Sustainability Roadmap 2018-2019: Water Efficiency and Conservation

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

California Governor's Office of Emergency Services
Edmund G. Brown Jr., Governor

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California Governor's Office of Emergency Services Sustainability Road Map 2018-2019: Water Efficiency and Conservation

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TABLE OF CONTENTS

Page

TABLE OF CONTENTS iii
LIST OF TABLES iv
ACRONYMS v
GLOSSARY vi
EXECUTIVE SUMMARY 1
SUSTAINABILITY GOALS 3
Executive Order B-18-12 3
Executive Order B-29-15 4
Executive Order B-30-15 4
Executive Order B-37-16 4
State Administrative Manual & Management Memos 4
SAM Sections 4
Relevant MMs 4
Relevant Legislation 5
WATER EFFICIENCY AND CONSERVATION REPORT 6
Introduction 6
Department Mission and Built Infrastructure 6
Cal OES Water Trends 8
Water Shortage Contingency Plans (WSCP) and Critical Groundwater Basins 10
Building Inventory Summary 10
Heating and Cooling Systems Inventories Summary 11
Irrigation Hardware Inventories Summary 12
Living Landscape Inventory 13
Large Landscape Water Use 14
Building Management Practices 14
Building Water Management BMPs 14
Building Heating and Cooling Systems BMPs 15
Landscaping Hardware Maintenance BMPs 15
Living Landscape BMPs 15
Monitoring, Reporting and Compliance 16
DEPARTMENT STAKEHOLDERS 17

LIST OF TABLES

Page

Table 1: Total Purchased Water 7
Table 2: Properties with Largest Water Use Per Capita 7
Table 3: Properties with Largest Landscape Area 7
Table 3a: Department Wide Water Use Trends 7
Table 4: Total Water Reductions Achieved 8
Table 5: Summary of Indoor Water Efficiency Projects Completed or In Progress 9
Table 6: Summary of Boilers and Cooling Systems Projects Completed or In Progress 9
Table 7: Summary of Landscaping Hardware Water Efficiency Projects Completed or In Progress 9
Table 8: Summary of Living Landscaping Water Efficiency Projects Completed or In Progress 10
Table 9: Number of Buildings with Urban Water Shortage Contingency Plans and in Critical Groundwater Basins 10
Table 10: Summary of Building Inventory Needs 11
Table 11: Summary of Boilers and Cooling Systems Inventory 12
Table 12: Summary of Irrigation Hardware Inventory 13
Table 13: Summary of Living Landscape Inventory 13
Table 14. Summary of Large Landscape Inventory and Water Budget 14

ACRONYMS

BMP	Best Management Practices
Cal EMA	California Emergency Management Agency
Cal OES	California Office of Emergency Services
DGS	Department of General Services
DWR	Department of Water Resources
EO	Executive Order
FY	Fiscal Year
GHGe	Greenhouse Gas Emissions
GPM	Gallons per Minute
GSA	Groundwater Sustainability Agencies
HWP	Hot Water Pump
HQ	Headquarters
HVAC	Heating, Ventilation and Air Conditioning
IGA	Investment Grade Audit
MM	Management Memo
MWELO	Model Water Efficient Landscape Ordinance
SAM	State Administrative Manual
SOC	State Operations Center
SGMA	Sustainable Groundwater Management Act
WSCP	Water Shortage Consistency Plan

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.

Backflow 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.

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

Mulch – mulch is a layer of material applied on top of soil. Examples of material that can be used as mulch 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. When the device is switched off, the flow is reinstated with the temperature and pressure resumes to previous settings.

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% of California's energy use is related to water use with nearly 10% 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 Plans 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

In 1950, the California Office of Emergency Services was established as part of the Governor's Office as the State Office of Civil Defense. In 1956, the agency became more involved in natural disaster operations, and the name was changed to the California Disaster Office. Upon the adoption of the State's Emergency Services Act in 1970, the name was changed to the Office of Emergency Services. In 2009, the Department merged with the Governor's Office of Homeland Security legislatively changing the name to the California Emergency Management Agency (Cal EMA). In July of 2013, the Public Safety Communications Office merged with Cal EMA, becoming what we know today as the California Governor's Office of Emergency Services (Cal OES).

