County Operations Water Conservation Plan

FEBRUARY 2023

COUNTY OF SAN DIEGO

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Prepared by Water Systems Consulting, Inc

WSC

ACKNOWLEDGMENTS

The County Operations Water Conservation Plan was prepared by Water Systems Consulting, Inc. The primary authors are listed below.

Ian Castillo, Water Resilience Planner

Kirsten Plonka, Vice President, P.E.

Spencer Waterman, Water Resource Planner

Water Systems Consulting, Inc. would like to acknowledge the significant contributions of County of San Diego and Stok. The primary contributors are listed below.

Charles Marchesano, Chief, Energy & Sustainability Program

Susan Freed, Project Manager, Energy & Sustainability Program

Sandy Houck, Director of Engineering, Stok

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ACRONYMS & ABBREVIATIONS

AB 1668	Assembly Bill 1668
AFY	Acre-feet Per Year
AMI	Automated Metering Infrastructure
BMP	Best Management Practice
CAP	Climate Action Plan
CII	Commercial. Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CPC	California Plumbing Code
DGS	Department of General Services, County of San Diego
DRAP	Drought Response Action Plan
DWR	Department of Water Resources
EO-N-7-22	Executive Order N-7-22
FY	Fiscal Year
LEED	Leadership in Energy and Environmental Design
MWD	Metropolitan Water District of Southern California
MGD	Million Gallons per Day
NOAA	National Oceanic and Atmospheric Association
SANDAG	San Diego Association of Governments
SB 606	Senate Bill 606
SB X7-7	Senate Bill X7-7
SDCWA	San Diego County Water Authority
SWB	State Water Resources Control Board
UWMP	Urban Water Management Plan
WCP	Water Conservation Plan
WSC	Water Systems Consulting
WSCP	Water Shortage Contingency Plan
WUE	Water Use Efficiency
ZCPP	Zero Carbon Portfolio Plan

Executive Summary

This section of the report introduces the purpose and structure of the Water Conservation Plan, including a summary of significant findings.

IN THIS SECTION

- Purpose of the plan
- Summary of findings & opportunities
- Introduction to report structure

Purpose

The County of San Diego Department of General Services (DGS) has developed this Water Conservation Plan to provide a portfolio-level plan for managing water consumption at County-owned and occupied facilities.

The purpose of this plan is to:

- Determine opportunities to reduce potable water use in County operations.
- Create a strategy and set forth a blueprint to meet water demand reduction targets.
- Identify implementable measures to achieve these targets.
- Develop practices to track performance and to adapt to changing circumstances.
- Achieve alignment with the County's Climate Action Plan (CAP) and Zero Carbon Portfolio Plan (ZCPP).[1]

Background

Sufficient water supply and a strong local economy are tightly linked. Water suppliers and governmental entities around the region have identified anticipated shortages in the future and warned that long-term permanent conservation measures will be critical to ensuring that water is used most efficiently, helping to avoid or mitigate drought impacts.

The County of San Diego (County) owns or leases facilities spread throughout the geographic county which are served by approximately 500 water utility accounts. Data regarding water use by these facilities during the most recent five-year fiscal period, from 2016/17 through 2020/21, was collected to establish an average annual water use baseline and to analyze water use by significant factors that contribute to an understanding of potential for water use savings. The baseline established is **438,316 hundred cubic feet (HCF).** To simplify analysis and implementation of findings, the 20 highest water-using County facilities, which represents 84% of the total baseline, were identified for water use efficiency (WUE) implementation efforts. These are listed in Table ES-1 below.

Table ES-1. Inventory and Ranking of Top 20 County Facilities by Water Use

Site	% Share of Demand[2]
George Bailey / E Mesa Detention	29%
North County Regional Center	12%
San Diego Central Jail	8%
N Inland Crisis Residential Center	8%

[1] The County of San Diego Climate Action Plan (CAP) was developed in 2018 and is currently in re-development. It is expected to be implemented in late 2023. The Zero Carbon Portfolio Plan (ZCPP) was published in April of 2022 and is now in the process of implementation. This Plan follows the goals of both the CAP and the ZCPP.

[2] Demand is the total annual water use by the top 20 facilities.

Site	% Share of Demand[2]
Las Colinas Detention & Reentry Fac	7%
County Operations Center	6%
South Bay Regional Center	5%
County Administration Center	5%
Sweetwater Regional Park	3%
Edgemoor Skilled Nursing Facility	3%
Descanso RMS	2%
Dos Picos Park	2%
Lindo Lake Park	2%
Guajome Regional Park-Oceanside	2%
Hall of Justice	1%
Descanso Fire Station 45	1%
Heritage Park	1%
McClellan Palomar Airport	1%
Collier Park	1%
Juvenile Probation Center	1%

The 2030 WUE target of this plan was determined to be 100,770 hundred cubic feet (HCF) per year in savings, representing a 23% reduction in baseline water use. This target was established by pairing reduction measures with identified remaining WUE potential across County facilities for reasonable implementation by 2030. The Plan includes broad objectives and detailed numeric targets for water efficiency, including research into future opportunities to support local stewardship of the County's water resources.

Analysis

The project team examined current facility conditions, predominant land uses, technologies available, facility-specific support from local retail water suppliers, and feedback from County facility operators to develop a comprehensive list of water use efficiency (WUE) strategies that correspond to the County's water demand characteristics and savings potential.

Analysis performed included examining water use by factors such as land use (some land uses present greater opportunities to implement a single strategy), retail supplier (to determine potential cost savings), and annual and seasonal variations (to delineate indoor versus outdoor uses). From this analysis, the team identified strategies for implementation of measures and calculated potential water and cost savings from implementation.

Savings Potential

The proposed water use reduction strategies are expected to result in 100,770 HCF of savings in the target year 2030, equating to an estimated $538,000 in avoided purchased water costs annually.[3]

To achieve the 2030 targeted water savings, the planning team developed a set of proposed WUE measures broken down into four different categories: indoor savings, outdoor savings, potential for onsite non-potable reuse, and improved metering and leak detection. Table ES-2 below demonstrates the estimated total savings potential by facility for the top 20 facilities.

Table ES-2. Total Savings Potential – Top 20 Facilities

Site	Est. Savings Potential (HCF)	% Reduction from Baseline
George Bailey / E Mesa Detention	28,548	26%
North County Regional Center	22,023	51%
San Diego Central Jail	10,865	36%
N Inland Crisis Residential Center	3,904	14%
Las Colinas Detention & Reentry Fac	7,471	28%
County Operations Center	10,592	45%
South Bay Regional Center	3,811	19%
County Administration Center	2,197	13%
Sweetwater Regional Park	1,103	11%
Edgemoor Skilled Nursing Facility	2,327	23%
Descanso RMS	1,084	14%
Dos Picos Park	664	9%
Lindo Lake Park	650	9%
Guajome Regional Park-Oceanside	590	9%
Hall of Justice	324	7%
Descanso Fire Station 45	632	14%
Heritage Park	366	10%
McClellan Palomar Airport	687	18%
Collier Park	346	10%

[3] This avoided cost estimate does not include additional considerations for avoided wastewater fees and should be treated as a conservative estimate to inform future opportunities.

Site	Est. Savings Potential (HCF)	% Reduction from Baseline
Juvenile Probation Center[4]	111	3%

Implementation

The following six (6) best management practices (BMPs) below are recommended for the County's top 20 facilities. These steps are a guide to consider where applicable and feasible for implementation. The efforts will start with an initial assessment to determine the scope of work needed to implement the measures followed by execution of the work needed to achieve the noted savings.

This Plan identifies the potential to save more than 100,000 HCF per year, which represents a 23% total reduction in demand from a baseline water use of 438,316 HCF per year based on the five-year average demand between fiscal years 2016/17 and 2020/21.

Assessments

- Facility-wide WaterSense Audit
- Water$mart Irrigation Audit
- Onsite Reuse Feasibility Study

Execution

- Implement Fixture Level Retrofits
- Implement Landscape/Irrigation Retrofits
- Implementation of Onsite Reuse Strategy(s)

Next steps to achieve the 2030 targeted savings include a focus on the recommended implementation measures that cover 10 sites which were selected for short-term WUE efforts based on savings potential, certainty of savings, and applicability to other County facilities. The measures with the greatest potential for water savings are itemized in Table ES-3 below.

Table ES-3. Potential Impact of Measures with Greatest Savings Potential

Water Use Efficiency Measure	Annual Savings (HCF)
Onsite Reuse	38,052
Landscaping improvements5	21,519+

[4] During the process of developing this Plan, the Juvenile Probation Center was being demolished and a new, larger Youth Transition Facility is currently under construction in the same location. The new Youth Transition Facility is likely to still fall into the Top 20 facilities and as such will remain as Site 20 for this Plan. Due to new sustainable construction of this facility, onsite water reuse and rainwater capture are expected to be the only options available for this site.

[5] Due to lack of metering, some of this measure's savings are indeterminable.

Water Use Efficiency Measure	Annual Savings (HCF)
Metering and leak detection	17,413
Kitchen equipment improvements	7,565
Cooling tower technologies	4,508
High efficiency plumbing fixtures	11,713
TOTAL	**100,770**

Financial Considerations

Implementation costs of the proposed WUE strategies range from low to high where the low end of the spectrum represents remaining "low hanging fruit" such as fixture-level upgrades and retrofits with payback periods of one to two years while the high end of spectrum represents more demanding strategies that require significant project management, coordination, research, and funding.

Within just 10 years' time, the payback period for full-scale implementation of onsite reuse projects across all applicable County facilities may be met, opening up opportunities for savings in the millions of dollars over the next 10-year planning period, which can then provide opportunity for new resources for the County to advance its planning objectives in an uncertain climate future.

Report Overview

The County of San Diego Water Conservation Plan (Plan) is organized by the following sections.

Section 1: Overview and Strategy

- The role of water efficiency within long-term planning for the County of San Diego.

Section 2: Demand Assessment and Savings Potential

- The comprehensive data collection, evaluation, and analysis process that was undertaken for the development of this Water Conservation Plan.

Section 3: Existing Conservation and Compliance

- Existing conservation and compliance achieved by the County to date, and a review of relevant policies, codes, and standards that apply to County facilities.

Section 4: Water Efficiency Projects, Programs, and Policies

- Proposed water use reduction strategies and projects for Existing Facilities and New Construction.

Section 5: Implementation Plan

- Required effort to achieve the savings outlined.

1.0 Overview and Strategy

This section of the report introduces the role of water efficiency within long-term planning for the County of San Diego, including a discussion of drivers, such as expected population and ongoing drought, and intended outcomes for the development of this Water Conservation Plan.

IN THIS SECTION

- Drought inevitability
- Population growth
- Drivers and intended outcomes

1.1 What is a Water Conservation Plan?

The County of San Diego (County) completed this Water Conservation Plan (Plan) as an essential roadmap to 2030, providing an adaptive planning document that outlines clear water use efficiency (WUE) strategies to deliver significant and cost-effective water savings.

This Plan includes broad objectives and detailed numeric targets for water efficiency, including research into future opportunities to support local stewardship of the County's water resources.

The Plan provides several valuable resources and will be used as:

- **A Planning Tool** – projects long-range demand reductions and defines the role of water efficiency in County operations
- **A Business Plan** – provides the overall strategy and the economic benefit of water efficiency
- **A Means to Raise Political Awareness** – promotes water efficiency as a sound strategy, establishes partnerships, and sets the trajectory for new and ongoing projects
- **A Means for Regional Coordination** – provides opportunities for complimentary efforts between regional, local, and retail agencies

The 2030 WUE target of this plan was chosen as 100,770 hundred cubic feet (HCF) per year in savings, representing a 23% reduction in baseline water use. This target was established by pairing reduction measures with identified remaining WUE potential across County facilities for reasonable implementation by 2030. In some cases, savings will be maintained years beyond the 2030 target year. Additional reductions are possible by implementing WUE strategies, such as cooling tower and onsite reuse projects that cannot be quantified at this time.

It is important to note that the County is not a water provider, and as such, it does not fall under the same WUE requirements as those required of urban retail water suppliers that have more than 3,000 connections or supply more than 3,000 AFY. In fact, the County is not a supplier, but a customer of many different urban retail water suppliers whose service areas fall under the region's wholesaler, San Diego County Water Authority (SDCWA), with facilities across the County. However, the County intends that this Plan will serve as a regional tool for supportive action of water efficient practices, helping SDCWA and its retail member agencies meet their established targets by exhibiting water resource best management practices across its facilities.

1.2 Why Water Efficiency?

The role of County facilities is to provide necessary and expected services to County citizens for the public good. The County supports the local economy through essential social infrastructure services that must remain at consistent levels of service, drought or no drought. As a government institution, the County fulfills an essential role by supporting the quality of life of the San Diego region. By investing in social infrastructure, the County supports the local economy and citizen wellbeing. From an economic perspective, impacts to a region's well-being occur when water use is restricted or when increased water costs drive undesirable reductions in the general demand for goods and services.

In 2020, the population within SDCWA's service area was approximately 3.3 million people and is projected to increase to roughly 3.8 million people by 2050.[6] This anticipated growth suggests increased pressure on the County's services over time. Table 1-1 below summarizes SDCWA's population forecast from 2025-2045 using data from San Diego Association of Governments (SANDAG) Series 14 and the agency's 2020 Urban Water Management Plan (UWMP).[7]

Table 1-1. Water Authority Service Area Population Forecast (2025-2045)

Year	Population
2025	3,442,340
2030	3,536,336
2035	3,623,655
2040	3,709,299
2045	3,789,443
Average Annual Growth	**17,355**

Sufficient water supply and a strong local economy are tightly linked. As part of SDCWA's 2020 UWMP a Drought Risk Assessment was prepared, identifying anticipated shortages or surpluses in a normal year, single dry year, and five-consecutive-year drought scenarios. No shortages were identified in all scenarios, but long-term permanent conservation savings will be critical to ensuring water is used most efficiently, helping to avoid or mitigate drought impacts.

Drought is an inevitable part of living in the State of California (State). According to a study published in the journal *Geophysical Research Letters* in 2021, the 2012-2014 drought in California was its most intense drought in at least 1,200 years, exceeding the severity of a late-1500s megadrought that previously had been identified as the driest such period on record.[8] The National Oceanic and Atmospheric Association (NOAA) defines megadrought as a period of prolonged drought lasting two decades or longer. In fact, researchers believe that the periodic intense droughts between 2000 and 2020 constitute its own megadrought.[9] As Figure 1-1 demonstrates below, as of August 2022, 100% of the State is in some drought condition while 59.81% is in the range of extreme to exceptional drought conditions.

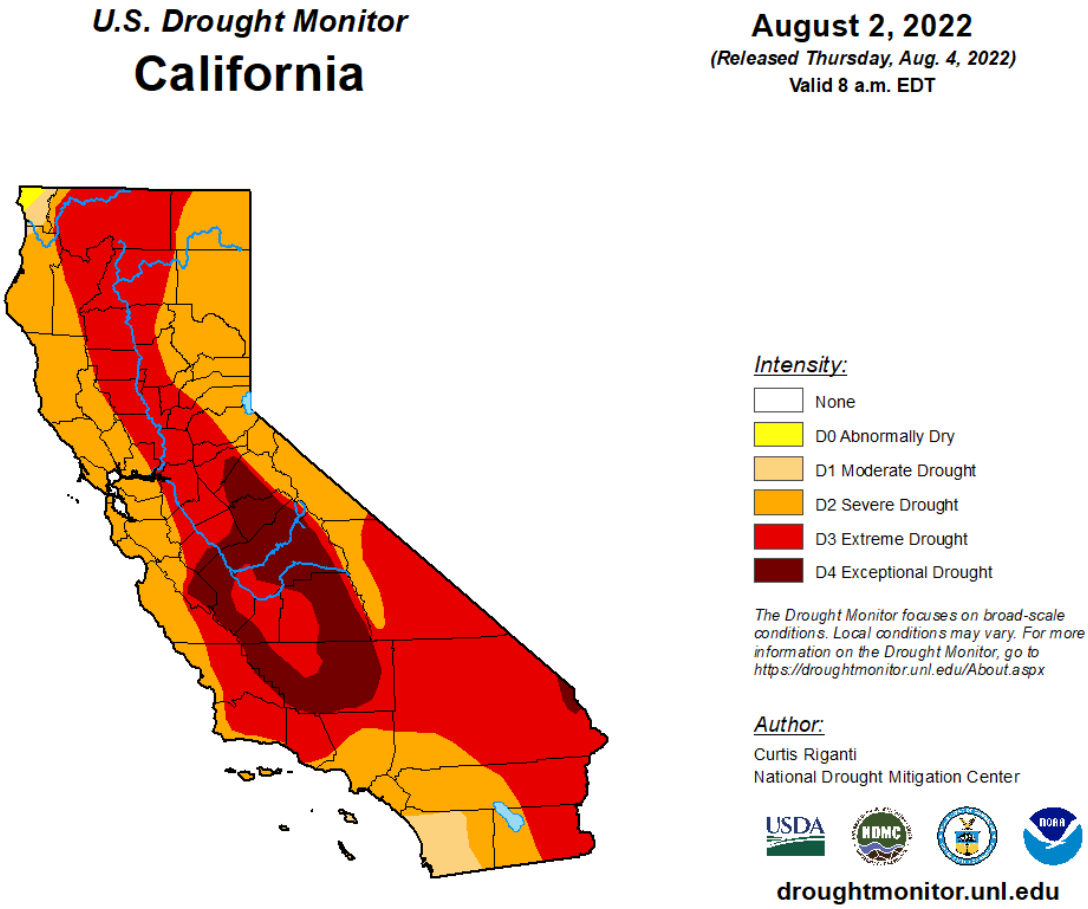
[6] SANDAG Series 14 Regional Growth Forecast (version 17)

[7] https://www.sdcwa.org/wp-content/uploads/2021/06/SDCWA-2020-UWMP.pdf

[8] https://www.theguardian.com/environment/climate-consensus-97-per-cent/2014/dec/08/california-just-had-its-worst-drought-in-over-1200-years

[9] https://cpo.noaa.gov/News/ArtMID/7875/ArticleID/2366/Study-Dry-Future-Likely-Unavoidable-for-Southwest-But-Reducing-Greenhouse-Gases-Can-Still-Help

Figure 1-1. California Drought Monitor, August 2, 2022



There are several reasons why water efficiency plays a continual role today and in future planning:

1. Water efficiency is one of the most cost-effective methods to increase water supplies.
2. Despite overall reductions in regional per capita water use, it is likely that demand will rebound as the economy recovers from COVID-19 and as population grows.
3. Future droughts are an inevitable part of California's hydrologic variability, and water efficiency planning is part of the overall process of planning to prevent shortages and adapt to them should they occur.
4. Water efficiency diversifies the water resource portfolio.
5. Water efficiency provides broad benefits beyond water use reductions, including but not limited to energy savings, reduced run-off and non-point source pollution, reduced overspray damage, improved plant and ecosystem health, and resource stewardship.
6. As a water customer of many retail water suppliers, the County has a significant opportunity for cost savings by integrating water efficiency into its standard operations.

This Plan is designed to serve as a dynamic resource that can be adapted to changing circumstances. As budgets and grant funding fluctuate over time, the County will be able to employ a suite of strategies to achieve water savings.

1.3 Planning Process

Working in partnership with the County, WSC gathered and organized data from retail water suppliers and a range of other sources to understand the characteristics of the County's facilities and the service area in which they reside. Data resources included the following:

- Urban Water Management Plans (UWMPs).
- Water Shortage Contingency Plans (WSCPs).
- Records of past WUE project data.
- Account-level historical water use data of County facilities.
- Land use designations of each County facility for trends analyses.

From these sources, data were compiled into summaries of water use by accounts and by land use classification designated by Tririga.[10] Land use classifications were developed by County staff based on SANDAG data and the County's General Plan. Savings from previous WUE efforts were assessed in parallel with remaining opportunities for savings. Section 2.0 – Demand Assessment includes more information on the data assessment and evaluation process for land and water use by County facilities.

In addition to a thorough desktop review process as described above, WSC also conducted a thorough interview process with several County operator staff members and documented WUE strategies implemented to date. Upon completion of the interview process, WSC identified commonalities between responses that summarized past, present, and ongoing water efficiency efforts and interests across County facilities. This is further described in Section 3.0 – Existing Conservation and Compliance. Existing WUE efforts include, but are not limited to, the development of a Drought Response Action Plan (DRAP) in 2015, the County's pilot to use non-potable water in cooling towers, commonly referred to as the "Zero Blowdown Project," fixture-level WUE measures, landscape and irrigation retrofits and upgrades, and other uses of non-potable water supplies to offset potable demands. These results were also summarized and reported in a technical memorandum to the County.[11]

[10] Tririga is an integrated workplace management system software that assists the County of San Diego with building class classifications of its facilities for planning efforts.

[11] Operator Interview Summaries Technical Memorandum provided to the County April 18, 2022.

2.0 Demand Assessment

This section of the report discusses the comprehensive data collection, evaluation, and analysis process that was undertaken for the development of this Water Conservation Plan. This includes a discussion of data sources along with other relevant information used to characterize the County facilities' historical water use.

IN THIS SECTION

- Historical water use of County facilities
- Water use trends and insights
- County land uses

2.1 All County Facilities

2.1.1 Retail Service Areas

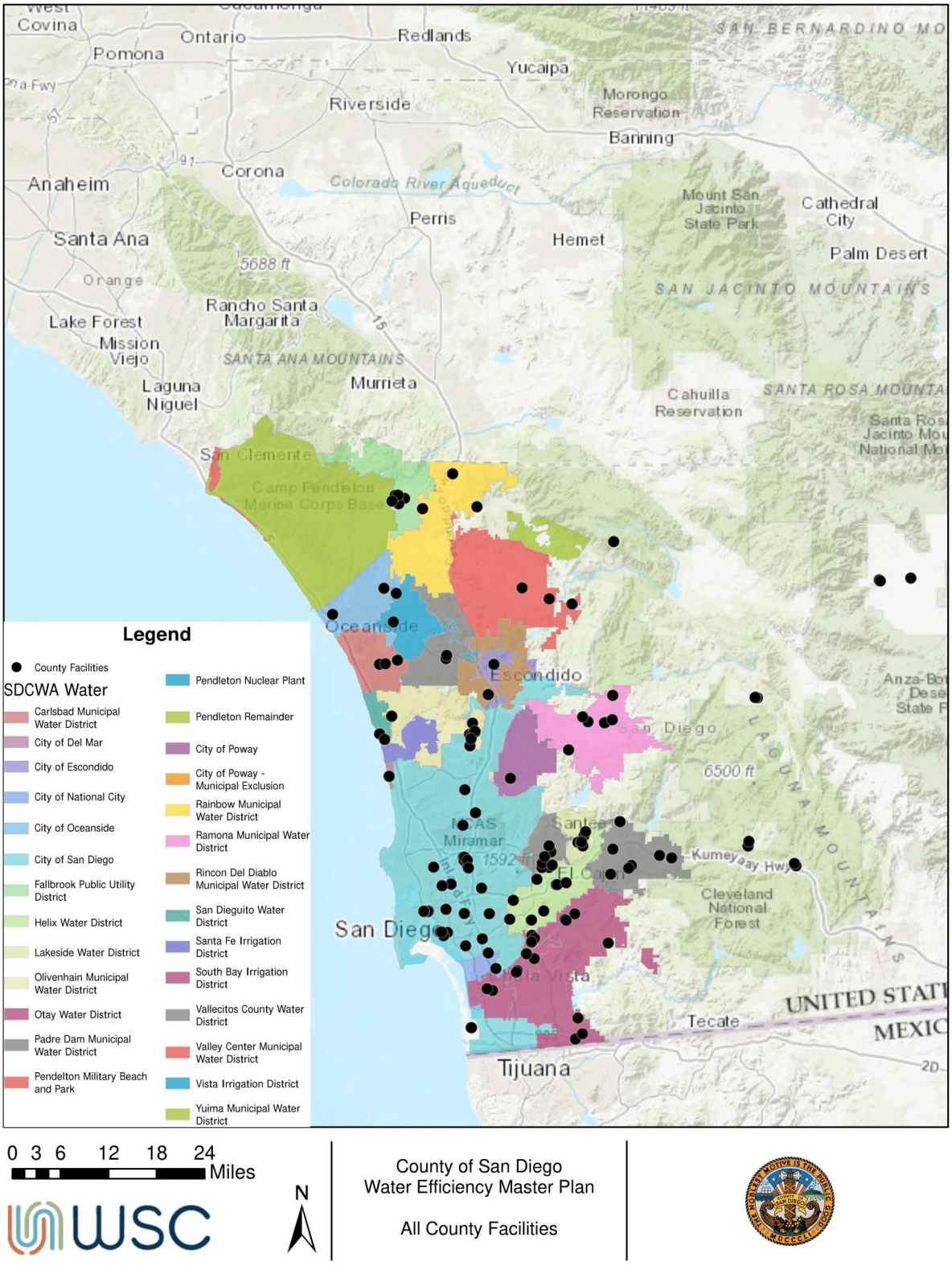
DGS facilities include approximately 500 water utility accounts spread throughout the County. These facilities fall under the jurisdiction and authority of retail water suppliers operating under the County's wholesaler, SDCWA. County facilities are located in each of the SDCWA retail member agencies listed below.

- Carlsbad Municipal Water District
- City of Del Mar
- City of Escondido
- Fallbrook Public Utility District
- Helix Water District
- Lakeside Water District
- City of National City
- City of Oceanside
- Olivenhain Municipal Water District
- Otay Water District
- Padre Dam Municipal Water District
- City of Poway
- Rainbow Municipal Water District
- Ramona Municipal Water District
- Rincon Del Diablo Municipal Water District
- City of San Diego
- San Dieguito Water District
- South Bay Irrigation District
- Vallecitos Water District
- Valley Center Municipal Water District
- Vista Irrigation District

A list of addresses and land use designations were provided by the County for each facility. These addresses were spatially linked to their corresponding retail water supplier under SDCWA based on Geographic Information System (GIS) boundary files provided by SANDAG.[12] Figure 2-1 below shows the distribution of County facilities included in this analysis across the service areas of SDCWA retail agencies. Most of the facilities not served by retail agencies under SDCWA have their own wells with the exception of Borrego Springs Library which receives water service from Borrego Water District. In accordance with the Sustainable Groundwater Management Act (SGMA), Borrego Water District has been ordered to reduce water use by 75% due to unsustainable demand. As a result, County facilities served by Borrego Water District have reduced water use to a minimum.

[12] https://rdw.sandag.org/Account/gisdtview?dir=District

Figure 2-1. Location of County Facilities



In order to better understand the water savings opportunities and unique water shortage conditions at each County facility, the County provided historical water use data for each County facility from the 2013/14 fiscal year (FY) up to the 2020/21 FY. For the purposes of this Plan, the most recent five years of water use data were included in the analysis to establish an average water use baseline for each facility based on data provided for the five-year period between the 2016/17 and 2020/21 FYs.

Table 2-1 below shows the total number of County facilities present within each retail water supplier service area boundary from the map provided in Figure 2-1. In total, 137 County facilities were included in this analysis, 16 of which fall under the service area of non-SDCWA retail agencies. Facilities that completely lacked water use data for this five-year period were not included in the analysis. For a complete list of facilities' average baseline water use, land use, and associated retail water supplier, please refer to Appendix A.

Table 2-1. Count of County Facilities per Retail Water Supplier

Urban Retail Water Supplier	Facilities per Water Supplier
City of San Diego	31
Padre Dam Municipal Water District	14
Olivenhain Municipal Water District	9
Otay Water District	9
Helix Water District	8
South Bay Irrigation District	8
Lakeside Water District	7
Ramona Municipal Water District	7
Fallbrook Public Utility District	5
Carlsbad Municipal Water District	3
Rainbow Municipal Water District	3
Vallecitos County Water District	3
Valley Center Municipal Water District	3
City of Oceanside	2
San Dieguito Water District	2
Vista Irrigation District	2
City of Del Mar	1
City of Escondido	1
City of National City	1
City of Poway	1
Rincon Del Diablo Municipal Water District	1
Non-SDCWA Water Suppliers	16
TOTAL	**137**

Note:

All suppliers that fall under the service areas of non-SDCWA retail agencies are grouped into one category, non-SDCWA water suppliers, at the bottom of this table.

Figure 2-2 below shows the historical aggregate water use of all County facilities for the five-year period of this analysis. Each color in the stacked plot represents a different County facility included in this analysis ordered by highest to lowest water use from bottom to top.

