methodology for the fixture retrofit saturation analysis), adjusted to count only 80% of the clothes washers, since studies show only 80-85% of residences in the United States have a clothes washer, on average.<sup>39</sup>
    - Number of devices is broken out by efficiency rating to accurately estimate the water savings from each fixture type conversion.
    - Assumes the same number of toilet flushes and showers per person per day and clothes washer loads per residence per day (average), 365 days a year.
    - The estimated number of fixtures of various flow rates, and related savings per fixture, was compared to the estimated total water use per fixture based on estimated indoor water use per water source and industry average residential end use water assumptions<sup>40</sup> to ground truth the savings estimates (see discussion of bottom-up and top-down approaches and the end use concept in the Introduction section). The savings estimates for toilets, showerheads, and clothes washers calculated using the bottom-up fixture profile approach were multiplied by an adjustment factor of 70% to better align with the top-down estimate, which uses consumption data percentages. By adjusting to the lower number the study avoids the potential to overestimate savings and accounts for a margin of error in fixture profile development (see Appendix A) and average fixture use rates.

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<sup>38</sup> AWWARF Report “Residential End Uses of Water, Version 2 - 4309” (DeOreo, 2016).

<sup>39</sup> <https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-PO.pdf>;  
<https://www.statista.com/statistics/1117972/major-appliances-ownership-selected-countries/>;

<https://www.prnewswire.com/news-releases/us-census-bureau-daily-feature-for-october-26-washing-machines-300343533.html>.

<sup>40</sup> [https://www.circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](https://www.circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf)

| Residential Indoor Use                     | % of Indoor Residential Use |
|--|-----------------------------|
| Toilet                                     | 24%                         |
| Faucet, Bathroom <sup>41</sup>             | 7%                          |
| Faucet, Kitchen <sup>15</sup>              | 13%                         |
| Shower                                     | 20%                         |
| Clothes Washer                             | 17%                         |
| Leak                                       | 13%                         |
| Bath                                       | 3%                          |
| Dishwasher                                 | 2%                          |
| Other                                      | 3%                          |
| Hot Water Use                              | 33%                         |
| 20% of Hot Water Use, estimated amt wasted | 7%                          |

Source: See referenced footnotes.

- For hot water recirculation systems, the estimated potential savings were calculated by multiplying the indoor water use per unit by an estimated percent savings and number of units targeted. The estimated percent savings was assumed to be 3% of indoor use, assuming 33% of indoor residential water use is hot water use<sup>42</sup> and 20% of residential indoor hot water use is wasted<sup>43</sup> and that half of wasted hot water could be saved by efficient recirculation systems ( $33\% * 20\% * 50\% = 3\%$ ). 5% of existing residential units were assumed to be targeted.

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<sup>41</sup> The residential faucet split is based on a 35% bathroom/65% kitchen split of all faucet use based on the following sources:

- Water Consumption by Water-Using Plumbing Products and Appliances - 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition. 2013.
- GMP Research, Inc. (2019). 2019 U.S. WaterSense Market Penetration Industry Report.
- Consortium for Efficient Energy ([www.cee1.org](http://www.cee1.org)).
- California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.
- AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016).
- California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.
- Alliance for Water Efficiency, The Status of Legislation, Regulation, Codes & Standards on Indoor Plumbing Water Efficiency, January 2016.

<sup>42</sup> [https://www.circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](https://www.circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf)

<sup>43</sup> Lutz, J. (2005). Estimating Energy and Water Losses in Residential Hot Water Distribution Systems (No. LBNL-57199). Lawrence Berkeley National Lab. (LBNL), Berkeley, CA (United States).

