Sustainability Roadmap 2018- 2019: Water Efficiency and Conservation

Progress Report and Plan Update
on Meeting the Governor's Sustainability Goals
for California State Agencies

Department of Water Resources

Edmund G. Brown Jr., Governor

December 2017

Department of Water Resources

Sustainability Road Map: Water Efficiency and Conservation

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Acronyms

BMP	Best Management Practices
CALGREEN	California Green Building Code (Title 24, Part 11)
DGS	Department of General Services
EO	Executive Order
DWR	Department of Water Resources
ESPM	Energy Star Portfolio Manager
GHGe	Greenhouse Gas Emissions
GPM	Gallons per Minute
GSP	Groundwater Sustainability Plan
LCM	The Landscape Coefficient
LEED	Leadership in Energy and Environmental Design
MM	Management Memo
MAWA	Maximum Applied Water Allowance
MWELO	Model Water Efficient Landscape Ordinance
SAM	State Administrative Manual
SGA	Sustainable Groundwater Agency
SGMA	Sustainable Groundwater Management Act
WMC	Water Management Coordinator
WUCOLS	Water Use Classifications of Landscape Species

Glossary

Backflow - is the undesirable reversal of the flow of water or mixtures of water and other undesirable substances from any source (such as used water, industrial fluids, gasses, or any substance other than the intended potable water) into the distribution pipes of the potable water system.

Back flow prevention device – a device that prevents contaminants from entering the potable water system in the event of back pressure or back siphonage.

Blowdown - is the periodic or continuous removal of water from a boiler to remove accumulated dissolved solids and/or sludge. Proper control of blowdown is critical to boiler operation. Insufficient blowdown may lead to deposits or carryover. Excessive blowdown wastes water, energy, and chemicals.

Compost – Compost is the product resulting from the controlled biological decomposition of organic material from a feedstock into a stable, humus-like product that has many environmental benefits. Composting is a natural process that is managed to optimize the conditions for decomposing microbes to thrive. This generally involves providing air and moisture, and achieving sufficient temperatures to ensure weed seeds, invasive pests, and pathogens are destroyed. A wide range of material (feedstock) may be composted, such as yard trimmings, wood chips, vegetable scraps, paper products, manures and biosolids. Compost may be applied to the top of the soil or incorporated into the soil (tilling).

Critical overdraft - a condition in which significantly more water has been taken out of a groundwater basin than has been put in, either by natural recharge or by recharging basins. Critical overdraft leads to various undesirable conditions such as ground subsidence and saltwater intrusion.

Ecosystem services - are the direct and indirect contributions of ecosystems to human well-being. They support directly or indirectly our survival and quality of life. Ecosystem services can be categorized in four main types:

- Provisioning services are the products obtained from ecosystems such as food, fresh water, wood, fiber, genetic resources and medicines.

- Regulating services are the benefits obtained from the regulation of ecosystem processes such as climate regulation, natural hazard regulation, water purification and waste management, pollination or pest control.

- Habitat services provide living places for all species and maintain the viability of gene pools.

- Cultural services include non-material benefits such as spiritual enrichment, intellectual development, recreation and aesthetic values.

Grasscycling -refers to an aerobic (requires air) method of handling grass clippings by leaving them on the lawn when mowing. Because grass consists largely of water (80% or more), contains little lignin and has high nitrogen content, grass clippings easily break down during an aerobic process. Grasscycling returns the decomposed clippings to the soil within one to two weeks acting primarily as a fertilizer supplement and, to a much smaller degree, mulch. Grasscycling can provide 15 to 20% or more of a lawn's yearly nitrogen requirements.

Hydrozone – is a portion of a landscaped area having plants with similar water needs served by one irrigation valve or set of valves with the same schedule.

Landscape Coefficient Method (LCM) describes a method of estimating irrigation needs of landscape plantings in California and is a guide for landscape professionals.

Landscape water budget - is the calculated irrigation requirement of a landscape based on landscape area, local climate factors, specific plant requirements and the irrigation system performance.

Model Water Efficient Landscape Ordinance (MWELO) - The Water Conservation in Landscaping Act became law on September 29, 1990. The premise was that landscape design, installation, and maintenance can and should be water efficient. Some of the provisions specified in the statute included plant selection and groupings of plants based on water needs and climatic, geological or topographical conditions, efficient irrigation systems, practices that foster long term water conservation and routine repair and maintenance of irrigation systems. DWR adopted the Model Ordinance in June of 1992. One element of the Model Ordinance was a landscape water budget. The water budget approach establishes a Maximum Applied Water Allowance (MAWA) based on the landscape area and the climate where the landscape is located. MWELO's latest updates occurred in 2015. MWELO applies to all state agencies' landscaping.

Mulch – Mulch is a layer of material applied on top of soil. Examples of mulchable materials include wood chips, grass clippings, leaves, straw, cardboard, newspaper, rocks, and even shredded tires. Benefits of applying mulch include reducing erosion and weeds and increasing water retention and soil vitality. Whenever possible, look for mulch that has been through a sanitization process to kill weed seeds and pests.

Trickle flow – A device that allows users to reduce flow to a trickle while using soap and shampoo. Switching off the device resets the temperature and pressure to the previous settings.

Sprinkler system backflow prevention devices – are devices to prevent contaminants from entering water supplies. These devices connect to the sprinkler system and are an important safety feature required by the California Plumbing Code.