The mission of Cal OES is to protect lives and property, build capabilities, and support our communities for a resilient California. Cal OES responds to and coordinates emergency services to save lives and reduce property loss during disasters as well as coordinates recovery from the effects of disasters. On a day-to-day basis, Cal OES provides leadership, training, assistance and support to State and local agencies. Additionally, Cal OES coordinates with Federal agencies in responding, planning, and preparing for the most effective use of Federal, State, local, and private sector resources when California experiences a catastrophic emergency.

When emergencies exceed the capabilities of local resources, Cal OES activates the State Operations Center (SOC) located within the Cal OES Headquarters (HQ) in Mather, California. Regional Emergency Operation Centers may activate in Northern California (Inland and Coastal Regions) and Southern California (Southern Region) to receive and process local requests for assistance. Cal OES operates the California Specialized Training Institute in San Luis Obispo where training programs for local, county and State emergency services personnel are conducted.

Cal OES is an emergency responder that operates 24/7/365. As such, Cal OES faces challenges when it comes to meeting the 25% water reduction per Executive Order (EO) B-29-15. During activations, Cal OES operates around the clock and hosts several outside agencies responding to the disaster. Water consumption during these times can more than double. Activation often lasts several weeks at a time. During 2017, year round activations occurred due to numerous wild fires, earthquakes, and winter storms throughout California. The Cal OES increase in water consumption is in direct correlation with additional staff on site and the activation of the Cal OES SOC.

Over the last three years, Cal OES has initiated and worked on the preliminary planning phases of several mission critical projects to meet the Governor's sustainability goals pertaining to water efficiency and conservation. In 2015, a building and landscape inventory and inspection was completed to assess the condition of all water fixtures, appliances and irrigation equipment. Cal OES then took steps to make necessary repairs and replacements to fixtures. In 2016, Cal OES received a grant to replace all restroom faucets with automated faucets. The new fixtures helped decrease water usage as well as allow for additional energy savings. To continue on the path of energy and water efficiency, Cal OES is working with the Grants Unit at California Water Resource Board to retrofit all urinals, toilets, shower heads, and kitchen faucets with energy and water efficient fixtures.

Cal OES has roughly 156,816 square feet (3.6 acres) of landscape and is currently working with the Department of General Services (DGS) on a project that will utilize 100% drought tolerant vegetation throughout the entire Cal OES HQ campus. This evaluation will examine weather measurements to adjust the irrigation schedule that will minimize the water usage based on the type of drought tolerant vegetation and plants. The landscape plan will ensure that similar

groups of plants and shrubs are placed together allowing for less water usage. Mulch and drought tolerant ground coverings will also be used to bring irrigation usage down to a minimum.

With the ongoing drought conditions and California's changing climate, Cal OES is taking necessary steps to upgrade landscaping which will help reduce water consumption and effectively reduce water usage. Cal OES is committed to reducing water usage and will continue to explore ways to reduce usage.

Mark S. Ghilarducci
Director

SUSTAINABILITY GOALS

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

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

The Governor has issued numerous EO 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 departments to reduce the environmental impacts of State operations by reducing GHGe, managing energy and water use, improving indoor air quality, generating onsite renewable energy when feasible, implementing EPP 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 staff level Sustainability Working Group and the executive level Sustainability Task Force to ensure these measures are met.

EO B-18-12 requires State departments to reduce department-wide water usage by 10% by 2015 and 20% by 2020 as measured against a 2010 baseline. The 2015 and 2020 targets reinforce Senate Bill X7-7 requirement that State departments reduce water usage at facilities they operate to support local water suppliers in meeting their targets.

On February 28, 2013, the California Department of Water Resources (DWR) issued Water Use Reduction Guidelines and Criteria, pursuant to EO B-18-12. Each applicable agency is required to take actions to reduce water use in facilities and landscapes 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 are economically feasible.