- Peak demand across the five-year period occurred in August 2019.
- Minimum demand across the five-year period occurred in February 2021.
- Note the seasonality of the County's water use, with spikes in demand typically occurring during the third quarter (Q3) period between July and September when irrigation demands are typically greatest. This signifies that the County likely has additional opportunities available to reduce outdoor water demand.

Figure 2-2. Five-year Historical Water Use for All Facilities

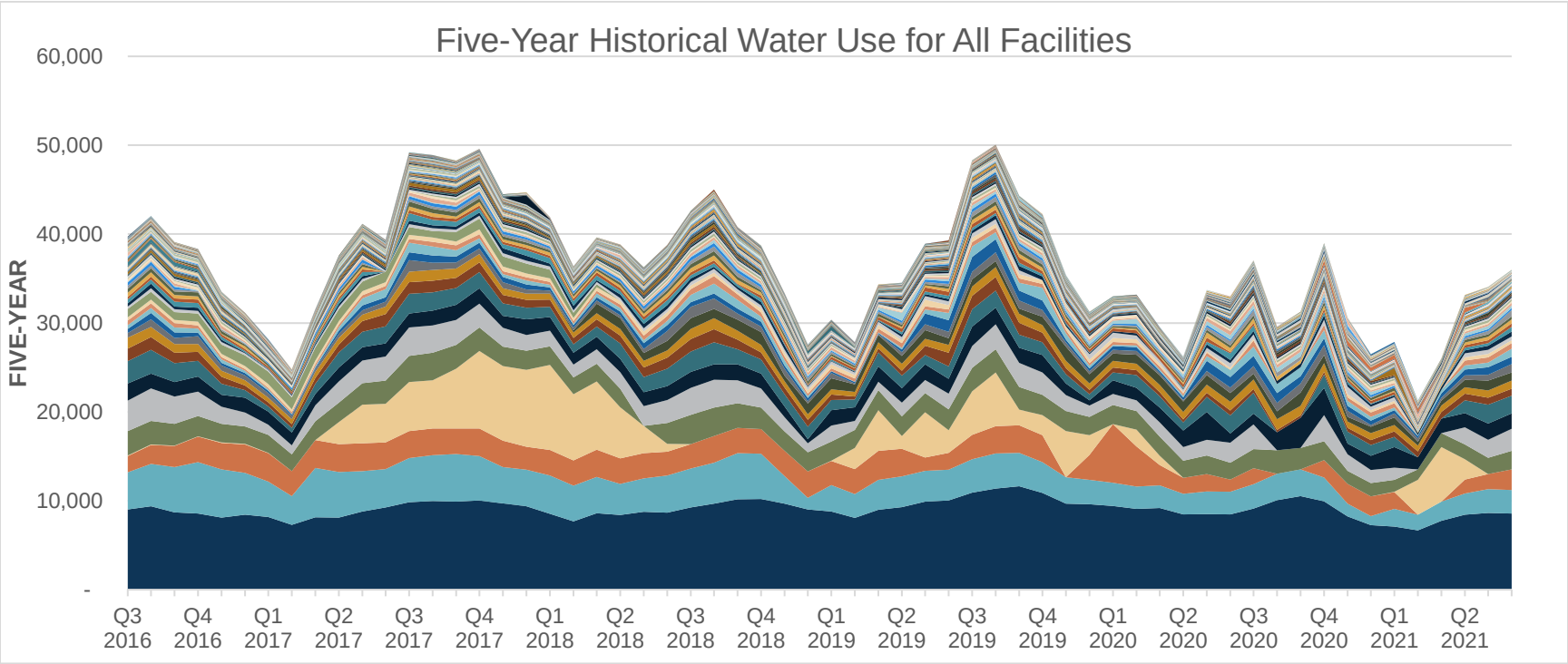
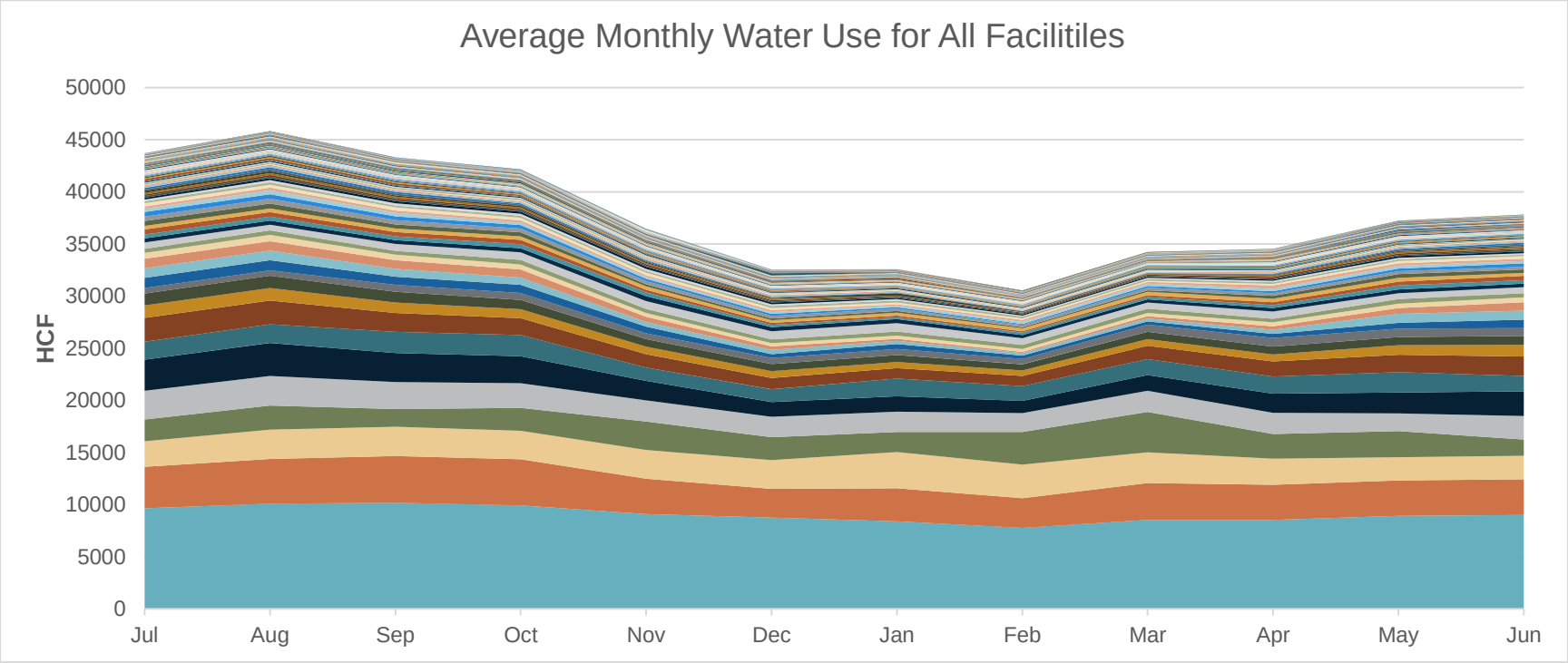


Figure 2-3 below shows the average monthly water use of all County facilities for the five-year period. Similar to Figure 2-2 on the previous page, each color in the stacked plot represents a different County facility included in this analysis ordered by highest to lowest water use from bottom to top.

- Average monthly peak demand occurred in August over the five-year period, which corresponds to the single highest month's peak demand across the five-year study period demonstrated in Figure 2-2.
- Average monthly minimum demand occurred in February, which corresponds to the single lowest month's minimum demand across the five-year period.
- Note the seasonal peak of the County's water use across all facilities from the July to September period when irrigation demands are typically greatest.

Figure 2-3. Five-year Average Monthly Water Use for All Facilities



2.1.2 Accounts and Water Use by Land Use Classification

This section provides a breakdown of County facilities by land use classification and by water use. Table 2-2 below presents the number and types of accounts for all County facilities and their associated water use based on historical demands from the five-year period between FYs 2016/17 and 2020/21. Key takeaways include:

- Four land uses make up 78% of the County's water demand over the five-year period. These are detention, public safety, health, and park facilities.
- Four detention facilities make up the greatest share of total demand across all land uses at 38%, followed by public safety (15%), health (13%), and park facilities (12%). Parks (36) and libraries (21) are the County's top two land uses across all facilities, providing recreation and educational resources to the public.

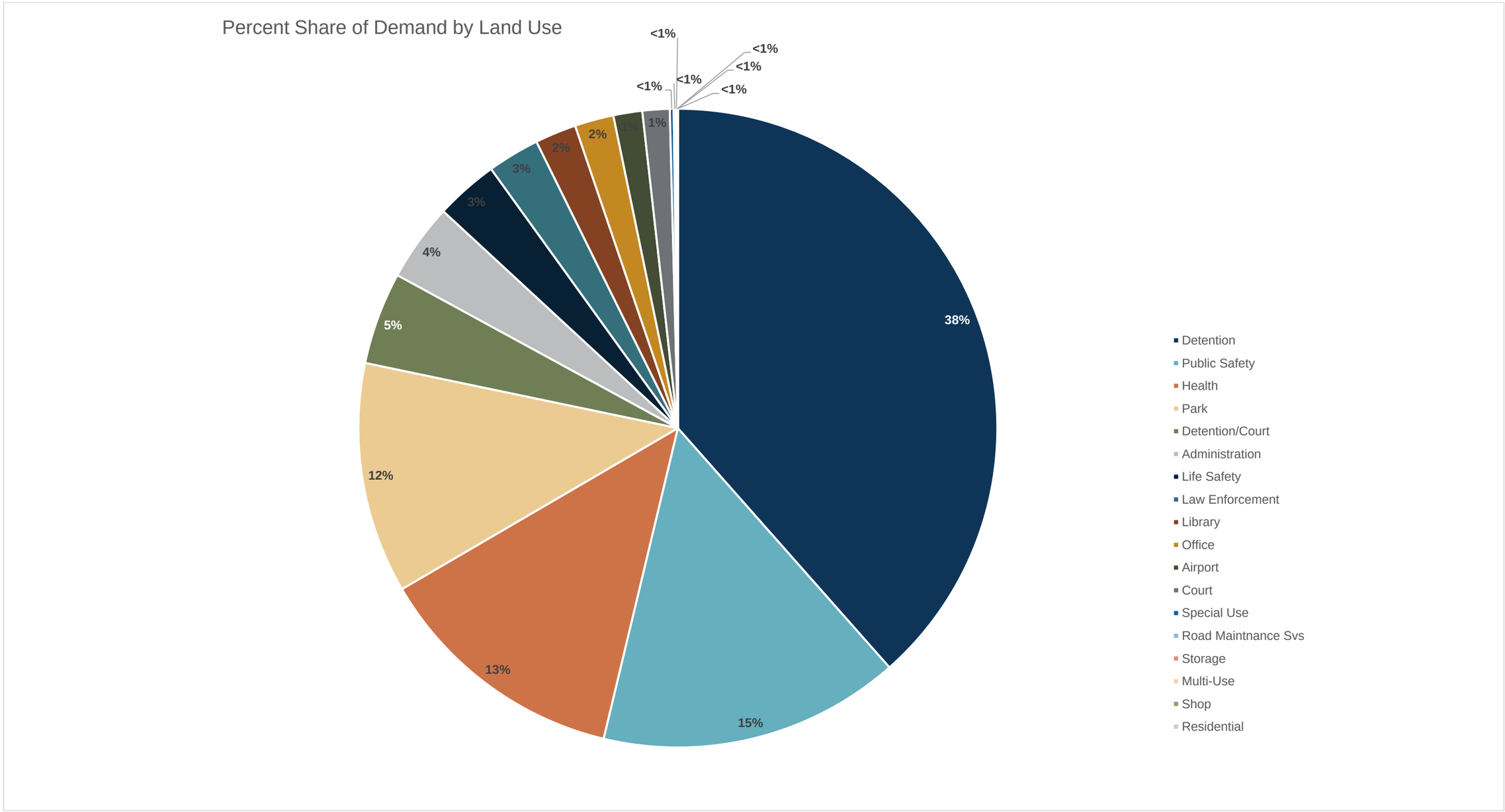
Table 2-2. Water Use by Land Use Classification for All Facilities

Land Use Classification	Sum of five-year Average Demand (HCF)	% Share of Demand	Count of Land Use	% Share of Land Use Classification
Detention	168,666	38%	4	3%
Public Safety	66,856	15%	3	2%
Health	56,354	13%	16	12%
Park	51,212	12%	36	26%
Detention/Court	20,482	5%	2	1%
Administration	17,236	4%	1	1%
Life Safety	13,960	3%	7	5%
Law Enforcement	11,566	3%	19	14%
Library	9,143	2%	21	15%
Office	8,640	2%	10	7%
Airport	6,400	1%	4	3%
Court	6,030	1%	4	3%
Special Use	865	0%	3	2%
Road Maintenance Services	442	0%	1	1%
Storage	266	0%	1	1%
Multi-Use	168	0%	2	1%
Shop	19	0%	1	1%
Residential	9	0%	2	1%
TOTAL	**438,316**	**100%**	**137**	**100%**

Notes:
HCF refers to hundred cubic feet, also referred to as one "unit" of water, equivalent to 748 gallons.
North County Regional Center and South Bay Regional Center in the table above fall under two different land uses and both are categorized as Detention/Court.

Figure 2-4 below demonstrates the data presented in Table 2-2, visualizing the percentage of water demand by land use classification across all County facilities. Here, it is apparent that focused WUE efforts across the top four land uses would be an impactful approach to reducing water use across the County's demand profile. These are detention, public safety, health, and park facilities.

Figure 2-4. Percent Share of Demand by Land Use for All Facilities



2.2 Top 20 County Facilities

For the purposes of this Plan the County seeks to develop measurable WUE strategies for the County's top 20 facilities by water use. As mentioned in Section 2.1.1, a list of addresses, land use designations, and account-level water use data were provided by the County for each facility. Based on these data, the top 20 County facilities by water use were identified for WUE implementation efforts. These are listed in Table 2-3.Table 2-3.

Table 2-3. Inventory and Ranking of Top 20 County Facilities by Water Use

Site	Land Use	Average Annual Water Use (HCF)	% Share of Demand	Retail Water Supplier
George Bailey / E Mesa Detention Center	Detention	108,812	29%	Otay Water District
North County Regional Center	Detention/Court	43,083	12%	Vista Irrigation District
San Diego Central Jail	Detention	29,994	8%	City of San Diego
N Inland Crisis Residential Center	Health	28,606	8%	City of Escondido
Las Colinas Detention & Reentry Facility	Detention	26,300	7%	Padre Dam Municipal Water District
County Operations Center	Public Safety	23,442	6%	City of San Diego
South Bay Regional Center	Detention/Court	19,871	5%	South Bay Irrigation District
County Administration Center	Administration	17,236	5%	City of San Diego
Sweetwater Regional Park	Park	10,092	3%	South Bay Irrigation District
Edgemoor Skilled Nursing Facility	Health	10,071	3%	Padre Dam Municipal Water District
Descanso RMS	Life Safety	7,710	2%	Descanso County Water District
Dos Picos Park	Park	7,300	2%	Ramona Municipal Water District
Lindo Lake Park	Park	7,140	2%	Lakeside Water District
Guajome Regional Park-Oceanside	Park	6,442	2%	City of Oceanside
Hall of Justice	Court	4,363	1%	City of San Diego
Descanso Fire Station 45	Life Safety	4,362	1%	Descanso County Water District
Heritage Park	Park	3,781	1%	City of San Diego
McClellan Palomar Airport	Airport	3,744	1%	Carlsbad Municipal Water District
Collier Park	Park	3,556	1%	Ramona Municipal Water District
Juvenile Probation Center	Office	3,495	1%	City of San Diego
TOTAL		**369,400**	**100%**	

Notes:

HCF refers to hundred cubic feet, also referred to as one "unit" of water, equivalent to 748 gallons.

North County Regional Center and South Bay Regional Center in the table above fall under two different land uses and both are categorized as Detention/Court.

Descanso RMS and Descanso Fire Station 45 are located in the service area of Descanso County Water District, which is not a retail member agency of San Diego County Water Authority. However, these facilities are included in the top 20 facilities analysis. Both facilities are designated as life safety facilities.

Site	Land Use	Average Annual Water Use (HCF)	% Share of Demand	Retail Water Supplier
During the process of developing this Plan, the Juvenile Probation Center was being demolished and a new, larger Youth Transition Facility is currently under construction in the same location. The new Youth Transition Facility is likely to still fall into the Top 20 facilities and as such will remain as Site 20 for this Plan. Due to new sustainable construction of this facility, onsite water reuse and rainwater capture are expected to be the only options available for this site.				

2.2.1 Retail Service Area

DGS top 20 facilities are spread throughout the County and primarily fall under the jurisdiction of retail agencies operating under SDCWA. County facilities are located in each of the SDCWA retail member agencies listed below. It is recommended that the County coordinate with these suppliers to schedule WaterSense audits and Water$mart irrigation audits where applicable.

- Carlsbad Municipal Water District
- City of Escondido
- Lakeside Water District
- City of Oceanside
- Otay Water District
- Padre Dam Municipal Water District
- Ramona Municipal Water District
- City of San Diego
- South Bay Irrigation District
- Vista Irrigation District

A list of the total count of top 20 facilities per retail water supplier are provided in Table 2-4. Note that six of the County's top 20 facilities fall under the service area of the City of San Diego, which offers a starting point for enhanced coordination to evaluate remaining water savings potential.

Table 2-4. Count of Top 20 Facilities per Retail Water Supplier

Urban Retail Water Supplier	Count of Top 20 Facilities per Water Supplier
City of San Diego	6
Descanso County Water District	2
Padre Dam Municipal Water District	2
Ramona Municipal Water District	2
South Bay Irrigation District	2
Carlsbad Municipal Water District	1
City of Escondido	1
City of Oceanside	1
Lakeside Water District	1
Otay Water District	1
Vista Irrigation District	1

Notes:

Two of the Top 20 facilities: Descanso RMS and Descanso Fire Station 45 are located in the service area of Descanso County Water District, which is not a retail member agency of San Diego County Water Authority.

Figure 2-5 below shows the distribution of the County's top 20 facilities across SDCWA retail agencies. Note that two facilities, Descanso RMS and Descanso Fire Station 45, are highlighted with a blue symbol since they are located outside of SDCWA.

Figure 2-5. Location of Top 20 County Facilities

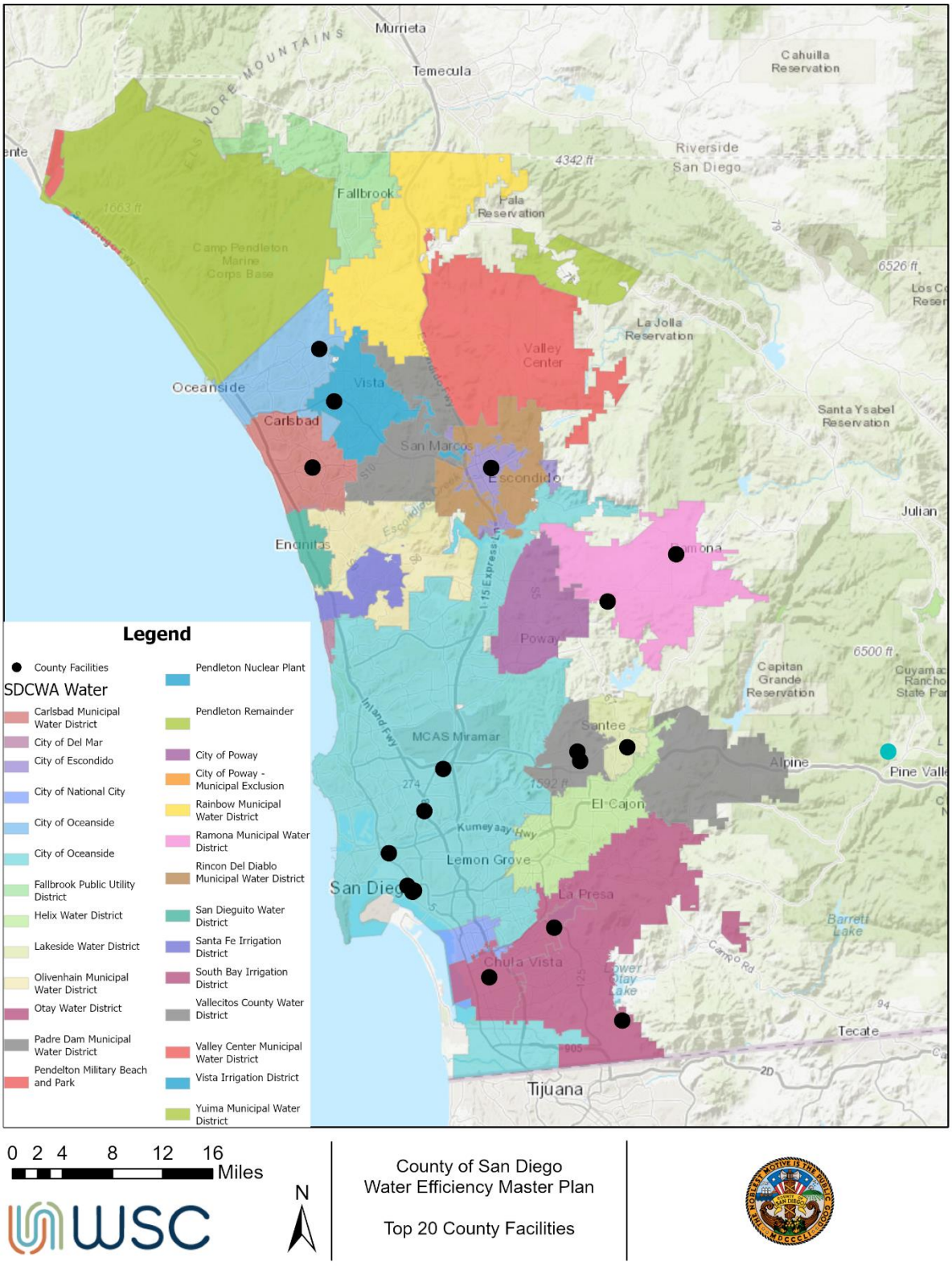


Figure 2-6 below demonstrates the County's top 20 facilities by water use of increasing magnitude. Each facility's average annual water use across the five-year period was calculated and is demonstrated by blue-shaded circles whose sizes are proportional to their water use. The larger the shaded circle, the larger the annual average water demand exhibited by the facility. Note that two facilities, Descanso RMS and Descanso Fire Station 45, are located in the service area of Descanso County Water District, which is not a retail member agency of San Diego County Water Authority. As in Figure 2-5, these facilities are highlighted with light blue symbols instead of black to indicate that these facilities are located beyond the service area of SDCWA.

Figure 2-6. Top 20 County Facilities by Water Use

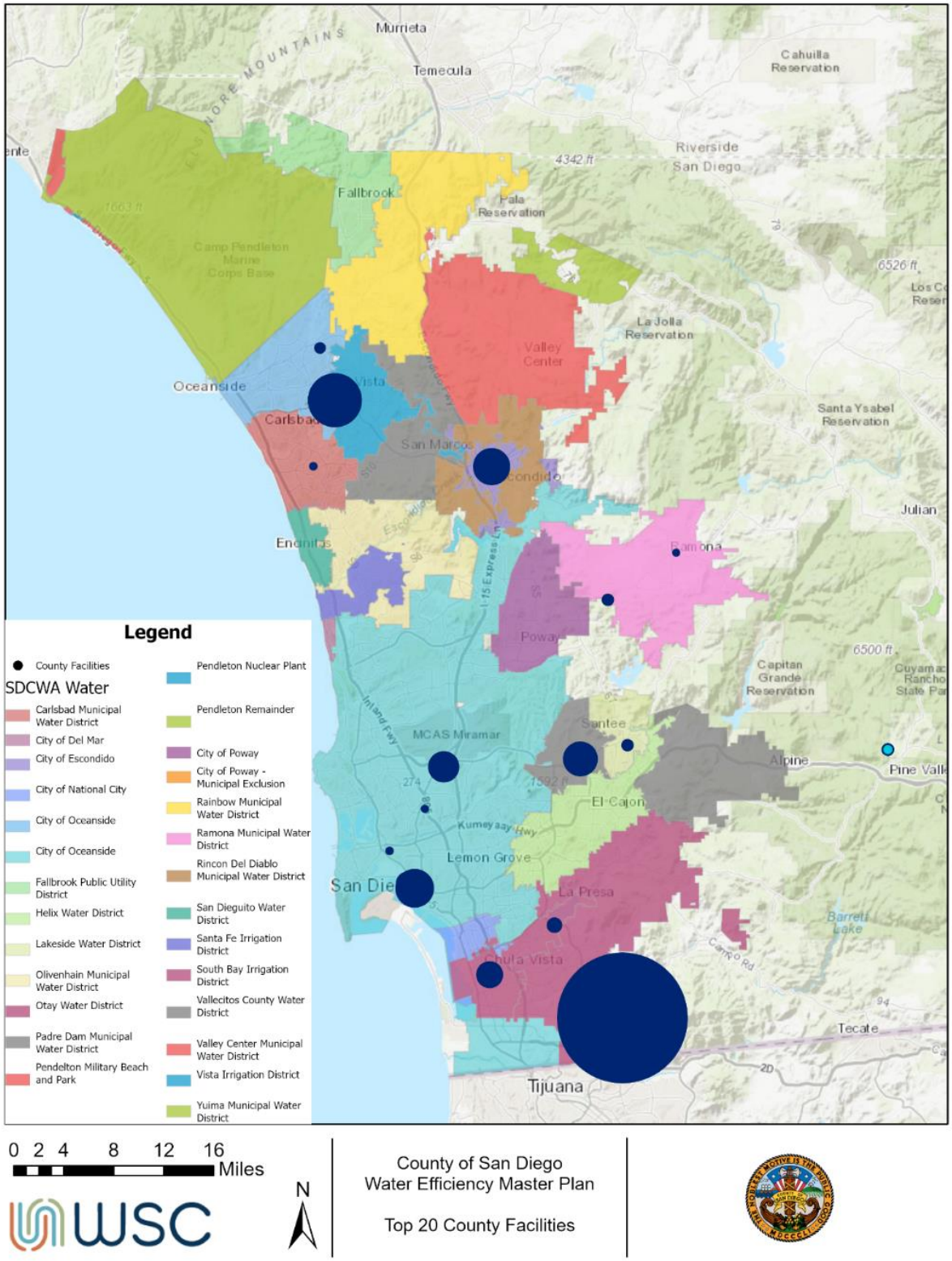


Figure 2-7 below shows the five-year historical water use of the County's top 20 facilities. Each color in the stacked plot represents a different County facility included in this analysis ordered by highest to lowest water use from bottom to top.

- Consistent with the results of County water use across all facilities demonstrated in Figure 2-2, peak demand across the five-year period for the County's top 20 facilities occurred in August 2019 and minimum demand across the five-year period occurred in February 2021.
- Note the seasonality of the County's water use, with spikes in demand typically occurring during Q3 between July and September when irrigation demands are typically greatest.
- The County's top 20 facilities' water use account for 84% of total demand across all facilities for the five-year period, confirming that the management of water use and WUE implementation across these facilities are paramount to influencing overall County water demand.