Submeter- a metering device installed to measure water use in a specific area or for a specific purpose. Also known as dedicated meters, landscape submeters are effective for separating landscape water use from interior water use, evaluating the landscape water budget and for leak detection within the irrigation system.

Water Budget - A landscape water budget is the calculated irrigation requirement of a landscape based on landscape area, local climate factors, specific plant requirements and the irrigation system performance.

Water-energy nexus - Water and energy are often managed separately despite the important links between the two. 12 percent of California's energy use is related to water use with nearly 10 percent being used at the end water use. Water is used in the production of nearly every major energy source. Likewise, energy is used in multiple ways and at multiple steps in water delivery and treatment systems as well as wastewater collection and treatment.

Water Shortage Contingency Plans - each urban water purveyor serving more than 3,000 connections or 3,000 acre-feet of water annually must have an Urban Water Shortage Contingency Plan (Water Shortage Plan) which details how a community would react to a reduction in water supply of up to 50% for droughts lasting up to three years.

EXECUTIVE SUMMARY

DWR manages the State Water Project (SWP) and works with other agencies and the public to develops strategic goals, and near-term and long-term actions to conserve, manage, develop, and sustain California's water resources. DWR also works to prevent and respond to floods, droughts, and other events that would threaten public safety, water resources and management systems, the environment, and property.

DWR not only manages water but also uses water to produce electricity and move approximately 3.0 million acre-feet of water annually. Additionally, as part of producing energy to help move this large amount of water, DWR has eight hydroelectric power plants, and three pump/generating plants making the SWP the fifth largest electrical utility in California with an installed generation capacity about 1,700MW. For comparison, the SWP is similar in size to the Sacramento Utility District (SMUD) (load), and about 4 percent of California's load.

The SWP is the third largest generator of clean hydro power in California, providing about 14% of California's hydropower. This water moved and used by DWR for power purposes is known as "process water" and is excluded from the Executive Orders regarding water use. Only the water used by DWR office buildings and operations and maintenance centers for building operations and facility landscaping is reported under the Executive Order requirement.

DWR's largest water users per capita are the water quality testing building, the Lost Hills Maintenance and Subcenter (387 gallons per person per day) and the Sacramento Maintenance Yard at 223 gallons per person per day. Following closely in per capita use are the Oroville Operations and Maintenance Center. These facilities represent forty percent of the building space but use eighty percent of DWR's total water consumption.

DWR has met the water reduction requirements of twenty percent from the 2010 baseline as well as the drought emergency requirement of 25 percent reduction from the 2013 baseline. Overall, DWR has reduced its per capita consumption from 119 gallons to 74 gallons. However, DWR has two challenges: one is documentation of boiler and chiller maintenance and the other is landscaping maintenance. Where applicable, boiler and chiller maintenance is either done by trained DWR staff or by contract. The overall maintenance documentation record is not kept in a central location and is difficult to track. Improvement in this area is a focus going forward.

The second challenge is properly maintaining DWR's large landscape areas. DWR has five locations that have more than 20,000 square feet of landscaping, requiring a water budget for each large landscape and needing at least one staff person certified by an EPA WaterSense program or an Irrigation Association certification program. Developing the necessary water budgets and assuring staff certification are a priority for 2018.

Karla Nemeth
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SUSTAINABILITY GOALS

The Governor has directed California State Agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Sustainability includes the following general initiatives:

- Greenhouse Gas Emissions Reductions
- Building Energy Efficiency and Conservation
- Indoor Environmental Quality (IEQ)
- Water Efficiency and Conservation
- Monitoring Based Building Commissioning (MBCx)
- Environmentally Preferable Purchasing (EPP)
- Financing for Sustainability
- Zero Emission Vehicle (ZEV) Fleet Purchases
- Electric Vehicle Charging Infrastructure
- Monitoring and Executive Oversight

The Governor has issued numerous executive orders directing sustainable state operations. The orders relevant to water are:

Executive Order B-18-12

EO B-18-12 and the companion *Green Building Action Plan* require state agencies to reduce the environmental impacts of state operations by reducing greenhouse gas emissions, managing energy and water use, improving indoor air quality, generating onsite renewable energy when feasible, implementing environmentally preferable purchasing, and developing the infrastructure for electric vehicle charging stations at state facilities. The Green Building Action Plan also established two oversight groups; the staffs level Sustainability Working Group and the executive level Sustainability Task Force, to ensure these measures are met.

Executive Order B-18-12 requires State agencies to reduce agency-wide water use 10% by 2015 and 20% by 2020 as measured against a 2010 baseline. The 2015 and 2020 targets reinforce the SB X7-7 requirement that State agencies reduce water use at facilities they operate to support local water suppliers in meeting their targets.

On February 28, 2013, the California Department of Water Resources issued its Water Use Reduction Guidelines and Criteria, pursuant to Executive Order B-18-12. Each applicable agency was required to take actions to reduce water use in facilities and landscapes that are operated by the state, including facilities owned, funded or leased. State operated facilities are defined as facilities where the agency has direct control of the buildings' function, maintenance and repair. For leased facilities, the Green Building Action Plan directed at that time that new and renegotiated leases include provisions for water conservation, reporting water use and installation of sub-meters to the extent possible and economically feasible.

All the following sections in this water plan and the accompanying worksheet only repeat the initial criteria and guidelines issued at that time. Only the MWELO requirements have been updated since that time. Additionally, other Executive Orders have followed, strengthening and elaborating on the issues contained in EO B-18-12.