All of the following sections in this water plan and the accompanying worksheet only repeat the initial criteria and guidelines issued at that time. Only the Model Water Efficient Landscape Ordinance (MWELO) requirements have been updated since that time. Additionally, other EOs have followed that strengthen and elaborate on the issues contained in EO B-18-12.

EO B-18-12 requires that beginning January 2013, departments shall regularly report current water use into a water tracking database. Since January 2014, progress towards meeting the 2015 and 2020 has been documented in the Energy Star Portfolio Manager: (http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager_benchmarking).

Executive Order B-29-15

EO B-29-15 directs State departments 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 departments to develop new programs and regulations to mitigate the effects of the drought, and required increased enforcement of water waste statewide. Departments were instructed to reduce potable urban water use by 25% by February 28, 2016.

Executive Order B-30-15

EO B-30-15 declared climate change to be a threat to well-being, public health, natural resources, economy, and the environment of California. It established a new interim statewide GHGe reduction target of 40% below 1990 levels by 2030, and reaffirms California's intent to reduce GHGe by 80% below 1990 levels by 2050. To support these goals, this order requires numerous State departments to develop plans and programs to reduce emissions. It also directs State departments to take climate change into account in their planning and investment decisions and employ life-cycle cost accounting to evaluate and compare infrastructure investments and alternatives. State departments are directed to prioritize investments that both build climate preparedness and reduce GHGe, prioritize natural infrastructure, and protect the State's most vulnerable populations.

Executive Order B-37-16

EO B37-16 builds on what were formerly temporary statewide emergency water restrictions in order 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. The 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 departments 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 departments under the Governor's executive authority:

SAM Sections

- 1821.5 Landscaping practices
- 1821.4 Drought moratorium

Relevant MMs

- MM 14-02 Water Efficiency and Conservation
- MM 14-07: Standard Operating Procedures for Energy Management in State Buildings
- MM 14-09: Energy Efficiency in Data Centers and Server Rooms
- MM 15-04: Energy Use Reduction for New, Existing, and Leased Buildings
- MM 15-06 State Buildings And Grounds Maintenance and Operation

Relevant Legislation

Sustainable Groundwater Management Act of 2014 – The Sustainable Groundwater Management Act (SGMA) directs DWR to identify groundwater basins and sub-basins 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 over drafted 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 Cal OES has made toward meeting the Governor's goals related to water efficiency and conservation. 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 a record low statewide mountain snowpack of only 5% of average while 2012-2014 were the four driest consecutive years of statewide precipitation on 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 EO and SAM sections listed in the previous section help 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 use by State departments goes beyond the scope of these EO, SAM sections and DGS MMs as these documents do not address such related issues as water runoff from landscaping and various work processes, 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 can add considerable value and benefits to the organization and surrounding communities.

Department Mission and Built Infrastructure

Cal OES has a responsibility to protect lives and property, build capabilities, and support communities under the authorities of the Essential Services Act. Accomplishing this mission requires a large and diverse team of individuals as well as a sturdy and well-structured building. Cal OES HQ, located at 3650 Schriever Avenue, Mather, California, was built in 2001 and is comprised of three Buildings (A, B, and C) totaling 125,400 square feet.

Building A houses the mission critical functions of Cal OES including the SOC and a central amphitheater that is used 24 hours a day during declared emergencies. The Warning Center is also located in Building A and is the central information hub for statewide emergency communications and notifications. This branch of Cal OES operates 24/7/365 and is staffed with Emergency Notification Controllers, Emergency Services Coordinators, and Senior Communications Coordinators.

Building B is a two story building housing the administrative offices of the department.

Building C contains the central plant for the HQ and contains the chiller and boiler plant for heating and cooling the two main buildings along with electrical switchgear and emergency generation equipment. Storage areas and an office for the building operations staff are also contained in Building C.

Represented below in Tables 1 and 2 is the total amount of indoor and outdoor potable water purchased in 2016, as well as gallons per capita. These numbers are retained and recorded monthly on the Energy Star Manager Portfolio website: https://www.energystar.gov/buildings.