## APPENDIX E – COST DISCLOSURE

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Cost Disclosure - Documents and Written Reports. Pursuant to Government Code section 7550, if the total cost of this Contract is over Five Thousand Dollars (\$5,000), the Contractor shall include in all documents and in all written reports falling within section 7550, a written summary of costs, which shall set forth the numbers and dollar amounts of all contracts and subcontracts relating to the preparation of such documentation or written report. The contract and subcontract numbers and dollar amounts shall be contained in a separate section of such document or written report.

| <b>Contract/Subcontract</b>   | <b>Cost</b> |
|---|-------------|
| <b>Contract - Maddaus Water Management Inc.</b><br>Water Offset Study for the Community of Los Osos including Parcel-Specific Saturation Analysis for Plumbing Fixture Retrofits and Flume Device Data Analysis | \$70,000    |
| <b>Subcontract - Flume Inc.</b><br>Flume Device Data for San Luis Obispo County-Community of Los Osos   | \$10,000    |

## APPENDIX F – RELIABILITY OF ESTIMATES

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The information contained herein is inherently reliant on estimates. Estimates are based on the best available data at the time the study was conducted. As such, the saturation rates and water savings potential are intended for planning and decision support purposes only. Demand and savings forecasts are subject to uncertainties that cannot be fully identified or quantified. Projections and actual results may vary due to events and circumstances that are beyond control and not reasonably foreseeable. All programs are dependent upon staffing, funding, political support, and community participation as well as weather, technology, policies, economic drivers and unforeseen circumstances that may impact program implementation or adoption. MWM is not responsible for the realization of, or identification of factors that may impact, the projected savings potential.



## APPENDIX G – DEPARTMENT RESPONSE TO LOS OSOS WATER PURVEYORS’ ADU COMMENT LETTER DATED AUGUST 25, 2021

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In August 2021, the three Los Osos water purveyors submitted a joint comment letter regarding the Department’s proposal to allow new accessory dwelling units (ADUs) in Los Osos to be built if they offset their estimated water demand through the County’s retrofit-to-build program. The County has since adopted, and California Coastal Commission has certified, a Coastal ADU Ordinance that restricts new ADUs in the Los Osos Basin Area. However, the comment letter included specific requests for the Department regarding the retrofit-to-build program, which informed the scope of work for this study. The Department’s written response to the water purveyors’ comment letter is included in this section for reference and context. MWM was not involved with the preparation of and does not take any responsibility for the Department’s response.



COUNTY OF SAN LUIS OBISPO  
DEPARTMENT OF PLANNING & BUILDING  
TREVOR KEITH, *DIRECTOR*

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## MEMO

Date: June 19, 2023  
To: Los Osos Water Purveyors (Golden State Water Company, Los Osos Community Services District, and S&T Mutual Water Company)  
From: County of San Luis Obispo Department of Planning & Building  
**Subject: Response to ADU comment letter dated August 25, 2021, as it pertains to the Los Osos Water Offset Study**

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This memo is a response to a joint comment letter from the three Los Osos water purveyors dated August 25, 2021 (attached) regarding the adequacy of water services for new development of accessory dwelling units (ADUs) in Los Osos, as it pertains to the Los Osos Water Offset Study (Offset Study).

**Background.** The ADU ordinance proposed in August 2021 would have allowed new ADUs to be built in Los Osos if they offset their water use at a 2:1 ratio through the County's "retrofit-to-build" (also known as, Title 19) program. On April 4, 2023, the County adopted a Coastal ADU Ordinance that restricts ADU development using water from the Los Osos Groundwater Basin until water resource considerations are addressed. California Coastal Commission certified the ordinance on May 11, 2023. The redline ordinance is available at: [https://www.slocounty.ca.gov/Departments/Planning-Building/How-to-Apply-for-a-Permit-in-Unincorporated-SLO-Co/Land-Use-Zoning/Zoning/Allowable-Uses/Accessory-Dwelling-Unit/Coastal-Accessory-Dwelling-Units-\(1\).aspx](https://www.slocounty.ca.gov/Departments/Planning-Building/How-to-Apply-for-a-Permit-in-Unincorporated-SLO-Co/Land-Use-Zoning/Zoning/Allowable-Uses/Accessory-Dwelling-Unit/Coastal-Accessory-Dwelling-Units-(1).aspx)

In December 2021, the County contracted with Maddaus Water Management Inc. to complete the Offset Study to update estimates of average annual residential water use and best quantify the remaining water savings potential for Los Osos to inform updates to the retrofit-to-build program. The study is scheduled to be published this month. A hearing date for the County Board of Supervisors to consider amendments to the retrofit-to-build program policies has not yet been scheduled.