EO B-18-12 requires that beginning January 2013, agencies shall regularly report current water use into the water tracking database. Since January 2014, annual water use reports have documented progress towards the 2015 and 2020 targets using the ESPM http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager_benchmarking to track energy and water use and to submit annual reports to DGS. (Sustainability Manager, Department of General Services, 707 Third Street, 8th Floor, West Sacramento, CA 95798-9052). Additionally, for facilities with landscape areas over 20,000 sq. ft. the landscape water use must be tracked with a water budget program.

Executive Order B-29-15

EO B-29-15 directs state agencies to take actions in response to the ongoing drought and to the State of Emergency due to severe drought conditions proclaimed on January 17, 2014. The Governor directed numerous state agencies to develop new programs and regulations to mitigate the effects of the drought, and required increased enforcement of water waste statewide. Agencies were instructed to reduce potable urban water use by 25% between 2013 and February 28, 2016.

Executive Order B-30-15

EO B-30-15 declared climate change to be a threat to the well-being, public health, natural resources, economy, and environment of California. It established a new interim statewide greenhouse gas emission reduction target of 40 percent below 1990 levels by 2030, and reaffirms California's intent to reduce greenhouse gas emissions by 80 percent below 1990 levels by 2050. To support these goals, this order requires numerous state agencies to develop plans and programs to reduce emissions.

Other Relevant Executive Orders…

Executive Order B-37-16

EO B37-16 builds on what were formerly temporary statewide emergency water restrictions to establish longer-term water conservation measures, including permanent monthly water use reporting, new permanent water use standards in California communities and bans on clearly wasteful practices such as hosing off sidewalks, driveways and other hardscapes. The EO focuses on using water more wisely, and eliminating water waste by taking actions to minimize water system leaks. DWR estimates that leaks in water district distribution systems siphon away more than 700,000 acre-feet of water a year in California - enough to supply 1.4 million homes for a year.

The EO further strengthens local drought resilience and looks to improve agricultural water use efficiency and drought planning. State agencies are to cooperate with urban water management plans which include plans for droughts lasting for at least five years by assuring that the water efficiency and conservation plan has drought contingency actions.

State Administrative Manual & Management Memos

The following sections of the State Administrative Manual (SAM), and associated Management Memos (MM), currently impose sustainability requirements for water on the department under the Governor's executive authority:

SAM Sections

- Landscaping practices 1821.5
- Drought moratorium 1821.4

Relevant Management Memos

- MM 15-06 State Buildings and Grounds Maintenance and Operation
- MM 14-02 Water Efficiency and Conservation

Relevant Legislation

Sustainable Groundwater Management Act of 2014 - The Sustainable Groundwater Management Act (SGMA) directs the Department of Water Resources (DWR) to identify groundwater basins and subbasins in conditions of critical overdraft. Conditions of critical overdraft result from undesirable impacts, which can include seawater intrusion, land subsidence, groundwater depletion, and/or chronic lowering of groundwater levels. As defined in the SGMA, "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts."

As required in the SGMA, basins designated as high or medium priority *and* critically overdrafted shall be managed under a groundwater sustainability plan or coordinated groundwater sustainability plans by January 31, 2020. All other high and medium priority basins shall be managed under a groundwater sustainability plan by January 31, 2022.

WATER EFFICIENCY AND CONSERVATION REPORT

This Water Efficiency and Conservation Report demonstrates to the Governor and the public the progress the Department has made toward meeting the Governor's goals. This report identifies successful accomplishments, ongoing efforts, and outstanding challenges.

Introduction

California experiences the most extreme variability in yearly precipitation in the nation. In 2015, California had record low statewide mountain snowpack of only 5 percent of average while 2012-14 were the 4 driest consecutive years of statewide precipitation in the historical record. Now, the 2017 water year (October 1, 2016-September 30, 2017) is surpassing the wettest year of record (1982-83) in the Sacramento River and San Joaquin River watersheds and close to becoming the wettest year in the Tulare Basin (set in 1968-69). These potential wide swings in precipitation from one year to the next show why California must be prepared for either flood or drought in any year.

Therefore, using water wisely is critical. The E.O.s and SAM sections listed in the previous section demonstrate the connection between water and energy use, (the water-energy nexus), water and climate change, and water and landscaping. Further, the impact of water uses by state agencies goes beyond the scope of these E.O.s, SAM sections and DGS management memos as these documents do not address such related issues as water runoff from landscaping and various work processes and the potential for water pollution or the benefits of water infiltration, soil health and nutrient recycling. However, by using holistic water planning, a well-crafted water plan can not only meet all state requirements but add considerable value and benefits to the organization and surrounding communities.

Department Mission and Built Infrastructure

DWR manages much of California's water supply including the SWP. SWP water irrigates about 750,000 acres of farmland, mainly in the southern San Joaquin Valley. Approximately 25 million of California's estimated 37 million residents benefit from SWP water. The SWP facilities include 30 dams (29 of which impound water), 20 reservoirs, 29 pumping and generating plants, and approximately 700 miles of aqueducts. Of the hundreds of buildings owned by DWR, the Executive Orders cover only 70, which are at over 23 separate facility locations for a total of 361,355 square feet of building space. Table 1 shows the total amount and cost of DWR's 2016 water use. In 2016, DWR consumed over eight million gallons of water and did not use any recycled water. Although DWR has reviewed the possibility of using recycled water, the cost of recycling water has been shown to be prohibitive.