Table 1: Total Purchased Water

Purchased Water	Quantity (Gallons)	Cost
Potable Indoor	1,414,565	$ 4,224.86
Outdoor Irrigation	1,632,249	$ 4,320.36
Recycled Water	N/A	N/A
Totals	3,046,814	$ 8,545.22

Table 2: Properties with Largest Water Use Per Capita

Building Name	Area (ft^2)	Total Potable Indoor Gallons	Total Irrigation in Gallons	Gallons per Capita
Cal OES HQ	125,400 ft^2	1,714,534	1,632,249	8,572.67
Total for Buildings in This Table	125,400 ft^2	1,714,534	1,632,249	8,572.67
Total for All Department Buildings	125,400 ft^2	1,714,534	1,632,249	8,572.67
% of Totals	100%	100%	100%	100%

Table 3 represents the total square footage of landscape at Mather HQ. This number correlates with Tables 1 and 2 as it specifies the total area of vegetation compared to gallons of irrigation used.

Table 3: Properties with Largest Landscape Area

Building Name	Area (ft^2)
Cal OES HQ	348,480 ft^2
Total for Buildings in This Table	348,480 ft^2
Total for All Department Buildings	348,480 ft^2
% of Totals	100%

The occupancy rate for 2010 is the number of authorized positions from the FY 2010/11 Governor's Budget, Salary and Wages Supplement. The occupancy rate for 2013 is the number of authorized positions from the FY 2013/14 Governor's Budget, Salary and Wages Supplement. The occupancy numbers for 2016 is the number of authorized positions from the FY 2016/17 Governor's Budget, Salary and Wages Supplement.

Table 3a: Department Wide Water Use Trends

Year	Total Occupancy 2016	Total Amount Used (Gallons)	Per capita Gallons per person per day
Baseline Year 2010	653	1,589,455	7
Baseline Year 2013	543	3,004,866	15
Year 2016	912	3,346,783	10
2020 Goal	900	1,271,564	4

Once water fixture and irrigation upgrades are completed (2020), Cal OES will reduce its consumption by the required 20% compared to the 2010 baseline.

Cal OES Water Trends

Cal OES faces challenges when it comes to meeting a 25% reduction per EO B-29-15 in response to water consumption due to being operational 24/7/365. During activations, the facility hosts multiple agencies assisting with the disasters. Water consumption during these times are very high due to the amount of people within the facility. Historically, activations last 16 days on average bringing in over 200 additional staff per shift. Furthermore, Cal OES hosts over a thousand meetings, seminars and training events per year which contributes to higher than average water consumption.

Cal OES experiences activations year round due to wild fires, earthquakes, and winter storms throughout California. In 2016, during the summer months (May-August), a total of 731,595 gallons of indoor water was used; 42% of the entire year total in four months. The high water percentage is in direct correlation with additional staff on-site and the activation of the Cal OES SOC.

Since 2012, Cal OES has worked diligently to alleviate the high usage of indoor water consumption by installing low flow sinks to the building and working with DGS landscapers to cease water usage during the months of November through April. Cal OES is currently working with DGS project managers on a landscaping project that will include drought tolerant plants as well as the use of mulch to eliminate unnecessary water usage during the hottest months of the year.

Cal OES takes multiple steps to educate the public, staff and visitors on water efficiency and conservation goals. Signs are posted throughout the building, in all restrooms and breakrooms emphasizing the importance of water usage reduction. "Save Our Water" slogans are present on emails and on the Cal OES Intranet and Internet.

As depicted in Table 4 below, Cal OES's achievements towards water reduction has yet to be realized; however, it remains a goal and focus to achieve the mandated reduction. It has been very difficult for Cal OES to achieve success in this endeavor because an increase of 50 to 100 employees each year has occurred. Additionally, activations for wild fires, earthquakes, floods, and winter storms throughout the year has brought several hundred additional staff to Cal OES for multiple months contributing to higher water consumption.