The County and water purveyors are in ongoing collaboration to align land use planning and water resources planning for the community of Los Osos beyond the scope of the Offset Study. The Los Osos Community Plan is still pending California Coastal Commission certification; hearing date not yet scheduled.

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**Monitoring Data and Metrics Deserve More Emphasis.** The attached comment letter expressed a need for additional monitoring of the groundwater basin to assess the effects of Basin Plan programs on improving basin conditions. The Department is collaborating with the three Los Osos water purveyors on an updated approach to aligning land use and growth policies with water resource metrics and management efforts.

**Need for Water Conservation Study.** The comment letter requested the County investigate the assumptions and arithmetic used to estimate the water savings resulting from the retrofit-to-build program and the remaining water savings potential in Los Osos, considering the relatively low water use per capita in Los Osos, to ensure the offset program actually results in no new net water demand from new development. A key deliverable of the Offset Study is an updated collection of residential average annual water use estimates, based on consumption data provided by the water purveyors, including separate estimates for single-family and multi-family units and areas that are served by water purveyors and private wells. The County also completed an updated estimate of outdoor water use for residences using private wells based on 2021 aerial imagery measurements of landscaping areas and estimated evapotranspiration factors (Offset Study Appendix C).

The water purveyors requested the Offset Study include a comparison of the available water savings potential to the estimated water demand for ADUs. The study does not include an estimate of water use for ADUs because they are not currently allowed in Los Osos and there are few existing ADUs in the community, so historic consumption data is not available for analysis.

**Request for Amendments to Chapter 19.07.** The Department's retrofit-to-build program requirements and administrative procedures are specified in County Code, Section 19.07.042. The Department will publish proposed amendments to this code section based on the findings of the Offset Study, to be circulated for public review before being brought to the County Board of Supervisors for consideration at a public hearing. The proposed amendments are not yet available. The Board of Supervisors must approve any policy changes.

Verifiable Water Offsets. The water purveyors requested that the County Code require new development to provide "verifiable water offsets using purveyor water data" and allow the County and water purveyors to "track the long-term effectiveness of retrofits by requiring monitoring and reporting and, if retrofits are ineffective, mandating that the development implement additional water conservation measures to achieve no net water use." The Offset Study recommends requiring retrofit-to-build program participants to agree to

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release water use data for informational purposes and includes case study examples of agencies that have incorporated enforcement actions into their verification procedures. The study also includes a discussion of the different factors affecting water use patterns (e.g., plumbing fixtures, outdoor landscaping, consumer behavior, rainfall) and a case study of a statistical analysis to verify water savings for outdoor water efficiency measures.

Location of Water Offsets. The water purveyors also requested that the County Code require water offset credits to be sourced from within the same water purveyor service area boundary as the proposed new development. The Offset Study includes estimates of remaining water savings potential for each water purveyor service area to support this requested policy change.

**Funding Mechanism to Support New Development.** The comment letter stated that the water purveyors would need to explore alternative funding strategies with the County for water supply and infrastructure costs related to ADU development, since State law prohibits impact fees for ADUs. This comment is not applicable at this time since ADUs are not currently allowed in Los Osos. Developing funding strategies for water supply infrastructure is outside of the Department's scope.