Table 2 displays the six DWR properties that consume the most water per capita. The top three water users include two of the three DWR visitor centers. By accommodating hundreds of thousands of visitors as well as housing a small number of permanent employees, all DWR's three visitor centers qualify as a transient noncommunity water systems under drinking water

rules. By functioning as small water systems, the volume of water consumed is much larger than would be normal for a single office building. For example, in 2017, the three visitor centers saw over 460,000 visitors, even though the permanent staff only totaled six people. Further, as small water systems, the per capita calculation, normally a reasonable indicator of building water use, is highly inaccurate. For DWR's visitor centers, when the transient visitor population is factored into the per capita calculation, the per capita use drops to a tiny fraction of a gallon. For this reason, the per capita calculation for these properties is omitted in Table 2.

The third largest user is the water quality test building, having only 3 staff but using 387 gallons of water per day per capita. However, the high water use in this building is due to the nature of the work. The various laboratory procedures including soil testing, concrete testing and water quality testing requires water intensive protocols and procedures to assure accurate test results.

Table 1: Total Purchased Water

Purchased Water	Quantity (Gallons)	Cost ($/Yr.)
Potable	8,035,400	$ $120,468
Recycled Water	0	$ 0
Total	**8,035,400 Gallons**	**$ 120,468**

Table 2: Properties with Largest Water Use Per Capita

Building Name	**Area (ft^2)**	**Total Gallons**	**Total Irrigation in Gallons (if known)**	**Gallons per Capita**
Romero Overlook Visitor Center	5,100	788,600	N/A	N/A
Vista Del Lago Visitor Center	18,446	474,300	N/A	N/A
Water Quality Test Building	2,400	423,900	Unknown	387
Lost Hills Operations and Maintenance Subcenter	37,600	1,385,700	Unknown	223
Sacramento Maintenance Yard	32,100	810,300	Unknown	117
Oroville Operations and Maintenance Center	51,413	2,599,300		117
Total for Buildings in This Table	**147,059ft^2**	**6,482,100**	**Unknown**	**N/A**
Total for All Department Buildings	**361,355 ft^2**	**8,035,400**	**Unknown**	**74**
% of Totals	**41%**	**80 %**		**---**

Table 3a: Properties with Largest Landscape Area

Building Name	Area (ft^2)	
Building Name	**Total Landscape Area (Sq. ft.)**	**Total Turf Area (Sq. ft.)**
San Joaquin Operations and Maintenance Center	133,800	62,800
Delta Operations and Maintenance Center	116,619	61,435
Oroville Operations and Maintenance Center	113,115	82,635
Sacramento Maintenance Yard	83,805	5,100
Lost Hills Operations and Maintenance Subcenter	32,700	11,900
Total for Buildings in This Table	**480,039ft^2**	**223,870**
Total for All Department Buildings	**549,599 ft^2**	**237,570**
% of Totals	**95%**	**94%**

As Table 2a illustrates, DWR facilities have nearly 550,000 square feet of landscaping, located mainly at the field division headquarters and the maintenance centers. The San Joaquin Operations and Maintenance center is the largest landscaped area with 133,800 square feet of total landscaping. Of the landscaped area for all facilities, nearly 50 percent is landscaped with turf or grass. However, the facility with the highest percentage of its landscaping in turf is Oroville at 73 percent turf. However, the landscaping at Oroville is a more climate appropriate landscaping than the landscaping at San Joaquin. Figure 1 clearly shows the comparison of the climate appropriate landscaping at Oroville versus the bright green lawns in stark contrast to the desert landscape surrounding the San Joaquin facility.

Figure 1: Comparison of Oroville Landscaping (right) with San Joaquin Operations and Maintenance Center

DWR's largest challenge is lack of funding for landscape irrigation improvements and replacing existing landscaping with climate appropriate plants. DWR has attempted to apply for funding only to be not eligible for funds or having funds exhausted before DWR applications were processed. DWR also attempted to collaborate with DGS on a demonstration project at the Fresno Office. Although the project would have used chiller blow down water currently discharged into a storm drain, and DWR had completed the landscape design, DGS was unable to follow through on landscape installation.

Table 3: Department Wide Water Use Trends

Year	Total Occupancy /Year	Total Amount Used (Gallons/Year)	Per Capita Gallons Per Person Per Day
Baseline Year 2010	539	17,473,300	119
Baseline Year 2013	539	10,850,500	74
2016 Total	539	8,035,400	55
2020 Goal			

Despite the lack of funding for irrigation and landscaping projects, DWR has achieved both the 20 percent reduction from a 2010 baseline and the 25 percent reduction from the 2013 baseline. Overall, DWR has reduced water use by 42 percent for a total annual savings of over eight million gallons of water. Table 5 details some of the water efficiency projects that DWR has completed to help achieve these savings.

Table 4: Total Water Reductions Achieved

Total Water Use Compared to A: 2010 Baseline	Reduction Achieved	Total Amount Used (gallons per year)	Annual Gallons Per capita
2010 baseline: 20% Reduction Achieved	☒Yes ☐ No	14,579,400	74
2013 baseline: 25% Reduction Achieved	☒Yes ☐No	11,396,300	58

DWR used ARRA funds in 2010 and 2011 to replace fixtures, showerheads and toilets in various field divisions and the three visitor centers. No retrofits have been done since those upgrades. However, DWR has completed its building walkthroughs and have identified areas that need upgrades or retrofits in Table 10.