Table 4: Total Water Reductions Achieved

Total Water Use Compared to Baseline	Total Amount Used (Gallons per Year)	Annual Gallons Per capita
20% Reduction Achieved	0	0
Less than 20% Reduction	0	0
25% Reduction Achieved	0	0
Less than 25% Reduction Achieved	0	0
Totals	0	0
Department-Wide Reduction	0	0

As depicted in Table 5 (Page 9), Cal OES has had to a slow start in water reduction; however, beginning in 2016, results have vastly improved. This effort represents the implementation of several indoor water efficiency projects. Plans are in the works for a multitude of other water saving projects including, but not limited to, upgraded landscaping with drought resistant plants, upgraded outdoor watering systems and upgrades to urinals, water closets, shower heads, flow valves and kitchen faucets. These projects will ensure Cal OES meets and/or exceeds the 25% consumption reduction goal by 2020.

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

Year Started	Water Saved (Gallons/Year)	Cost Savings per Year
2012	N/A	---
2013	N/A	---
2014	N/A	---
2015	0	N/A
2016	620,508	$21,126.86

The 2016 data shown in Table 5 is based on a one year comparison from 2015. This reduction comes from reduction in landscape water usage as well as having the low flow sinks installed in January 2016.

Cal OES evaluated and assessed the boilers and cooling systems for their condition and operational efficiency in 2017 (see Table 6). A contract to replace and upgrade the hot water pumps and the cooling system are in progress and will be executed in fiscal year (FY) 17/18.

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

Year Funded	Water Saved (Gallons/Year)	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
2017	N/A	2	100%

In 2017, Cal OES used the DGS online project initiation system that allows projects to be tracked by the DGS Real Estate Services Division. This project request will allow our landscape to be replaced with modern drought tolerant native vegetation. Estimated annual water savings will be determined once the project has been completed by DGS in FY 17/18.

Table 7: Summary of Landscaping Hardware Water Efficiency Projects Completed or In Progress

Year Funded	Water Saved (Gallons/Year)	Estimated Annual Cost Savings	Total Number of Projects per Year
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
2017	N/A	TBD	1

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

Year Funded	Water Saved (Gallons/Year)	Landscape Area MWELO (ft2)	Climate Appropriate Landscape Area (ft2)
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	156,816	156,816

Water Shortage Contingency Plans (WSCP) and Critical Groundwater Basins

Urban water suppliers are required to maintain WSCPs 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 WSCP, the water supplier will require increasingly stringent reductions in water use.

State departments are to be aware of their water suppliers' WSCP and the potential impact each stage may have on their water use. State departments are to have their own contingency plans in place for their building and landscaping water usage in order 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-priority and medium-priority groundwater basins and sub basins. A GSA is responsible for developing and implementing a groundwater sustainability plan to meet the sustainability goal of the basin to ensure that it is operated within its sustainable yield, without causing undesirable results. For those facilities located in critical groundwater basins, State departments are to work with the local GSA plan.

Table 9: Number of Buildings with Urban WSCPs and in Critical Groundwater Basins

Number of Buildings with urban WSCPs	Number of buildings in critical groundwater basins	Total Amount of water used by buildings in critical groundwater basins (Gallons)
N/A	N/A	N/A

Building Inventory Summary

In 2015, Cal OES began working with DGS on a grant for indoor water fixture replacement through the Water Conservation Program. The total project amount requested was $80,150.00 and the funds were to be distributed as follows:

Cal OES: $ 21,624.00
DGS: $ 58,526.00

In 2016, Cal OES received $5,980.00 to retrofit restroom faucets throughout the entire facility. The new ultra low flow faucets have 0.5 gallons per minute (GPM) system while the previous faucets operated at 1.5 GPM. These specific faucets are automated with motion sensors function which reduce the water run time.

Cal OES is currently working with DGS for additional grant funds to continue the upgrade of remaining plumbing fixtures. This project will include the replacement of all facility, flush valves, urinals, shower heads and kitchen faucets. Currently, toilets flush at 1.6 GPM and will be replaced with 1.28 GPM models with a 1 GPM flush option for liquids. Urinals currently at 1 GPM will be retrofitted with .25 GPM fixture. The installation of these fixtures will provide tangible water savings. Estimation of water savings are expected to exceed 213,000 gallons a year. This reduction will reduce indoor water consumption by an estimated 28% compared to 2014 usage data.

