State of California
The Natural Resources Agency
Department of Water Resources
Division of Statewide Integrated Water Management
Water Use and Efficiency Branch

INDEPENDENT TECHNICAL PANEL ON DEMAND MANAGEMENT MEASURES

Recommendations Report to the Legislature On Landscape Water Use Efficiency

A report to the Legislature pursuant to Section 10631.7 of the California Water Code

May 2016

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SECTION 1: INTRODUCTION

This report is submitted pursuant to California Water Code §10631.7 which directs the California Department of Water Resources (DWR or the Department) to convene an Independent Technical Panel (ITP or Panel) to provide information and recommendations to DWR and the Legislature on new demand management measures, technologies, and approaches. This report outlines the ITP's recommendations for California landscape water use efficiency and reduction measures, and provides a framework for future advances in water use efficiency. A glossary is provided to ensure clarity and consistency of terms related to landscape water use efficiency. These terms are italicized throughout the text of this report.

Background

In February 2014, the ITP submitted its first report to the Legislature on urban water management plan demand management measures. The document was prepared to allow the Legislature to consider ITP recommendations and potentially amend the Urban Water Management Planning Act (UWMPA) during the 2014 legislative session. The ITP's recommendations were ultimately incorporated into several legislative actions that resulted in amendments to the UWMPA.

Following completion of their first report, the ITP reconvened in March 2014 to discuss where to next focus their efforts. Several topics were considered[1] and discussed at subsequent meetings in May and August 2014. Through this process, the ITP decided it would next address *urban landscape* water use. The ITP convened in November 2014 and began to analyze challenges and solutions related to *urban landscape* water use, ultimately generating the recommendations contained in this report.

[1] A summary of the topic table s prepared by the ITP can be reviewed in Appendix A.

SECTION 2: INDEPENDENT TECHNICAL PANEL ON DEMAND MANAGEMENT MEASURES: ORGANIZATION AND PROCESS

Independent Technical Panel Purpose and Scope

The California Legislature passed Assembly Bill (AB) 1420 (2007) which amended the eligibility requirements for State water management grants or loans to be conditioned on urban water suppliers implementing specified water demand management measures.[2] AB 1420 also directed DWR to convene an Independent Technical Panel by 2009 to provide information and recommendations to DWR and the Legislature on new demand management measures, technologies, and approaches. The ITP was directed to report to the Legislature every five years, starting in 2010. DWR was directed to review the ITP's report and include in the final report to the Legislature, the Department's recommendations and comments regarding the Panel process and the Panel's recommendations.

Due to insufficient resources, DWR was unable to convene the ITP in accordance with the schedule specified in AB 1420. However, in January 2013, DWR, in consultation with the California Urban Water Conservation Council (CUWCC), solicited nominations and subsequently selected members for the ITP. The ITP held its first meeting on May 2, 2013. Since inception, the ITP has held 30 meetings between May 2013 and April 2016.

Independent Technical Panel Membership and Meeting Process

AB 1420 specified that the ITP should have no more than seven members, with at least one but no more than two representatives from the following: retail water suppliers, environmental organizations, the business community, wholesale water suppliers, and academia. In accordance with AB 1420, members of the ITP were selected by a joint committee of DWR and CUWCC representatives. Criteria for selection included prospective members' technical knowledge of demand management measures, their geographic representation, and the overall representative balance of experts in each of the designated categories. The ITP members are listed below:

Name	Representation	Organization
Peter Estournes	Business	Gardenworks, Inc.
Penny M. Falcon, P.E.	Retailer	City of Los Angeles, Department of Water and Power
David W. Fujino, Ph.D.	Academia	UC Davis, California Center for Urban Horticulture
William E. Granger	Retailer	City of Sacramento, Department of Utilities
Lisa Maddaus, P.E.	At large	Maddaus Water Management, Inc.
Edward R. Osann	Environmental	Natural Resources Defense Council
Jeff Stephenson	Wholesaler	San Diego County Water Authority

[2] California Water Code §10631.5, §10631.7, and §10644.

As a legislatively-created State body, ITP meetings were conducted in accordance with the Bagley- Keene Open Meeting Act of 2004 (Bagley-Keene). Meetings were also conducted consistent with the ITP Charter[3] developed by DWR and the ITP. The Charter describes roles and responsibilities, decision-making methods, communication protocols, and similar for the ITP. Meeting notices and materials were posted on DWR's web site[4] at least 10 calendar days in advance of each meeting. Every in-person, telephone, and web-based meeting was memorialized in written format and summaries were posted on the web site.

The ITP made decisions on administrative matters and on technical recommendations in accordance with the decision making methods described in the Charter. Each of the landscape water use recommendations in this report was proposed, deliberated, and decided upon using the "consensus with accountability" method described in the Charter. The ITP was deemed at consensus when all Members expressed ability to either support a proposal / recommendation, or at a minimum express a willingness to "live with" a proposal / recommendation and not reject it. If consensus could not be reached, decision-making deferred to a majority rule method of at least five ITP Members voting in support or "can live with" with a particular recommendation. In these circumstances, Members opposed to a recommendation were provided the option to prepare statements to be included in the Final Report that expressed their perspectives about the recommendation.

Roles and Responsibilities

The ITP is, true to its name, an independent panel conducting its deliberations and decision making. ITP activities on the landscape water use topic were supported by DWR, which provided technical and administrative staff support. Staff from the California State University Sacramento, Center for Collaborative Policy provided neutral third party meeting facilitation and ensured adherence to the Bagley Keene Act and Charter requirements.

Public Participation

All of the ITP meetings were open to the public in accordance with Bagley-Keene. The facilitator solicited public comments during the open discussion periods of each agenda item and prior to ITP decisions. The comprehensive Public Draft Report of the ITP's recommendations on landscape water use efficiency was posted for public review and comment for one month, from February 13 until March 13, 2016. All written comments received during the public comment period (and at all times during the ITP process) were considered by the ITP as they created and deliberated their recommendations about landscape water use.