Table 5: Summary of Indoor Water Efficiency Projects Completed or In Progress

Year Started	Water Savings (Gallons/Yr.)	Cost Savings per Year
2012	N/A	N/A
2013	N/A	N/A
2014	N/A	N/A
2015	N/A	N/A
2016	N/A	N/A

DWR has no boiler or cooling systems projects that include water efficiency.

Table 6: Summary of Boilers and Cooling Systems Projects Completed or In Progress

Year Funded	Water Savings (Gallons/Yr..)	Number of Systems with Water Efficiency Projects	Percent of Department Heating and Cooling systems
2012	N/A	N/A	N/A
2013	N/A	N/A	N/A
2014	N/A	N/A	N/A
2015	N/A	N/A	N/A
2016	N/A	N/A	N/A

DWR has over 549,000 square feet of landscaping at its facilities of which nearly 50 percent is turf grass. DWR has prioritized its landscapes and has completed a priority plan for installing drip irrigation and replacing landscaping. To date, DWR has installed a drip system at its San Luis Operations Yard, saving over 17,000 gallons of water annually. DWR has replaced twenty-

thousand square feet of landscaping with Model Water Efficient Landscape Ordinance (MWELO) plantings and eleven hundred square feet of climate appropriate plantings. As previously noted, DWR's San Joaquin Operations and Maintenance Center is the largest landscaped area. DWR has estimated that it still needs up to 280,000 drip emitters to complete the transition to drip irrigation. Water savings estimates are not available, but anticipated savings will be substantial. To track irrigation water, use separately from building water use, DWR will need to install 89 new submeters.

Table 4: Summary of Landscaping Hardware Water Efficiency Projects Completed or In Progress

Year Funded	Water Savings (Gallons/Yr.)	Estimated Annual Cost Savings	Total Number of Projects per Year
2012			
2013			
2014	17,054	$28	1
2015			
2016			
Totals	17,054	$28.00	1

Table 8: Summary of Living Landscaping Water Efficiency Projects Completed or In Progress

Year Funded	Project Name	Water Savings (Gallons/Yr.)	Landscape Area MWELO (ft2)	Climate Appropriate Landscape Area (ft2)
2013	Sutter Maintenance Yard	18,852		1,110
2014	Delta Operations and Maintenance Yard	329,276	5,140	0
	Totals	348,128 Gallons/Yr.	5,140 ft2	1,110 ft2

Water Shortage Contingency Plans and Critical Groundwater Basins

Urban water suppliers are required to maintain Water Shortage Contingency Plans that are customized to local conditions. These plans include a staged response to water shortages and droughts lasting up to three years. When implementing the stages of the Water Shortage Contingency Plan, the water supplier will require increasingly stringent reductions in water use.

State agencies are to be aware of their water suppliers' Water Shortage Contingency Plan and the potential impact each stage may have on their water use. State agencies are to have their own contingency plans in place for their building and landscaping water use to respond to any stage implemented by the water supplier.

The Sustainable Groundwater Management Act (SGMA) established a new structure for managing California's groundwater resources at a local level by local agencies. SGMA requires, by June 30, 2017, the formation of locally controlled groundwater sustainability agencies (GSAs) in the State's high- and medium-priority groundwater basins and subbasins (basins). A GSA is responsible for developing and implementing a groundwater sustainability plan (GSP) to meet the sustainability goal of the basin to ensure operations within its sustainable yield, without causing undesirable results. For those facilities located in critical groundwater basins, state agencies are to work with the local GSA plan.

DWR has four facilities in critical groundwater basins. One of the facilities, Vista del Lago Visitor Center, uses nearly 500,000 gallons of water per year. As previously discussed, Vista del Lago is a transient, noncommunity water system, with over 124,000 visitors per year. As DWR is the water system owner, DWR can reduce the Visitor Center's hours, or if necessary, close the facility as per the drought contingency plan.

DWR's other large water user in a critical groundwater basin is its Water Quality Test Building located in the San Joaquin Delta- Mendota Basin. The Water Quality Test Building uses over 400,000 gallons of water annually. Together these facilities account for ninety -seven percent of DWR's critical groundwater basin use.

Table 9: Number of Buildings with Urban Water Shortage Contingency Plans and in Critical Groundwater Basins

Number of Buildings with urban water shortage contingency plans.	Number of buildings in critical groundwater basins	Total Amount of water used by buildings in critical groundwater basins (Gallons)
2	4	923,500

Building Inventories Summary

DWR completed its building inventories walk through and identified ninety toilets that need replacing with low-flush toilets as well as five urinals. Seventy-seven faucets aerators and fifteen trickle-flow showerheads need installation. These upgrades will occur in the next year out of existing maintenance funds.

Table 10: Summary of Building Inventory Needs

Number of toilets to be replaced with 1.25 gallon per flush	Number of urinals to be replaced	Number of faucet aerators to be replaced	Number of showerheads to be replaced @ 2.0 gpm and trickle flow control	Number of clothes washers to be replaced with Energy Star washers	Number of garbage disposals to be replaced.	Number of pre-rinse valves to be purchased and replaced
90	5	77	15	N/A	N/A	N/A

Heating and Cooling Systems Inventories Summary

DWR has identified this as an area where more documentation of maintenance procedures is required. Although DWR has trained staff and or contracts in place for maintenance, this data is not centrally located nor well documented. DWR's plan for improving this section consists of conducting on-site inspections to obtain more thorough data regarding the level of boiler and chiller maintenance, conducting personnel training to ensure pertinent personnel is aware and familiar with the maintenance guidelines and include maintenance guidelines in engineering specifications and inspection criteria for new construction\renovation projects.