Table 10 inventories the total amount of water fixtures throughout Cal OES and corresponds with the grant money being requested for the fixture upgrades.

Table 10: Summary of Building Inventory Needs

Number of water closets 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
32	10	26	5	N/A	N/A	N/A

Heating and Cooling Systems Inventories Summary

In response to an Investment Grade Audit (IGA) conducted in 2016, Cal OES is considering the following cooling system upgrades:

Cooling Tower System

Cal OES cooling tower fans have two-speed fan operations with separate motors for high and low speeds. The IGA has suggested converting the tower fans from two-speed to variable speed operations which will reduce stress and wear on the equipment. This process will also help modify existing condenser water set-point programming, optimize the condenser water under all operating conditions, and optimize chiller efficiency while minimizing excessive operation of the cooling tower fans.

Hot Water Pumps (HWP)

The primary HWPs are the pumps that circulate water through the boilers and the primary heating water loop in the boiler plant. Each pump serves one boiler and there is no redundancy built into the system. Both boilers are needed to provide heat to the facility during maximum heating conditions.

Both of the primary HWP pump seals have leaks but both of the pump assemblies are still in operation. The motors appear to be original equipment and have approximately 17 years of operation.

In 2017, Cal OES received a review of the two HWPs and it was determined that the two existing HWPs and motor assemblies must be replaced with the new version of the same component, with all new gaskets and gauges and reutilization of the existing seismic and mounting hardware. The estimate for pumps and repairs: $10,678.

As depicted in Table 11, neither of the systems are currently metered. Cal OES is in the process of obtaining meters for more efficient readings.

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)
Not Metered	N/A	2	0	N/A

Irrigation Hardware Inventories Summary

Landscape typically uses 50% or more of a department's total water usage. 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.

DGS landscapers maintain a system map to regularly assess irrigation hardware as part of their documentation for regular assessments. Water meters are located to the right of Building C in front of the vehicle gate. Backflow is located to the right of the entrance gate on Old Placerville Drive.

During spring and summer months when vegetation is watered, DGS landscapers ensure spouts are flowing directly onto landscaping. DGS landscapers also ensure there is at least 10 feet of space between the building foundation and irrigation system per local code requirements.

Cal OES has requested a grant through the Water Conservation Program for outdoor irrigation controllers, master valves and flow sensor installation. This request will correct a deficiency in Cal OES's existing irrigation system. Currently, the controller does not support the control of a master valve and flow sensor. The installation of this equipment will prevent future water loss due to mechanical failures and line breaks.

Watering schedules are set for evening hours, so if a line breaks or a sprinkler valve fails it is possible that it will go undetected because the current system does not have a built-in leak detection or system failure controller. Also, the current system has no way to recoup the water lost after a break or failure has occurred. Installing irrigation controllers will allow the system to detect a leak or failure and can shut down the system before the water is lost. The total project amount requested is $8,000. These funds were requested and distributed in 2015 and the funds were disbursed as follows:

Cal OES: $ 1,200.00
DGS: $ 6,800.00

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
1	1	N/A	1	1	1	TBD	0	0	N/A	N/A	N/A

Living Landscape Inventory

Far from being just an aesthetic or ornamental feature, landscaping plays a critical role around public buildings and facilities. It provides safety and security, reduces local heat islands, suppresses dust, reduces water runoff, maintains soil health, and aids in water filtration and nutrient recycling. 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 GHGe reduction.

Urban forests are vital to improve site conditions for occupants and visitors to buildings and the surrounding community. Cal OES has met with DGS project managers and architects to assess the landscaping conditions and to determine a drought friendly landscaping design for the campus. If it is found feasible to incorporate a living landscape feature at Cal OES, one will be implemented and indicated herein.

Table 13 (Page 14) identifies the landscape features to be inventoried. Once a site walk has been completed, a landscape inventory will be conducted.