Figure 2-7. Five-Year Historical Water Use of Top 20 Facilities

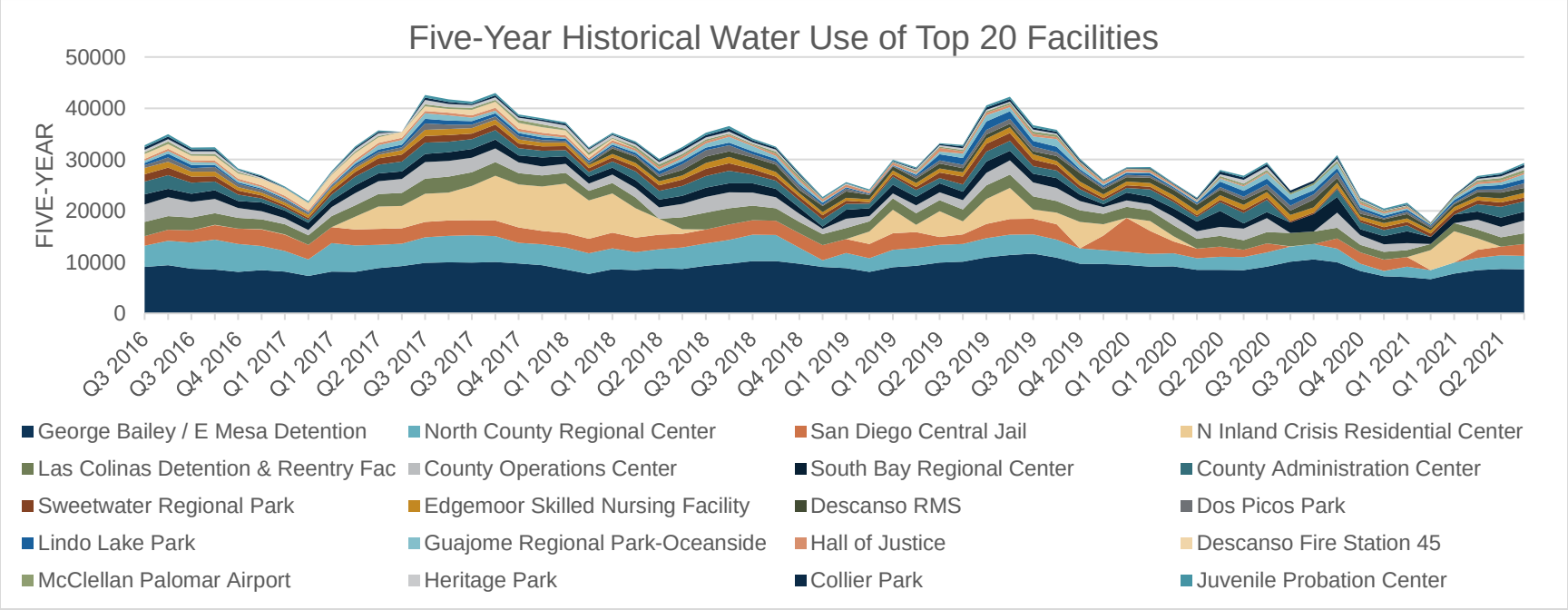
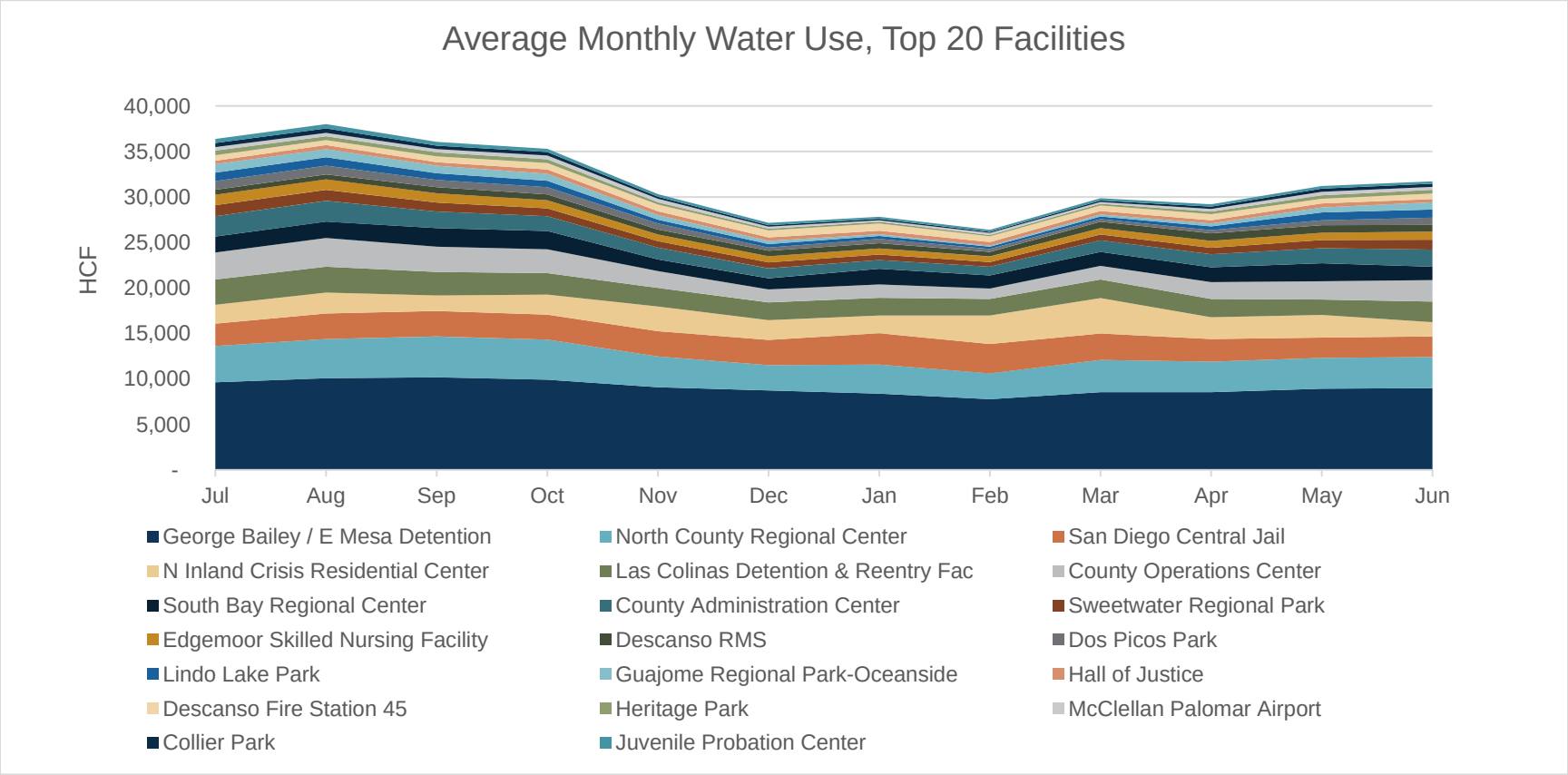


Figure 2-8 below demonstrates average monthly water use per facility for the County's top 20 users ordered by highest to lowest water use from bottom to top.

- Note the top five users account for 63% of demand across the top 20 facilities. This equates to 55% of total demand across all facilities, signifying that a focus on top water users in the County provides a significant opportunity to reduce overall water demand. These facilities include George Bailey / East Mesa Detention facility, North County Regional Center, San Diego Central Jail, North Inland Crisis Residential Center, and Las Colinas Detention and Re-entry Facility.

Figure 2-8. Five-Year Average Monthly Water Use of Top 20 Facilities



2.2.2 Accounts and Water Use by Land Use Classification

This section provides a breakdown of the top 20 County facilities by land use classification and by water use. Table 2-5 below presents the count and land use classification of accounts for all County facilities and their associated water use based on historical demands from the five-year period between FYs 2016/17 and 2020/21. Note that this water use trends analysis is consistent with the findings amongst all County facilities as described in Section 2.1.2.

Key takeaways include:

- Detention facilities, including facilities that double as detention and court facilities, make up 62% of the County's water demand amongst the top 20 users over the five-year period.
- As with the land use analysis of all County facilities, detention, health, park, and public safety facilities are the land uses that make up most of demand, reinforcing that focused WUE efforts across these land uses would be an impactful approach to reducing water use across the County's demand profile.
- Parks (6) are the County's most common land use across its top 20 facilities, providing recreation to the public.

Table 2-5. Water Use by Land Use Classification for Top 20 Facilities

Land Use	Sum of Average Annual Water Use (HCF)	% Share of Demand	Count of Land Use	% Share of Land Use
Detention	165,105	45%	3	15%
Detention/Court	62,954	17%	2	10%
Health	38,677	10%	2	10%
Park	38,310	10%	6	30%
Public Safety	23,442	6%	1	5%
Administration	17,236	5%	1	5%
Life Safety	12,072	3%	2	10%
Court	4,363	1%	1	5%
Airport	3,744	1%	1	5%
Office	3,495	1%	1	5%
TOTAL	**369,400**	**100%**	**20**	**100%**

Notes:

North County Regional Center and South Bay Regional Center in the table above fall under two different land uses and both are categorized as Detention/Court.

HCF refers to hundred cubic feet, also referred to as one "unit" of water, equivalent to 748 gallons.

Figure 2-9 below demonstrates the percentage of water demand by land use classification. Note that due to the significant demand exhibited by the County's top 20 users that trends compared to overall County facility water use across all facilities remain mostly the same.

Figure 2-9. Percent Share of Demand by Land Use of Top 20 Facilities

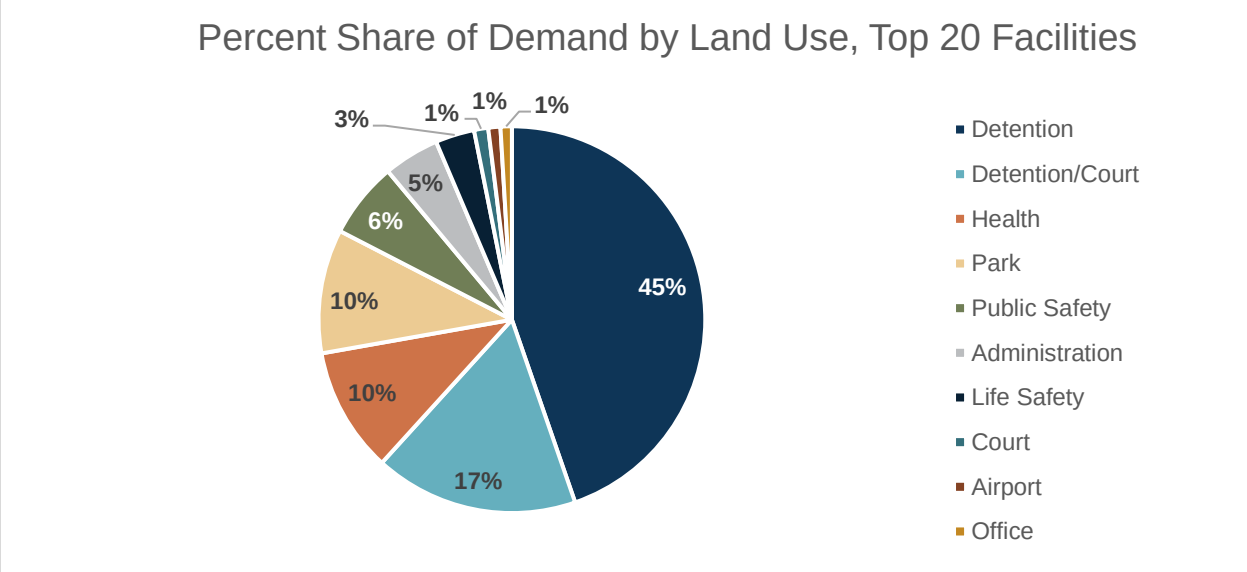
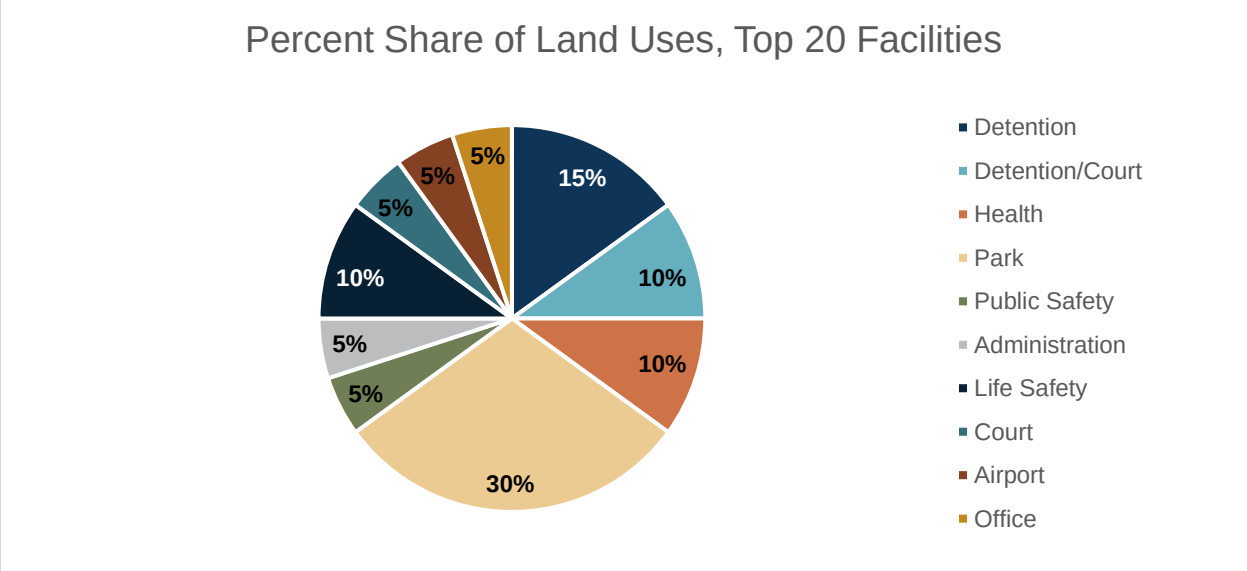


Figure 2-10 demonstrates the percentage of accounts by land use classification.

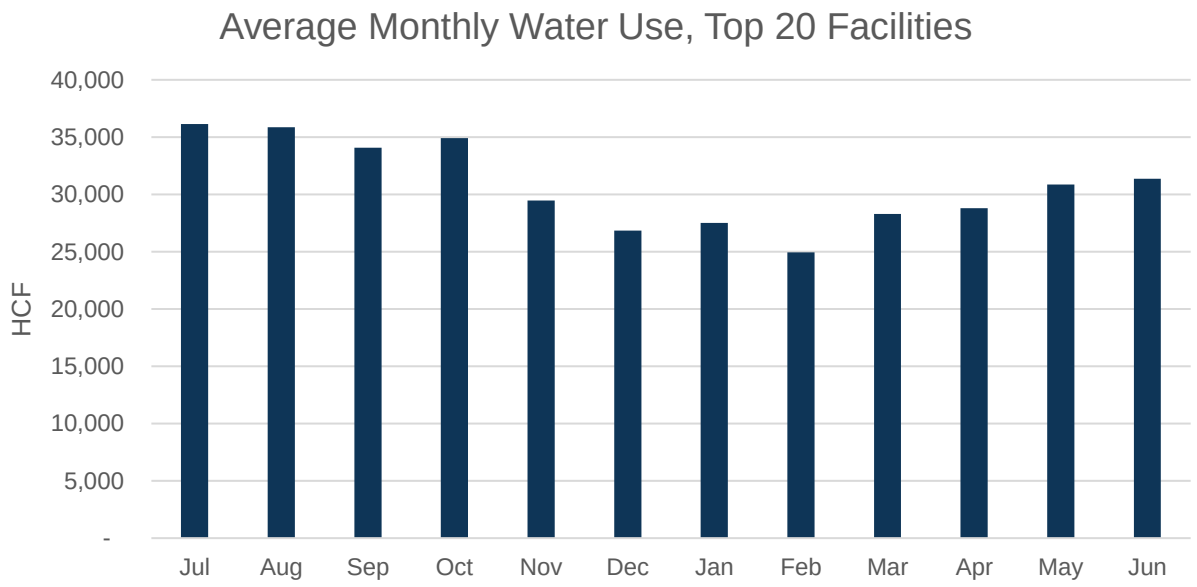
Figure 2-10. Percent Share of Land Use of Top 20 Facilities



2.2.2.1 Landscape Water Use

Outdoor water use is a significant part of County facilities' overall demand. Climate within the San Diego region is characteristically Mediterranean along the coast, with mild temperatures year-round. Inland area weather patterns are more extreme, with summer temperatures often exceeding 90 degrees Fahrenheit (ºF) and winter temperatures occasionally dipping below freezing. Average annual rainfall is approximately 10 inches per year on the coast and more than 33 inches per year in the inland mountains. More than 80% of the region's rainfall occurs between December and March.[13] Average Evapotranspiration (ET_o) is 50.65 inches per year, with the greatest water demand in the summer months.[14] Evapotranspiration is the term used to describe the loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues). Figure 2-11 shows the seasonal pattern of water use based on the five-year average of the County's top 20 facilities.

Figure 2-11. Bar Chart of Average Monthly Water Use for Top 20 Facilities



As demonstrated by the figure above, peak demand typically occurred during the Q3 period while minimum demand occurred during the winter months. This indicates the County's top 20 facilities exhibit strong trends of seasonal water demand, providing a significant opportunity for savings through efficient outdoor water use practices and improvements to cooling tower use, the latter of which represents greater use than landscaping at detention facilities.

Water use for landscaping is generally not directly metered except in cases where Dedicated Irrigation Meters (DIMs) exist. It was noted that the County does have DIMs, but data from DIMs

[13] https://www.sdcwa.org/your-water/reservoirs-rainfall/rainfall/#:~:text=Average%20annual%20rainfall%20is%20about,occurring%20between%20December%20and%20March.

[14] https://www.sandiegocounty.gov/content/dam/sdc/pds/docs/Landscape/WELDManual-Appendix-A.pdf

or other submeters were not available for the purposes of this analysis. The analysis will be refined when data becomes available. Table 2-6 lists County facilities with DIMs, including those in construction expected to have DIMs installed for future use. As the County expands this program, data will become more easily accessible for future use in other WUE planning efforts. A more granular understanding of landscape water demands is a critical component to begin evaluating the opportunity in more innovative WUE strategies, such as onsite reuse, which is discussed in Section 4.1.4.

Table 2-6. Facilities with Dedicated Irrigation Meters

Facility Name	Status
Alpine Branch Library	Fully Occupied
Imperial Beach Library	Fully Occupied
NC HHSA (Oceanside)	Fully Occupied
Santa Ysabel Nature Center	Fully Occupied
Borrego Springs Public Library	Fully Occupied
Sheriff Technology & Information Center (on COC campus)	Fully Occupied
East County Assessor, Recorder, County Clerk (EC ARCC)	Fully Occupied
Ohio Street Probation Center	Fully Occupied
Lakeside Branch Library	In Construction
Southeastern Livewell Center	In Construction
Juvenile Justice Center/Youth Transition Center	In Construction
East Otay Mesa Fire Station	In Construction

As a result of this inaccessibility of disaggregated outdoor water use data, outdoor water demand was estimated using best available data. Two estimation methods are provided below. Method 1 reflects the widely used “minimum month” approach. Method 2 reflects another method that allows for non-zero winter irrigation use. As stated above, data required to utilize Method 2 were not available, so Method 1 was selected to estimate landscape water use. Method 2 is provided for comparison purposes and may be evaluated for use in later Water Conservation Plans the County may develop.

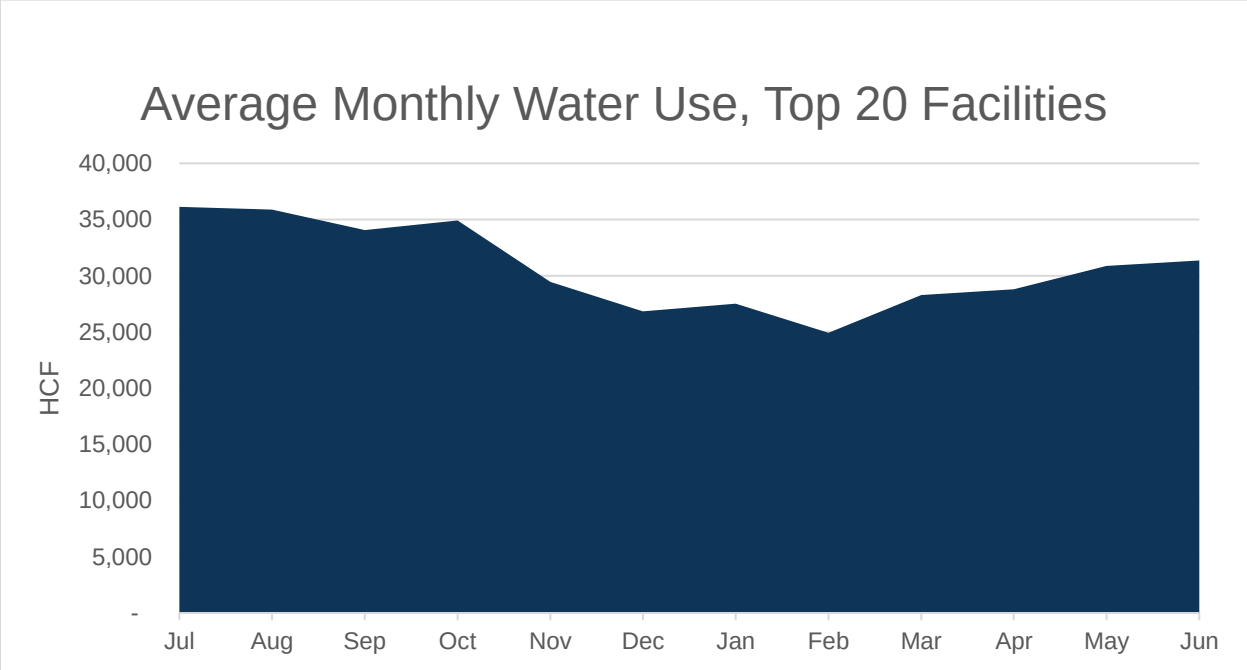
2.2.2.1.1 Method 1 (Minimum Month)

A common method used to infer outdoor use is to assume that all winter use is categorized as indoor consumption. For example, if winter minimum use is calculated over 12 months, this value would be the inferred total indoor use for the year. Total use for the year minus indoor use then equals outdoor use. Method 1 typically underestimates outdoor use because there may be winter irrigation in dry climates such as in the San Diego region.

The County provided account-level water use data for all facilities dating back to the calendar year 2013/14. For the purposes of the analysis for the Plan, only the most recent 5 years of data, FYs 2016/17 to 2020/21, were utilized. Figure 2-12 below shows the average monthly

water use across the five-year period for the County's top 20 facilities. Note the data represented in this figure below are the same as that of Figure 2-11, but instead demonstrated as a stacked plot for later reference when indoor and outdoor use are disaggregated. One may think of this graph below as a "before" snapshot.

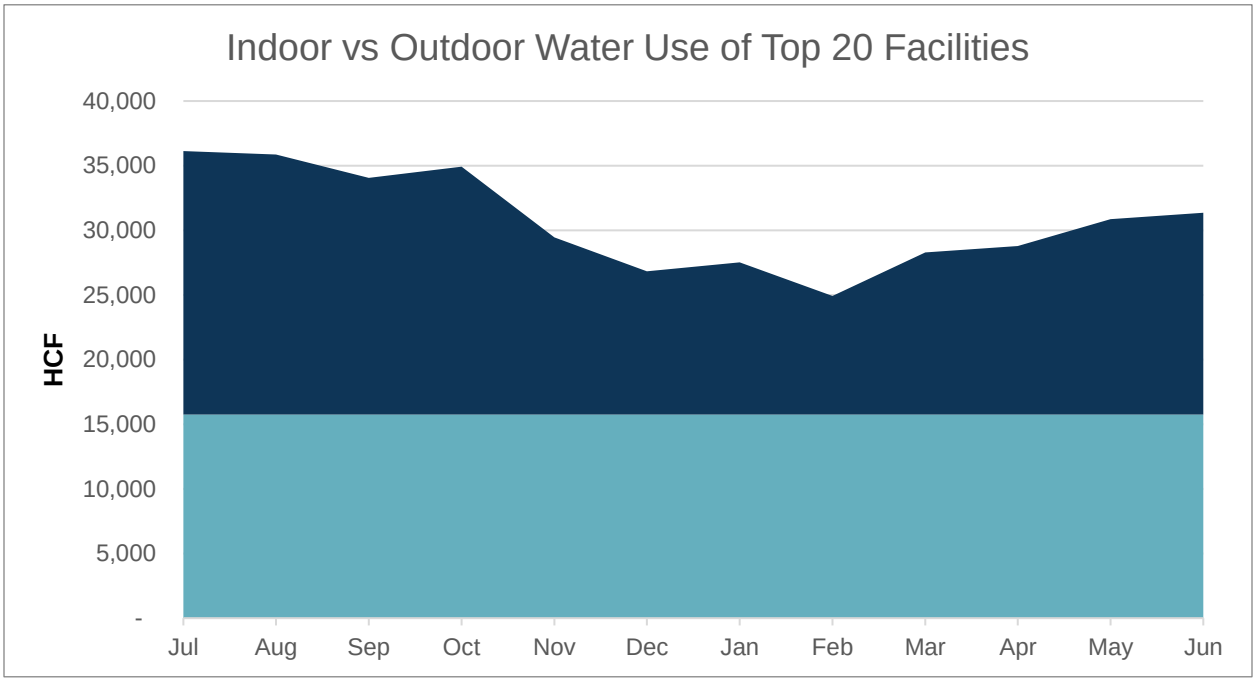
Figure 2-12. Stacked Plot of Average Monthly Water Use of Top 20 Facilities



Each of the County's top 20 facilities were individually assessed for a minimum winter demand month across the five-year period. Due to the naturally arid climate of the San Diego region, it is assumed that all facilities exhibit some level of outdoor use during the winter months. As a result, if the winter demand month methodology rendered a zero value for any facility during the winter months, the next most minimum monthly value for winter demand was selected to disaggregate water use.[15] Outdoor water use was then assumed to be the remaining volume of water used beyond this minimum winter demand month threshold across all other months of the year. Figure 2-13 demonstrates indoor vs outdoor water use using the minimum demand method on a per facility basis. Here, outdoor water use represents 49% of total demand and is represented by the dark blue color and indoor water demand is represented by the light blue color.

[15] A zero minimum winter demand month value entails that no water was used indoors during the month in question. As a result, all use above this zero-value threshold is assumed to be outdoor irrigation. Not only does this render all water use of the facility to be outdoors across the five-year period, overinflating outdoor demand, but is also sets an inaccurately low baseline, a zero value, for indoor use.

Figure 2-13. Indoor versus Outdoor Water Use of Top 20 Facilities



Summing across all months in the five-year period provides the estimated split in total water demand between indoor and outdoor end uses. Table 2-7 demonstrates indoor water use makes up 51% of demand while outdoor water use makes up 49% of demand.

Table 2-7. Indoor versus Outdoor Water Use, Five-year Average

5-Year Annual Average	Total Demand (HCF)	% Share
Indoor Use	189,018	51%
Outdoor Use	180,052	49%
TOTAL	**369,069**	**100%**

Notes:

HCF refers to hundred cubic feet, also referred to as one “unit” of water, equivalent to 748 gallons.

3.0 Existing Conservation and Compliance

This section of the report discusses existing conservation and compliance achieved by the County to date, including a summary of past water efficiency efforts and a review of relevant State policies, codes, and standards that apply to County facilities.

IN THIS SECTION

- 2015 Drought Action Plan
- Indoor and outdoor water efficiency efforts
- State policies, codes, and standards

3.1 Existing Water Conservation

Data from previous water efficiency efforts were collected from the County to summarize past achieved conservation across County facilities. Past achieved conservation is critical to incorporate into the water efficiency planning process to better understand remaining conservation potential.

3.1.1 2015 Drought Response Action Plan

In 2014, for the first time in the 15-year period on record for the US Drought Monitor, California experienced the worst classification of drought, known as D4 or "exceptional drought." As of February 4th, 2014, 94.2% of the State was experiencing drought conditions.[16] In response, the County completed a Drought Response Action Plan (DRAP) in 2015, which included a list of proposed measures for the County to reduce water demand. The DRAP focused on reducing water use across the County's top 20 facilities, which included a review and analysis of accounts and water bills, the creation of water budgets, and the identification of opportunities to conserve, recycle, or use alternative water sources. The sections below provide an overview of the County's efforts to reduce water demand to date, including efforts beyond that of the 2015 DRAP.