Table 11: Summary of Boilers and Cooling Systems Inventory

Amount of Water Used for make-up (Gallons)	Number of flash tanks to purchase and install	Number of meters to purchase and install	Amount currently reused? (Gallons)	Remaining additional water suitable for other purposes such as irrigation (Gallons)
Unknown	Unknown	Unknown	Unknown	Unknown

Irrigation Hardware Inventories Summary

Landscaping typically uses 50 percent or more of an agency’s total water use. While landscaping serves critical functions, the accompanying irrigation hardware, if not properly installed and maintained, can contribute to water waste. By reviewing and inventorying all irrigation hardware, it is possible to achieve significant water savings.

Flow sensing and flow measuring are irrigation techniques that are becoming more commonplace due to the usefulness of their applications in large irrigation systems. Flow sensors monitor the flow through an irrigation system and can alert a user to low or high flow conditions. The conditions may be caused by stuck valves, leaks or failures. At a minimum, flow sensing will save water, but the greatest advantages are realized for large system failures that can cause flooding, damages to buildings and safety hazards. Flow sensing is also a MWELO requirement for landscapes >5000 sq. ft.

Table 12: Summary of Irrigation Hardware Inventory

Number of separate meters or sub-meters to purchase and install.	Number of irrigation controllers required with weather or soil moisture adjustment and flow sensing capabilities to purchase and install.	Number of backflow prevention devices to purchase and install.	Number of flow sensors to be purchased and installed	Number of automatic rain shut-off devices needed	Number of new pressure regulators to purchase and install.	Number of new hydrozones needed.	Number of new valves to purchase and install.	Number of filter assemblies to purchase and install.	Amount of drip irrigation to purchase and install (area covered)	Number of booster pumps to purchase and install	Number of rotary nozzles or other high efficiency nozzles to purchase and install
89	TBD	0	TBD	TBD	TBD	TBD	TBD	TBD	283,419	TBD	TBD

Living Landscape Inventory

Far from being just an aesthetic or ornamental feature, landscaping plays a critical role around public buildings and facilities. From providing safety and security, to reducing local heat islands, suppressing dust, reducing water runoff, maintaining soil health, aiding in water filtration and nutrient recycling, landscaping around public buildings is essential. Further, landscaping in public places frequently surrounds historic places and public memorials as well as provides pleasant public gathering spaces. The health and proper maintenance of these landscapes is vital to the physical wellbeing of California’s people as well as to its social, cultural, political and historical life.

Additionally, the many vital ecosystem functions carried out by living public landscaping are critical in helping California meet its goals for greenhouse gas reduction, climate adaptation, and water and energy efficiency and water conservation.

Table 13 details DWR's living landscape, the number of memorials maintained by DWR, the MWELO compliant landscaping and the amount of climate appropriate landscaping. As previously discussed, although DWR has over five hundred thousand square feet of landscaping, much of it is climate appropriate. The exception is the San Joaquin Operations and Maintenance with 133,800 square feet of total landscaping, most of which is not climate appropriate. Replacing this landscaping with appropriate landscaping will be an on-going task as budget and staff constraints permit. However, two issues can be addressed in 2018 without requiring significant resources. One is the establishment of a water budget for the San Joaquin facility and the other is to assure that appropriate staff become EPA WaterSense certified (or other equivalent certification). Just accomplishing these two tasks will be a significant step forward on making sure water is being used wisely at this facility. This will be a priority in 2018. Other landscaping issues are discussed in the following section on large landscapes.

Table 13: Summary of Living Landscape Inventory

Landscape >500Sq. ft.)	Turf (Sq. ft.)	Number of historical sites or memorials	MWELO landscape area (Sq.ft.)	Climate appropriate landscape area (Sq.ft.)
549,599	266,180	1	5,140	1,110

Large landscape water use

Large landscape water use often represents a significant percentage of a facility's water use and significant water savings can often be achieved through better irrigation scheduling or inexpensive improvements in irrigation hardware. As part of the Water Use Guidelines and Criteria, the water use for landscape areas over 20,000 sq. ft. shall be tracked through a water budget program. Large landscapes also require EPA WaterSense or Irrigation Association certified staff.

As Table 14 shows, DWR has five facilities with large landscapes totaling over 490,000 square feet. Water budgets for these facilities have not been calculated nor do these facilities have any personnel who are EPA WaterSense (or equivalent) certified. Creating water budgets and getting certified staff is a priority for 2018 as these are straightforward steps that can assure that water on these landscapes is being applied efficiently.

Table 14. Summary of Large Landscape Inventory and Water Budget

Number of Facility Sites/Locations with > 20,000 sq.ft. of Landscaping	Total Landscape Area per facility (sq. ft.)	Total Water Budget per facility (Gallons)	Total EPA WaterSense or Irrigation Association Certified Staff
San Joaquin Operations and Maintenance Center	133,800	Water Budget not Calculated	No Certified Staff
Delta Operations and Maintenance Center	116,619	Water Budget not Calculated	No Certified Staff
Oroville Operations and Maintenance Center	113,115	Water Budget not Calculated	No Certified Staff
Sacramento Maintenance Yard	83,805	Water Budget not Calculated	No Certified Staff
San Luis Operations and Maintenance Center	42,960	Water Budget not Calculated	No Certified Staff
Total Landscaping Area	**490,299**	Water Budget not Calculated	No Certified Staff

BMPs

Building Best Management Practices (BMPs) are ongoing actions that establish and maintain building water use efficiency. State agencies are required by DGS Management Memo 14-02 to implement the building BMPs outlined below.