Table 13: Summary of Living Landscape Inventory

Landscape >500Sq. ft.)	Turf (Sq. ft.)	Number of historical sites Or memorials	MWELO landscape area (Square Feet)	Climate appropriate landscape area (Square Feet)
N/A	N/A	N/A	N/A	N/A

Large Landscape Water Use

Large landscape water use often represents a significant percentage of a facility's water usage and substantial 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.

As indicated in Table 14 below, Cal OES has a large landscape inventory. Cal OES is in the very early stages of embarking on a landscape project with DGS. In the near future, Cal OES and DGS will be conducting a site walk to determine the landscaping needs. The water budget will be a factor in determining the final project scope.

Table 14: Summary of Large Landscape Inventory and Water Budget

Number of Facility Sites/Locations with > 20,000 Square Feet of Landscaping	Total Landscape Area per facility	Total Water Budget per Facility	Total EPA Water Sense or Irrigation Association Certified Staff
1	156,816	TBD	TBD

Building Management Practices

Building Best Management Practices (BMPs) are ongoing actions that Cal OES currently takes to establish and maintain building water use efficiency. Following critical practices in effective water management, Cal OES will be designating a water management coordinator to conduct the building walk-through pertaining to facility inventory and will implement the building BMP's and monitor water usage. Per DGS, in the beginning of implementation BMPs require that staff be able to have sufficient time and resources to perform the actions required. A certain level of expertise may also be required. It is possible that various skills are needed which may not be found in just one person but require a team approach.

Cal OES' BMPs are continuously updated based on need and tailored to fit the facility depending on occupancy and specific operations. Per MM 14-02, Cal OES is mandated by DGS to implement the following BMPs:

Building Water Management BMPs

General Water Management

Cal OES tracks its monthly water usage via the Energy Start Portfolio Website. See link below: https://portfoliomanager.energystar.gov/pm/property/1138077#water

The DGS engineer assigned to Cal OES ensures that a leak detection site-walk is completed on a daily basis as well as a separate evaluation conducted by DGS landscapers several times per month. Sacramento County water bills are received and reviewed every other month to check for any spikes in water usage and water meters are checked regularly by the DGS engineer to ensure accurate readings are being taken. If any irregularities are detected, the DGS engineer and Cal OES facility staff take immediate action to investigate and correct any problems.

Leak Detection and Repair

Leak detection inspections of the water closet fixtures are conducted on a daily basis by custodial and facility staff. In 2016 the restroom faucets were upgraded to battery powered faucets with a flow rate of .5 GPM.

Leak detection inspections of the toilets and urinals are conducted on a daily basis by custodial and facility staff. Cal OES plans to replace the current units with solar operated flush meters to allow for metered flushing and control of water usage as well as energy usage. Purchase of the flush meters will be determined in the 2018/2019 budget.

Leak detection inspections of the shower heads are conducted on a daily basis by custodial and facility staff. Cal OES has replaced shower heads with efficient shower heads that will save up to 20% more water during the duration of a shower and have a maximum flow rate of 2.0 GPM.

Kitchens

Custodial and Cal OES staff continuously check to ensure staff have completely turned off faucets. Employees are educated on water conservation practices by signage and memos to ensure they pre-soak utensils and dishes in basins of water rather than in running water, do not use running water to defrost food, turn water off and on as needed when using the kitchen sinks, etc. Cal OES has plans to adjust ice machines to dispense only the amount of ice needed.

Laundry Facilities

Cal OES does not have laundry facilities.

Building Heating and Cooling Systems BMPs

In 2017, Cal OES contracted with Johnson Controls to install an automated system to ensure that the HQ heating, ventilation and air conditioning system (HVAC) is operating at optimal levels at all times. The HVAC systems are monitored and controlled by the Johnson Controls Metasys building automation systems. The HVAC systems are controlled on a local basis by the respective stand-alone microprocessor based controllers. Should the system detect an unacceptable variance, an alarm will sound so that an adjustment can immediately be made. The DGS engineer assigned to Cal OES will then immediately make the necessary adjustments.

Cal OES has a boiler maintenance and repair contract with Bay City Boiler. Under the terms of the contract, Bay City Boiler performs an annual inspection and performs necessary maintenance and testing. Under the terms of the Bay City Boiler contract. Bay City Boiler's responsibility includes cleaning tube surfaces and checking the heat transfers to insure optimal energy efficiency. The last inspections was on May 17, 2017.