[3] The ITP Charter is located on the California Department of Water Resources' ITP webpage: http://www.water.ca.gov/wateruseefficiency/sb7/committees/urban/u2/

[4] http://www.water.ca.gov/wateruseefficiency/

Landscape Water Use Discussion Process

Between November 2014 and April 2016, the ITP met 15 times, including two-day in-person meetings and conference call/web-based virtual meetings, to discuss and complete their recommendations and this report. As referenced in the above background section, the ITP planned for its 2014-2016 work from March 2014 to August 2014. The ITP agreed to conduct meetings as two-day events taking place approximately every other month, alternating locations between northern and southern California. In November 2014, the ITP began receiving presentations from a myriad of landscape industry organizations and advocacy groups on water use efficiency options. This allowed the ITP to engage in an open dialogue with professionals and define key issues related to the topic of *urban landscape* water use. The ITP continued receiving presentations and considering issues related to landscape water use for multiple meetings through April 2015, after which the ITP developed a seven-point framework to guide the creation of their final report recommendations. These seven framing topics were (in alphabetical order):

1. Incentives
2. Model Water Efficiency Landscape Ordinance (MWELO), Codes and Standards
3. Overarching Goals for State Water Use
4. Plant Labeling and Identification of High Water Use Plant Material
5. Public Perceptions and *Social Norms*
6. Research Needs and Support
7. Workforce Education and Certification

EXECUTIVE ORDER B-29-15

In April 2015, after a historically low snow pack, and fourth year of drought conditions, Governor Jerry Brown signed Executive Order (EO) B-29-15 requiring the first ever statewide mandatory water conservation measures. Relevant to the ITP, the EO required DWR to:

- Partner with local agencies to replace 50 million square feet of lawns and *ornamental turf* with *water efficient landscapes* in underserved communities.
- Revise MWELO in an expedited time frame to increase water use efficiency for new landscapes through more efficient irrigation systems, *graywater* usage, onsite storm water capture, and by limiting the portion of landscapes that can be covered by turf.
- Require local agencies to report on the implementation and enforcement of local water use efficiency ordinances.

While the ITP had already identified MWELO as a topic to address under their seven-point framework, the EO significantly expedited this particular effort. The ITP worked from late-April to mid-June 2015 in a focused effort with DWR to provide recommendations for the MWELO revisions required in the EO.[5] The revised MWELO was approved by the California Water

[5] See Appendix B for complete set of recommendations.

Commission in July 2015 and became effective in the California Code of Regulations on September 18, 2015. Local agencies were given until December 1, 2015 to adopt either the Revised MWELO or a local ordinance at least as effective. All agencies were required to comply with Revised MWELO reporting requirements by December 31, 2015. The adoption of regional ordinances was to be completed by February 2016 or MWELO became effective by default.

Below is a timeline of the ITP's work between April 2015 and April 2016, including the Panel's participation in the revision of MWELO:

- **April 2015:** ITP members volunteered to draft MWELO revision recommendations to be discussed and modified during a web-based meeting in May 2015. Their recommendations centered on turf limits, permits and fees, *graywater* capture and use, landscape water meters, *rainwater retention*, reporting requirements, penalties for noncompliance, and scope and size thresholds for the ordinance.
- **May 2015:** The ITP met twice via web-based meeting to discuss and improve their draft recommendations to revise MWELO. They also agreed to recommendations related to turf prohibition, *irrigation efficiency* requirements and landscape size and scope thresholds.
- **June 2015:** The ITP finalized their recommendations to DWR for revisions to MWELO. They also returned to discussion of the seven-point framework topics. At this meeting, they received presentations from industry experts on codes and standards related to *landscape water efficiency*, and on workforce challenges and opportunities. Authoring teams comprised of up to three ITP members volunteered to prepare text related to strengthening education requirements, removing barriers to landscape professionals, encouraging State agencies to hire licensed landscape professionals, and developing an MWELO short form (MWELO EZ) to improve compliance.
- **August 2015:** The ITP reviewed their Vision Statement for the final report as well as an outline for this document. Individual authors and authoring teams were created to prepare draft sections and recommendations included herein that reflect the collective sentiments of the ITP and past ITP discussions.
- **September 2015:** Authoring teams prepared draft report recommendations for review during two four-hour web-based meetings in October 2015.
- **October 2015:** The ITP met via web-based meeting to review draft sections of the final report, and to develop recommendations for next steps to prepare the ITP final report content. Authoring teams continued to work on recommendation text throughout the month.
- **November 2015:** The ITP continued to review draft recommendation text. Authoring teams considered feedback and continued to revise recommendations throughout the month. At this meeting, a Metrics Work Group was formed to address the numerous statistical references embedded throughout the report recommendations.

- **December 2015 and January 2016:** These meetings were also dedicated to the review and discussion of updated and newly available draft recommendation text. Authoring teams considered feedback and continued to revise recommendations over the course of the next three months.
- **February 2016:** The ITP held a web-based meeting to review draft sections and to take formal action determining which draft sections to include in the Public Draft Report. All contents in the body text of the document represented unanimous or majority approval of said text by the ITP, as per its decision rule memorialized in the ITP Charter. The Public Draft Report was then made available for a 30-day comment period on February 13, 2016.
- **March 2016:** The ITP hosted a full-day public meeting to receive and consider comments on the Public Draft Report. Ten days following the public meeting, the ITP held a web-based meeting to discuss how to incorporate and/or address public comments into their final report.
- **April 2016:** Final meeting of the ITP, where recommendations and supporting text were finalized and approved for submission to the California Department of Water Resources and the Legislature.

SECTION 3: ACHIEVING SUSTAINABLE URBAN LANDSCAPES THROUGHOUT CALIFORNIA

This section presents background information about the vision and recommendations of the Independent Technical Panel (ITP). It includes a vision statement, a description of the *watershed approach* to California landscapes, a description of actions to support the *watershed approach*, and an overview of the ITP's recommendations on landscape water use efficiency.

PART #1: Independent Technical Panel Vision Statement

In the grip of a drought that is truly unprecedented in California's recorded history, communities throughout the State have been directed to curtail urban water use by 25 percent, and initial reporting indicates that most communities have met their goal thus far. Prior to these extraordinary reductions, approximately half of the urban water provided for all purposes in California was used outdoors, primarily for landscape irrigation. This staggering amount of potable water, roughly four million acre-feet per year, illuminates the critical importance of the choices individuals and communities make about landscaping.[6]

Functional and attractive landscapes are essential to our quality of life, providing places to recreate and relax, cooling the environment around buildings, offering wildlife habitat, and creating places of beauty. But the current drought is a reminder that the landscape designs we have brought to California, coupled with ingrained habits of water use, are not sustainable. Homes, businesses, and parking lots surrounded by vivid green turf make inordinate demands on the same water supplies we depend on for cooking, bathing, sanitation, and business activity. A cultural norm that originated in the English countryside is increasingly out of place in today's California – let alone, in a more populous California with an even warmer climate in the years ahead.