3.1.2 Indoor Water Efficiency

Based on the information gathered in the 2015 DRAP, County operator interviews, responses to the County's Existing Water Conditions Assessment Tool, and review of past water efficiency project data, it became apparent that the County has already undertaken significant efforts to reduce indoor water use. These efforts include regular site evaluations and water audits provided by retail water agencies, fixture-level retrofits and upgrades to restroom facilities, laundry facilities, kitchen facilities, miscellaneous leak repair, and other industrial efficiency efforts like the installation of booster pumps. As part of the 2015 DRAP, it was identified that detention facilities exhibit significant water demands. To reduce demand at four detention facilities, the County retrofitted toilets to high efficiency models and installed flush sensors that limited the amount of water available between flush intervals. This effectively minimized excessive flushing by inmates and reaped enormous rewards. Additional low-flow fixtures and sensors were installed in faucets and urinals across County facilities. However, it was discovered that some waterless urinal installations had unintended consequences, where some waterless fixtures installed on copper or cast-iron piping resulted in corrosion and need for repair or replacement, generating costs that negated the savings due to reduced water use. Moving forward, the County has taken note that these waterless urinal replacements are not suitable for all restroom facilities and additional consideration should be made for the physical composition of the local drainage system. This is a great example of how a one-size-fits-all approach to water use efficiency (WUE) is not so efficient after all. In the literature and data review process, it was noted that the following facilities underwent some level of indoor water efficiency upgrades; County Operations Center (COC), County Administration Center (CAC), Hall of Justice, North County Regional Center (NCRC), George Bailey / E Mesa Detention

[16] https://www.ncdc.noaa.gov/sotc/national/201401/supplemental/page-4#:~:text=For%20the%20first%20time%20in,state%20was%20experiencing%20drought%20conditions

Facility, San Diego Central Jail, Edgemoor Skilled Nursing Facility, Health Services Complex, and the San Diego County Psych Hospital.[17]

3.1.3 Cooling Tower Efficiency

One significant alternative water supply project that resulted from the 2015 DRAP was the County's "Zero Blowdown Project," which involved the use of brackish water in cooling towers instead of potable water with the intent of increasing WUE. This led to the installation of eight brine systems to decrease the frequency of blowdowns at County cooling towers. However, like the use of waterless urinals, this project had unintended consequences. Corrosion of surrounding uncoated or unpainted surfaces near the cooling towers resulted in costly damage and repair, as well as a corresponding decrease of useful life of the cooling tower components. Despite these undesirable results, it is estimated that the project saved approximately 2.3 million gallon per day (MGD).

3.1.4 Outdoor Water Efficiency

Following the DRAP, the County began an extensive review of its outdoor water use practices. Decorative water features were restricted during the drought years following the submission of the DRAP, but outdoor savings were realized most effectively through a thorough review of outdoor watering practices. This included a review of the irrigation application systems and technologies used, the water demands of the vegetation and flora on County landscapes, and other improvement opportunities to increase efficiency. To date the County has made a diligent effort to remove non-essential turf at all facilities where appropriate. Under the first year of the County's five-year landscaping contracts, groundcover was largely removed and replaced with hardscaping, and landscapes were replanted to include local, drought-tolerant plants, decreasing water demand. The County Operations Center (COC) landscape was significantly rebuilt and is a great example of this replanting work. Adjusting irrigation schedules to cycle once per week down from thrice per week also yielded favorable results. Several irrigation systems were retrofitted and upgraded to include high efficiency sprinkler heads and tree bubblers, while additional considerations for drip irrigation and use of weather-based irrigation controllers (WBICs) were either implemented or are soon underway. In the literature and data review process, it was noted that the following facilities underwent some level of outdoor water efficiency upgrades; County Operations Center (COC), South Bay Regional Center (SBRC), County Administration Center (CAC), North County Animal Shelter, North County Regional Center (NCRC), George Bailey / E Mesa Detention Facility, Edgemoor Skilled Nursing Facility, Health Services Complex, and the San Diego County Psych Hospital.[18]

3.1.5 Alternative Water Supplies

An essential element of increasing water efficiency is decreasing demand on potable drinking water supplies. The use of alternative water supplies, such as "purple pipe" recycled water or onsite re-use, helps to reduce potable demand. Not only can the use of alternative water supplies result in significant water savings, but it can also result in significant energy and cost

[17] Note that the Health Services Complex is no longer occupied and will be replaced in the future.

[18] Ibid.

savings as a result of avoiding the embedded energy and financial costs of treating water to potable drinking water standards. This win-win makes significant progress towards implementing not only this Plan and similar plans, but also the County's Zero Carbon Portfolio Plan (ZCPP).

As part of the 2015 DRAP, recycled water feasibility studies were conducted for fountain, laundry, and irrigation applications at various facilities, including at the County Operations Center, County Administration Center, Las Colinas Detention Facility, and more. However, due to limited funding and access to existing recycled water infrastructure, only a select number of these projects were brought to implementation. Only two County facilities, Las Colinas Detention Facility and Edgemoor Skilled Nursing Facility, use recycled water from recycled water distribution systems. Despite the expansion of recycled water use in North County, development of such infrastructure requires significant upfront costs. These opportunities are further discussed in Section 5.

Onsite reuse was also explored for various laundry and kitchen facilities. The 2015 DRAP included replacing laundry units at multiple detention facilities, such as East Mesa, Central Jail and North County Regional Center. Today the George Bailey/E Mesa Detention Facility recycles wash water from its laundry facilities, reducing potable water demand. Additional investigation into onsite reuse may present significant water, energy, and cost savings for the County. These opportunities are discussed later in Section 5.

3.2 Compliance Assessment

The Building Standards Commission of the State Department of General Services, the State Water Resources Control Board (State Water Board), and the Department of Water Resources (DWR) oversee the water resources of the State through numerous programs. Summarized below are relevant codes, standards, policies, and programs that act as drivers for water efficiency across County facilities.

3.2.1 Legislative Background

In November of 2009, California's state senate passed Senate Bill X7-7 (SB X7-7) requiring all urban retail water suppliers to reduce per capita water use 20% by 2020. The SB X7-7 potable demand target calculated for SDCWA member agencies in 2020 was 619,232 AF, and actual potable water use for the 2020 reporting year was 457,964 AF, which was well within compliance of the established target.[19]

In 2018, new conservation legislation was signed into law. Senate Bill 606 (SB 606) and Assembly Bill 1668 (AB 1668) created a framework that directed DWR and the State Water Board to develop and adopt long term water efficiency targets to exceed the 20x2020 water savings by 2027. Each retail supplier across the State will have a water use target based on efficiency standards for indoor and outdoor residential water use, commercial industrial and institutional (CII) DIM water use and real water loss. These targets are currently being developed and projected to be adopted in 2022. Retail water suppliers will be required to meet demand targets by 2027 or face penalties set by the State Water Board. SDCWA staff are

[19] https://www.sdcwa.org/wp-content/uploads/2021/03/Draft-2020-UWMP.pdf

working with State agencies to develop targets and will assist member agencies in calculating and meeting these targets.

In March of 2022 Governor Gavin Newsom issued Executive Order N-7-22 (EO-N-7-22), declaring extreme and expanding drought conditions across the State. It was noted that the 2021 meteorological summer in California and the rest of the western United States was identified as the hottest on record.[20] EO-N-7-22 required that the State Water Board consider adopting emergency drought regulations that include, but are not limited to, a requirement that each urban water supplier submit a WSCP to DWR and implement the shortage response actions for a water shortage level of up to 20 percent (State Standard WSCP Stage 2) by a date set by the State Water Board. In May of 2022, the State Water Board adopted Resolution No. 2022-0018, which listed the adopted emergency drought regulations to reduce water demand and improve water conservation across the State.[21,22] To prevent the unreasonable use of water and to promote water conservation, the uses of water listed below are prohibited until the drought declaration is lifted:

- The application of potable water to outdoor landscapes in a manner that causes more than incidental runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures.
- The use of a hose that dispenses water to wash a motor vehicle, except where the hose is fitted with a shut-off nozzle or device attached to it that causes it to cease dispensing water immediately when not in use.
- The use of potable water for washing sidewalks, driveways, buildings, structures, patios, parking lots, or other hard surfaced areas, except in cases where health and safety are at risk.
- The use of potable water for street cleaning or construction site preparation purposes, unless no other method can be used or as needed to protect the health and safety of the public.
- The use of potable water for decorative fountains or the filling or topping-off of decorative lakes or ponds, with exceptions for those decorative fountains, lakes, or ponds that use pumps to recirculate water and only require refilling to replace evaporative losses.
- The application of water to irrigate turf and ornamental landscapes during and within 48 hours after measurable rainfall of at least one fourth of one inch of rain. In determining whether measurable rainfall of at least one fourth of one inch of rain occurred in a given area, enforcement may be based on records of the National Weather Service, the closest California Irrigation Management Information System (CIMIS) station to the parcel, or any other reliable source of rainfall data available to the entity undertaking enforcement of this subdivision.
- The use of potable water for irrigation of ornamental turf on public street medians.

In December of 2022 the Metropolitan Water District (MWD) of Southern California declared a regional drought emergency for all of Southern California. The water saving call could become

[20] https://www.gov.ca.gov/wp-content/uploads/2022/03/March-2022-Drought-EO.pdf

[21] https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2022/rs2022_0018.pdf

[22] https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2022/rs2022_0002.pdf

mandatory if drought conditions persist. MWD will consider allocating supplies to the member agencies which would require them to reduce water use or incur steep fees.

As a customer of many retail agencies, and as an extension of government itself, the County has an obligation to help its water suppliers meet their state-mandated goals by exhibiting best management practices across County facilities to secure permanent conservation savings and reduce water demand. If drought conditions continue it is possible that the Governor will expand EO-N-7-22 to implement level 3 WSCP shortage response actions at a later date.

3.2.2 State Codes and Standards

3.2.2.1 California Green Building Standards

The California Green Building Standards (Title 24, Part 11 of the California Plumbing Code) address water use in commercial buildings, notably in Appendix A5 Nonresidential Voluntary Measure Division A5.3 – Water Efficiency and Conservation. The following codes are examples of applicable imperatives for County facilities. The codes are most applicable to planning and design of new facilities, but existing facilities may also benefit from adhering to these codes through retrofits, especially as short-term measures.

- Section A5.106.3 identifies several low impact development strategies in addition to stormwater retention requirements, such as filtration planters, precipitation capture, filter strips, tree preservation, and improvements to soil quality for rain retention.
- Section A5.303.2.3.4 defines non-potable water systems for indoor use. Table A5.303.2.2 Water Use Baseline identifies commercial kitchen standards for appliances and fixtures. These include flow requirements, such as 3.5 gallons per cycle for compact dishwashers and 4.25 gallons per cycle for standard dishwashers.
- Section A5.303.5 defines standards for dual plumbing from buildings and into buildings.
- Section A5.304 Outdoor Water Use addresses flow meters and submeters, adaptive vegetation, and greywater irrigation systems.

3.2.2.2 California Plumbing Code

3.2.2.2.1 CPC Chapter 15 Alternate Water Sources for Non-potable Applications

Chapter 15 of the California Plumbing Code (CPC) regulates non-potable water sources including but not limited to rainwater, municipal recycled water, grey water, and other onsite non-potable waters that are treated onsite. The CPC defines requirements for construction, alteration, discharge, use, and repair of alternate systems. Treatment requirements are based on the source water quality and intended end uses. Chapter 15 also includes requirements for using recycled water from municipal sources.

3.2.2.2.2 CPC Chapter 16 Non-potable Rainwater Catchment Systems

This CPC defines the requirements for capturing rainwater for non-potable uses and are similar to Chapter 15, except that implementation is significantly easier and less expensive due to the higher quality of the collected water. CPC Table 1602.9.4 defines treatment and water quality standards for non-potable rainwater catchment systems.

3.2.2.2.3 CPC Appendix L Sustainable Practices

This appendix of the CPC addresses numerous water conservation and efficiency measures through plumbing fixtures, appliances, irrigation systems, occupancy-specific water efficiency requirements, vehicle washing, trap seals, water heating systems, and the use of water meter and leak detection to track consumption and water waste.

3.2.3 State Water Policies

State codes, policies, and orders frame the opportunities and restrictions for the County to consider when looking to conserve water. Especially relevant are policies set by the Water Quality Control Policy for Recycled Water, State Water Board Order WQ 2014-0153-DWQ, and Senate Bill 966 (SB 966). Relevant elements of these policies and others are briefly described below.

3.2.3.1 Water Recycling

The Water Quality Control Policy for Recycled Water encourages the safe use of recycled water from wastewater sources. Allowable conditions for use are defined in CWC section 13050(n). Here, allowable conditions pertain to the use of water in a manner that implements State and federal water quality laws and protects public health and the environment.

3.2.3.2 State Water Board Order WQ 2014-0153-DWQ

State Water Board Order WQ 2014-0153 DWQ, a special subset of the Recycled Water Policy, opens the opportunity to allow any party to recycle up to 100,000 gallons per day of water onsite as part of the State's policy to:

1. Substantially increase the production and use of recycled water.
2. Increase the amount of water conserved in urban and industrial uses.
3. Substitute as much recycled water for potable water as possible by 2030.

In essence, the State now encourages broader participation in water recycling. Thus, by this order from the State Water Board, the County may recycle water at facilities where reuse opportunities are present.

3.2.3.3 Senate Bill 966

Signed into law in September 2018, by Governor Jerry Brown, SB 966 directs the State Water Board to develop risk-based water quality standards for onsite non-potable water systems and to adopt these regulations on or before December 1, 2022. It aims to create consistent water quality standards statewide and to provide guidance to communities interested in implementing permitting and oversight programs for onsite non-potable systems. The bill would require a local jurisdiction that elects to establish a program for onsite treated non-potable water to adopt, through an ordinance, a local program that includes the risk-based water quality standards established by the State Water Board.[23]

SB 966 is expected to shift permitting authorities to local agencies, potentially altering and simplifying the permitting process for onsite reuse. This legislative effort is largely driven by the

[23] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB966

success of the City and County of San Francisco's Non-potable Water Ordinance, which requires that new development projects that apply for a site permit after January 1, 2022, of 100,000 gross square feet or more to install and operate an onsite water reuse system. The required alternate water sources and required non-potable uses are based on development project type. More information can be found on the San Francisco Public Utilities Commission's website.[24]

3.2.4 County of San Diego Policies

3.2.4.1 Landscaping Ordinance

The County of San Diego's Landscaping Ordinance closely reflects the State's Model Water Efficient Landscape Ordinance which sets water efficiency standards for new and existing landscapes. The ordinance applies to any new construction for which the County issues a building permit or a discretionary review where the aggregate landscaped area is 500 square feet or more to obtain outdoor water use authorization. The ordinance was updated after the County Board of Supervisors adopted its Climate Action Plan (CAP) in 2018 to require less water in irrigated landscapes and two trees planted to each new single-family residence. Outdoor water use budgets can be calculated using the County's Water Efficient Landscape Worksheet for landscaping projects greater than 2,500 square feet, or the County's Water Use Application Using Prescriptive Compliance Option for landscaping projects from 500-2,500 square feet. The ordinance encourages the use of native, drought-tolerant, ignition-resistant flora and efficient irrigation application technologies such as drip irrigation and bubblers. More information on the County's Landscaping Ordinance can be found online.[25]

3.2.4.2 Board of Supervisors Policy A-106

In 1986, the County Board of Supervisors (Board) established a Water Supply, Conservation, and Reclamation Policy (Policy A-106).[26] This policy, which was updated in 2017, serves to direct and guide various water-related uses at County facilities. The Board directed the Chief Administrative Officer to initiate a Water Management Plan and Program to conserve water throughout all County-owned and operated facilities. Policies and action programs to achieve this goal are identified in Section I of Policy A-106. These include, but are not limited to, the following:

- Flow requirements for low-flow fixtures
- Mandatory use of automatic flow-control devices on irrigated landscapes 500 square feet or larger
- Use of drip irrigation and/or automated irrigation management systems to the maximum extent possible
- Immediate reporting of water leaks and repair as quickly as possible

[24] https://sfpuc.org/construction-contracts/design-guidelines-standards/onsite-water-reuse

[25] https://www.sandiegocounty.gov/content/sdc/pds/LandscapeOrdinance.html

[26]https://codelibrary.amlegal.com/codes/san_diego/latest/sandiego_board/a_106____water__supply%2C__conservation%2C_and__reclamation

- Minimized use of water during peak electric demand periods (10 AM – 5 PM during summer and 5 PM to 9 PM during winter).

3.2.4.3 Board of Supervisors Policy G-15

In January 1990, the Board of Supervisors adopted a policy and work program for space requirements that recognized the need for centralized management of County property and facilities. This policy (Policy G-15), which is updated regularly, with the latest update occurring in 2019, established design standards for County facilities that set forth appropriate techniques, materials, and technology to improve public accessibility, energy performance, resource utilization, and the work environment. More information on this policy can be found through the County's website.[27]

Following is the guidance set forth in this document regarding water resource utilization:

"3 (d) Evaluate and incorporate cost-effective technologies to reduce water consumption, including ultra-high efficiency plumbing fixtures, cooling tower water treatment equipment, irrigation devices and controllers, and other applicable technologies.

I. Consider wastewater reuse technologies to reduce potable water use for non-potable purposes.
II. Implement landscaping designs that emphasize water conservation through use of drought-tolerant, fire-resistant, native plant materials compatible with the surrounding area for new, County-owned properties and projects. Landscape designs shall comply with the County's landscaping standards (Zoning Ordinance Sections 3712, et seq., or as amended), including water conservations requirements. Active-use parks may be exempted from this section for the use of turf grass."

3.2.4.4 Climate Action Plan

The County developed a Climate Action Plan (CAP) in 2018 which was later rescinded and is currently in re-development and is expected to be implemented in 2024. DGS developed a Zero Carbon Portfolio Plan (ZCPP) in April 2022. The ZCPP provided a framework to cut greenhouse gas emissions from County facilities by 90% by 2030.

As discussed throughout this Plan, the County has a longstanding track record for water savings, which were also discussed in the CAP. The 2018 CAP included specific measures for water reduction including: Measure W-1.3 which set a water use reduction target of 15% below 2014 levels by 2020, which the County easily achieved, and 20% below 2014 levels by 2030. Water efficiency goals were included in the ZCPP as supporting efforts that are not currently quantified in the Plan but will likely be included in the future.

[27]https://codelibrary.amlegal.com/codes/san_diego/latest/sandiego_board/g_15____design__standards_for__county__facilities_and__property

4.0 Water Efficiency Projects, Programs, and Policies

This section of the report discusses proposed water use reduction strategies for the County as well as considerations for feasibility of implementation and remaining potential for water use efficiency.

IN THIS SECTION

4.1 Existing Facilities Water Efficiency Strategies

A key goal of the Plan was to create a comprehensive list of water use efficiency (WUE) strategies that corresponded to the County's water demand characteristics and savings potential. **The proposed water use reduction strategies discussed below are expected to result in 100,770 HCF of annual water savings and are summarized across the County's top 20 facilities in Table 4-1. These water savings are equivalent to an estimated annual cost savings of $538,000 from the avoided purchased water at County facilities from local retail water suppliers.** Assumptions and methodologies used to calculate these values are further outlined below. It's important to note that this avoided cost estimate does not include additional considerations for avoided wastewater fees. As a result, this estimate should be treated as a conservative estimate to inform future opportunities with the understanding that the true savings potential may be much higher as water and sewer rates rise throughout the planning horizon.

WSC examined remaining opportunities, including the predominant land uses, technologies available, and facility-specific support from local retail water suppliers. In addition, the team obtained feedback from County staff on past, ongoing, and expected future water efficiency projects to take place based on available data. These ongoing and future opportunities were evaluated for efficacy in achieving significant WUE progress across County facilities. These new projects, programs, and policies were created to "fill the gaps" in addressing the County's water demand profile. The new opportunities were then added into the mix for consideration, along with the existing programs and quantified water savings. Savings potential across the County's top 20 facilities are summarized in Table 4-1.

Table 4-1. Savings Potential of Top 20 County Facilities

Site	Average Annual Baseline Water Use of Top 20 Facilities (HCF)[2]	Est. Indoor Water Savings (HCF) from Table 4-5	Est. Outdoor Water Savings (HCF) from Table 4-6	Est. Onsite Re-use (HCF) from Table 4-7	Leak Detection & Automated Metering Infrastructure (AMI)	Est. Savings Potential (HCF)	% Reduction from Baseline Water Use of Top 20 Facilities
George Bailey / E Mesa Detention Facility	108,812	6,743	5,442	14,146	2,217	28,548	26%
North County Regional Center	43,083	3,065	6,767	11,288	903	22,023	51%
San Diego Central Jail	29,994	1,826	0	Not determinable[3]	9,039[4]	10,865	36%
North Inland Crisis Residential Center	28,606	1,859	1,432	Not determinable	613	3,904	14%
Las Colinas Detention & Reentry Facility	26,300	1,756	2,632	2,516	567	7,471	28%
County Operations Center	23,442	1,289	705	7,619	979	10,592	45%
South Bay Regional Center	19,871	2,378	995	Not determinable	438	3,811	19%
County Administration Center	17,236	948	519	Not determinable	730	2,197	13%
Sweetwater Regional Park	10,092	353	507	Not determinable	243	1,103	11%
Edgemoor Skilled Nursing Facility	10,071	1,781	304	Not determinable	242	2,327	23%

Site	Average Annual Baseline Water Use of Top 20 Facilities (HCF)[2]	Est. Indoor Water Savings (HCF) from Table 4-5	Est. Outdoor Water Savings (HCF) from Table 4-6	Est. Onsite Re-use (HCF) from Table 4-7	Leak Detection & Automated Metering Infrastructure (AMI)	Est. Savings Potential (HCF)	% Reduction from Baseline Water Use of Top 20 Facilities
Descanso RMS	7,710	502	387	Not determinable	195	1,084	14%
Dos Picos Park	7,300	110	367	Not determinable	187	664	9%
Lindo Lake Park	7,140	107	359	Not determinable	184	650	9%
Guajome Regional Park-Oceanside	6,442	96	324	Not determinable	170	590	9%
Hall of Justice	4,363	196	0	Not determinable	128	324	7%
Descanso Fire Station 45	4,362	284	220	Not determinable	128	632	14%
Heritage Park	3,781	57	192	Not determinable	117	366	10%
McClellan Palomar Airport	3,744	382	189	Not determinable	116	687	18%
Collier Park	3,556	54	180	Not determinable	112	346	10%
Juvenile Probation Center[6]	3,495	N/A	N/A	Not determinable	111	111	3%

Site	Average Annual Baseline Water Use of Top 20 Facilities (HCF)[2]	Est. Indoor Water Savings (HCF) from Table 4-5	Est. Outdoor Water Savings (HCF) from Table 4-6	Est. Onsite Re-use (HCF) from Table 4-7	Leak Detection & Automated Metering Infrastructure (AMI)	Est. Savings Potential (HCF)	% Reduction from Baseline Water Use of Top 20 Facilities
Polinsky Children's Center and Juvenile Detention Center[1]	N/A	N/A	N/A	2,483	N/A	2,483	N/A
TOTAL	**369,400**	**23,786**	**21,521**	**38,052**	**17,413**	**100,770**	**27%[5]**

Notes:

[1]Note that the Polinsky Children's Center and the Juvenile Detention Center are two distinct sites that are not included in the top 20 facilities but are included in this analysis due to available data in an existing feasibility report.

[2]HCF refers to hundred cubic feet, also referred to as one "unit" of water, equivalent to 748 gallons.

[3]Measures listed as "Not determinable" are included as proposed measures but require more data to assess water use efficiency potential.

[4]The Central Jail Water Conservation Report 2015 08 28 provided by the County identified a 30% reduction in baseline water use at the San Diego Central Jail if water loss through leaks were addressed. Note that water use reductions from addressing water loss at the rest of County facilities was conservatively attributed at 2% reduction in baseline water use when in fact savings could be much more significant.

[5]Note that if all measures summarized in this table were implemented by 2030, the total reduction in baseline water use of the County's top 20 facilities would be 27%, while the total percent reduction from baseline water use of all County facilities would be 23%.

[6]During the process of developing this Plan, the Juvenile Probation Center was being demolished and a new, larger Youth Transition Facility is currently under construction in the same location. The new Youth Transition Facility is likely to still fall into the Top 20 facilities and as such will remain as Site 20 for this Plan. Due to new sustainable construction of this facility, onsite water reuse and rainwater capture are expected to be the only options available for this site.

Water savings were calculated using percent reduction estimates applied on a per facility basis based on best available data from past WUE project reports and best professional judgment. Where it was noted that a measure was already fully implemented at a specific facility by County operator staff or provided WUE project reports, no percent reduction for conservation resulting from the measure was attributed to the facility. The proposed WUE strategies provided in Table 4-2 below provide savings well beyond the target year of 2030, allowing the County to implement a phased, adaptable approach based on short and long-term priorities, available funding, and staff availability to implement the strategies. For a full description of each WUE measure, refer to Table 4-3.

Overall, implementation of the strategies in this Plan are expected to result in 100,770HCF of annual savings. However, as mentioned above, the strategies listed in this Plan are expected to deliver savings well beyond 2030, further contributing to enhanced return on investment (ROI) and water savings beyond simply exhibiting wise water use practices.

Table 4-2. Estimated Savings by Target Year of 2030

Water Use Efficiency Measure	Annual Savings (HCF)[1]
High Efficiency Toilets (HETs)	1,665
Ultra-Low Water / Zero Water Urinals	1,136
High Efficiency Showerheads	2,159
Connectionless Food Steamers (Boiler-less)	436
Air-Cooled Ice Machines	268
High Efficiency Dishwashers	1,797
Pre-Rinse Spray Valves (PRSVs)	5,064
Cooling Tower Conductivity Controller	1,124
pH-Cooling Tower Controller	3,384
WaterSense flow auditing program, Water$mart Audits	6,753
High Efficiency Sprinkler Nozzles (HENs)	Not determinable[2]
Spray-to-Drip Conversion	Not determinable
Removal of non-functional turf grass	Not determinable
Smart Controllers (Weather-based Irrigation Controllers) OR Central Computer Irrigation Controller	11,541
Soil Moisture Sensors	3,315
Dedicated Irrigation Meters	Not determinable
Water$mart Irrigation Check Ups	6,631
Waterscape Rainwater Harvesting	32
Automated Metering Infrastructure (AMI)	814

Water Use Efficiency Measure	Annual Savings (HCF)[1]
Leak Detection	16,599
Onsite Reuse	38,052
TOTAL	**100,770**

Table 4-3. Description of Water Use Efficiency Measures

Measure Name	Water Use Category	Measure Text	Market Potential	Stage of Implementation
High Efficiency Toilets (HETs)	Indoor	Complete saturation of HETs across all County facilities.	Low	Late
Ultra-Low Water / Zero Water Urinals	Indoor	Complete saturation of Ultra-Low Water / Zero Water Urinals across all County facilities.	Low	Late
High Efficiency Showerheads	Indoor	Complete saturation of High Efficiency Showerheads across all County facilities.	Low	Ongoing
Connectionless Food Steamers (Boiler-less)	Indoor	Where applicable, install connectionless food steamers.	Low-Moderate	Early
Air-Cooled Ice Machines	Indoor	Where applicable, install Air-Cooled Ice Machines across all County facilities.	Low-Moderate	Early
High Efficiency Dishwashers	Indoor	Complete saturation of High Efficiency Dishwashers.	Low-Moderate	Ongoing
Pre-Rinse Spray Valves (PRSVs)	Indoor	Install PRSVs in all kitchen facilities and ensure compliance with kitchen best management practices, including signage for designated prep sinks, plate scraping, and prohibition of meat thawing in sinks.	Low	Ongoing
Cooling Tower Conductivity Controller	Indoor	Cooling tower conductivity controllers will monitor the electrical conductance of the cooling water. If the water exceeds a set point on the controller, it activates a blowdown process that releases some of the highly conductive water and then chemicals are added to the tower water to maintain homeostasis. Create a cooling tower database across all County facilities. Evaluate applicability of conductivity and pH controllers.	Moderate-High	Early
pH-Cooling Tower Controller	Indoor	pH-Cooling tower controllers will reduce scaling within the cooling tower to maintain efficiency and prevent build up and corrosion. Where applicable, install pH-cooling tower controllers.	Moderate-High	Early
WaterSense flow auditing program, Water$mart Audits	Indoor	Develop a WaterSense flow auditing program to ensure all fixtures are at or exceed WaterSense standards for indoor fixtures.	Low-Moderate	Mid
High Efficiency Sprinkler Nozzles (HENs) - Irrigation Application Technologies	Outdoor	Convert high-precipitation rate fixed spray irrigation to low-precipitation rate rotating nozzles and/or drip irrigation. Complete saturation of landscape BMPs across all County facilities.	Moderate	Mid
Removal of non-functional turf grass	Outdoor	Remove all non-essential turf at County government owned and operated facilities.	Moderate	Mid
Smart Controllers (Weather-based Irrigation Controllers) OR Central Computer Irrigation Controller	Outdoor	Upgrade antiquated irrigation timers to WBICS across all County facilities, where applicable.	Moderate-High	Ongoing
Soil Moisture Sensors	Outdoor	Install soil moisture sensors to integrate with WBICs to utilize weather-based and soil-moisture based irrigation applications to avoid unnecessary outdoor watering.		
Dedicated Irrigation Meters (DIMs)	Outdoor	Install DIMs, where applicable.	Moderate	Early
Water$mart Irrigation Check Ups	Outdoor	Coordinate with retail agencies at each facility to conduct irrigation audits of the property where outdoor water use is significant. Specifically, evaluate use of WBICs, high efficiency sprinkler nozzles, soil moisture sensors, drip irrigation, bubblers, hardscaping and use of gravel, availability/applicability of free mulch, watering schedule, sprinkler or irrigation application distribution uniformity,	Moderate-High	Ongoing

Measure Name	Water Use Category	Measure Text	Market Potential	Stage of Implementation
		and working condition of existing irrigation technology. Work to limit runoff, assess remaining turf removal capacity, and evaluate replanting of non-drought-tolerant landscaping with xeric flora. Remove irrigation where no planting.		
Waterscape Rainwater Harvesting	Outdoor	Determine which County facility roof areas are greater than the required minimum of 225 square feet (roughly 15 x 15 feet) to engage in the County Waterscape Rebate Program for installation of rainwater harvesting and catchment systems, such as rain barrels, upgraded rain gutters, and/or other catchment or diversion systems for landscape applications.	Low	Early
Automated Metering Infrastructure (AMI)	Leak Detection	Where applicable, coordinate with retail agencies to prioritize County facilities in their roll outs of AMI. Encourage facility operators to set up water budgets and leak notifications through their respective Water Use Data Portals. Applicable to the County Operations Center, County Administration Center, and possibly more County facilities in the future.	Low	Early
Leak Detection	Leak Detection	Reevaluate leak detection across all County facilities. Conduct leak assessments of all cooling towers. Prioritize meter maintenance tests in top 20 facilities, especially Downtown Jail, which have a history of significant loss.	Low-Moderate	Ongoing
Onsite Reuse	Onsite Reuse	Where and when feasible, develop onsite reuse opportunities and implement treatment technology suitable for intended end-use.	High	Early

Notes:

Fields under Market Potential and State of Implementation are based on past water efficiency project data provided by the County and interviews with County operator staff.