Updates about the Department's land use planning efforts for Los Osos are available at:

<https://www.slocounty.ca.gov/Departments/Planning-Building/Grid-Items/Community-Engagement/Communities-Villages/Los-Osos.aspx>

#### **Attachments.**

1) Los Osos water purveyor ADU comment letter dated August 25, 2021



August 25, 2021

San Luis Obispo County  
Department of Planning and Building  
976 Osos Street, Room 200  
San Luis Obispo, CA 93401

**Subject: Los Osos Groundwater Basin Purveyor Recommendations re County of San Luis Obispo's Proposed ADU Ordinance**

To Whom It May Concern:

**Introduction**

The Golden State Water Company ("GSWC"), Los Osos Community Services District ("LOCSO") and S&T Mutual Water Company ("S&T") (jointly, "Purveyors") provide water to the Los Osos community, which overlies the Los Osos Groundwater Basin ("Basin").<sup>1</sup> Together with the County, the Purveyors are tasked with sustainable management of the Basins through their positions on the Basin Management Committee ("BMC").<sup>2</sup> The Purveyors are writing this letter in response to the County's request for Purveyor input on the "adequacy of water . . . services" to support the construction of accessory dwelling units ("ADUs") within the Los Osos community. (Gov. Code § 65852.2(a)(1)(A).)

Although the Purveyors acknowledge that the County retains land use authority throughout the Los Osos community, they also understand that a clear and accurate description of the community's groundwater resources is fundamental to successful land use planning, which must account for resource availability in the decision-making process. The following letter summarizes (1) the BMC's efforts to date to create a sustainable water supply for the Los Osos Community, as well as (2) the Purveyor's concerns regarding potential impacts of the County's proposed ordinance to allow accessory dwelling units ("ADU Ordinance") on Basin sustainability.

**Background on the BMC and Basin Plan**

In January 2015, the Purveyors and the County released the Updated Basin Plan for the Los Osos Groundwater Basin ("Basin Plan") which details a series of strategies, plans and

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<sup>1</sup> The County of San Luis Obispo ("County") also operates several groundwater wells overlying the Basin and provides recycled water to the Los Osos community from the Los Osos Water Recycling Facility ("LOWP").

<sup>2</sup> Pursuant to the court-approved stipulated judgment ("Stipulated Judgment") in *Los Osos Community Services District v. Golden State Water Company et al.* (Case No. GIN 040126), the Purveyors and the County formed the BMC in 2015.

projects to manage and protect groundwater resources in the Basin.<sup>3</sup> The Basin Plan proposes a strategy and establishes goals, timeframes, milestones, and metrics to address basin management. The primary goals of the Basin Plan include halting seawater intrusion into the Basin and providing sustainable water supplies for existing and future needs.

The Basin Plan's implementation strategy is centered around construction of a series of proposed projects, that comprise the Basin Infrastructure Program ("Program"), to address the Basin Plan's stated goals. The Program is divided into four parts, designated Program A, Program B, Program C, and Program D. Programs A and B are designed to shift groundwater production from the lower aquifer to the upper aquifer, and Programs C and D are designed to shift production within the lower aquifer from the western area to the central and eastern areas, respectively. To date, Purveyor efforts have focused on implementation of Program A and Program C improvements to achieve a sustainable water supply under what the Basin Plan refers to as the "Existing Population Scenario".

The Basin Plan establishes a comprehensive Groundwater Monitoring Program to collect, organize, and report data regarding the health of the Basin. That data is used to calculate the metrics discussed in the following paragraphs and to provide information needed to manage the Basin for long-term sustainability.

To report on the Basin's progress, the BMC is required to submit an annual report to the County of San Luis Obispo Superior Court ("Court") detailing the monitoring results and Basin Plan implementation progress for the previous year ("Annual Report"). Each annual report includes, among other information, groundwater production data, an update on the implementation of Basin Plan Programs, and the recent monitoring results of Basin Plan metrics.<sup>4</sup> This last element provides the best indicator of the status and health of the Basin.