A break with the past would involve at least four key changes for new landscapes:

- Rainwater would be largely retained on site or nearby for landscape use or groundwater recharge.
- Soil would be managed to hold moisture, filter pollutants, and sequester carbon.
- Attractive *water-wise plant material* would be used in place of most *ornamental turf* and other high water using plants.
- Water for *supplemental irrigation* would be separately measured to allow for careful water management and would be applied through efficient *landscape irrigation systems* and techniques

[6] California Department of Water Resources. *California Water Plan Update 2013*. 2014. Section 3 – Resource Management Strategies. Chapter 3 – Urban Water Use Efficiency. 3-10.

These same strategies can be applied to existing landscapes, albeit to a degree that is financially practical and at a pace that allows for public awareness and acceptance. The good news is that these practices are well known and available today. A growing selection of *water-wise plant materials* and more water-efficient irrigation equipment is available at home centers and nurseries around the State. A growing movement of landscape professionals treat rainwater and stormwater as resources to be used on site, rather than as a nuisance to be quickly expelled from the property. And the remarkable enthusiasm for participation in turf conversion rebate programs is a sign that significant public interest exists to make this transition.

Over the long term, water suppliers and their customers will benefit by a gradual but steady reduction in potable water use outdoors. Landscape water use is the most variable part of urban water demand – subject to wide swings in use between wet and dry years and from winter to summer. Nearly every urban water utility's *peak demands* are shaped by landscape water use and these *peak demands* drive requirements for costly conveyance, treatment, and distribution capacity (see Figure 1). A less thirsty *urban landscape* would mean less volatility in demand throughout the year and from one year to the next, and provide greater revenue stability for water suppliers and lower peak-related costs to be recovered from customers. Ideally, for many water suppliers, reduced landscape water use will improve the reliability of water supplies, allowing additional water to be drawn upon during future droughts.

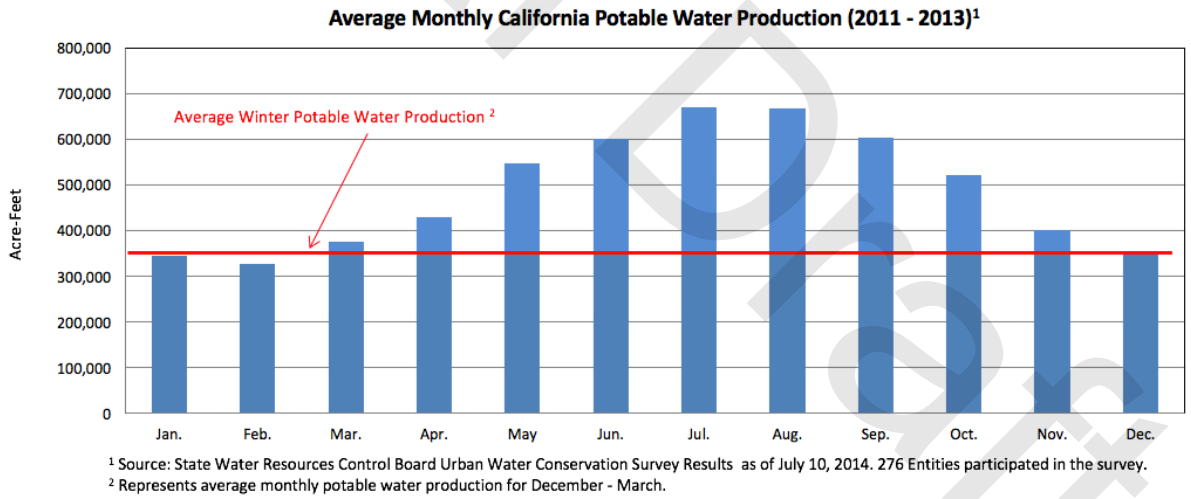

Figure 1

The professional landscape industry will benefit through new and profitable business models, incorporation of new technologies and alternate water sources, efficiencies, and a better trained and educated workforce while still creating and managing outdoor areas for enjoyment, relaxation, habitat and social wellbeing.

A Goal for the State: Reduce potable water use on urban landscapes by half over the next twenty years

The purpose of this report is to provide a comprehensive and complementary set of recommendations for adoption of the policies and practices that will make landscape water use far more sustainable than today. The Independent Technical Panel recommends a goal to reduce potable water use on *urban landscapes* statewide on the order of 50 percent from pre-drought levels over the next 20 years. This will result in an average annual savings of more than two million acre-feet, or about four times the amount of water used by the entire City of Los Angeles in one year. In broad terms, these savings will largely come from three sources:

- Approximately 800,000 acre-feet from the replacement of roughly 140,000 acres of *ornamental turf* – about seven percent of the State's turf area – with *water-wise plant material*[7]
- Approximately 800,000 acre-feet from improved irrigation equipment, plant selection, soil health, and rainwater catchment at other existing residential and commercial landscapes[8]
- Approximately 400,000 acre-feet from the application of stronger landscape water use standards for all new landscaping, as per the State's *Model Water Efficient Landscape Ordinance* [9]

By 2035, the use of potable water on *urban ornamental landscapes* will be much less common than today. Residential and commercial landscapes will be attractive and *functional*, and will be largely sustained by natural precipitation where it falls, *harvested rainwater*, and on-site sources of water acceptable for landscape use. Such landscapes will retain most precipitation for storage, direct use, or recharge, rather than generating runoff.[10]

The use of *recycled water* and other approved on-site sources of non-potable water will contribute to the reductions in potable water applied to *urban landscapes* recommended in this

[7] Assumes 0.121 gallons of water saving per square foot per day. Metropolitan Water District of Southern California. Metropolitan's Conservation Savings Model: Methodology and Assumptions, 2015 Integrated Resources Plan Update, Water Efficiency Workgroup. Draft. 04/13/2015. Page 8.