HETs refer to High Efficiency Toilets.

PRSVs refers to Pre-Rinse Spray Valves for use in kitchens.

DIMs refer to Dedicated Irrigation Meters.

AMI refers to Automated Metering Infrastructure.

WSC worked to maximize access to regional funding and program opportunities through SDCWA and Metropolitan Water District of Southern California (Metropolitan Water District). A thorough analysis of avoided costs from conservation was conducted. Cost savings are calculated by comparing the cost of implementation of the water efficiency measure to the avoided cost of purchased water, which is dependent on the retail agency in which the County facility resides. The more expensive the cost of purchased water, the more cost effective the measure will be. Although cost effectiveness was not the only consideration in selecting proposed water efficiency efforts, it was a critical evaluation component. Water efficiency efforts were also compared by accounting for low overall costs of implementation and high lifetime savings.

Considerations for feasibility of water efficiency efforts are further summarized below:

- **Cost effectiveness** – The measure provides economical water savings compared to the avoided cost of purchased water.
- **Certainty of water savings** – The measure uses "tried and true" measures that have proven savings.
- **Market potential** – The measure has an opportunity for large volume of water savings.
- **Market innovation/transformation** – The measure supports the County's progressive approach to sustainability and intention to lead by example.
- **Ease of operation** – The measure is not burdensome for the County to operate.
- **External funding potential** – There is a possibility of third-party funding or grant money, which would reduce overall program costs and increase the County's benefit-to-cost ratio.
- **Regulatory compliance** – The measure meets or exceeds code or mandatory requirements and supports State and Local policies and guidance.
- **Broad support** – Operators respond well to the measure and support its implementation.
- **Other benefits** – The measure has additional benefits such as reduced runoff, reduced non-point source pollution, reduced wastewater, or improved water quality.

Cost estimates of implementation are critical to prioritizing measures over the planning period. As part of the planning process, WSC gathered the most recent (2022) water rates information from all retail water suppliers where the County's top 20 facilities are present. It was determined that more water will be saved in certain supplier service areas than others, so a basic average cost per unit of water would not fully reflect the true expected financial savings potential for the County from conservation. Water is more or less expensive in certain service areas than others. As a result, a weighted average unit cost of water was calculated. This was calculated by attributing on a percentage basis where conservation is expected to take place throughout County facilities in service areas of retail water suppliers. Based on the percent attributions of savings per water supplier, WSC was then able to calculate a weighted average unit cost. This cost came out to $5.34 per HCF. Expected savings, percent attributions, and 2022 water rates information that contributed to this analysis are demonstrated in Table 4-4 below.

Table 4-4. Weighted Average Unit Cost of Water

Supplier	Sum of Annual Savings per Supplier	Weighted Savings per Supplier	CII Unit Cost of Water ($USD/HCF)[1,2]
Carlsbad Municipal Water District	646	0.65%	4.36
City of Escondido	3,864	3.88%	6.74
City of Oceanside	549	0.55%	2.77
City of San Diego	26,281	26.40%	6.394
Lakeside Water District	609	0.61%	4.78
Otay Water District	28,508	28.64%	4.17
Padre Dam Municipal Water District	9,715	9.76%	7.36
Ramona Municipal Water District	927	0.93%	6.56
South Bay Irrigation District	4,833	4.86%	5.29
Vista Irrigation District	21,981	22.08%	4.72
Descanso County Water District	1,633	1.64%	2.53
TOTAL	**100,770**	**100.00%**	**Weighted Average Unit Cost = $5.34**

Notes:

[1]CII refers to commercial, industrial, and institutional customers, which encompasses the customer class of all County top 20 facilities.

[2]HCF refers to hundred cubic feet.

All suppliers listed bill for water per hundred cubic feet except for the City of Escondido, which bills per thousand gallons of water. For the purposes of this analysis, the City of Escondido's water rates were adjusted to reflect a standardized dollar per hundred cubic feet amount.

Applying the calculated value of the weighted average unit cost of water to the total expected annual savings from the proposed WUE strategies results in an estimated $536,000 of avoided annual costs expected from conservation. This value will later determine the cost-benefit ratio used to prioritize the phased implementation of the proposed WUE strategies discussed in Section 5.

4.1.1 Indoor Water Efficiency

The primary channels for indoor water use efficiency for the County involve WUE implementation efforts in restrooms, kitchens, and cooling towers. It has been noted that the County has already taken action to reduce indoor water demand through the 2015 DRAP following the previous drought and that most of the "low-hanging fruit" has been achieved. Metropolitan Water District offers free CII Water$mart audits that ensure all fixtures and appliances are at or exceed WaterSense flow requirements. In order to maintain consistently low levels of indoor water use, it is encouraged that the County opt-in to these WaterSense flow audits at least once every five years and that the County develop a tracking mechanism to enable this best practice.

Total indoor water savings expected to result from the implementation of Indoor Water Efficiency measures in this Plan are approximately 24,000 HCF with annual avoided purchased water cost savings of $127,000.[28] Note that indoor savings resulting from the future utilization of alternative water supplies, such as reclaimed water use at cooling towers and laundry facilities, are not included in this estimate and are instead categorized separately under alternative water supplies in Section 4.1.4. For a more detailed discussion of cooling tower water use, refer to Section 4.1.2.

Costs of implementation vary widely per facility and are dependent on the current flow status of existing fixtures and appliances. For example, a facility with less fixtures or appliances at or above WaterSense standards will reap more significant water and cost savings in the shorter term. Overall, fixture-level implementation efforts offer the quickest ROI for swift water and cost savings and should be prioritized for short-term action. A complete list of indoor WUE strategies is provided in Table 4-5.

[28] This value is calculated by multiplying the total expected savings in hundred cubic feet from indoor water use efficiency measures by the calculated weighted average unit of cost of water of $5.34.

Table 4-5. Indoor Water Savings Calculations

Facility Name	High Efficiency Toilets (HETs)	Ultra-Low Water / Zero Water Urinals	High Efficiency Showerheads	Connectionless Food Steamers (Boiler-less)	Air-Cooled Ice Machines	High Efficiency Dishwashers	Pre-Rinse Spray Valves (PRSVs)	Cooling Tower Conductivity Controller	pH-Cooling Tower Controller	WaterSense flow auditing program, Water$mart Audits
George Bailey / E Mesa Detention Facility	Implemented[4]	Implemented	1088	109	67	544	1632	281	846	2176
North County Regional Center	Implemented	215	N/A[7]	N/A	N/A	215	646	281	846	862
San Diego Central Jail	Implemented	Implemented	300	109	67	150	600[3]	N/A	N/A	600
N Inland Crisis Residential Center	286	143	286	N/A	N/A	143	429	N/A	N/A	572
Las Colinas Detention & Reentry Facility	132[1]	132	263	109	67	132	395	N/A	N/A	526
County Operations Center	234	117	N/A	N/A	N/A	117	352	N/A	N/A	469
South Bay Regional Center	199	99	N/A	N/A	N/A	258[2]	298	281	846	397
County Administration Center	172	86	N/A	N/A	N/A	86	259	N/A	N/A	345
Sweetwater Regional Park	101	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	202
Edgemoor Skilled Nursing Facility	101	50	101	N/A	N/A	50	151	281	846	201
Descanso RMS	77	39	77	N/A	N/A	39	116	N/A	N/A	154
Dos Picos Park	73	37	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lindo Lake Park	71	36	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Guajome Regional Park-Oceanside	64	32	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hall of Justice	Implemented	22	N/A	N/A	N/A	22	65	N/A	N/A	87
Descanso Fire Station 45	44	22	44	N/A	N/A	22	65	N/A	N/A	87
Heritage Park	38	19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
McClellan Palomar Airport	37	19	N/A	109	67	19	56	N/A	N/A	75
Collier Park	36	18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Juvenile Probation Center[6]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Annual Savings (HCF)	**1,665**	**1,136**	**2,159**	**436**	**268**	**1,797**	**5,064**	**1,124**	**3,384**	**6,753**

Notes:

[1]The October 26, 2015, Las Colinas Water Conservation Report detailed that the installation of High Efficiency Toilets would result of 0.5% savings, and so this custom percent reduction estimate is used in place of the assumed 1.0% applied to other facilities.

[2]The August 23, 2015, SBRC Water Conservation Report detailed that High Efficiency Dishwashers would result in 1.3% savings, and so this custom percent reduction estimate is used in place of the assumed 0.5% applied to other facilities.

[3]The August 28, 2015, Central Jail Water Conservation Report detailed that Pre-Rinse Spray Valves would result in 2.0% savings, and so this custom percent reduction estimate is used in place of the assumed 1.5% applied to other facilities.

[4]Fields marked as implemented entail that the measure has already been fully implemented at that specific facility.

Facility Name	High Efficiency Toilets (HETs)	Ultra-Low Water / Zero Water Urinals	High Efficiency Showerheads	Connectionless Food Steamers (Boiler-less)	Air-Cooled Ice Machines	High Efficiency Dishwashers	Pre-Rinse Spray Valves (PRSVs)	Cooling Tower Conductivity Controller	pH-Cooling Tower Controller	WaterSense flow auditing program, Water$mart Audits

[5]Static savings entail that savings resulting from the water use reduction measure are calculated on a per unit installation basis, not a percent reduction estimate from baseline water use.

[6]During the process of developing this Plan, the Juvenile Probation Center was being demolished and a new, larger Youth Transition Facility is currently under construction in the same location. The new Youth Transition Facility is likely to still fall into the Top 20 facilities and as such will remain as Site 20 for this Plan. Due to new sustainable construction of this facility, onsite water reuse and rainwater capture are expected to be the only options available for this site.

[7]N/A refers to Not Applicable, meaning that the water use reduction measure is not applicable to the facility.

Percent water use reductions from each facility's five-year baseline water use are estimated based on past water efficiency project data, interviews with County operator staff, and best professional judgement.

4.1.2 Cooling Tower Efficiency

The County portfolio includes many facilities with Cooling Towers which utilize a significant amount of water and thus provide an opportunity for WUE measures. As mentioned previously, in response to the 2015 DRAP, the County implemented what is known as the "Zero Blowdown Project," which involved the use of brackish water in cooling towers instead of potable water with the intent of increasing WUE. Despite the unintentional and undesirable results (described in Section 3.1.3), it is estimated that the project saved approximately 2.3 million gallons per day (MGD).

Incorporating lessons learned from the Zero Blowdown Project and the acknowledgement that technologies have evolved since that project was implemented, the County intends to re-evaluate potential cooling tower efficiency projects as a WUE. This section includes strategies that have been researched by County personnel representing potential measures to implement on existing cooling towers. This will require additional research, feasibility studies and pilot projects to determine the best strategy per site. Each project will be evaluated based on the criteria identified in Section 4.1.

Due to the specific nature of this strategy, the savings impact is not quantified in this report and will be evaluated on a project-by-project basis. Following are high level descriptions of potential strategies including links to online resources.

Note: Option 2 was installed at the Edgemoor Skilled Nursing Facility in October 2022 and it is recommended that a case study of that project be developed after one full year of operation to quantify savings and identify any lessons learned.

Option 1: Dynamic Water Technologies

How the System Works: System uses electrolysis to split water actively using 15 amps of direct current to create an acidic solution at the anode (titanium rod) and a basic solution at the cathode (reactor shell). Process promotes scaling of hard minerals and silica to the reactor instead of in the cooling tower and heat exchanger tubes.

Link: https://dynamicwater.com/

Option 2: Evapco Smart Shield: Monitored Release

How the System Works: Smart Shield® is a factory assembled solid chemistry water treatment system. The Monitored Release System is designed for larger systems and those with higher inhibitor chemistry demand. It uses an advanced inhibitor probe to automatically monitor and maintain precise inhibitor residual throughout the evaporative cooling water application. The solid chemistry for the Monitored Release Feeder is manufactured with an inert tracer dye which the advanced inhibitor probe can detect through the use of fluorescent light. Using the controller that is included with the package, the Monitored Release System automatically determines the amount of chemistry in the condenser water and ensures continually precise control, even as the system's thermal load fluctuates.

Link: https://www.evapco.com/products/water-treatment-systems/smart-shieldr-towers

4.1.3 Outdoor Water Efficiency

The primary channels for outdoor WUE practices for the County involve implementation efforts such as the removal of non-functional turf grass, retrofit of existing irrigation application technologies to more efficient applications such as spray-to-drip conversions, installation of dedicated irrigation meters (DIMs), and installation of Weather-Based Irrigation Controllers (WBICs) where applicable to ensure efficient outdoor water use. Outdoor water savings potential is demonstrated in Table 4-6. In order to maintain low levels of outdoor water use, it is critical for the County to opt-in to Water$mart irrigation audits at least once every five years to ensure proper functioning of equipment. **Total outdoor water savings expected to result from the implementation of this Plan are approximately 21,000 HCF with annual avoided purchased water cost savings of $115,000.** [29] Note that outdoor savings resulting from the utilization of alternative water supplies, such as reclaimed water use for irrigation, are not included in this estimate and are instead categorized separately under alternative water supplies in Section 4.1.4.

Costs of implementation vary widely per facility and are dependent on the current irrigation application technologies and water use practices of individual sites. It is expected that over time outdoor water demands may be suitable end-uses for the development of on-site water reuse or connected to municipal recycled water distribution systems to reduce potable demands at multiple facilities.

[29] This value is calculated by multiplying the total expected savings in hundred cubic feet from outdoor water use efficiency measures by the weighted average unit of cost of water of $5.34.

Table 4-6. Outdoor Water Savings Calculations

Facility Name	High Efficiency Sprinkler Nozzles (HENs)[1]	Spray-to-Drip Conversion [1]	Removal of Non-functional Turfgrass[1]	Smart Controllers (Weather-based Irrigation Controllers) OR Central Computer Irrigation Controller	Soil Moisture Sensors	Dedicated Irrigation Meters[5]	Water$mart Irrigation Check Ups	Waterscape Rainwater Harvesting[7]
George Bailey / E Mesa Detention	Not determinable	Not determinable	Not determinable	2,176	1,088	Not determinable	2,176	1.88
North County Regional Center	Not determinable	Not determinable	Not determinable	5,472[2]	431	Not determinable	862	1.88
San Diego Central Jail	Not determinable	Not determinable	Not determinable	N/A	N/A	Not determinable	N/A	N/A
North Inland Crisis Residential Center	Not determinable	Not determinable	Not determinable	572	286	Not determinable	572	1.88
Las Colinas Detention & Reentry Fac	Not determinable	Not determinable	Not determinable	1,841[3]	263	Not determinable	526	1.88
County Operations Center	Not determinable	Not determinable	Not determinable	Implemented[4]	234	Not determinable	469	1.88
South Bay Regional Center	Not determinable	Not determinable	Not determinable	397	199	Not determinable	397	1.88

Facility Name	High Efficiency Sprinkler Nozzles (HENs)[1]	Spray-to-Drip Conversion [1]	Removal of Non-functional Turfgrass[1]	Smart Controllers (Weather-based Irrigation Controllers) OR Central Computer Irrigation Controller	Soil Moisture Sensors	Dedicated Irrigation Meters[5]	Water$mart Irrigation Check Ups	Waterscape Rainwater Harvesting[7]
County Administration Center	Not determinable	Not determinable	Not determinable	Implemented	172	Not determinable	345	1.88
Sweetwater Regional Park	Not determinable	Not determinable	Not determinable	202	101	Not determinable	202	1.88
Edgemoor Skilled Nursing Facility	Not determinable	Not determinable	Not determinable	Implemented	101	Not determinable	201	1.88
Descanso RMS	Not determinable	Not determinable	Not determinable	154	77	Not determinable	154	1.88
Dos Picos Park	Not determinable	Not determinable	Not determinable	146	73	Not determinable	146	1.88
Lindo Lake Park	Not determinable	Not determinable	Not determinable	143	71	Not determinable	143	1.88
Guajome Regional Park-Oceanside	Not determinable	Not determinable	Not determinable	129	64	Not determinable	129	1.88
Hall of Justice	Not determinable	Not determinable	Not determinable	N/A	N/A	Not determinable	N/A	N/A
Descanso Fire Station 45	Not determinable	Not determinable	Not determinable	87	44	Not determinable	87	1.88

Facility Name	High Efficiency Sprinkler Nozzles (HENs)[1]	Spray-to-Drip Conversion [1]	Removal of Non-functional Turfgrass[1]	Smart Controllers (Weather-based Irrigation Controllers) OR Central Computer Irrigation Controller	Soil Moisture Sensors	Dedicated Irrigation Meters[5]	Water$mart Irrigation Check Ups	Waterscape Rainwater Harvesting[7]
Heritage Park	Not determinable	Not determinable	Not determinable	76	38	Not determinable	76	1.88
McClellan Palomar Airport	Not determinable	Not determinable	Not determinable	75	37	Not determinable	75	1.88
Collier Park	Not determinable	Not determinable	Not determinable	71	36	Not determinable	71	1.88
Juvenile Probation Center[6]	Not determinable	Not determinable	Not determinable	N/A	N/A	Not determinable	N/A	N/A
Total Annual Savings (HCF)				**11,541**	**3,315**	**Not determinable**	**6,631**	**32**

Notes:

[1]Savings resulting from installation of high efficiency sprinkler nozzles, spray-to-drip conversions, and removal or non-functional turf grass are attributed under Water$mart Irrigation Check Ups at a conservatively estimated reduction from baseline water use of 2%.

[2]The June 22, 2015, NCRC Water Conservation Report detailed that irrigation and landscaping improvements, such as replacing all sprinkler heads with conservation irrigation solutions, would result in 12.7% savings, and so this custom percent reduction estimate is used in place of the assumed 2.0% applied to other facilities.

Facility Name	High Efficiency Sprinkler Nozzles (HENs)[1]	Spray-to-Drip Conversion [1]	Removal of Non-functional Turfgrass[1]	Smart Controllers (Weather-based Irrigation Controllers) OR Central Computer Irrigation Controller	Soil Moisture Sensors	Dedicated Irrigation Meters[5]	Water$mart Irrigation Check Ups	Waterscape Rainwater Harvesting[7]

[3]The October 26, 2015, Las Colinas Water Conservation Report detailed that irrigation and landscaping improvements, such as spray-to-drip conversion, the use of mulch, and retrofit of artificial turf, would result of 7.0% savings, and so this custom percent reduction estimate is used in place of the assumed 2.0% applied to other facilities.

[4]Implemented entails that the measure has already been fully implemented at that specific facility.

[5]Savings resulting from Dedicated Irrigation Meters are labeled not determinable but are included as a measure to support future water use efficiency planning efforts.

[6]During the process of developing this Plan, the Juvenile Probation Center was being demolished and a new, larger Youth Transition Facility is currently under construction in the same location. The new Youth Transition Facility is likely to still fall into the Top 20 facilities and as such will remain as Site 20 for this Plan. Due to new sustainable construction of this facility, onsite water reuse and rainwater capture are expected to be the only options available for this site.

[7]Savings for rainwater harvesting through the County waterscape program are based on the following assumptions; 0.625 gallons of water are collected per square foot of catchment area, each facility will meet the required minimum of 225 square feet of catchment area to engage in the program, and that 10 inches of annual rainfall are expected.

Percent water use reductions from each facility's five-year baseline water use are estimated based on past water efficiency project data, interviews with County operator staff, and best professional judgement.

4.1.4 Alternative Water Supplies

Increasing pressures on water resources have led to greater water scarcity and growing demand for alternative water resources. A leading motivating factor for the development of this Plan was to assess the opportunity of County facilities to develop alternative water supplies to reduce potable demands and further contribute to the movement for water resiliency. Utilization of alternative water supplies may be achieved through two channels, connection to recycled water distribution systems and development of onsite reuse at specific facilities. These opportunities are discussed in detailed below.

As discussed in Section 4.1.4.1 - Municipal Recycled Water Distribution Systems, municipal recycled water for cooling tower end-uses often requires additional treatment to account for corrosion control and efficient long-term performance. In some cases, phosphates may be reduced by clarification, ammonia may be eliminated via nitrification, reverse osmosis (RO) may be used for partial reduction of conductivity, and chlorine levels may also need to be considered. All this is to say that even after addressing the hurdle of permitting for and delivering municipal recycled water to the facility, more treatment is needed, and thus, more infrastructure as well. Onsite reuse presents a unique opportunity for the County in that the need for pipeline infrastructure required to develop and implement recycled water can be circumvented with a more localized treatment system that is also more resilient to external factors.

4.1.4.1 Municipal Recycled Water Distribution Systems

The evaluation of connection to municipal recycled water distribution systems for County facilities is dependent on proximity to existing infrastructure and existing demand for recycled water resources. Due to the infrastructure needed, connection to recycled water distribution systems requires significant upfront capital investment in addition to an extensive permitting process. As a result, it was determined that investment in recycled water connections do not exhibit attractive water and cost savings long-term compared to other proposed projects discussed in this Plan with quicker ROIs. Therefore, connection to “purple pipe” is not recommended for consideration for implementation at this time.

WSC assessed this as a potential strategy for the County and the evaluation process and calculations are provided in Appendix B and will serve as a reference point if the County is to find itself within closer proximity to recycled water infrastructure in the future.

4.1.4.2 Onsite Reuse Systems

Onsite non-potable reuse is one solution that can help communities reclaim, recycle, and reuse water for non-drinking water purposes. Onsite non-potable water reuse systems (ONWS) capture and treat water generated from within or surrounding a building, such as wastewater, greywater, stormwater, or roof-collected rainwater. This water is then reused onsite or locally for end uses such as cooling towers, irrigation and laundry.

Onsite reuse provides multiple benefits beyond simply reducing water demand, such as reduced wastewater and sewer fees, reducing environmental outflows to the ocean and improving marine ecosystem health, and reduced energy demand and utility fees, lowering greenhouse gas emissions. It’s estimated that approximately 350 billion kilowatt hours of recoverable energy

is flushed down the drain every year in the United States, which is roughly enough energy to power 30,000,000 homes. For every 1,000 gallons of water treated onsite for non-potable uses, it's estimated that, on average, 24,000 kilowatt hours may be harnessed for onsite use through the wastewater heat energy recovery process. This energy can be used to pre-heat incoming water in a building heating recirculation loop or offset expensive heat pump costs in all electric buildings. Implementation of onsite reuse projects has tremendous potential to contribute not only to the efforts listed in this Plan, but the County's Climate Action Plan as well.

See Appendix C for further guidance and case studies related to Onsite Reuse Systems.

4.1.4.2.1 Sample Onsite Reuse Projects for County Facilities

As part of the plan development process, the County provided past WUE project data to WSC. Some of these data involved Water Conservation Assessments of County facilities as well as Feasibility Assessments for future water recycling opportunities. Savings expected to result from onsite reuse were calculated using past WUE project data where savings were attributed due to proposed future onsite reuse opportunities. These opportunities are discussed below.

The primary potential end-uses of onsite reclaimed water for County facilities identified are cooling tower, irrigation, and laundry uses. Although toilet and urinal flushing presents an additional opportunity for onsite reuse, based on the historical WUE project data provided by the County, it was determined that onsite recycling for end-uses that require dual plumbing are infeasible at this time due to significant costs of implementation and limited demand. Any measure that requires dual plumbing will be evaluated for new construction projects.

Note: Onsite water reuse is a potential WUE for the new Youth Transition Facility, which is replacing the existing Juvenile Probation Center, which is site #20 in this analysis. The site is listed in Table 4-7 below however estimated demand reduction is not determinable at this time.

A summary of onsite reuse opportunities is demonstrated in Table 4-7.

Table 4-7. Potential Demands to be Met with Onsite Reuse

Site	Potential Annual Demands to be Met with Onsite Reuse (HCF)
George Bailey / E Mesa Detention Facility[1]	14,146
North County Regional Center[2]	11,288
Las Colinas Detention & Reentry Facility[3]	2,516
County Operations Center[4]	7,619
Polinsky Children's Center and Juvenile Detention Center[5]	2,483
Juvenile Probation Center (Juvenile Justice/Youth Transition Center)	TBD
TOTAL	**38,052**

Notes:

[1]The July 7, 2016, East Mesa Water Conservation Report identified a 13.0% reduction in baseline water use would occur if the facility was to develop onsite reuse.

[2]The June 22, 2015, NCRC Water Conservation Report identified a 26.2% reduction in baseline water use occur if the facility was to develop onsite reuse.

[3]The August 26, 2015, Las Colinas Water Conservation Report identified a 4% reduction in baseline water use would occur if the facility was to develop onsite reuse.

[4]The draft "COC Report Complete" provided by the County identified a 32.5% reduction in baseline water use would occur if the facility was to develop onsite reuse.

[5]The July 26, 2016, Laundry Recycled Feasibility Report identified a reduction in baseline water use of 2,483 HCF as a result of onsite laundry water recycling between the Polinsky Children's Center and the Juvenile Detention Center. Note that these two facilities are not included in the top 20 facilities but are included in this analysis due to available data in existing reports.

4.1.4.2.1.1 Reclaimed Uses for Cooling Towers and Irrigation

It is commonly understood by County staff that demand from cooling tower water use is significant across its facilities. More granular water use information to determine maximum seasonal cooling tower demands would greatly benefit the development of reuse opportunities. A 2015 Water Recycling Feasibility Study for the County Operations Center found that onsite reuse for irrigation and the central plant would reduce demand 32.5%.[30] This project involves development and implementation of an onsite wastewater treatment and recycling system

[30] County Operations Center Water Recycling Feasibility Study v2.pdf

based on designs from ECOfluid, a wastewater management service company who designs, builds, and operates small to medium capacity advanced wastewater treatment systems.[31] Based on the study, one-time project costs for installation of a water recycling unit are estimated at $1,568,00 with ongoing operations and maintenance costs of $103,000 annually. After 10 years, the avoided cost of water is estimated to be $2.2M, exhibiting a payback period of 12 years. The expected water savings to result from this project exhibit a low risk, attractive ROI via equipment that have a reliable track record. ECOfluid has developed and implemented over 200 advanced wastewater treatment systems throughout North America, rendering the company a potential defensible contributor to enhancing water resiliency across County owned and operated facilities. As such, ECOfluid is recommended for further investigation and consideration for future onsite recycling opportunities. This onsite reuse project for the County Operations Center would set an example for surrounding businesses and government agencies looking to reduce potable water demands and exhibit wise water use practices and therefore, this implementation project is recommended for consideration.