Directions for completing building BMPS. Under each heading, discuss how each BMP has been implemented. If the BMP is a process or inspection, explain how the process is institutionalized by the Department. Give number of repairs and replacements as well as estimated water savings under each BMP inspection.

Building Water Management BMPS

General Water Management

- Track monthly water use
- Check leak indicator on water meter when water is not in use

DWR tracks monthly water use and checks the leak indicator on its water meters. DWR maintains and compares water use annually considering seasonal water use.

Leak Detection and Repair

Perform monthly visual leak detection survey on all water use fixtures:

- Toilets
- Urinals
- Faucets - Check faucets for proper aerators (kitchen faucets 2.2 gpm and lavatory faucets 0.5 gpm), and install aerators or laminar flow devices if necessary.
- Showers - Check showerhead flow rates and install showerheads using no more than 2.0 gpm with trickle flow controls.

DWR performs monthly visual inspections and compares water use over time to assure that leaks are not occurring.

Kitchens

DWR does not have kitchen facilities

Laundry Facilities

DWR does not have laundry facilities

Building Heating and Cooling Systems BMPs

The BMPs in this section not only save water and energy but they perform an important safety role as well. The meters, leak detection processes, and routine maintenance following manufactures instructions required by these BMPs assure that costly repairs and accidents are avoided.

As previously discussed, this is an area that needs improvement. Although DWR has trained personnel and or contracts for these best practices, documentation is scarce. DWR's plan for improvement includes conducting on-site inspections to obtain more thorough data regarding

the level of boiler and chiller BMPs, conducting personnel training to ensure pertinent personnel is aware and familiar with the BMPs and include BMPs in engineering specifications and inspection criteria for new construction\renovation projects.

Landscaping Hardware Maintenance BMPS

Discuss how each of the BMPs is implemented; give the number of repairs and replacements as well as the estimated water savings under each BMP.

- Install check valves, swing joints and replace nozzles as needed
- Install faucet timers for hose or hand irrigation
- Install shut-off nozzles or quick-couplers for all hoses

DWR's landscaping BMPs are not well documented. Although DWR does little hand and or hose irrigation, it is not clear if facet timers are available. The same is true with shut-off nozzles. Documenting landscaping hardware BMPs is a priority in 2018 while assuring that written procedures exist and that staff training has been completed.

Living Landscape BMPs

Discuss how each of the BMPs is implemented; give the number of repairs and replacements as well as the estimated water savings under each BMP.

- Prioritize and assign value to plants within a landscape.
- During drought or other water shortages, give trees and large shrubs highest priority for survival.
- Continue to water trees and shrubs as needed.
- Refresh mulch as needed. All bare soil must be covered by a minimum of 3 inches of mulch.
- Adjust the irrigation schedule for seasonal changes.
- Test irrigation system monthly to check for leaks and misalignment, and other malfunctions. Repair immediately with the correct parts. Adjust irrigation systems as needed.
- Water early in the morning or in the evening when wind and evaporation are lowest. Never water between 10am and 6pm
- Prevent runoff! Make sure sprinklers are directing water to only landscape areas, avoiding hardscapes such as parking lots, sidewalks, or other paved areas. No irrigation water should ever be permitted to leave the site.
- Use WUCOLS to find plant water use requirements and only water landscapes according the plant water needs.
- Plant species native to the climate zone.

- Use bio-swales and other forms of rainwater capture to keep water onsite.
- Incorporate plantings for pollinators
- when planting new areas or replacing plants, add compost to the soil (entire planting areas, not just planting holes) at a rate of 4 cubic yards per 1000 square feet to a depth of six inches unless contradicted by a soil test. Fix leaks immediately.

Building landscaping is usually a function of building design and building age. Landscapes are typically installed with the building and designed to complement the building's appearance. Landscaping may also be installed with an eye to building safety and security as well. Typically, the landscaping never changes except when dead or diseased plantings are removed. Then those dead plants are usually replaced with the same species, regardless of whether the original planting was climate or site appropriate. This makes implementing drought protocols or water efficiency measures very difficult.

Most of DWR's buildings are over 50 years old and they reflect the landscaping practices of the 1950s. This means lush landscapes and predominately turf plantings. DWR's challenge is to cost- effectively transition these landscapes to the new water efficiency norms. Of the BMPs listed above, DWR needs to accomplish the following:

- Prioritize and assign value to plants within a landscape.
- Use WUCOLS to find plant water use requirements and only water landscapes according the plant water needs.
- Plant species native to the climate zone.
- Use bio-swales and other forms of rainwater capture to keep water onsite.
- Incorporate plantings for pollinators
- When planting new areas or replacing plants, add compost to the soil (entire planting areas, not just planting holes) at a rate of 4 cubic yards per 1000 square feet to a depth of six inches unless contradicted by a soil test.

Performing this transition takes expertise, time and budgets. Although DWR has the expertise among its staff, it does not have the budget for new landscaping. However, this is an area where replacing dead plantings with climate appropriate ones, using WUCOLS, considering pollinators and prioritizing and assigning values to plants can be done on an on-going basis, with actual landscape transitions occurring over time. Having a master landscaping plan for each facility can help with this transition. Creating these facility landscaping plans is a priority in 2018.