[8] As noted, a variety of strategies can contribute to these savings. If half of existing landscapes reduce ETAF from 1.2 to 0.8 (the current Model Water Efficient Landscape Ordinance (MWELO) standard for existing landscapes), savings of this magnitude would be achieved. Assumes current *plant factor* averaging 0.85 and current *irrigation efficiency* averaging 70% on half of existing *landscape area* using 2.4 M AFY pre-drought. Savings attributable to irrigation controller upgrades alone have been estimated at 18 to 22%. See Berg, J.O. et al., "Residential Weather-Based Irrigation Scheduling: Evidence from the Irvine "ET Controller" Study, June 2001, Irvine Ranch Water District, CA; and Brown, et al., "Water Efficient Irrigation Study," May 2003, Seattle Public Utilities.

[9] Annual savings of 15,000 to 20,000 AFY with low water use planting in new landscapes, as per Yale team presentation (under "NRDC Presentation for ITP" here: http://www.water.ca.gov/calendar/index.cfm?meeting=23682).

[10] According to the California Urban Water Conservation Council's *Achieving a New Normal in California Landscapes*, a watershed-based approach to *urban landscapes* promotes a balance between resource efficiency and protection, environmental stewardship and quality of life. It is a more collaborative and integrated way of managing water, soil, energy and air resources, as well as improving water quality, reducing runoff, protecting wildlife habitat, reducing waste and mitigating the effects of climate change.

report. Recycled and alternate waters can provide drought-proof local water supplies, the availability of which is not subject to variations in weather. Because of this, *recycled water* and other alternate sources should play an expanded role in the State's efforts to reduce potable water use on *urban landscapes*.

There is no single program that will achieve these results, and it is unrealistic to expect that all landscape conversions will be financed with public funds. The policies and practices that will achieve these results will involve a combination of market forces, targeted incentives, reasonable regulations, improved business models, workforce preparation, evolving *social norms*, and applied research. Specific recommendations for each of these areas are contained in the chapters that follow.

SECTION 3: ACHIEVING SUSTAINABLE URBAN LANDSCAPES THROUGHOUT CALIFORNIA

PART #2: The Watershed Approach to California Landscapes

Approximately half of California's potable water supply is used as *supplemental irrigation* on our *urban landscapes* given that plants commonly used often do not adapt to our natural climate.[11] Recent and severe droughts are requiring that California accelerate toward more *sustainable landscapes* and *water efficient landscape* practices. A key strategy to support this statewide transformation is taking a watershed based approach to design, install and manage future California landscapes.

As defined by the California Urban Water Conservation Council, the ***watershed approach*** is an integrated and holistic approach to site-specific landscape design, construction, and maintenance that transcends water-use efficiency to address the related benefits of *rainwater capture* and use; reduction of storm water runoff, pollution, greenhouse gases, and green waste; energy and cost savings; and human and wildlife habitat improvements[12].

Landscape management must integrate and coordinate all the activities that affect a watershed's natural resources, water quality and water supply. The California Department of Water Resources has also adopted the *watershed approach* in their most recent update to the *Model Water Efficient Landscape Ordinance*:

> *490 (c): Landscapes that are planned, designed, installed, managed and maintained with the watershed based approach can improve California's environmental conditions and provide benefits and realize sustainability goals. Such landscapes will make the urban environment resilient in the face of climatic extremes.* [13]

The ITP strongly supports the *watershed approach* to California landscapes, and emphasizes that this innovative approach be embedded in statewide and local policies, procedures and methodology. This includes leveraging partnerships between various agencies and organizations. As a result, the *watershed approach* is a focal point of all the Independent Technical Panel's recommendations aimed at improving our water management of *urban landscapes.*

[11] 2013 California Water Plan, Chapter 3, Page 8, Landscape Irrigation

[12] https://www.cuwcc.org/Portals/0/Document%20Library/Resources/Sustainable%20Landscapes/Watershed%20Approach_Briefing.pdf?timestamp=1430853508685

[13] http://www.water.ca.gov/wateruseefficiency/landscapeordinance/docs/E.OB_29_15_MWELO_Update_07-09-%2015_Draft_Final.pdf

SECTION 3: ACHIEVING SUSTAINABLE URBAN LANDSCAPES THROUGHOUT CALIFORNIA

PART #3: Actions to Support the Watershed Approach

The Independent Technical Panel's (ITP) report recommendations are consistent with the *watershed approach*, and an essential strategy to achieve sustainable *urban landscapes* throughout California. The ITP's goal is to promote education, incentives and mandates that maximize the *watershed approach* with on-site water retention and use, design with climate appropriate plants, and management of soils such that *supplemental irrigation* with potable water is minimal or ideally eliminated. This strategy is tied to the following key objectives as agreed to by the ITP:

- Manage water as effectively as possible on existing and new landscapes, which includes new irrigation equipment standards and requiring permitted systems.
- Retrofit existing landscapes through financial incentives to replace high water consuming ornamental plants, including turf grass.
- Design and construct new landscapes as efficiently as possible leveraging implementation and enforcement around the *Model Water Efficient Landscape Ordinance*, or local equivalent policy.
- Transform the workforce to meet the goal of more watershed based landscapes designed, installed and managed by trained and certified professionals with continuing education requirements.
- Change social and cultural norms through education to gain greater acceptance of the minimal *supplemental irrigation* needed by many native and climate appropriate ornamental plants and through irrigation management education.
- Accelerate the use of *sustainable landscapes* with more visibility in State and publicly owned buildings that are highly water efficient through installation of demonstration landscapes.
- Include funding for research to quantify efficiency and value of landscape water use programs, equipment, technologies, techniques, regulations, etc.

SECTION 3: ACHIEVING SUSTAINABLE URBAN LANDSCAPES THROUGHOUT CALIFORNIA

PART #4: Independent Technical Panel Recommendations on Landscape Water Use Reduction and Efficiency

Recommendations Overview

The Independent Technical Panel's (ITP) final recommendations on landscape water use efficiency measures address a variety of issues determined by the Panel members to be of critical and timely importance. The recommendations acknowledge the importance of functional and attractive outdoor spaces, while aiming to achieve cumulative water savings in support of the Panel's vision of a California that uses one-half the potable water on outdoor landscapes in 2035 from pre-drought water use levels.