As part of the alternative water supply assessment for County facilities, WSC met with Epic Cleantec, another wastewater management service company who designs, builds, and operates small to medium capacity advanced wastewater treatment systems. Products such as Epic Cleantec's customizable, package plant type systems convert building wastewater into recycled water for onsite non-potable reuse, such as for cooling tower and irrigation end-uses. Each system can be configured to recover heat and is designed for deployment at the building scale, where the cost of construction and standards for space efficiency are typically lower than conventional wastewater projects. In addition to design and build, Epic Cleantec can also take on the permitting process for such projects, confidently guiding the County to implementation and results. Each treatment unit is delivered in containers for up to 1 MGD capacity. In the evaluation of the County's capacity for use of alternative water supplies, where costs were infeasible to develop due to limited data, it is assumed that onsite reuse for non-potable water are $1,000,000 per 40,000 gallons of reclaimed water based on discussions with Epic Cleantec.[32] As an industry leader, this value was determined to be a defensible baseline for cost determinations where data gaps were present. This assumed cost includes design, equipment, permitting, and installation. As one example, Epic Cleantec worked to develop and implement an onsite reuse system for a 55-story mixed use building in the City of San Francisco. Here, it was identified that cooling towers made up nearly 50% of the entire building's water use with total annual water/wastewater costs of $2,500,000 before installation. After installation of the system, annual water/wastewater costs were reduced to $1,300,000, reducing total water use 48%, reusing more than 24,500,000 gallons annually with a cumulative 10-year water/sewer bill savings of more than $12,000,000. Epic Cleantec has implemented many projects with similar results in the cities of San Diego, San Jose, and more, receiving accolades from large media and news outlets such as the New York Times and NBC for their innovative approach to tackling drought conditions. In addition to EcoFluid, Epic Cleantec is recommended for further investigation and consideration for onsite recycling opportunities.

[31] https://ecofluid.com/

[32] Microsoft Teams meeting with Epic Cleantec. July 8, 2022.

4.1.4.2.1.2 Reclaimed Uses for Laundry Facilities

In a *Feasibility Assessment for Laundry Water Recycling at Six Facilities* provided to the County by The Water and Energy Conservation Services (WECS) Reno Contracting team it was noted that the George Bailey / E Mesa Detention Facility currently recycles water from both of its laundry washers, which are the two largest laundry facilities owned and operated by the County. It is estimated that these recycling efforts collectively save nearly 7,000 HCF per year. The feasibility of implementing laundry recycling systems was assessed for the next three largest laundry facilities operated by the County. These facilities are located at the Las Colinas Detention Facility, Juvenile Detention Center, and the Polinsky Children's Center. It was noted that the latter two facilities are not included in the County's top 20 facilities but are included in this analysis as relevant, viable options to implement onsite reuse. Table 4-8 below summarizes the flow of recycled water, capital costs, and payback periods of the laundry recycling systems. These facilities are ranked from shortest to longest payback period, with the longest payback period not to exceed 10 years.

Table 4-8. Ranked Laundry Recycling Feasibility for Four Facilities

Facility	Recycled Water (GPD)	Capital Cost ($)[2]	Total Annual Savings ($)[2]	Payback Period (Years)[2]
Las Colinas Detention Facility	3,000	240,363	26,156	<8
Juvenile Detention Center Option 2[1,3]	2,400	50,381	5,328	<8
Juvenile Detention Center Option 1[1,3]	2,400	54,659	5,328	<9
Polinsky Children's Center[3]	2,688	57,150	3,637	<10

Notes:

[1]The *Feasibility Assessment for Laundry Water Recycling at Six Facilities* provided to the County by The Water and Energy Conservation Services (WECS) Reno Contracting team identifies two options for laundry recycling at the Juvenile Detention Center. Capital costs for option 1 are higher due to the proposed demolition of the partial wall grate where the washer is located to make room for the recycling equipment. Option 2 suggests installing the recycling equipment in the adjacent utility/break room, which provides the advantage of allowing the installation of another washer, if necessary, in the original room.

[2]Costs and savings estimated were gathered from the 2016 Feasibility Assessment Report for Laundry Water Recycling at Six Facilities provided by the County.

[3]The Juvenile Detention Center and Polinsky Children's Center are not listed in the County's top 20 facilities but are included in this analysis as viable opportunities for onsite recycling.

GPD refers to Gallons per Day.

The two detention facilities and the children's home are ideal candidates for laundry recycling. The laundry recycling equipment costs for Las Colinas Detention is more expensive due to the need for additional treatment processes, which are further described in the feasibility assessment provided by the County as part of the data evaluation process. Nevertheless, the payback period is attractive and should be considered a worthwhile investment. Similar additional treatment processes were required for the laundry water recycling unit already implemented at George Bailey / E Mesa Detention Facility. Note that despite the George E Bailey / E Mesa Detention Facility laundry washer being a larger, more expensive facility, the project exhibited shorter payback periods for the two washers than the laundry water recycling opportunities listed in Table 4-8. This is a great example of how onsite reuse favors economies of scale, and, despite significant one-time capital costs, should be strongly considered for implementation in the shorter term.

Based on the designs provided to the County, daily maintenance of the recycling units listed in Table 4-8 is required and takes about 5 to 10 minutes. This process involves emptying the lint shaker and checking that there are no leaks or alarms. The interior of the tank needs to be hosed down once on a weekly basis. The total cost of ownership, which includes installation and operation of the unit, includes equipment cost and installation, infrastructure to support equipment, maintenance, and monitoring. Each of these costs varies by site but note that the payback period for all proposed projects is less than 10 years with a sum of annual savings of $40,000 assuming all projects are implemented. Savings regarding decreased detergent use, decreased burden on sewers and wastewater treatment plants, and a decreased impact on the environment through lower CO_2 emissions are not included because they are currently undefined. Thus, this is a conservative estimate, meaning true ROI may be higher with a shorter payback period. Cost factors analyzed include water and sewer rates, capital costs, annual servicing, energy and gas consumption changes, a 10% contingency cost, and project management.[33] More site-specific information regarding treatment processes, required infrastructure, and other methods and assumptions can be found in the 2016 Feasibility Assessment Report for Laundry Water Recycling at Six Facilities provided by the County.[34]

[33] Installation costs associated with piping, electrical, and structural changes were included at 20%. Project management costs were reduced to 5% for the equipment installation due to its pre-assembled delivery and installation provided by others.

4.2 New Construction Water Efficiency Strategies

In addition to addressing water efficiency in existing facilities, the County has a goal to incorporate deep water savings into new construction projects. This will support overall water reduction goals and provides the opportunity to evaluate strategies that may not be feasible as a retrofit in existing facilities.

Water strategies for new construction will be identified in Requests for Proposals (RFPs) and will address Indoor, Outdoor, Cooling Tower and Onsite Reuse strategies, proposing options to be evaluated based on the new capital project type and anticipated water uses.

The strategies considered will follow legislative policies, guidance and best practices and may also conform to water credits defined in third party certification systems. DGS is in the process of updating the new construction RFP template and will incorporate and expand upon, the water efficiency strategies and guidance described below.

4.2.1 Water Efficiency Strategies

Certain water efficiency strategies, such as fixture level Indoor and Outdoor Efficiency strategies represent tried and true measures that should be considered low-hanging fruit and prioritized for all projects. Exceeding code-required savings for these types of measures will be mandatory.

Cooling Tower and Onsite Reuse efficiency strategies represent options that can provide significant savings although they may not be applicable or feasible for every project.

Following is a list of potential WUE strategies to be considered for each new construction project. Strategies that are identified as feasible for the specific project will be required in the issued RFP and construction budget will be allocated to the measures.

Indoor Water Efficiency

- General Fixtures:
  - High Efficiency Toilets (HETs)
  - Ultra-Low Water Urinals
  - High Efficiency Shower Heads
- Kitchens
  - Connectionless Food Steamers (Boilerless)
  - Air-Cooled Ice Machines
  - High Efficiency Dishwashers
  - Pre-Rinse Spray Valves (PRSVs)

- Laundry
    - Extreme low water laundry equipment
- Dual-Plumbing for Toilets

Cooling Tower Efficiency

- Blowdown Reduction Strategies

Outdoor Water Efficiency

- Incorporate drought tolerant, native landscaping
- Utilize smart irrigation controllers and drip irrigation in alignment with County Policies G-15 and A-106
- Landscape designs shall comply with the County's landscaping standards (Zoning Ordinance Sections 3712, et seq., or as amended), including water conservation requirements

Alternative Water Supplies

- Connection to recycled water (purple pipe) supply
- Inclusion of onsite re-use systems including, but not limited to:
    - Greywater recycling at facilities with kitchen or laundry space types
    - Blackwater recycling
    - Rainwater harvesting

Note: With regards to onsite re-use systems the feasibility of these strategies will be dependent upon the anticipated non-potable demand of the facility, which will vary based on size, design and occupancy type. A process for analyzing this or identifying thresholds for inclusion for each project will be developed and described within the template RFP. As an example of a potential approach, see the City and County of San Francisco's planning requirements outlined in Section 3.2.3.3 Senate Bill 966, which require an onsite water re-use system for new development projects that are larger than 100,000 sf.

Mandatory Strategies to Include:

- Provide the following water consumption submeters:
    - Main Building Potable Water Submeter
    - Irrigation Water Submeter (DIM)
    - Submeters for significant WUE strategies on the project to separately monitor consumption
- Water submeters will be integrated into the County's Building Automation System (BAS) for ongoing monitoring purposes
- Third-Party Certification
    - Achieve all water-related related LEED credits
    - Evaluate ability to comply with the Net Positive Water Imperative of the Living Building Challenge, CORE certification

4.2.2 Design Process

As part of the County's Zero Carbon and sustainability goals DGS has developed a process to ensure the applicable strategies are incorporated into the design and maintained throughout design and construction and the performance is monitored over the life of the facility.

Following is an overview of that process as applied to Water Efficiency:

Pre-RFP Analysis

- As part of the initial Pre-RFP analysis that has traditionally evaluated Zero Net Energy potential the County will include evaluation of the following potential WUE projects to determine which measures will be part of the project scope:
    - Indoor Water Efficiency Measures
    - Outdoor Water Efficiency Measures
    - Cooling Tower Water Options
    - Laundry Water Strategies
    - Kitchen Water Strategies
    - Onsite re-use strategies such as:
        - Greywater systems
        - Blackwater systems
        - Rainwater harvesting
    - Connection to municipal recycled water system
- Required performance with regards to applicable codes and policies
- Third Party Certifications to pursue

RFP Phase

- Include strategies, requirements and procedures identified as feasible in issued RFP

Design Phases

- Initial evaluation of compliance with Water Efficiency strategies identified in the RFP.
- Develop a process for third-party review of compliance with goals throughout the design of the project. Confirm that all stated water strategies are evaluated and incorporated in the design.

Construction Phase

- Review water system submittals and provide comments
- Commissioning of water systems to be included in Cx Agent scope

Occupancy Phase

- Track consumption for all distinct water systems included on project separately to obtain data for case studies and future feasibility analyses. Monitoring should occur monthly or quarterly to quickly identify any issues with the equipment or programming.
- Conduct WaterSense and Water$mart Irrigation Audits every five (5) years at the facility.

4.2.3 Third Party Certifications

Following are high level descriptions of the third-party organizations that are currently pursued or being considered for New Construction Projects.

4.2.3.1 US Green Building Council

The Leadership in Energy and Environmental Design (LEED) system uses a system of credits to integrate environmental benefits and efficiencies into building designs and construction. The LEED Water Efficiency credits define measures for four categories of water use:

1. Outdoor water use reductions by eliminating or reducing irrigation demands.
2. Indoor water use reductions by installing low-flow fixtures and appliances as well as specific standards for heating and cooling systems.
3. Optimizing consumption of process water used in cooling towers, chillers, and boilers.
4. Water metering for all water systems and subsystems to conserve potable water resources, support water management, and identify opportunities for additional water savings by tracking water consumption.

The LEED method for evaluating existing water systems and alternatives remains powerful, albeit not an exclusive approach for enabling greater water efficiency.

It is the County's policy to require all new construction to achieve a minimum of LEED Gold which typically includes pursuing most of the water conservation points available. Further guidance on Water-related credits and thresholds to achieve will be identified in the updated County Sustainability RFP.

4.2.3.2 International Living Future Institute

The International Living Future Institute (ILFI) is an environmental NGO committed to leveraging building design and functions to improve the built environment's relationship with the natural world. ILFI's Net Positive Water Imperative seeks to harmonize water use and discharge with the natural flows of the site and its surroundings. To fulfill this imperative, one hundred percent of the project's water needs must be supplied by captured precipitation or other natural closed-loop water systems, and/or by recycling used project water, and must be purified as needed without the use of chemicals. All stormwater and water discharge, including grey and black water, must be treated onsite and managed either through reuse, a closed-loop system, or infiltration. Excess stormwater can be released onto adjacent sites under certain conditions.

While the opportunity for rainwater capture is limited in the San Diego region's arid climate, the values and fundamental elements of ILFI remain relevant and can be taken into consideration when looking to capture and use rainwater and stormwater, reusing facility water, and implementing reuse systems. While helpful for consideration, the measures required to completely fulfill ILFI's Net Water Positive Imperative were determined to be too costly for the County to pursue at this time however the Imperative provides a reach target for new construction projects.

5.0 Implementation Plan

This section of the report discusses costs associated with implementation of this Water Conservation Plan, including an assessment of avoided purchased water costs, expected water and costs savings, and resulting returns on investment. By establishing a priority for implementation projects that exhibit high lifetime savings, short-term returns, and significant water use reductions, the County will be well-positioned for a safe and reliable water future.

IN THIS SECTION

- Costs of implementation
- Evaluation of payback periods and returns on investment
- Assessment of accessibility to rebate incentives and external funding

5.1 Implementation Overview

This Plan will allow the County the ability to implement a phased, adaptable approach based on short and long-term priorities, available funding, and staff availability to implement the proposed strategies. This section is intended serve as a guidebook to reduce water demand, enhance local water resiliency, and demonstrate best practices in the stewardship of local resources, which are further described below.

The objectives of this Plan will be achieved through three phases.

In **Phase 1,** the County will coordinate with inhouse staff and retail water suppliers in which its top sites are located to complete WaterSense and Water$mart Irrigation Audits at each facility. This will include an inventory of fixture performance and outdoor water use practices at each facility and enhance the County's supporting data to navigate WUE efforts. Costs to implement WUE projects identified in audits will be provided on a per project/site basis to allow County to schedule and allocate funding.

In **Phase 2**, WUE measures listed in this Plan will be implemented, in addition to potential findings made during the site auditing process by inhouse staff and/or retail water suppliers. It is assumed that the approach and lessons learned through this process may be applied to the rest of the County's top 20 facilities.

In **Phase 3**, measures identified for new construction projects will ensure water conservation and resiliency are a way of life moving forward. All new projects will include up front water assessments to allow key water measures to be included in the initial RFP and design process.

5.2 Plan Impact

WUE implementation for County owned and operated facilities is forecast out to 2030. Site selection and prioritization for implementation considers cost-effectiveness, certainty of water savings, market potential, ease of implementation, external funding potential, regulatory compliance, and other variables discussed in Section 4.

If all opportunities identified in this Plan are implemented by 2030 the potential reduction from the baseline water use of all County facilities will be 22%. The County's top 20 facilities together account for 84% of total demand, demonstrating that a long-term focused effort on these sites exhibits a significant opportunity to enhance operational water use efficiency.

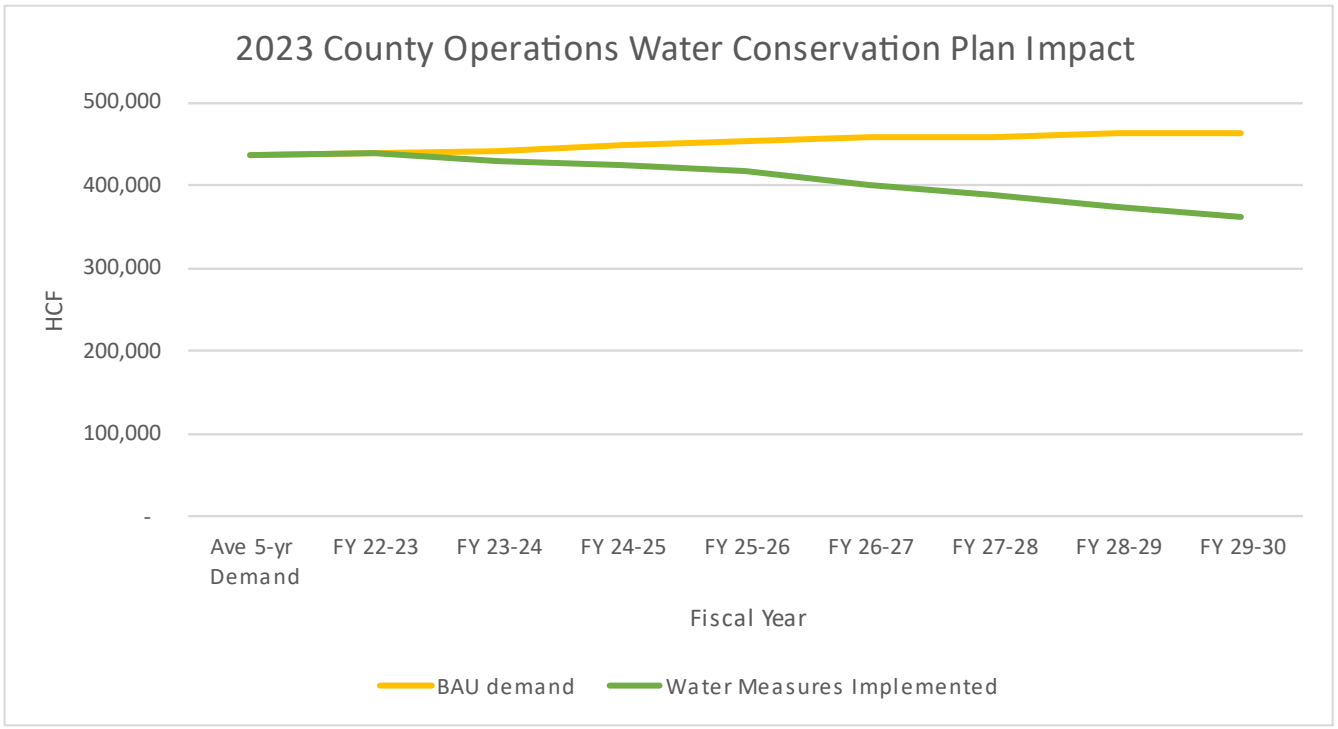
Business As Usual (BAU) Case Includes:

- Average Baseline Water Use of 438,316 HFC based on 2016/17-2020/21 data.
- Estimated demand for new construction projects that are not replacing existing buildings and thus will result in increase water demand:
    - FY of occupancy estimated from most recent FY 21-26 Capital Improvement Needs Assessment (CINA)
    - Amount of added water demand calculated using a rough estimate of gallons/sf based on average five-year demand (HCF) divided by overall portfolio area (sf) and multiplying by proposed building area (sf)

Measures Implemented:

- Total savings identified in this plan (100,770 HCF) distributed across FY 23-24 through FY 29-30:
    - Estimates based on indoor, outdoor and onsite reuse.
    - Projects will be identified from facility audits and implemented based on available funding and opportunities.

Figure 5-1. 2023 County of San Diego WUE Impact



5.3 Best Management Practices

The following five steps below are recommended as best management practices for the County's top sites and are essential to gathering the data and insight needed to pursue more innovative and impactful water use reduction strategies such as onsite reuse. Not every site will pursue each strategy. These steps are to be considered as guiding best management practices for the County to consider where applicable and feasible for implementation.

Step 1: Facility-wide WaterSense Audit

Step 2: Implement Fixture Level Retrofits

Step 3: Water$mart Irrigation Audit

Step 4: Implement Landscape/Irrigation Retrofits

Step 5: Feasibility Assessment and Implementation of Onsite Reuse

Step 1: Facility-wide WaterSense Audit – This work may be performed inhouse or in coordination with the retail water supplier who provides water service to the County facility and involves a complete inventory of the site's indoor water use fixtures, including the make, model, and estimated or actual year of installation of toilets, urinals, sinks, showerheads, and more. With this information, an assessment may be made to compare fixture performance against WaterSense standards to evaluate the water savings potential and return on investment if the fixture were to be retrofitted.

Step 2: Implement Fixture Level Retrofits – Where the results of **Step 1** demonstrate considerable lifetime savings at a reasonable cost with a payback period of 1-2 years, it is recommended the County implement retrofits across all appropriate indoor water use fixtures and keep record of the date of installation for later reference.

Step 3: Water$mart Irrigation Audit – This work may be performed in-house or in coordination with the retail water supplier who provides water service to the County facility and involves a complete inventory of outdoor water use practices at a given facility, including, but not limited to, documentation of total square footage of irrigated landscape area, water application methods such as overhead sprinklers or drip irrigation and expected flow rates of individual fixtures, use of irrigation technologies such as weather-based irrigation controllers, irrigation cycles and duration, and presence of Dedicated Irrigation Meters. More information regarding outdoor water use efficiency information record keeping may be found in Appendix D – Data Resource Management.

Step 4: Implement Landscape/Irrigation Retrofits – Where the results of **Step 3** demonstrate considerable lifetime savings at a reasonable cost with a payback period of less than 3 years, it is recommended the County implement retrofits across all appropriate outdoor water use fixtures and irrigation practices and keep record of the date of installation for later reference.

Step 5: Feasibility Assessment and Implementation of Onsite Reuse – With the information harvested from **Steps 1-4,** a more accurate assessment of disaggregated potable versus non-potable demands per site may be conducted to evaluate the cost of implementation for onsite reuse. For example, after determining the outdoor water savings potential of the top five sites, the County will be able to confidently assess non-potable demands to be met with onsite reuse. Secondly, a renewed focus on sub-metered cooling tower water use across County facilities can be supplemented to outdoor non-potable demands to determine the total savings potential within onsite reuse. Onsite reuse feasibility assessments require clear and complete understanding of operational water use at a given facility. **Steps 1-4** will allow the County to confidently pursue **Step 5** to pursue the funding needed to develop the onsite reuse systems. Sample designs of onsite non-potable water reuse treatment systems are provided in Appendix B. Additional guidance and case studies for development of industrial reuse is provided in Appendix C.

5.4 Considerations for Onsite Reuse Implementation

It is important to note that onsite reuse requires a number of considerations for successful implementation. Overlooking these considerations may result in unexpected consequences long-term that affect the performance of newly installed infrastructure and overall ROI. These considerations include permitting, space requirements for facility equipment, annual operations and maintenance, and innovative approaches to water quality treatment and design. These considerations are discussed in the following sections below.

Permitting

Implementation of onsite reuse requires a thorough permitting process which may take up to two years, involving coordination with the State Water Board and Regional Water Quality Control Board. This permitting process involves a Title 22 Engineering Report, which refers to the California Code of Regulations (CCR) that set state guidelines for how treated and recycled water is discharged and used. In addition, permitting for onsite reuse may require a filing report of waste discharge, a write-up of site conditions at the facility, and design and build reports for the proposed treatment and recycling system. More information concerning regulations and permitting requirements for onsite treatment and reuse of non-potable water may be found on the State Water Board's website.[35] Third party firms that conduct this work include, but are not limited to, WSC, CDM Smith, Brown and Caldwell, and Carollo Engineers. Note that some firms that carry out permitting for this work can also perform journey-level services to implementation; from design and build, to permitting and construction, to operation and maintenance.

Space Requirements

Other hurdles to implementation are space requirements for the treatment and recycling facilities themselves. Typically, onsite reuse for a facility that produces 250 GPD of reclaimed water requires a space of at least 40 ft by 40 ft, and, conservatively, up to 100 ft by 100 ft for facilities looking to produce 1 MGD. Space requirements are linked to storage and treatment, and is heavily dependent on peak demands, where in some cases significant storage of the treated water is required so that it is available when demand spikes. If demand is more consistent, storage becomes less of a concern. Generally, four tanks are needed for onsite reuse; two half design flows, one aerobic tank, and one anoxic tank. Storage may look like large cast-in-place concrete cisterns.

Annual Operation and Maintenance

As with most infrastructure-related projects, operation and maintenance (O&M) is critical to long-term success. Accounting for programmatic O&M procedures in the design process will ensure the safe and reliable delivery of a more water resilient future. For example, a simpler treatment facility may require less equipment and therefore less one-time capital costs but may require more O&M, reducing ROI and increasing risk of equipment failure longer term. It is recommended that the County pay particular attention to O&M in the design process of its potential onsite reuse facilities. Often, a more expensive, complex treatment system that

[35]https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/onsite_nonpotable_reuse_regulations.html

integrates elements like backwash and clean-in-place tanks in the design process not only reduces O&M, but extends the lifetime use of the infrastructure, decreasing the risk of the investment. For onsite reuse, ROI leverages economies of scale. The larger the demand for reclaimed water, the quicker the payback. Although a smaller project may require less materials and equipment, larger projects exhibit a greater opportunity for significant long-term savings, reducing sewer fees and water utility fees. With the exception of dual-plumbing, which requires additional infrastructure, making considerations to meet maximum demand for non-potable end-uses in the design and construction process will result in better financial and water savings.

5.5 Site Selection

Of the County's top 20 sites by water use, the following 10 sites were selected for short-term water use efficiency (WUE) implementation efforts based on savings potential, certainty of savings, applicability to other County facilities, and a focused effort to gather the site-specific information required to develop the best fits for onsite reuse in the longer term. This list includes the seven sites with the greatest savings potential, one park facility, and two sites with an opportunity for short-term implementation of onsite reuse.

- George Bailey Detention Facility
- North County Regional Center
- San Diego Central Jail
- North Inland Crisis Center
- Las Colinas Detention Facility
- County Operations Center
- South Bay Regional Center
- Sweetwater Regional Park
- Polinsky Children's Center
- Juvenile Detention Center

Where accessibility to any of the sites listed above may be a concern, such as George Bailey, Central Jail, and Las Colinas detention facilities, the County may consider shifting implementation efforts to the next top facilities by water use in Table 4-1. Savings Potential of Top 20 County Facilities

Sweetwater Regional Park is the only park recommended for auditing in the short-term, but lessons learned from the outdoor water auditing process here can be swiftly applied to the other five parks listed in the County's top 20 users, scoring high in "market potential" for scalable savings.

The Polinsky Children's Center and Juvenile Detention Center are not included in the list of top 20 County facilities but were selected for implementation because they are the only two sites whose onsite reuse savings potential requires no further assessment of end-uses, scoring high in "certainty of savings." These savings come directly from laundry recycling opportunities listed in Table 4-8 in Section Reclaimed Uses for Laundry Facilities 4.1.4.2.1.2 and are therefore recommended for development. A more detailed understanding of end-uses and savings potential are required for the remaining sites, which may be achieved through the summary of action items and steps described in the next section of this report.

5.6 Project Prioritization

Implementation of the measures listed in Table 5-1 are expected to reduce baseline water use across all County facilities by 11%. Remaining savings will be achieved by applying similar approaches to the rest of the County's top 20 facilities, and by leveraging the insight acquired through this process to develop onsite reuse.

Table 5-1. Action Items and Sample Projects

Site	Action Item[1,2]	Savings Potential (HCF)
San Diego Central Jail	Conduct a WaterSense Audit, re-evaluate leak detection, and implement the proposed WUE strategies at San Diego Central Jail.	1,800
George Bailey Detention Facility	Conduct a WaterSense Audit, re-evaluate leak detection, and implement the proposed WUE strategies at George Bailey.	6,743
North County Regional Center	Conduct a Water$mart Irrigation Audit and implement outdoor WUE measures at North County Regional Center.	6,767
George Bailey Detention Facility	Conduct a Water$mart Irrigation Audit and implement outdoor WUE measures at George Bailey.	5,442
North County Regional Center	Conduct a WaterSense Audit, re-evaluate leak detection, and implement the proposed WUE strategies at North County Regional Center.	3,065
South Bay Regional Center	Conduct a WaterSense Audit, re-evaluate leak detection, and implement the proposed WUE strategies at South Bay Regional Center.	2,378
Las Colinas Detention Facility	Conduct a Water$mart Irrigation Audit and implement outdoor WUE measures at Las Colinas.	2,632
Polinsky Children's Center and Juvenile Detention Center[3]	Implement the laundry recycling system to develop onsite reuse at Polinsky Children's Center and Juvenile Detention Center.	2,483
North Inland Crisis Center	Conduct a WaterSense Audit, re-evaluate leak detection, and implement the proposed WUE strategies at N Inland Crisis Center.	1,859
Las Colinas Detention Facility	Conduct a WaterSense Audit, re-evaluate leak detection, and implement the proposed WUE strategies at Las Colinas.	1,756
County Operations Center	Conduct a WaterSense Audit, re-evaluate leak detection, and implement the proposed WUE strategies at County Operations Center.	1,289
North Inland Crisis Center	Conduct a Water$mart Irrigation Audit and implement outdoor WUE measures at N Inland Crisis Center.	1,432
South Bay Regional Center	Conduct a Water$mart Irrigation Audit and implement outdoor WUE measures at South Bay Regional Center.	995
County Operations Center	Conduct a Water$mart Irrigation Audit and implement outdoor WUE measures at County Operations Center.	705
Sweetwater Regional Park	Conduct a WaterSense Audit, re-evaluate leak detection, and implement the proposed WUE strategies at Sweetwater Regional Park.	355
Sweetwater Regional Park	Conduct a Water$mart Irrigation Audit and implement outdoor WUE measures at Sweetwater Regional Park.	507
TOTAL		**40,208**

Notes:

[1]Savings from WaterSense Audits, improved leak detection, and indoor WUE implementation efforts was calculated by taking the sum of indoor water savings in Table 4-5 and savings from improved leak detection in Table 4-1.