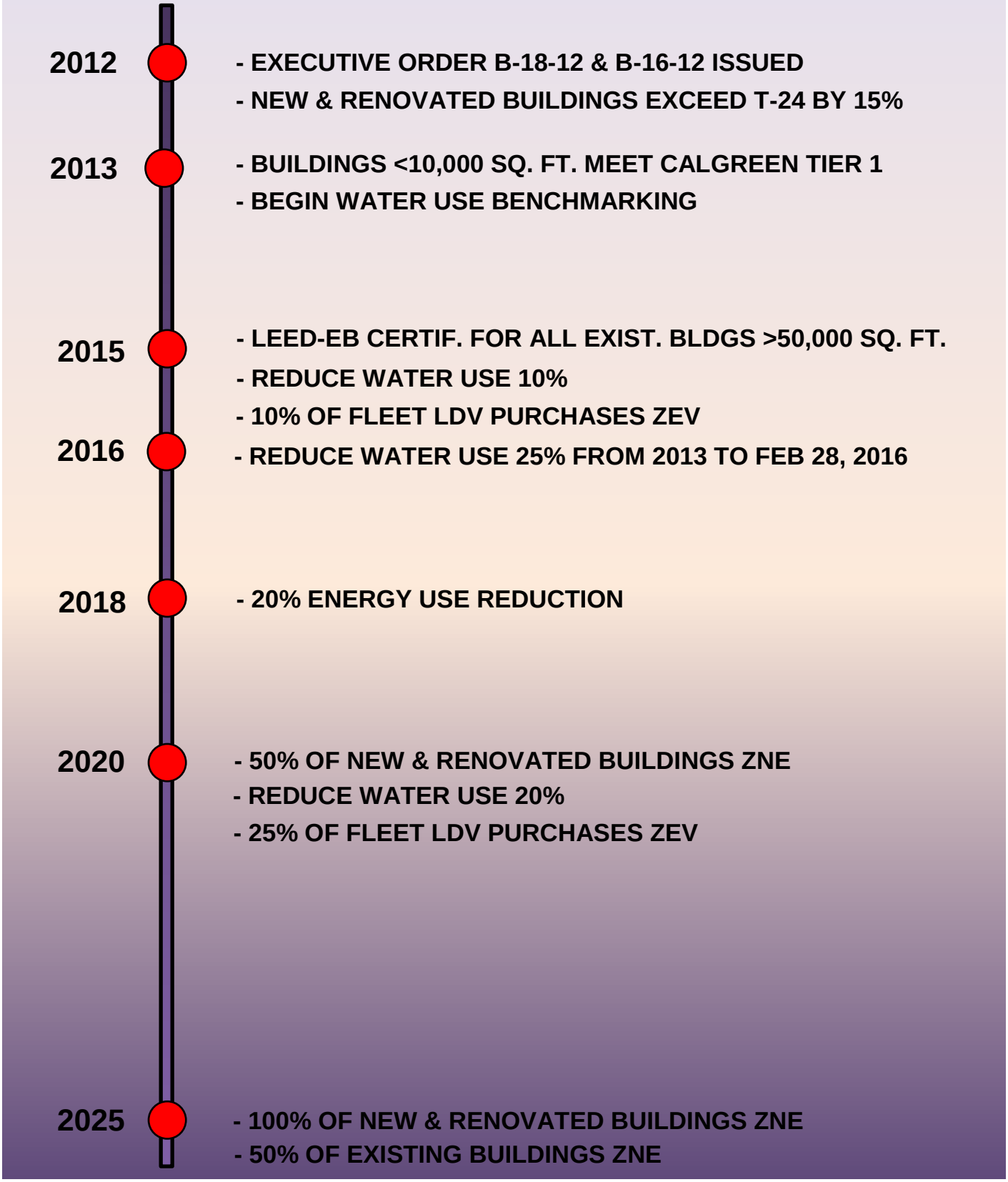
Monitoring, Reporting and Compliance

Each state agency is responsible for monitoring water use and reporting baseline and annual water use for compliance with the water use reduction targets. Water use shall be measured at facilities that have meters and submeters.

Water use must be estimated at state facilities that do not have water meters. All estimates and assumptions of water use should be well documented.

DWR has been reporting its water use monthly since 2010. For those facilities without meters, DWR uses standard estimates and has documented all its assumptions. DWR is following all water monitoring and reporting requirements.

SUSTAINABILITY MILESTONES & TIMELINE



RESPONSIBLE DEPARTMENT, PROGRAMS AND EMPLOYEES

List individuals, offices, and divisions responsible for leading efforts related to each initiative identified in this report. Include their respective titles, roles, responsibilities. The "**responsible party**" is the individual or entity that controls, manages, or directs the entity and the disposition of the entity's funds and assets

Indoor Water Efficiency Projects in Progress First initiative	
Water and Energy Efficiency Unit	Beatrice Rocha
	.

Boilers and Cooling Systems Projects in Progress	
Field Divisions	Building Operations and Maintenance Staff
Landscaping Hardware Water Efficiency Projects in Progress	
Field Divisions	Building Operations and Maintenance Staff

Living Landscaping Water Efficiency Projects in Progress	
Various Field Divisions	Building Operations and Maintenance Staff

Buildings with Urban Water Shortage Contingency Plans in Progress	
Field Divisions	Building Operations and Maintenance Staff