The BMC adopted and submitted the 2020 Annual Report to both the Court and the Department of Water Resources ("DWR") on June 16, 2021.<sup>5</sup> As part of this report, and as required by the Stipulated Judgment, the BMC updated the monitoring results for each of the four metrics set forth in the Basin Plan. The following table summarizes the Annual Report's findings:

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<sup>3</sup> Both the Basin Plan and the cooperative authority described in the Basin Plan were approved by the Superior Court in October 2015.

<sup>4</sup> The Basin Plan established several metrics to evaluate nitrate impacts to the Upper Aquifer ("Nitrate Metric"), seawater intrusion into the Lower Aquifer ("Chloride Metric"), and the effect of management efforts of the BMC ("Basin Yield Metric" and "Water Level Metric"). These metrics, along with others, are jointly referred to as the "Basin Metrics". These Basin Metrics allow the BMC, regulatory agencies, and the public to evaluate the status of nitrate levels and seawater intrusion, and the impact of implementation of the Basin Plan Programs in the Basin through objective, numerical criteria that can be tracked over time. The Basin Plan requires the continual monitoring and reporting of each of the Basin Metrics.

<sup>5</sup> A copy of the 2020 Annual Report can be found at [https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Los-Osos-Basin-Management-Committee-\(BMC\).aspx](https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Los-Osos-Basin-Management-Committee-(BMC).aspx)

| <b>Summary of Basin Plan Metrics (as reported in 2020 Annual Report)</b> |                                       |   |   |
|--|---------------------------------------|---|---|
| <b>Metric</b>  | <b>Basin Plan Goal</b>                | <b>Value Reported in 2020 Annual Report</b> | <b>Notes</b>  |
| <b>Basin Yield Metric</b>  | 80 or less                            | 73  | Deterioration from 2019; but has met Basin Plan goal since 2016 |
| <b>Water Level Metric</b>  | 8 feet above mean sea level or higher | 1.8 feet above mean sea level               | No change since 2019; has not reached Basin Plan goal           |
| <b>Chloride Metric</b>   | 100 mg/L or lower                     | 205 mg/L                                    | Deterioration from 2019; has not reached Basin Plan goal        |
| <b>Nitrate Metric</b>  | 10 mg/L or lower                      | 20 mg/L (NO <sub>3</sub> -N)                | Improvement from 2019; has not reached Basin Plan goal          |

### **Purveyor Concern Regarding Sustainability of Basin**

As illustrated in the above table, despite the BMC's best efforts, only one of the four Basin Metrics (the Basin Yield Metric) is currently within the targeted range.<sup>6</sup> Further, two of the three other Basin Metrics (the Water Level Metric and the Chloride Metric) saw a deterioration over the prior year. As a result, the Purveyors are concerned the adoption of the County's proposed ADU Ordinance could further hinder the BMC's efforts to sustainably manage the Basin and achieve the goals of the Basin Plan. The following comments are provided with this in mind.

### Monitoring Data and Metrics Deserve More Emphasis

As reported in the 2020 Annual Report, both the monitoring data and the Basin Metrics indicate that Basin conditions as a whole are static or worsening, which is being closely monitored and evaluated by purveyors. Unfortunately, sustainable management of groundwater resources is not often achieved quickly, and instead takes years of continued effort to begin seeing results. Based on the trends and monitoring results published in previous Annual Reports, it may take several more years before it is possible to determine whether implementation of the Basin Plan has been successful in reversing seawater intrusion and improving other unfavorable water quality trends. Prior to being asked to serve additional demand, therefore, the Basin Metrics must indicate not only an end to deteriorating conditions but measurable and sustainable improvements across the Basin. It may also be necessary to consider creative water supply options, such as supplemental or imported water, in order to solve the long-term water issues within the Basin.

### Need for Water Conservation Study

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<sup>6</sup> Although the 2020 Annual Report was adopted by the BMC at its June 16, 2021 meeting, it did not receive unanimous approval because of concerns regarding the current value of the sustainable yield (as set forth in the Annual Report), which has a direct impact on the Basin Yield Metric.