[2]Savings from Water$mart Irrigation Audits and outdoor implementation efforts are calculated by taking the sum of outdoor water savings in Table 4-6.

[3]Savings from implementation of laundry recycling is referenced from Table 4-87.

5.6.1 Financial Considerations

Implementation costs of the proposed WUE strategies are critically dependent on unit installation metrics that can be acquired through the completion of various site audits and inventories and improved data resources management. Once these data are gathered and easily accessible, the County can input this information into a cost-benefit analysis spreadsheet to gather an understanding of WUE implementation projects per unit of installation, including estimates for lifetime water and cost savings, cost of implementation per unit, opportunities for external funding, and payback period per unit of installation. This information is summarized below in Table 5-2.

Overall, implementation costs range from low to high where the low end of the spectrum represents remaining "low hanging fruit" such as fixture-level upgrades and retrofits with payback periods of one to two years while the high end of spectrum represents more demanding strategies that require significant project management, coordination, research, and funding, such as advanced onsite reuse for non-potable end-uses, like cooling towers, irrigation, and laundry, with payback periods ranging from 8 to 12 years with significant one-time investments, some in excess of $1,000,000. As part of the plan development process, WSC worked to evaluate the cost of developing similar reuse capacity across County facilities and found that the average cost to develop onsite reuse for non-potable end-uses is $1,000,000 per 40,000 gallon per day capacity. This cost includes design, equipment, permitting, and installation with a return on investment that favors scalability. Identifying all non-potable demands that can be met with reuse in a given facility is a critical component to shortening the return on investment, maximizing water and cost savings, and increasing accessibility to external funding.

This Plan sets forth the path required for the County to gather this information to then make a more informed decision to pursue these opportunities depending on cost, but overall, these opportunities should be given strong consideration despite the apparent high initial investment. Within just 10 years' time, the payback period for full-scale implementation of onsite reuse projects across all applicable County facilities may be met, opening up opportunities for savings in the millions of dollars over the next 10-year planning period, which can then provide opportunity for new resources for the County to advance its planning objectives in an uncertain climate future.

This Water Conservation Plan was developed as an essential roadmap that outlines clear water use efficiency (WUE) strategies and is estimated to result in 100,770 hundred cubic feet (HCF) of annual savings is all WUE projects identified are implemented. This represents a 23% reduction in baseline water use. By achieving these savings and demonstrating local water stewardship, the County will ensure that it continues to provide necessary and expected services to County citizens for the public good. There are additional opportunities that cannot be quantified at this time such as cooling tower and onsite reuse projects that would further reduce water demand in the County portfolio.

Table 5-2. Water Use Efficiency Implementation Guide

Strategy	Unit	Source of Unit Savings Estimate	Savings Per Unit (GPY)	Savings, Useful Life (Years)	Lifetime Savings (AF)	Avoided Annual Purchased Cost of Water ($)[8]	MWD Rebate Funding ($/Unit)[9]	SDCWA ($/Unit)	County of San Diego ($/Unit)	Estimate Cost per Unit ($)	Cost of Implementation per Unit ($)[10]	Payback Period per Unit Installation (Years)[11]
High Efficiency Toilets (HETs)	Toilet	MWSDC Save a Buck[1]	13,849	10	0.43	989	40	N/A	N/A	230	190	<1
Ultra-Low Water / Zero Water Urinals	Urinal	MWSDC Save a Buck	39,982	20	2.45	5,709	200	N/A	N/A	400	200	<1
High Efficiency Showerheads	Showerhead	US EPA[2]	2,700	10	0.08	193	0.60/1,000 Gal	N/A	N/A	15	14.55	<1
Sink Aerator Retrofit (1.5 GPM -> 0.5 GPM)	Sink Aerator	Professional Judgement[3]	913	5	0.01	33	0.60/1,000 Gal	N/A	N/A	10	9.55	<1
Connectionless Food Steamers (Boiler-less)	Steamer	MWSDC Save a Buck	81,463	10	2.5	5,816	485	N/A	N/A	18,000	17,515	2.97
Air-Cooled Ice Machines	Ice Machine	MWSDC Save a Buck	50,181	10	1.54	3,582	1,000.00	N/A	N/A	3,500	2,500	<1
High Efficiency Dishwashers	Dishwasher	Energy Star	5,600	10	0.17	400	0.60/1,000 Gal	N/A	N/A	2,000	2,000	4.8
Pre-Rinse Spray Valves (PRSVs)	Valve	Professional Judgement[4]	7,000	10	0.21	500	0.60/1,000 Gal	N/A	N/A	275	275	<1
Cooling Tower Conductivity Controller	Controller	MWSDC Save a Buck	209,848	5	3.22	7,491	625	N/A	N/A	1,400	775	<1
pH-Cooling Tower Controller	Controller	MWSDC Save a Buck	633,455	5	9.72	22,611	Up to 1,750	N/A	N/A	1,400	0	<1
Removal of Non-functional Turf Grass	Square Foot	MWSDC Save a Buck	1,303	5	0.02	47	2	1	1	Cost of labor for coordination with landscape contractors	Not determinable	Not determinable
High Efficiency Sprinkler Nozzles (HENs) - Irrigation Application Technologies	Nozzle	MWSDC Save a Buck	46	10	0	3	2	7	N/A	4	2	1.17
Spray-to-Drip Conversion	Square Foot	Not determinable[5]	Not determinable	10	Not determinable	Not determinable	0.45/sq ft	N/A	N/A	320	Not determinable	Not determinable
Smart Controllers (Weather-based Irrigation Controllers) OR Central Computer Irrigation Controller	Controller	MWSDC Save a Buck	4,203	10	0.13	300	35	50	80	150	115	<1

Strategy	Unit	Source of Unit Savings Estimate	Savings Per Unit (GPY)	Savings, Useful Life (Years)	Lifetime Savings (AF)	Avoided Annual Purchased Cost of Water ($)[8]	MWD Rebate Funding ($/Unit)[9]	SDCWA ($/Unit)	County of San Diego ($/Unit)	Estimate Cost per Unit ($)	Cost of Implement ation per Unit ($)[10]	Payback Period per Unit Installation (Years)[11]
Soil Moisture Sensor	Sensor	MWSDC Save a Buck	4,624	10	0.14	330	35	N/A	N/A	250	215	<1
Waterscape Rebate Program	Program	Professional Judgement[6]	1,406	10	0.04	100	N/A	N/A	Up to 6,000	3,164	0	<1
Rain Barrel	Barrel	Professional Judgement[7]	300	10	0.01	21	N/A	N/A	290	98	0	<1

Notes:

[1]MWDSC Save A Buck refers to the Metropolitan Water District of Southern California's (MWDSC) database of water saving opportunities for Commercial, Industrial, and Institutional customers. The assumptions listed in this table can also be found in Table B-1 Savings and Cost Assumptions in Appendix B of the 2013 MWDOC WUE Master Plan.

[2]The US EPA reports unit savings from upgrading old showerheads to WaterSense-labeled showerheads are estimated to be 2,700 gallons per year.

[3]Sink aerator retrofits are included in table as additional opportunities to lower restroom water demands. Savings assume the faucet is used five times per day for thirty seconds with an adjusted flow rate from 1.5 GPM to 0.5 GPM.

[4]The US EPA reports unit savings from upgrading old, inefficient pre-rinse spray valves with Department of Energy-compliant models can save more than 7,000 gallons per year in a commercial kitchen.

[5]Unit savings from spray-to-drip conversions are not determinable due to lack of sufficient data. Drip is estimated to reduce water use up to 50%, but savings are ultimately dependent on existing irrigation cycles and flow rates.

[6]Savings from rainwater harvesting through the County Waterscape Rebate Program assume 225 square feet of capture area, the minimum requirement to engage in the program, and that 0.625 gallons are saved per 1,000 sq ft per 1" rain. Based on the San Diego region's hydrology, 10 inches of average annual rainfall are assumed.

[7]Savings from rain barrels assume five usable fills at 60 gallons per fill.

[8]Avoided annual purchased cost of water assumed $5.34 per hundred cubic feet as referenced from Table 4-4.

[9]MWD Rebate Funding refers to commercial rebate incentives currently offered through the SoCal Water$mart program. More information can be found here at https://socalwatersmart.com/en/commercial/

[10]Cost of implementation per unit is calculated by subtracting rebate incentives from the estimated cost per unit of equipment. Cost estimates do not include project management and coordination associated with implementation, nor savings from avoided wastewater fees where the County pays for these services through a wastewater provider. Total project costs will include other soft costs and constructions that will be determined during the audit phase.

[11]Payback period is calculated by diving the cost of implementation per unit by the avoided purchased cost of water.

References

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Appendix A All Facilities' Water Use by Land Use Classification

A

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
George Bailey / E Mesa Detention Facility	343	Detention	108,811.70	446 Alta Road	San Diego	CA	92158-0002	CWA OTAY WATER DISTRICT
North County Regional Center	87	Detention/Court	43,083.24	325 S Melrose Drive	Vista	CA	92083	CWA VISTA IRRIGATION
San Diego Central Jail	90	Detention	29,993.59	1173 Front Street	San Diego	CA	92101	CWA CITY OF SAN DIEGO
N Inland Crisis Residential Center	367	Health	28,606.06	490 North Grape Street	Escondido	CA	92025	CWA CITY OF ESCONDIDO
Las Colinas Detention & Reentry Facility	72	Detention	26,300.10	451 Riverview Parkway	Santee	CA	92071	CWA PADRE DAM MUNI WATER DIST
County Operations Center	86	Public Safety	23,442.30	5555 Overland Avenue	San Diego	CA	92123	CWA CITY OF SAN DIEGO
South Bay Regional Center	47	Detention/Court	19,870.59	500 Third Avenue	Chula Vista	CA	91910	CWA SOUTH BAY IRRIGATION
County Administration Center	350	Administration	17,236.10	1600 Pacific Highway	San Diego	CA	92101	CWA CITY OF SAN DIEGO
Sweetwater Regional Park	12	Park	10,091.89	3218 Summit Meadow Road	Bonita	CA	91902	CWA SOUTH BAY IRRIGATION
Edgemoor Skilled Nursing Facility	128	Health	10,071.20	655 Park Center Drive	Santee	CA	92071	CWA PADRE DAM MUNI WATER DIST
Descanso RMS	3013	Life Safety	7,709.57	24592 Viejas Grade Road	Descanso	CA	91916	<Null>
Dos Picos Park	91	Park	7,300.16	17953 Dos Picos Park Road	Ramona	CA	92065	CWA RAMONA MUNI WATER DIST
Lindo Lake Park	50	Park	7,139.78	12660 Lindo Lane	Lakeside	CA	92040	CWA LAKESIDE WATER DISTRICT

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Guajome Regional Park-Oceanside	471	Park	6,441.88	3000 Guajome Lake Rd	Oceanside	CA	92056	CWA CITY OF OCEANSIDE
Health Services Complex	385	Health	4,603.14	3851 Rosecrans Street	San Diego	CA	92110	CWA CITY OF SAN DIEGO
Hall of Justice	353	Court	4,363.29	330 West Broadway	San Diego	CA	92101	CWA CITY OF SAN DIEGO
Descanso Fire Station 45	4461	Life Safety	4,362.01	24592 Viejas Grade Road	Descanso	CA	91916	<Null>
San Diego County Psyc Hospital	392	Health	4,036.61	3853 Rosecrans St	San Diego	CA	92110	CWA CITY OF SAN DIEGO
Heritage Park	25	Park	3,780.60	2455 Heritage Park Row	San Diego	CA	92110	CWA CITY OF SAN DIEGO
McClellan Palomar Airport	384	Airport	3,744.45	2198 Palomar Airport Road	Carlsbad	CA	92008	CWA CARLSBAD MUNI WATER DIST
Juvenile Hall A	340	Detention	3,560.82	2801 Meadowlark Drive	San Diego	CA	92123	CWA CITY OF SAN DIEGO
Collier Park	17	Park	3,555.98	626 E Street	Ramona	CA	92065	CWA RAMONA MUNI WATER DIST
Juvenile Probation Center	344	Office	3,495.11	2901 Meadowlark Drive	San Diego	CA	92123	CWA CITY OF SAN DIEGO
Flinn Springs Park	338	Park	3,196.47	14787 Old Highway 80	El Cajon	CA	92021	CWA PADRE DAM MUNI WATER DIST
Sheriff HQ Admin Ctr	474	Law Enforcement	2,742.04	9621 Ridgehaven Court	San Diego	CA	92123	CWA CITY OF SAN DIEGO

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Gillespie Field Airport	324	Airport	2,539.89	1960 Joe Crosson Drive	El Cajon	CA	92020	CWA PADRE DAM MUNI WATER DIST
Fallbrook Park & Community Ctr	100	Park	2,521.30	341 Heald Lane	Fallbrook	CA	92028	CWA FALLBROOK PUBLIC UTILITY
Polinsky Children's Center	263	Health	2,174.45	9400 Ruffin Court	San Diego	CA	92123	CWA CITY OF SAN DIEGO
Rancho San Diego Sheriff Substation	284	Law Enforcement	1,892.01	11486 Campo Road	El Cajon	CA	92109	CWA OTAY WATER DISTRICT
South County Animal Shelter	26	Office	1,860.96	5821 Sweetwater Road	Bonita	CA	91902	CWA SOUTH BAY IRRIGATION
Encinitas Sheriff Station	302	Law Enforcement	1,469.90	175 North El Camino Real	Encinitas	CA	92024	CWA OLIVENHAIN MUNI WATER DIST
HHSA North Central Regional Center	264	Health	1,441.30	5055 Ruffin Road	San Diego	CA	92123	CWA CITY OF SAN DIEGO
Valley Center Library/Museum Water	0063W	Library	1,438.72	29200 Cole Grade Road	Valley Center	CA	92082	CWA VALLEY CENTER MUNI WATER DIST
Sheriff Reg Crime Lab	395	Law Enforcement	1,332.91	5255 Mount Etna Drive	San Diego	CA	92117	CWA CITY OF SAN DIEGO
County Offices Ramona	346	Court	1,233.97	1406 Montecito Road	Ramona	CA	92065	CWA RAMONA MUNI WATER DIST
Ramona Library	28	Library	1,164.34	1275 Main Street	Ramona	CA	92065	CWA RAMONA MUNI WATER DIST
Lakeside Community Center	0050A	Park	1,073.86	9841 Vine Street	Lakeside	CA	92040	CWA LAKESIDE WATER DISTRICT
El Cajon Library	113	Library	1,037.70	201 East Douglas Avenue	El Cajon	CA	92020	CWA HELIX WATER DISTRICT

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
El Cajon Family Resource Center	179	Health	940.38	220 First Street	El Cajon	CA	92020	CWA HELIX WATER DISTRICT
Felicita Park	119	Park	903.91	742 Clarence Lane	Escondido	CA	92029	CWA RINCON DEL DIABLO MUNI WATER DIST
SE Family Resource Ctr	120	Health	892.55	4588 Market St	San Diego	CA	92102	CWA CITY OF SAN DIEGO
East Otay Mesa Temporary Sheriff Sub	4310	Law Enforcement	889.37	2112 Enrico Fermi Drive	San Diego	CA	92154	CWA OTAY WATER DISTRICT
Law Library	361	Library	888.58	1105 Front Street	San Diego	CA	92101	CWA CITY OF SAN DIEGO
Rainbow Community Park	168	Park	880.67	5157 Fifth Street	Fallbrook	CA	92028	CWA RAINBOW MUNI WATER DISTRICT
NE Family Resource Ctr	106	Health	869.10	5001 73rd St	San Diego	CA	92115	CWA CITY OF SAN DIEGO
Nancy Jane Park	96	Park	844.77	120 N Park Dr	El Cajon	CA	92021	CWA PADRE DAM MUNI WATER DIST
North County Animal Shelter	2021	Special Use	831.25	2481 Palomar Airport Road	Carlsbad	CA	92009	CWA CARLSBAD MUNI WATER DIST
Central Reg Health Project	9	Health	817.58	3177 Ocean View Boulevard	San Diego	CA	92113	CWA CITY OF SAN DIEGO
Jamul Fire Station 36	4457	Life Safety	805.25	14024 Peaceful Valley Ranch Road	Jamul	CA	91935	CWA OTAY WATER DISTRICT
County Off San Marcos 141 Carmel St.	177A	Office	771.48	141 East Carmel Street	San Marcos	CA	92078	CWA VALLECITOS COUNTY WATER DISTRICT

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Jacumba Branch Library	4483	Library	736.83	44605 Old Highway 80	Jacumba	CA	91934	<Null>
Assessor Kearny Mesa	4549	Office	701.25	9225 Clairemont Mesa Boulevard	San Diego	CA	92123	CWA CITY OF SAN DIEGO
Levant Service Ctr	105	Health	649.77	6950 Levant St	San Diego	CA	92111	CWA CITY OF SAN DIEGO
Hazard Way Bldgs	396	Office	640.90	9325, -35, -55 Hazard Way	San Diego	CA	92123	CWA CITY OF SAN DIEGO
Alpine Library (New)	308	Library	628.14	1752 Alpine Boulevard	Alpine	CA	91901	CWA PADRE DAM MUNI WATER DIST
South Bay Regional Center ARCC	0047A	Detention/Court	610.91	500 Third Avenue	Chula Vista	CA	91910	CWA SOUTH BAY IRRIGATION
Jacumba Fire Station 43	4460	Life Safety	610.00	1255 Jacumba Street	Jacumba	CA	91934	<Null>
Los Penasquitos Preserve Park	472	Park	608.97	12020 Black Mountain Road	San Diego	CA	92129	CWA CITY OF SAN DIEGO
Fallbrook Library	61	Library	527.17	124 South Mission Road	Fallbrook	CA	92028	CWA FALLBROOK PUBLIC UTILITY
Alpine Sheriff Station	301	Law Enforcement	491.54	2751 Alpine Boulevard	Alpine	CA	91901-6200	CWA PADRE DAM MUNI WATER DIST
County Off San Marcos 151 Carmel St	177B	Office	472.09	151 Carmel St	San Marcos	CA	92078	CWA VALLECITOS COUNTY WATER DISTRICT
Whaley House Historical Site	373	Park	462.07	2482 San Diego Ave	San Diego	CA	92110	CWA CITY OF SAN DIEGO

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Assessor El Cajon	178	Office	450.25	200 South Magnolia Avenue	El Cajon	CA	92020	CWA HELIX WATER DISTRICT
Lakeside RMS	3025	Road Maintnance Svs	442.48	13115 Willow Road	Lakeside	CA	92040	CWA LAKESIDE WATER DISTRICT
Fallbrook Sheriff Substn	37	Law Enforcement	403.72	388 East Alvarado Street	Fallbrook	CA	92028	CWA FALLBROOK PUBLIC UTILITY
Live Oak Park	80	Park	371.47	2746 Reche Road	Fallbrook	CA	92028	CWA RAINBOW MUNI WATER DISTRICT
Astrea Sheriff Aviation Facility	2031	Law Enforcement	368.68	1745 North Marshall Avenue	El Cajon	CA	92020	CWA PADRE DAM MUNI WATER DIST
Lakeside Branch Library	393	Library	362.51	9839 Vine Street	Lakeside	CA	92040	CWA LAKESIDE WATER DISTRICT
Clemmens Lane Park	104	Park	358.98	344 Clemmens Lane	Fallbrook	CA	92028	CWA FALLBROOK PUBLIC UTILITY
Rancho San Diego Library	282	Library	340.84	11555 Via Rancho San Diego	El Cajon	CA	92019	CWA OTAY WATER DISTRICT
Pine Valley Sheriff Substation	400	Law Enforcement	335.89	28696 Old Highway 80	Pine Valley	CA	91962	<Null>
SHERIFF EVOC	334	Public Safety	330.93	7361 Otay Mesa Road	San Diego	CA	92154	CWA OTAY WATER DISTRICT
Cactus Park	101	Park	325.61	10610 Ashwood Street	Lakeside	CA	92040	CWA LAKESIDE WATER DISTRICT
Rancho Guajome Adobe-Vista	470	Park	323.71	2210 N. Santa Fe Avenue	Vista	CA	92083	CWA VISTA IRRIGATION

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Superior Court - Family Court Division	335	Court	315.48	1501 Sixth Avenue	San Diego	CA	92101	CWA CITY OF SAN DIEGO
San Marcos Library A	519	Library	314.66	2 Civic Center Drive	San Marcos	CA	92069	CWA VALLECITOS COUNTY WATER DISTRICT
Lakeside Sheriff Substation	382	Law Enforcement	307.84	12365 Parkside Street	Lakeside	CA	92040	CWA LAKESIDE WATER DISTRICT
Lincoln Acres Park & Library	304	Library	284.11	2725 Granger Avenue	National City	CA	91947	CWA SOUTH BAY IRRIGATION
Santee Sheriff Station	36	Law Enforcement	275.14	8811 Cuyamaca St	Santee	CA	92071	CWA PADRE DAM MUNI WATER DIST
Santee Operations Center	390	Storage	266.28	1840 Weld Blvd	El Cajon	CA	92020	CWA PADRE DAM MUNI WATER DIST
New Alternative - Hillcrest Rec	42	Health	262.84	4307 Third Avenue	San Diego	CA	92103	CWA CITY OF SAN DIEGO
Central Reg Pub Health Ctr	387	Health	261.17	5202 University Ave	San Diego	CA	92105	CWA CITY OF SAN DIEGO
North Coastal Live Well Center	459	Health	260.10	1701 Mission Avenue	Oceanside	CA	92058	CWA CITY OF OCEANSIDE
Descanso Branch Library	4498	Library	257.80	9545 River Drive	Descanso	CA	91916	<Null>
Julian Sheriff Substation	347	Law Enforcement	254.96	2907 Washington Street - Building C	Julian	CA	92036	<Null>
4S Ranch Sheriff Substation	305	Law Enforcement	253.60	10282 Rancho Bernardo Road	San Diego	CA	92127	CWA OLIVENHAIN MUNI WATER DIST

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Emergency Med Svcs Grantville	190	Health	250.85	6255 Mission Gorge Road	San Diego	CA	92120	CWA CITY OF SAN DIEGO
Harbison Canyon Fire Station 24	378	Life Safety	222.98	551 Harbison Canyon Road	El Cajon	CA	92109	CWA PADRE DAM MUNI WATER DIST
Lemon Grove District Office FRC	4383	Health	217.18	7065 Broadway	Lemon Grove	CA	91945	CWA HELIX WATER DISTRICT
Cardiff by the Sea Library	520	Library	209.32	2081 Newcastle Avenue	Cardiff-by-the-Sea	CA	92007	CWA SAN DIEGUITO WATER DISTRICT
Spring Valley Library/Gym/Teen Ctr	4538	Library	182.66	836 Kempton Street	Spring Valley	CA	91977	CWA OTAY WATER DISTRICT
Lamar Street Park	198	Park	179.63	3180 Bancroft Drive	Spring Valley	CA	91977	CWA HELIX WATER DISTRICT
BORREGO SPRG LIB	290	Library	176.96	2580 Country Club Road	Borrego Springs	CA	92004	<Null>
4S Ranch Library	2076	Library	171.18	10433 Reserve Drive	San Diego	CA	92127	CWA OLIVENHAIN MUNI WATER DIST
Imperial Beach Sheriff Station	4300	Law Enforcement	160.13	845 Imperial Beach Boulevard	Imperial Beach	CA	91932	<Null>
Valley Center Sheriff	95	Law Enforcement	157.95	28205 N Lake Wohlford Rd	Valley Center	CA	92082	CWA VALLEY CENTER MUNI WATER DIST
Bonita Sunnyside Library	4558	Library	157.73	4355 - 4375 Bonita Road	Bonita	CA	91902	CWA SOUTH BAY IRRIGATION
Poway Sheriff Station	4484	Law Enforcement	153.82	13100 Bowron Road	Poway	CA	92064	CWA POWAY CITY

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Sweetwater Lane Sports Complex	201	Park	151.90	1312 Sweetwater Lane	Spring Valley	CA	91977	CWA HELIX WATER DISTRICT
McClellan Palomar Airport Industrial	383	Multi-Use	150.92	Loker Avenue East	Carlsbad	CA	92008	CWA CARLSBAD MUNI WATER DIST
PINE VALLEY FIRE STATION 44	397	Life Safety	141.01	28850 Old Highway 80	Pine Valley	CA	91962	<Null>
Madge Bradley Building	476	Court	117.56	1409 Fourth Avenue	San Diego	CA	92101	CWA CITY OF SAN DIEGO
Ramona Airport	365	Airport	115.13	2450B Montecito Road	Ramona	CA	92065	CWA RAMONA MUNI WATER DIST
GSM 0094 ESTRELLA DRIVE PARK	94	Park	114.66	9813 Estrella Drive	Spring Valley	CA	91977	CWA HELIX WATER DISTRICT
CFA-Otay Water District Training	4047	Life Safety	109.44	11880 Campo Road	Spring Valley	CA	91977	CWA OTAY WATER DISTRICT
San Elijo Ecological Reserve & Regional Park	40	Park	106.36	2710 Manchester Avenue	Cardiff-by-the-Sea	CA	92007	CWA SAN DIEGUITO WATER DISTRICT
Mildred & Hale Whitaker Park	270	Park	100.42	12835 Castle Court Drive	Lakeside	CA	92040	CWA LAKESIDE WATER DISTRICT
Agriculture Insectary	13	Office	91.44	511 G Street	Chula Vista	CA	91910	CWA SOUTH BAY IRRIGATION
Dist Atty Community Outreach Office	4059	Office	90.21	12 North Euclid Avenue, Suites 12 - 14	National City	CA	91950	CWA CITY OF NATIONAL CITY
Hellhole Canyon Space Preserve	224	Park	82.67	19324 Santee Lane	Valley Center	CA	92082	CWA VALLEY CENTER MUNI WATER DIST

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Fletcher Hills Branch Library	55	Library	78.31	576 Garfield Ave	El Cajon	CA	92020	CWA HELIX WATER DISTRICT
Imperial Beach Library (New)	158	Library	78.08	810-A Imperial Beach Boulevard	Imperial Beach	CA	91932	<Null>
Ramona Grasslands Open Space Reserve	118	Park	72.11	944 Montecito Road	Ramona	CA	92065	CWA RAMONA MUNI WATER DIST
Ohio Street Probation	4178	Office	66.79	3977 Ohio Street	San Diego	CA	92104	CWA CITY OF SAN DIEGO
Don Dussaut Park	59	Park	64.02	8320 Alturas Street	Fallbrook	CA	92028	CWA FALLBROOK PUBLIC UTILITY
MIRAMAR SHOOTING RANGE	2028	Law Enforcement	62.80	Camp Elliott MCAS Miramar	San Diego	CA	92145	CWA CITY OF SAN DIEGO
Julian Park/Museum	307	Park	59.44	2845 Washington Street	Julian	CA	92036	<Null>
Del Mar Branch Library	2077	Library	54.66	1309 Camino Del Mar	Del Mar	CA	92014	CWA CITY OF DEL MAR
Julian Library	98	Library	52.88	1850 Highway 78	Julian	CA	92036	<Null>
El Monte Park	64	Park	50.00	15805 El Monte Road	Lakeside	CA	92040	CWA PADRE DAM MUNI WATER DIST
Old Ironside Park	287	Park	21.75	326 Harbison Canyon Road	El Cajon	CA	92019	CWA PADRE DAM MUNI WATER DIST
Cedar Kettner Parking Garage	349	Special Use	20.77	715 West Cedar Street	San Diego	CA	92101	CWA CITY OF SAN DIEGO
Encinitas Landfill-INACTIVE	3004	Shop	19.30	135 North El Camino Real	Encinitas	CA	92024	CWA OLIVENHAIN MUNI WATER DIST

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Bonita Cultural Museum	4558B	Multi-use	16.71	4355 Bonita Road	Bonita	CA	91902	CWA SOUTH BAY IRRIGATION
PROBATION TRAINING CARROLL CANYON RO	4543	Special Use	13.23	10111 Carroll Canyon Road	San Diego	CA	92126	CWA CITY OF SAN DIEGO
4S Ranch Community Park	454	Park	8.61	16118 4S Ranch Parkway	San Diego	CA	92127	CWA OLIVENHAIN MUNI WATER DIST
Ramona Refuse Disposal Site Buffer	409	Residential	8.20	2202 Pamo Road	Ramona	CA	92065	CWA RAMONA MUNI WATER DIST
Palomar Mountain Park	82	Park	8.15	21818 Crestline Road	Palomar Mountain	CA	92060	<Null>
Sheriff Video Production Facility	2009	Law Enforcement	7.40	1801 Hacienda Drive	El Cajon	CA	92020	CWA PADRE DAM MUNI WATER DIST
BORREGO SPRINGS SHERIFF OFFICE	279	Law Enforcement	6.09	2620 Country Club Road	Borrego Springs	CA	92004	<Null>
4S Ranch Heritage Park	455	Park	3.80	9972 Lone Quail Road	San Diego	CA	92127	CWA OLIVENHAIN MUNI WATER DIST
4S Ranch Liberty Park	457	Park	3.21	17750 Hunters Ridge Road	San Diego	CA	92127	CWA OLIVENHAIN MUNI WATER DIST
4S Ranch Patriot Park	456	Park	2.61	10502 Paseo de Linda	San Diego	CA	92127	CWA OLIVENHAIN MUNI WATER DIST
Borrego Valley Airport	315	Airport	0.91	1820 Palm Canyon Drive	Borrego Springs	CA	92004	<Null>
800 MHZ PALA	4575	Residential	0.40	10690 Highway 76	Pala	CA	92059	CWA RAINBOW MUNI WATER DISTRICT
4S Ranch Homestead Park	453	Park	0.40	4S Ranch Parkway	San Diego	CA	92127	CWA OLIVENHAIN MUNI WATER DIST

Site	CPN[1]	Land Use Classification[2]	Average Annual Baseline Water Use (HCF)[3]	Address	City	State	Zip code	Water Supplier[4]
Spring Valley Park	188	Park	0.03	8735 Jamacha Blvd	Spring Valley	CA	91977	CWA OTAY WATER DISTRICT

Notes:

[1] CPN refers to County Parcel Number and is based on data provided by the County.