While each recommendation can be viewed as an independent proposal, it is essential to realize that taken together, these recommendations have the potential to achieve significant water savings for the State. Many of the recommendations are synergistic: when combined they may produce a total effective water savings that is greater than the sum of the individual contributions.

The report organizes the recommendations into eight sections, beginning with Section 4, generally mirroring the original seven-point framework the ITP developed. Within these eight sections are a total of 19 recommendations. The recommendations are presented such that each contains: a background statement, a general recommended action, and a detailed proposed action. All recommendations herein represent consensus or majority approval for inclusion by the ITP, as per its decision rule memorialized in the ITP Charter[14] (*May 2013*).

Each recommendation and corresponding proposed action(s) can be categorized into one or more of the following four types:

- **Mandate**: A recommendation to the Legislature for a mandatory order or requirement to be made under statute, regulation, or by a public agency.
- **Standard**: A recommended new standard, or critical modification or update to an existing form, procedure, protocol, equipment performance measure, etc. to be made and considered by an authority or by general consent as a basis of comparison. Standards may or may not require legislative actions.
- **Education**: A recommendation for the continued education of industry professionals and the general public such that particular knowledge essential to achieve landscape water use efficiency (e.g. latest developments, new technologies, regulatory changes,

[14] http://www.water.ca.gov/wateruseefficiency/sb7/committees/urban/u2/docs/itp_charter.pdf

etc.) is imparted in an effective and timely manner. Educational recommendations may or may not have associated legislative actions.

- **Incentive**: A recommendation to provide an incentive in order to encourage and stimulate positive action relating to reduced landscape water use. Incentives are most often financial in nature, and may or may not have associated legislative actions.

The following chart lists the 19 recommendations and identifies the major categories into which they fall (Figure 2).

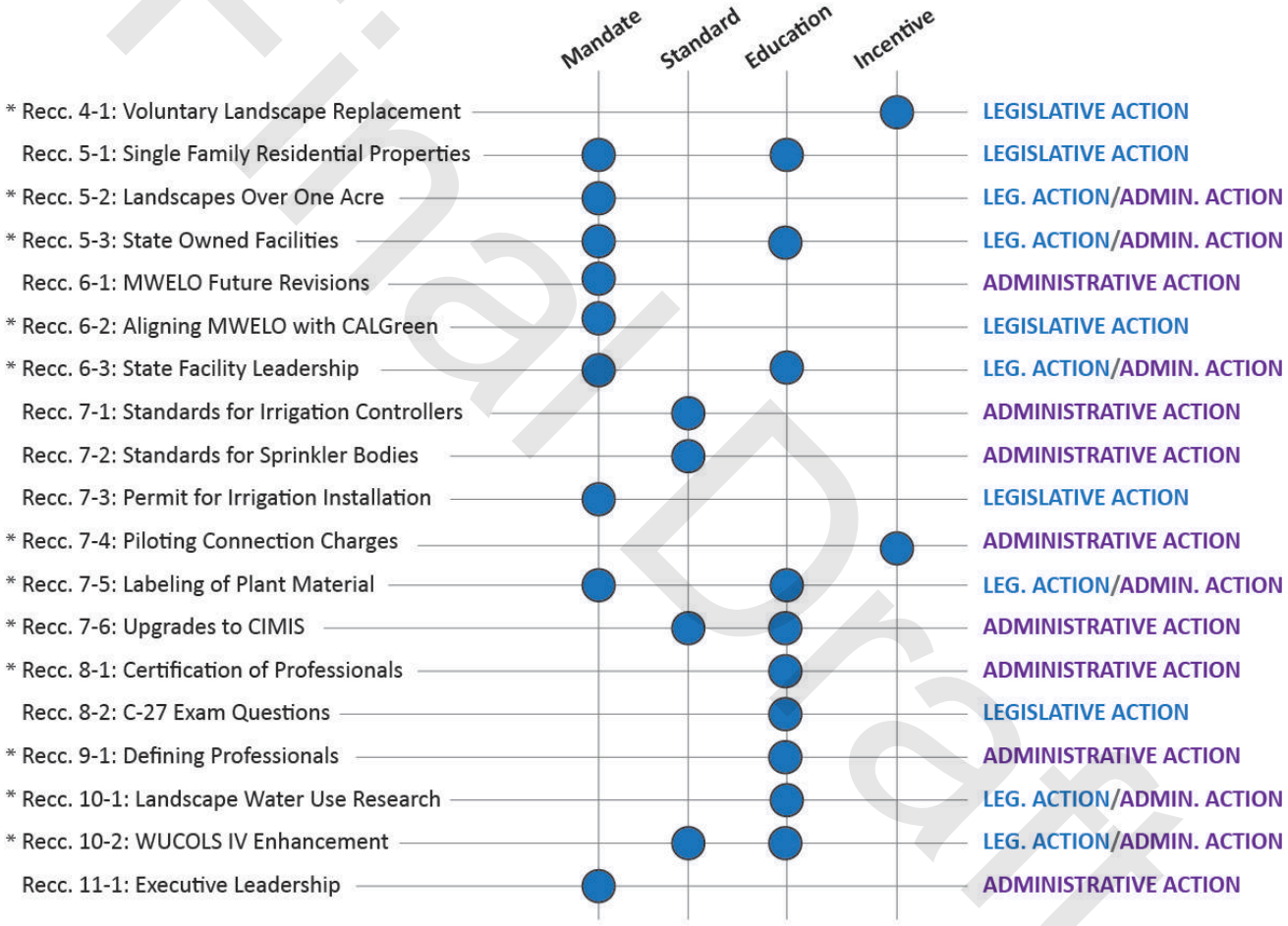

Figure 2: ITP recommendations on landscape water use efficiency measures by recommendation category. Recommendations identified with an asterisk (*) indicate funding is required for implementation.

SECTION 4: VOLUNTARY LANDSCAPE REPLACEMENT

This section presents the Independent Technical Panel's recommendations on opportunities for voluntary landscape replacement. It includes a recommendation for a landscape replacement incentive program.