The ADU Ordinance proposes to include a water offset requirement where an applicant for an ADU would be required to “offset” the ADU’s water demand by reducing water use through conservation measures. This requirement is intended to result in no new net demand in response to the County’s approval of an ADU.

The Purveyors can agree to support this, however, we request that the County investigate or revisit the assumptions and arithmetic used for defining the magnitude and availability of these conservation offsets, which the water purveyors feel are in error. Given that Los Osos has relatively low water use per capita, the Purveyors are concerned that the well-intentioned offset requirements will not result in the ADU Ordinance having no new net water use. The Purveyors request that the County initiate a study (“Water Conservation Study”) to identify the opportunities for retrofits, such as high efficiency toilets, showerheads, faucet aerators and washing machines, relative to the demand for ADUs. Based on this Water Conservation Study, the County, Purveyors and community can understand the anticipated amount of water available for new ADUs from water conservation offsets and the expectations for amount of ADU development that will occur within the Basin boundaries.

#### Request for Amendments to Chapter 19.07

As part of the County’s amendments to the ADU Ordinance, the Purveyors also request that the County amend Chapter 19.07 (Plumbing Code) of the County Code to harmonize and improve the County’s water conservation requirements. Based in part on the Water Conservation Study, the County should update Chapter 19.06 to require new development, including ADUs, to provide verifiable water offsets using Purveyor water data. These amendments also should permit the County and Purveyors to track the long-term effectiveness of retrofits by requiring monitoring and reporting and, if retrofits are ineffective, mandating that the development implement additional water conservation measures to achieve no net water use.

Further, the County should exercise its land use authority to require that water conservation offset credits be harvested from within the purveyor service area boundary in which the proposed development would occur. The County’s water offset program must take into account local water resource constraints and improve local water supply conditions. For example, retrofits to support new ADU development within Los Osos must occur within the Basin to result in water supply improvements. By localizing water conservation requirements and providing of long-term monitoring, the County will create a more effective offset requirements and help promote sustainable management of the Basin.

#### Funding Mechanism to Support New Development

State law limits the ability of local agencies, including the Purveyors, from assessing impact fees on ADUs to support new water supplies. (See Gov. Code § 65852.2(f).) These restrictions on impact fees make it difficult for the Purveyors to recuperate the water system and water supply costs associated with serving ADUs, while ensuring water remains affordable to existing customers. Due to the significant supply constraints and uncertainty of the long-term conditions within the Basin, the Purveyors need to explore alternative funding strategies with the County in order for new development to pay its fair



share of infrastructure and water supply costs. Otherwise, existing customers will disproportionately bear the costs of new development.

**Conclusion**

In summary, the Purveyors emphasize the importance of incorporating monitoring data, as well as Basin Metric trends, into the County’s land use planning and decisions about allowing additional development. As set forth above, recent monitoring data and the Basin Metrics both indicate that Basin conditions as a whole are static or worsening. The Purveyors also are concerned that the ADU Ordinance’s proposed offset requirements may impair the BMC’s ability to ensure a sustainable water supply for existing customers, or even result in a deterioration of the Basin Metrics. Accordingly, the Purveyors request the County to initiate a Water Conservation Study to evaluate whether the proposed offset requirements would allow for new development under the ADU Ordinance in a manner that is protective of Basin health. Finally, the Purveyors also request that the County collaborate with the Purveyors to develop new funding strategies to support the development of ADUs within the Basin and the anticipated growth associated with County’s Los Osos Community Plan Update. Coordination among the County and Purveyors to secure a sustainable and equitable funding scheme remains critical to achieving the Basin Plan Goals, and providing a safe, clean, and affordable water supply to the Los Osos community.

The Purveyors appreciate this opportunity to provide comments on the County’s proposed ADU Ordinance. Please let us know if you have any questions, or if you need more information.

Sincerely,

**Mark Zimmer**  
Digitally signed by Mark Zimmer  
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Golden State Water Company

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Cc: Dan Heimel, BMC Executive Director