[2] Land use classifications were developed by County staff based on Tririga. Tririga is an integrated workplace management system software that assists the County with building class classifications of its facilities for planning efforts.

[3] Average Baseline Water Use is based on water use data provided by the County for the five-year period between fiscal years 2016/16 and 2020/21. Volumes are reported in hundred cubic feet (HCF) which is equivalent to 748 gallons.

Appendix B Municipal Recycled Water Evaluation

B

WSC assessed which urban water suppliers hosts each of the County's top 20 facilities. The presence of a municipal recycled water distribution system was then evaluated for each urban water supplier. Of the suppliers that host at least one of the County's top 20 facilities, it was determined that the following currently own or operate municipal recycled water distribution systems that either presently or prospectively offer an opportunity for the County to access off-site reclaimed water supplies; Otay Water District, City of San Diego, City of Escondido, Padre Dam Municipal Water District, City of Oceanside, and Carlsbad Municipal Water District.

Demands with the opportunity to be met through recycled water connections primarily make up cooling tower, irrigation, and other non-potable uses such as fixture-level uses, which require dual-plumbing. Land uses and facilities that fit this similar water demand for reclaimed end-uses are detention and parks facilities. However not all these facilities are within close proximity to existing recycled water distribution system pipelines. In fact, most County facilities reside at least 2 miles from existing or future proposed recycled water infrastructure, which entail significant capital costs to develop and install new infrastructure. Of the top 20 County facilities, three were selected for evaluation of connection to existing or future recycled water distribution pipelines. These are Sweetwater Regional Park, George Bailey / E Mesa Detention Center, and Guajome Regional Park. Fixture-level end-uses that require dual plumbing were not evaluated due to significant costs of new infrastructure in existing facilities.

Sweetwater Regional Park was identified as the only County facility residing less than one mile from an existing recycled water connection at the intersection of Proctor Valley Road and Jonel Way in the City of Bonita under the service area of Otay Water District. As the closest County facility to an existing recycled water system of the top 20 facilities, this facility-specific evaluation offers an effective baseline insight into the costs of developing and connecting to recycled water infrastructure. For the purposes of this analysis, it is assumed that the County bears all costs of developing and connecting to existing infrastructure, which includes estimates for the cost of installed 12" PVC pipelines, fittings, bends, valves, earthwork, and a 20% contingency cost for project management.[36] Cost estimates for these factors were gathered from RS Means Construction Cost Estimating Software using data for Otay Water District.[37] It is estimated that the cost to connect Sweetwater Regional Park to Otay Water District's recycled water system is $491,407 without any incentives.

In order to better understand ROI for this conversion, an estimate of recycled water demand is required. This estimated demand can then be used to determine the capacity of cost sharing available through SDCWA's On-Site Retrofit Program, which provides up to $195 per acre-foot for 10 years of estimated water savings. Using the landscape water use disaggregation methodology discussed in Section 2.2.2.1.1, where each facility was individually assessed for indoor versus outdoor water use, it is expected that 6,469 HCF of water demand would be met with recycled water irrigation needs annually.[38] Assuming that Sweetwater Regional Park is

[36] Earthwork here refers to the act of digging trenches, which includes excavation, bedding, and compaction. Costs for planning and permitting are not included.

[37] https://www.rsmeans.com/

[38] This is a conservative landscape water use estimate based on best available data and likely understates the outdoor water demand of the facility.

currently billed as a potable irrigation customer by Otay Water District and would be billed as a recycled water irrigation customer after this conversion, the park's water bill would experience an avoided purchased water cost of $6,728 annually. Accounting for incentives provided by SDCWA, the expected payback period comes out to be 69 years. Due to significant capital costs, it is therefore not recommended that the County pursue this recycled water connection at this time. Because no other cost data were available for other facilities within relative proximity to other recycled water distribution systems, it is assumed that that these assumptions and estimates are consistent for other facilities in different water supplier service areas.

All other of the top 20 County facilities were determined to be at least 1 mile from existing or future proposed recycled water lines, signifying higher capital costs and longer payback periods, even with incentives provided by SDCWA. In the data evaluation process, five facilities were identified for potential connection to recycled water distribution systems based on ideal suitability for end-uses. These estimates were gathered from past WUE project data and demand estimates as described above in Sweetwater Regional Park's examples. A summary of these opportunities is provided below in Table B-1.

Table B-1. Potential Demands to be met with Recycled Water

Site	Potential Demands to be met with Recycled Water (HCF)
Sweetwater Regional Park[1]	6,470
George Bailey / E Mesa Detention Facility[2]	18,498
Guajome Regional Park-Oceanside[1]	6,182
Edgemoor Skilled Nursing Facility[3]	5,318

Notes:

[1]Estimated recycled water demands for Sweetwater Regional Park and Guajome Regional Park are expected to be irrigation end-uses, which were calculated using the winter minimum demand month methodology described in Section 2.2.2.1.1.

[2]The July 7, 2016, East Mesa Water Conservation Report identified a 17% reduction in baseline water use would occur if the facility was to connect to a recycled water connection based on available end-uses.

[3]The August 24, 2015, Edgemoor Water Conservation Report identified a 53% reduction in baseline water use would occur if the facility was to connect to a recycled water connection based on available end-uses.

Data used to evaluate total cost of connections to recycled water pipelines for Sweetwater Regional Park, George Bailey / E Mesa Detention Facility, and Guajome Regional Park is provide below in Table B-2. Data and assumptions used to calculate payback periods are provided in Table B-3.

Table B-2. Cost Evaluation of Connection to Recycled Water Distribution Systems

Facilities Evaluated for Recycled Water Connection	Sweetwater Regional Park	George Bailey / E Mesa Detention Center	Guajome Regional Park
Approximate Timeline	Short-term	Long-term	Long-term
Estimated Distance to Existing or Future Recycled Water Connection (miles)	0.7	1.3	3.3
Cost of Earthwork and Recycled Water Pipeline ($)[1]	369,600	686,400	1,742,400
# Fittings	184.8	343.2	871.2
Cost of Fittings ($)[2]	23,100	42,900	108,900
# 45-degree Bends	2	5	3
Cost of 45-degree Bends ($)[2]	1,200	3,000	1,800
# 90-degree Bends	5	1	2
Cost of 90-degree Bends ($)[2]	15,500	3,100	6,200
Cost of Valves ($)[2]	106	106	106
20% Contingency Cost ($)	81,901	147,101	371,881
Estimated Recycled Water Demand (HCF)	6,470	18,498	6,182
10-Year Aggregate Projected Demand (AF)	149	425	142
SDCWA On-site Retrofit Program Rebate ($/AF)[3]	28,959	82,802	27,672
Total Cost to Connect without Incentive ($)	491,407	882,607	2,231,287
Total Cost to Connect with Incentive ($)	462,448	799,805	2,203,616

Notes:

[1]Earthwork refers to the act of digging trenches, which includes excavation, bedding, and compaction. Costs for planning and permitting are not included. Proposed recycled water pipelines are assumed to be 12” PVC at an estimated cost of $50 per foot of pipe.

[2]The following assumptions are made to evaluate costs based on data for Otay Water District from RS Means Construction Cost Estimating Software; $125 per fitting, $600 per 45-degree bend, $3,100 per 90-degree bend, and $53 per valve.

[3]More information about San Diego County Water Authority’s (SDCWA) On-Site Retrofit Program may be found here: https://www.sdcwa.org/your-water/conservation/commercial-rebates-programs/

Table B-3. Estimated Payback to Connect to Recycled Water Distribution Systems

Facilities Evaluated for Recycled Water Connection	Sweetwater Regional Park	George Bailey / E Mesa Detention Center	Guajome Regional Park
Approximate Timeline	Short-term	Long-term	Long-term
Supplier Service Area	Otay Water District[1]	Otay Water District[1]	City of Oceanside[2]
Customer Class	Irrigation	Publicly Owned	Irrigation
Water Rate Source Data	2022	2022	2022
Potable Water Rate ($/HCF)	6	4	3
Recycled Water Rate ($/HCF)	5	4	3
Estimated Recycled Water Demand (HCF)	6,470	18,498	6,182
Current Estimated Bill of Demand to be Met with Recycled Water ($)	39,399	77,137	17,927
Projected Estimated Bill of Demand Met with Recycled Water ($)	32,671	66,223	15,949
Annual Avoided Purchased Water Costs ($)	6,728	10,914	1,978
Total Cost to Connect with Incentive ($)	462,448	799,805	2,203,616
Payback (Years)	69	73	1,114

Notes:

[1]2022 Water Rates data for Otay Water District may be found here: https://otay-3y354o0pajyrfwiyyvs.netdna-ssl.com/wp-content/uploads/2022/01/Water-Rate-Sheet-2022.pdf

[2]2022 Water Rates data for the City of Oceanside may be found here: https://www.ci.oceanside.ca.us/civicax/filebank/blobdload.aspx?blobid=56922

Note that these estimates assume that the County would bear the costs of installation and development, which is not the case if a water supplier is building out their recycled water infrastructure by their own accord, in which case, the County would need only to pay for the cost of the metered connection. Because of these assumptions and lack of proximity of County facilities to existing and future recycled water connections, it is not recommended that the County pursue connection to municipal recycled water distribution systems at this time. As recycled water propagates further through the County, there may be more cost-effective and technically feasible opportunities to connect to recycled water infrastructure.

Furthermore, this evaluation of connection to municipal recycled water distribution systems assumes that the quality of water received by the County from the urban water suppliers discussed is “fit-for-purpose,” meaning that the recycled water is assumed to not need any additional treatment or consideration for its intended end-uses.

Appendix C Guidance for Onsite Non-Potable Water Reuse

C

The paragraphs below describe case studies and lessons learned from different approaches to water quality and the treatment design process to enhance local water resiliency through onsite non-potable water reuse.

The *Framework for the Successful Implementation for Onsite Industrial Reuse* (2014), authored in partnership by the Water Reuse Association and the Water Research Foundation, addresses the struggles with pursuing the design, construction, and operation of onsite industrial water reuse. The study uses the Walter Kaizen Blitz (WKB) method to examine reuse and reclamation projects as an economic benefit to business and challenges the idea that water is an inexpensive commodity, reinforcing that water conservation and reuse have economic value and frequently present a positive return on investment.[39] It also made an effort to understand the end-to-end operations of a facility's water use over a period of time. Unlike a traditional audit, the methodology used generally involves a vigorous multi-day in-person walk-through working session of all components of the facility. This includes, but is not limited to, a thorough understanding of:

- Characterization of the source water.
- Where water is used, the resulting waste streams, and where those waste streams are discharged.
- The output of water at the site compared against a list of meter flow data to identify where measurement gaps exist.
- Clearly defined maximum and average temperatures of the water flow.
- Average and minimum water velocities within the facility.
- Stagnant or redundant equipment.
- Duration where no flow occurs.
- Existing protection from corrosion, deposits, and biological activity.
- A complete determination of metallurgy of all water-contacted equipment as well as their operating characteristics, e.g., towers, piping, all heat transfer units.
- The labor to operate the industrial system.
- Capital and regulatory obligations.

The examples discussed below demonstrate lessons learned when implementing onsite reuse at industrial facilities, both with the WKB method and without.

The most common hurdles observed in using reclaimed water for use in cooling towers or other industrial equipment is an oversimplification of the treatment process or lack of consideration for the metallurgy of the facility using the reclaimed water. HVAC and utility power plant cooling towers generally use copper and Admiralty brass tubes (70% copper/30% zinc) in their chillers, condensers, and heat exchangers and must limit the ammonia in the source water. Admiralty tubes must not see more than a couple parts of ammonia due to potentially catastrophic

[39] http://www.newea.org/wp-content/uploads/2019/02/AC19_EBelia_22.pdf

cracking, possibly resulting in fire or explosion. This is a commonly made mistake when using reclaimed water in industrial processes. Failure to remedy this often results in complete tube failures and discontinuation of facility equipment.

HVAC systems often use galvanized steel cooling towers which can suffer from "white rust" due to copper plating as well as high or low pH of the cooling tower water. Mild steel tubes are susceptible to phosphate deposits and copper plating, requiring thoughtful corrosion control. Excess phosphate and copper can induce bimetallic corrosion can reduce life expectancy of the mild steel tubes. HVAC cooling water condensers often use enhanced (grooved) copper tubes that require improved copper corrosion inhibition for tube protection. Where stainless steel heat transfer units are used, such as in chemical manufacturing, chlorides must be limited to avoid pitting and stress corrosion cracking.

In some cases, operators may blame water quality for poor performance or damaged equipment when in fact it is a lack of consideration for the metallurgy of the facility that is causing trouble. Often, more focused investment into the metallurgy used at the facility offers a more cost-effective solution than additional investment in treatment. This issue occurred at a west coast refinery, which used unlined mild steel pipe to move reclaimed water through the facility. Plant operators found that the reclaimed water corrosive enough to generate unacceptably high iron levels in the recycled water (3-5 ppm as Fe) before the cooling tower. Thus, the cooling tower running at five cycles would potentially have 15-25 ppm iron which would foul the heat exchangers. Instead of investigating further treatment, the refinery was able to eliminate iron pickup by replacing the line with an internally lined mild steel pipe. Similarly, another example covered by Water Technology, an online magazine that discusses innovative water solutions, discussed a facility that identified exceptionally high iron (over 5 ppm) in their cooling towers.[40] At five cycles, the iron was 25 ppm and fouled their heat exchangers. Additional treatment of the water was determined to be very costly. After a thorough investigation, operators found that the water at the intake had only 0.1 ppm iron, but as the water underwent a nitrification process the water gained a pH of 6.5 and a high free chlorine level (2 ppm). As a result, the water was very corrosive to the mild steel pipes used inside the plant, thus producing high iron. Instead of investing in additional treatment, the facility installed internally coated mild steel and the iron level remained at 0.1 ppm at the towers. These two examples demonstrate that even with a proper treatment facility in place, a lack of consideration for the inventory of all metallurgy used in the industrial process may still present issues, and therefore, must be accounted for in the planning and design process prior to implementation.

These next examples will demonstrate how a more encompassing approach to the lifecycle of the project, such as the WKB method, can, and have historically had, huge successes implementing onsite reuse for industrial processes, such as cooling towers. Arcadis, the inventor of the WKB method, worked with several PPG facilities to enhance water resiliency of

[40] https://www.watertechonline.com/process-water/article/16212383/recycled-water-for-cooling-towers-good-idea-or-bad

their operations. PPG operates a glass manufacturing facility in Wichita Falls, Texas that uses approximately 107 million gallons per year. While there were no industrial water use restrictions placed during a drought in 2013, the facility management team researched ways to reduce water demand while maintaining operations. It was discovered that half of the plant's water demand came from its seven cooling towers. After discussions with the city, PPG set out to build an onsite 1-million-gallon reservoir to store tertiary treated wastewater delivered through a direct pipeline from the local wastewater treatment facility. After a year of construction, the first cooling towers at PPG started using reclaimed water. By August 2015, the plant had used more than 27 million gallons of reclaimed water and, consequently, had saved an equivalent amount of potable water for use by the city. In another WKB implementation project, wastewater generation was cut by 25% at a facility in Batavia, Illinois, saving $489,000 in avoided purchased water costs and sewer fees after just two years.[41] Other success stories from deployment of the WKB method include the identification of 15 project opportunities for a large chemical manufacturing company, each with an ROI of less than two years, savings more than $3,000,000 a year with a capital investment of only $760,000.[42] Beyond PPG, the WKB method has seen excellent results with a number of industrial giants, such as General Motors, Coca-Cola Company, and Ford Motor Company. This value-driven approach works at all levels of implementation, from small to medium capacity systems to massive industrial facilities.

In another cooling tower success story, Covanta's Delaware Valley energy-from-waste facility in Chester, Pennsylvania sought development of onsite reuse for their cooling towers. This industrial facility generates up to 80 megawatts (MW) of clean energy from up to 3,510 tons per day of municipal solid waste. Prior to November 2014, the plant used 1.3 MGD of municipal drinking water in its waste-conversion process, costing the company thousands of dollars in daily water purchases. To reduce facility operating expenses and consumption of local water resources, Covanta worked with GE Water & Process Technologies (GE) to develop advanced onsite reuse for Covanta's cooling towers. The facility wanted to use treated discharge water from a nearby wastewater treatment plant as the source water for its cooling towers. With extensive experience in the design, installation, operation and maintenance of membrane water and waste treatment systems, a comprehensive assessment by GE discovered that RO paired with ultrafiltration (UF) pretreatment would provide the most effective results. The UF stage prior to RO prefilters organic material and suspended solids content in the water and optimizes the filtration system operation. The RO treatment provides low total dissolved solids (TDS), high quality water needed for the cooling towers. With the treatment solution clearly defined, GE developed RePak, a new product line developed for Covanta, for tertiary wastewater applications. This includes UF modules and low fouling RO elements all-in-one, including integrated controls and a common buffer, backwash, and clean-in-place tank. Combining these systems reduced the equipment's environmental footprint, space requirements, annual

[41] https://waterfm.com/study-examines-economic-value-reuse/

[42] https://wbcsdpublications.org/wastewate-a-cost-efficient-sustainable-source-of-water/

operation and maintenance costs, capital costs, and field installation expenses compared to the use of separate UF and RO systems with multiple process and cleaning tanks. The result allowed Covanta to reuse 1.3 MGD for cooling tower operations, saving $4,000 of avoided purchased water costs daily.[43] These examples, methods, and lessons learned can serve as a guiding compass for the County as it evaluates a more thorough investigative process for onsite reuse and its larger facilities, such as George Bailey / E Mesa Detention Center.

A summary of the lessons learned from the examples discussed are the following provided below.

- Just as the intended end-use of reclaimed water determines the desired fit-for-purpose water quality, equal consideration should be made for the facility's metallurgy and its potential effects and reactions with the reclaimed water and treatment design process.
- Admiralty tubes (70% copper, 30% zinc) are commonly used in HVAC cooling towers and must limit the ammonia in the source water. This can be done through nitrification.
- Mild steel pipes require significant corrosion control and are susceptible to phosphate deposits and copper plating. These pipes must be internally lined to keep iron levels low and reduce copper plating. Phosphates may be reduced by clarification.
- Enhanced copper tubes require improved corrosion control.
- Galvanized steel may suffer from "white rust" due to copper plating and/or high or low pH.
- Stainless steel heat transfer units must limit chlorides which can cause pitting and stress corrosion cracking
- RO and other membrane technologies are effective in reducing conductivity but may require additional filtration to manage organic material and other constituents.

[43] https://www.process-cooling.com/articles/88144-using-an-advanced-reuse-solution-for-cooling-tower-makeup-water

Table C-3. Reclaimed Water Quality Guidance for Cooling Tower Components

Impact on Piping	
Construction Materials	**Reuse Water Quality**
Mild Steel	Avoid pH below 5.0 Avoid a PSI above 8.0
Galvanized Steel	Max 500 ppm chlorides Max 0.5 ppm copper Avoid pH outside 6.0-9.0
Stainless Steel - 304	Max 200 ppm chlorides
Stainless Steel - 316	Max 400 ppm chlorides
Fiberglass/PVC (no inhibitors used)	No known limits
Impact on Heat Exchangers Tubes	
Construction Materials	**Reuse Water Quality**
Mild Steel	Max 1000 ppm chlorides, 8+ PSI
Copper	Max 2 ppm ammonia
Admiralty (70% copper, 30% zinc)	Max 2 ppm ammonia
90% copper and 10% nickel	Max 10 ppm ammonia
70% copper and 30% nickel	Max 20 ppm ammonia
Stainless Steel - 304	Max 150 ppm chlorides
Stainless Steel - 316	Max 400 ppm chlorides
Aluminum	Avoid pH outside 7.0-8.5
Titanium (no inhibitors used)	No known limits
Impact on Cooling Tower	
Construction Materials	**Reuse Water Quality**
Galvanized Steel	Max 500 ppm chlorides Max 0.5 ppm copper Avoid pH outside 6.0-9.0

Impact on Piping	
Stainless Steel - 304	Max 200 ppm chlorides
Stainless Steel - 316	Max 400 ppm chlorides
Wood (pre-treated)	Avoid pH outside 6.0-9.0
Concrete	Max 30 ppm chlorides Max 10,000 ppm TDS Max 1500 pm chlorides Max 600 ppm sulfates
Fiberglass/PVC (no inhibitors used)	No known limits

Notes:

PSI refers to pressure in pounds per square inch.

PVC refers to polyvinyl chloride.

TDS refers to total dissolved solids.

PPM refers to parts per million (10-6).

Appendix D Data Resource Management

D

As part of the data collection and evaluation process, it was acknowledged that more centralized management of County water resources data is needed to enable more streamlined planning and implementation efforts. It was noted that during the 2015 DRAP many improvements were made to the County's water use practices, including indoor and outdoor implementation efforts. As a result, the County effectively reduced its water demand. However, as the County approaches new stages of planning, it is critical that record of these and future improvements remain easily accessible for better monitoring and evaluation. The sections below will detail how an ongoing, encompassing inventory of water use practices across County facilities will bring the County to a clear, water resilient future.

Fixture-level WaterSense Audits and Indoor Water Use Inventory

It was noted that during the 2015 DRAP the County upgraded many of its indoor fixtures to improve water efficiency, including toilets and urinals. In order to confidently assess the remaining conservation potential and ROI for proposed indoor WUE projects, it is critical that the County maintain a database and thorough inventory documenting the following across its facilities.

- A record of its last indoor WaterSense Audit.
- A complete inventory of its indoor water use fixtures, including the make, model, and estimated or actual year of installation of toilets, urinals, sinks, showerheads, and more.
- An assessment of actual versus expected flow for all recorded fixtures against WaterSense standards.[44]

With a complete record of the number of fixtures and discrepancy between their actual flow rate versus WaterSense standards, the County will be able to effectively and confidently determine remaining water conservation potential for fixture-level implementation efforts and assess ROI for proposed retrofit projects. As mentioned previously, these projects are often "low hanging fruit" that are easy to implement and exhibit payback periods ranging from one to two years. As demonstrated in Table 5-2, it is estimated that annual savings from per unit indoor WUE installation efforts range from as little as 913 gallons per year up to 81,463 gallons per year with payback periods ranging from less than one to more than four years. The lower end comprises fixture-level retrofits while the upper end includes larger appliances like food steamers, ice machines, and dishwashers.

Reevaluation of Improved Outdoor Water Use and Estimation of Disaggregated Demand

Another effort identified in this plan to enable better implementation and monitoring of WUE efforts was better management of outdoor water use data. This would take form in a database that tracks landscape water use metrics and practices that would aid the County in reducing water demand where applicable. It is commonly understood that County sites are in constant

[44] Current WaterSense standards set maximum flow rates for performance of indoor fixtures at 1.6 gallons per flush (GPF) for toilets, 2.0 GPM for showerheads, and 1.5 GPM for faucets.

flux which poses a challenge to developing such a database, but the long-term value of this effort is not to be underestimated.

For example, this database would include a record of the following:

- Which facilities have Dedicated Irrigation Meters (DIMs) and other submeters that strictly measure outdoor water use.
- The total square footage of landscape per facility, or per outdoor submeter, if applicable
- Any indication of remaining potential for removal of non-native or high-water using vegetation.
- Type of irrigation application present at each facility; overhead spray, drip/micro-drip irrigation, or a combination of both, including an expected flow rate per fixture if nozzles are in use.
- Use of weather-based irrigation controllers (WBICs), soil moisture sensors, or other irrigation technologies.
- Up-to-date information on irrigation cycles and duration.
- Record of the landscape's last outdoor irrigation audit.

Mindful consideration to document and aggregate these metrics into a centralized database would be greatly beneficial to future planning and implementation efforts. At this time, the County is confident that following implementation of the 2015 DRAP efforts that landscape water use has improved, but as the data collection and evaluation process identified, further opportunities exist for improvement. Given that the County seeks to pursue more innovative WUE strategies such as onsite reuse, these improvements are warranted to ensure the security of the investments. More granular tracking efforts enable better implementation, monitoring, and evaluation of effectiveness. As demonstrated Table 5-2, it is estimated that annual savings from per unit outdoor WUE installation efforts range from as little as 46 gallons per year per high efficiency sprinkler nozzle up to 4,203 gallons per year per weather-based irrigation controller installed. Note that despite the apparent similar distribution in per unit installation savings, outdoor WUE efforts offer enhanced scalability compared to indoor measures. Table 5-2 offers per unit installation metrics and it is expected that the savings potential in retrofitting multiple nozzles, converting many systems to drip from spray irrigation, and removing many square feet of non-functional turf offer better market potential than indoor measures.

Onsite Reuse

Like outdoor water use, in the plan development process it was identified that cooling towers contribute a significant role to the seasonality of the County's annual water demand profile. Managing this peak demand during the hottest months of the year is a critical component to improving resiliency of County facilities across the water-energy nexus. As the County charts a path forward to 2030, more information is required to develop clear cost estimates for implementation of onsite reuse, which, at this time, is a more cost-effective, assured means of utilizing alternative water supplies than connection to municipal recycled water distribution

systems, which require significant investment in infrastructure and potential additional treatment of the recycled water once it is delivered.

Onsite reuse has multiple benefits beyond reduced water demand, including reduced water/sewer fees, reduced energy use, reduced marine outflow, improved water quality, alignment with state, national, and international water development policies, and thought leadership and recognition as a result of pursuing innovation within the industry. However, in order to implement onsite reuse, a clearer understanding of non-potable demands is needed. This can be accomplished by:

- Installing submeters on all County cooling towers.
- Maintaining an accessible record of monthly demands.
- A thorough and clear record of existing programmatic operation and maintenance procedures for County cooling towers.

With these data, the County can effectively estimate non-potable cooling tower demands to be met through advanced onsite reuse, as well as compare existing O&M procedures to proposed projects to assess ROI of proposed projects as well as potential need for additional resources.

Utilization of Data Inventory for Plug-and-Play Cost-Benefit Analysis

As part of the plan development process, WSC worked with the County to amass all available data needed to complete this Plan. As mentioned above, improvements to data resource management will go a long way in preparing the County for a more water resilient future by "filling in the gaps." For more granular unit installation metrics to develop cost estimates for water use efficiency implementation, refer to Table 5-2 in the main report.