RECOMMENDATION #1: Landscape Replacement Incentive Program

Background

According to the *California Water Plan 2013 Update*, the residential landscape and large landscape sectors account for approximately four million acre-feet, or 44 percent, of statewide urban water use per year. [15] Irrigation of commercial landscapes on mixed use accounts easily brings total outdoor water use to 50 percent of all water used in urban areas. A large volume of the water used by these sectors is wasted due to leaks, overwatering, and poorly maintained irrigation systems. Contributing to the high water use is the prevalence of cool-season turf grasses and other high-water-use plants.[16]

Many water suppliers around the State have offered customer incentives for turf replacement since the mid-2000s and customer participation has been strong. Notably, the Metropolitan Water District of Southern California has provided over $300 million to support residential and commercial turf removal in Southern California, supplementing turf replacement incentives offered by many of its member agencies. During Fiscal Year 14-15, 35 million square feet of turf were replaced, the initial portion of a planned total of 175 million square feet under this program.[17]

The Governor's April 2015 Executive Order directed the California Department of Water Resources (DWR) to initiate a program aimed at replacing 50 million square feet of turf. In August 2015, the Department launched the first phase of this program, seeking replacement of 10 million square feet of turf by residential property owners not otherwise participating in a local turf replacement program. During the first 8 months of this program, 3.3 million square feet of replacement have been accomplished at 2,097 locations.[18]

The amount of turf in California is vast – over two million acres.[19] No incentive program or programs can provide financial incentives to convert this large area, and replacement of all turf is not necessary to greatly improve the efficiency of landscape water use. Nevertheless, the stop and start nature of turf replacement programs undercuts the development of strong

[15] California Department of Water Resources. 2014. *California Water Plan Update 2013.* Volume 3 - Resource Management Strategies, Chapter 3 - Urban Water Use Efficiency, 3-10.
[16] Ibid., 3-12.
[17] Metropolitan Water District, *Water Tomorrow Progress Report*, February 2016, p.8.
[18] Todd Thompson, California Department of Water Resources, personal communication, April 11, 2016.
[19] Total turf in California: 2.75 million acres plus or minus 25%. C. Milesi, et al, "Mapping and Modeling the Biogeochemical Cycling of Turf Grasses in the United States," *Environmental Management*, Vol. 36, No. 3, July 2005, p. 433.

practices and a capable workforce to accomplish the replacement of *ornamental turf* over the next two decades.

Since 2005, there has been active Federal Income Tax Credits for Energy Efficiency. The Energy Policy Act of 2005 established an original federal tax credit for energy improvements to existing homes, with the Energy Improvement and Extension Act of 2008 and the American Recovery and Reinvestment Act of 2009 and subsequent acts further extending this credit through 2019. According to California Public Utilities Commission (CPUC) former President Michael R. Peevey, "California leads the nation in aggressive policies that promote renewable power and decrease greenhouse gas emissions. The State is offering nearly $3 billion in incentives for consumers and businesses to invest in solar power. "Go Solar California" offers tools and information to streamline the solar process and educate citizens on the benefits of this renewable resource[20]." This voluntary landscape replacement proposal recommends that a similar tax credit be established for water efficiency for statewide benefits, beginning with the State of California offering an outdoor landscape tax credit.

In light of the success and scale of these sustainable energy efforts, the Independent Technical Panel (ITP) recommends that a similar tax credit be established for landscape water efficiency in recognition of the similarly broad statewide benefits to be achieved. The State needs to invest in preserving our finite water resources to help "make conservation a California way of life" as called for in the California Water Action Plan. This tax incentive program will allow broaden the scope of current efforts to address our State's need for water supply reliability through landscape replacement.

Purpose Statement

The purpose of this recommendation is to reduce the amount of water used to irrigate *ornamental turf* and other high water use ground covers through a landscape replacement incentive program. Landscape replacement incentives are not intended to fund the entire cost of replacement projects, but rather to provide enough of an incentive for property owners to take action. Landscape replacement incentive programs are also not intended to be available indefinitely. Instead, they are implemented to provide an initial boost to the landscape transformation process and initiate change in the marketplace. There are far too many acres of turf in the State for a landscape replacement incentive program to fund replacement of all turf. The transition from turf and other high water use ground covers to *sustainable landscapes* will take years to accomplish, but when complete, will dramatically reduce the amount of water used for landscape irrigation.

Although the State's current turf replacement program is limited to residential property owners, the ITP believes that commercial and multifamily properties should be fully eligible for the expanded program recommended here. An income tax credit for owners of commercial and

[20] http://www.gosolarcalifornia.ca.gov/about/gosolar/history.php

multifamily properties will help California businesses reduce water utility costs and earn customer and community recognition as good stewards of our shared water resources. Commercial and multi-family replacement projects are larger and achieve economies of scale compared to smaller residential projects, thus ensuring that State financial assistance will maximize the amount of converted *landscape area* per dollar of credit. The professional maintenance of most commercial landscapes further increases the likelihood of successful and aesthetically pleasing conversion projects in public view.

State funding sources that reduce or offset the loss of General Fund revenue should be considered. One possible source would be a new tax on cool season turf grass seed and sod, which would further assist the market transformation envisioned in this report.

The Independent Technical Panel Recommends That:

1. Legislation be enacted to establish a five-year statewide landscape replacement incentive program in the form of a non-refundable income tax credit to encourage upgrades of existing high water use landscapes at residential and commercial properties to *sustainable landscapes*. The tax credit for individuals with single-family residential properties would be $1 per square foot of replaced landscape, and the credit for commercial and multifamily residential properties would be $0.50 per square foot of replaced landscape. The total tax credit for single-family residential properties would be capped at $1,500, and the tax credit for commercial and multifamily residential properties would be capped at $20,000 per property.

   Program requirements for converted areas would include, but not be limited to, the following:

   - Turf and other ground covers designated as high water use (ivy, etc.) to be removed must have been existing prior to the effective date of the bill
   - Only landscape irrigated with potable water is eligible
   - Landscape replacement must take place after the effective date of the bill
   - Tax credit is in addition to any local landscape replacement program incentive
   - Minimum of 250 square feet of turf or Water Use Classification of Landscape Species (WUCOLS)-listed “high water use” ground covers must be replaced
   - Minimum of 50 percent of removed *landscape area* must be replaced with WUCOLS-listed low- or very-low water-use plants
   - Irrigation fixtures must be at least as efficient as *high-efficiency nozzles* and *point source emitters*
   - Hardscape in replaced *landscape area* must be permeable, pervious, or porous
   - Install a minimum of 3” of mulch
   - New landscape materials must remain in place for at least five years
   - On-site *rainwater retention* features, such as *rain gardens*, *bio-swales*, or dry streambeds, are to be installed where site conditions permit

2. The California Department of Water Resources (DWR), in consultation with the Franchise Tax Board, prepare materials describing the elements and conditions of eligible landscape replacement projects.