Cal OES has a cooling tower maintenance and repair contract with Garrett-Callahan for a water treatment program. This contract covers the monthly inspection and repairs if necessary of the condenser and cooling and heating system. Under the terms of this contract, the blowdown rate is verified during the monthly inspection.

Landscaping Hardware Maintenance BMPs

DGS is responsible for performing all landscaping as needed by Cal OES. DGS landscapers perform regular inspections and immediately address any issues identified with the landscape hardware. Cal OES does not have any landscaping that requires hand or hose watering.

Living Landscape BMPs

DGS is responsible for performing all landscaping as needed by Cal OES. DGS landscapers ensure that trees receive the highest care and maintenance priority during droughts or water shortages; followed by shrubs and then ground covering. Mulch is refreshed as needed to ensure a minimum three inch covering at all times.

DGS ensures that all trees, shrubs and ground covering are watered only as needed for sustainability. DGS regularly adjusts the irrigation schedule for seasonal changes. During the fall and winter seasons, the irrigations system is turned off and during the spring and summer

seasons the irrigation is set on a rotational basis and adjusted as needed to ensure trees, shrubs and ground cover receive only the amount of water needed for sustainability. This is achieved by utilizing the Water Use Classifications of Landscape Species which is a reference source for determining the watering needs for different species of plants. The irrigation system is set to only water during evening hours as this is when wind and evaporation is at the lowest point. Timers are never set to water between 10:00 a.m. and 6:00 p.m. In addition, Cal OES has a bio-swale located on the north side of HQ building that catches roof run-off water.

At a minimum, DGS performs a monthly visual inspection of the Cal OES's irrigation system. During the inspection DGS, ensures there is no runoff occurring and that the sprinklers are only watering plants. For example, no water is hitting the parking lots, sidewalks or other paved areas.

As plants need replacement, drought tolerant vegetation is planted. Cal OES anticipates that by June, 2018, all landscaping will be replaced with drought resistant plants. During landscape upgrades and plant replacement, compost is added to the soil at a rate of four cubic yards per 1000 square feet to a depth of six inches.

Monitoring, Reporting and Compliance

Cal OES is responsible for monitoring water usage and reporting baseline and annual water usage to meet compliance with the water use reduction targets. Water use is measured at the facility through water meters and is recorded on a monthly basis with Energy Star Management Portfolio.

DEPARTMENT STAKEHOLDERS

Indoor Water Efficiency Projects In Progress First initiative	
Sehar Choudhary	HQ Facilities Manager, Logistics Management Directorate
Erik Hornbaker	Facilities Branch Chief, Logistics Management Directorate
Ron Williams	Branch Manager, Logistics Management Directorate
Mitchell Medigovich	Deputy Director, Logistics Management Directorate
Mark Ghilarducci	Director, California Governor's Office of Emergency Services

Boilers and Cooling Systems Projects In Progress	
Sehar Choudhary	HQ Facilities Manager, Logistics Management Directorate
Erik Hornbaker	Facilities Branch Chief, Logistics Management Directorate
Ron Williams	Branch Manager, Logistics Management Directorate
Mitchell Medigovich	Deputy Director, Logistics Management Directorate
Mark Ghilarducci	Director, California Governor's Office of Emergency Services

Landscaping Hardware Water Efficiency Projects In Progress	
Sehar Choudhary	HQ Facilities Manager, Logistics Management Directorate
Erik Hornbaker	Facilities Branch Chief, Logistics Management Directorate
Ron Williams	Branch Manager, Logistics Management Directorate
Marilyn Nelson	Project Manager, Department of General Services

Living Landscaping Hardware Water Efficiency Projects In Progress	
Sehar Choudhary	HQ Facilities Manager, Logistics Management Directorate
Erik Hornbaker	Facilities Branch Chief, Logistics Management Directorate
Ron Williams	Branch Manager, Logistics Management Directorate
Marilyn Nelson	Project Manager, Department of General Services