3. A report to the Governor and Legislature be prepared and submitted by the Franchise Tax Board, in consultation with the DWR, on the number of projects, converted *landscape area*, dollar value of credit, and projected water savings of the tax credits claimed during years one through four of the credit program, and recommendations from each agency regarding the extension or modification of the tax credit after year five.

ITP Member Votes

Support – Peter Estournes, Penny M. Falcon, William E. Granger, Lisa Maddaus, Edward R. Osann, Jeff Stephenson

Can Live With – None

Opposed – David W. Fujino

SECTION 5: IMPROVEMENTS IN EXISTING LANDSCAPES

This section presents the Independent Technical Panel's recommendations to create improvements in existing landscapes. It includes a recommendation to require *landscape irrigation system* evaluations as part of home inspections for single-family residential properties, and recommendations to address landscapes over one acre and on State owned facilities.

RECOMMENDATION #1: Require Irrigation System Evaluations as Part of Home Inspections for Single-Family Residential Properties

Background

Each year, roughly 400,000 existing homes are put up for sale in California. Before a sale is completed, most prospective purchasers contract for a home inspection to get a professional assessment of the condition of the home and its major systems to identify any material defects. The inspector is typically on the property for a couple of hours. The results of the inspection are provided to the prospective purchaser in a report that makes note of observed deficiencies. The report serves to inform the purchaser before making an irrevocable commitment to purchase the property.

Home inspections offer an excellent opportunity to inform homeowners and home buyers of material defects in *landscape irrigation systems*. These types of inspections are far more numerous than all other types of landscape inspections provided by water suppliers and commercial *landscape contractors*. However, by one estimate, only about 20 percent of home inspections include any assessment of the *landscape irrigation system*, thus missing a significant opportunity to alert homeowners to needed corrections of deficient irrigation systems and water waste.

Purpose Statement

The purpose of this recommendation is to ensure that purchasers of existing homes are informed of significant deficiencies in *landscape irrigation systems* by requiring home inspections to include a very basic assessment of said systems. Without such an evaluation, the buyer may not be aware of material defects in the irrigation system. The inspection is intended to identify gross deficiencies in the turf portion of the landscape readily observable by a professional, rather than a deep analysis of schedules and equipment needed to optimize irrigation at the site. For a landscape irrigation inspection to be integrated with a home inspection, a high-level assessment can be accommodated while a more time-consuming, in-depth analysis cannot.

It is anticipated that professional inspectors will be able to conduct this basic inspection with some additional minor training, since they are already versed in common plumbing and

electrical systems. Such training can be found in the marketplace through existing U.S. EPA *WaterSense*® Certified professional organizations such as the Qualified Water Efficient Landscaper, Watershed Wise Landscape Professional Certification, or similar programs within the Irrigation Association. Also, a training program could be created specifically to meet the home inspection report criteria in collaboration with landscape industry trade organizations and other interested groups who offered such assistance during the Panel's deliberations.

This proposal imposes no new requirements on home sellers, homebuyers, realtors, lenders, or water suppliers. As with other findings in a home inspection report, the seller and buyer are under no obligation to correct any deficiency noted, but are informed with a list of matters that will require attention in the newly purchased home. The inspection report need not provide definitive expertise on irrigation, but rather simply note material defects observed in the system. The report may refer any irrigation issue to other experts for further evaluation.

The Independent Technical Panel Recommends That:

Legislation be enacted to amend Chapter 9.3, Division 3 [Professions and Vocations Generally] of the Business and Professions Code by adding the following new section:

_____. (a) Beginning January 1, 2019, each home inspection report on a dwelling unit on a parcel containing an in-ground landscape irrigation system, the operation of which is under the exclusive control of the owner or occupant of the dwelling, shall include the following:

(1) Examination of the irrigation system controller (if present), noting defects in installation and/or operation.

(2) Activation of each zone or circuit providing irrigation water to turf grass, noting defects observed in the operation of:

(A) The irrigation valve
(B) Visible irrigation supply piping
(C) Sprinkler heads and stems

(3) During the foregoing activation of the system, observation of any of the following:

(A) Irrigation spray being directed to hardscape
(B) Irrigation water leaving the irrigated area as surface runoff
(C) Ponding of irrigation water on the surface of the irrigated area

(4) Notation if inspection is limited due to snow or ice or other site conditions that impeded an inspection.

(b) This section does not apply to any of the following:

(1) An inspection performed by a city, county, city and county, or public water supplier.
(2) An inspection performed at the direction of any court.
(3) An inspection confined solely to a landscape area.
(4) An appraisal for the purpose of preparing a report containing an estimated market value of a dwelling.

ITP Member Votes

Support – Peter Estournes, Penny M. Falcon, William E. Granger, Lisa Maddaus, Edward R. Osann, Jeff Stephenson

Can Live With – David W. Fujino

Opposed – None

SECTION 5: IMPROVEMENTS IN EXISTING LANDSCAPES

RECOMMENDATION #2: Landscapes Over One Acre

Background

One limitation of the current and newly updated *Model Water Efficient Landscape Ordinance* (MWELO) is the lack of ability to substantially reduce water use for existing landscapes. Existing landscapes account for the majority of potential for over watering and waste. Nearly 50% of current urban water use is attributed to landscape irrigation usage.[21] Therefore any process included in MWELO to manage and reduce the amount of water used and/or wasted from existing landscapes will provide significant savings to the State's water resources. Currently, Section 493.1 of MWELO addresses "*Irrigation Audit*, *Irrigation Survey*, and *Irrigation Water Use Analysis*" and states:

> ***493.1. Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.***
>
> *(a) This section, 493.1, shall apply to all existing landscapes that were installed before December 1, 2015 and are over one acre in size.*
> *(1) For all landscapes in 493.1 (a) that have a water meter, the local agency shall administer programs that may include, but not be limited to, irrigation water use analyses, irrigation surveys, and irrigation audits to evaluate water use and provide recommendations as necessary to reduce landscape water use to a level that does not exceed the Maximum Applied Water Allowance for existing landscapes. The Maximum Applied Water Allowance for existing landscapes shall be calculated as: MAWA = (0.8) (ETo) (LA) (0.62).*
> *(2) For all landscapes in 493.1(a), that do not have a meter, the local agency shall administer programs that may include, but not be limited to, irrigation surveys and irrigation audits to evaluate water use and provide recommendations as necessary in order to prevent water waste.*

It is currently difficult for many water providers to adequately account for and manage specific information about existing irrigation systems throughout their service area due to staff limitations and processes to gather and disseminate information, including delineation of irrigated *landscape areas*. In the future, when Automated Metering Infrastructure becomes more widespread, water providers will have better access to real time water usage. Until then, a challenge remains in most of the State to identify and report on existing irrigation systems, including the amount of water actually being used, especially at *peak demand* and how that usage compares to the water needs of the associated plant material.

[21] California Department of Water Resources *California Water Plan* 2013.

Purpose Statement

In keeping with section 493.1 of MWELO regarding existing landscapes, water efficiency strategies shall be applied to landscapes over 1 acre. These strategies should include the following: pragmatic regulation, conservation based pricing, and education and outreach. As such, reporting on the state and status of existing *landscape irrigation systems* is crucial to managing landscape water use appropriately. Inspections of existing *landscape irrigation systems* are necessary to determine those systems that are operating appropriately and those that are underperforming. Once identified, the local jurisdiction working with the property manager, owner and landscape company can determine the most appropriate approach to influence upgrades or compliance to local regulations. The responsibility of the governing entity is to notify the owner of the need to submit a landscape report. This can be done through a direct mailing or a bill insert to large property owners indicating that if their landscaped area is an acre or larger the report will be required. This then puts the onus on the owner to communicate with their landscape care provider to validate the size of the landscape. For an irrigation system report, it will be the responsibility of the *local agency* or its representative (MWELO section 493.0) to notify the property owner that a report is required. The onus will then be upon the property owner to verify the size of their landscape and see that a report is submitted to a California Department of Water Resources website created for this purpose. A third party (such as a landscape service provider who is typically well versed in the criteria that will be asked for in the report) or property manager can manage the creation of the report (and should already be aware of the size of the landscape) on behalf of the owner.

The Independent Technical Panel Recommends That:

1. The Water Conservation in Landscaping Act (Government Code, Article 10.8, sections 65591 – 65599), be amended at the appropriate place to add the following:

   Sec._____. (a) Upon notice from the local agency or its representative, each owner or owner's agent of an irrigated landscape of more than one acre shall submit a landscape irrigation report once every three years to the California Department of Water Resources.

   (b) The first landscape irrigation report shall be submitted to the Department by:

      (1) January 1, 2018 for multi-family residential, commercial, industrial, and institutional landscapes.

      (2) January 1, 2020 for single-family residential landscapes.

   (c) Each local agency, as such term is defined in section 491(oo) of Chapter 2.7, Title 23, California Code of Regulations, shall notify each owner of an irrigated landscape subject to the requirements of this section at least 60 days in advance of any date by which a landscape irrigation report shall be submitted.

(d) The California Department of Water Resources, in consultation with the California Urban Water Conservation Council and the California Landscape Contractors Association and other industry stakeholders, shall create a template for an irrigation inspection report form, an internet portal for electronic submission of such report forms, a database accessible to only local agencies and water suppliers and a method to notify the local agency that a report has been submitted

(e) Each landscape irrigation report shall include the following:

(1) Irrigation system overview: water meter type (if existing), assessor parcel number, irrigation zone map, zone description, plant factor by zone (Model Water Efficient Landscape Ordinance (MWELO) defaults) and irrigation water type (potable or non-potable)

(2) Water budget as defined in MWELO: gallons per minute per zone, operating pressure by zone, expected peak month consumption.

(3) List of responsible parties: owner, landscape professional, property manager or other agent as assigned by the owner.

(f) Not later than three years after the initiation of the on-line landscape reporting system authorized herein, the Department shall submit to the Governor and the Legislature a summary of the data compiled, together with any recommendations to revise reporting requirements or the provisions relating to existing landscapes in MWELO.

2. The California Department of Water Resources lead the effort to complete the mapping of irrigated landscape areas throughout the developed portions of the State, making such information available to local agencies, water suppliers, researchers, and landscape professionals.

ITP Member Votes
Support – Dave W. Fujino, William E. Granger, Lisa Maddaus, Edward R. Osann
Can Live With – Peter Estournes, Penny M. Falcon
Opposed – Jeff Stephenson

SECTION 5: IMPROVEMENTS IN EXISTING LANDSCAPES

RECOMMENDATION #3: State-Owned Facilities

Background

There are nearly three thousand State-owned facilities in the State of California.[22] It is unknown how much of the land area is irrigated at these facilities. It is assumed that most of the land area is in natural habitats such as in State Parks and as a result, is left unirrigated. In addition, there are approximately 2,300 properties leased by the State[1], and the State has some influence on the landscaping and landscape maintenance practices at these facilities.

Per Governor Brown's Executive Order (EO) B-18-12, all State operated facilities are required to report annual water use to the *Energy Star Portfolio Manager*. According to 2014 data, 14.8 billion gallons of water (based on benchmarking by the Department of General Services [DGS]) is utilized by State facilities annually. Additional data compilation is on-going to determine the estimated acres that could potentially undergo landscape conversion to sustainable, water-efficient landscaping at publicly owned facilities. Estimated water savings from feasible landscape conversions associated with irrigated landscapes may be estimated when more data is available to complete the analysis (DGS, March, 2016).

EO No. B-18-12 aimed to address landscape water use on State operated facilities. However, there was a lack of implementation resulting from funding difficulties. Overall, the budget estimate to implement each State agency's identified needs has yet to be quantified such that a legislative budget proposal may be completed.

State-owned sites have design oversight and/or are managed by many State departments, including the DGS, State Architect, California Department of Transportation (Caltrans), California Department of Corrections and Rehabilitation California Highway Patrol, California Department of Fire and Forest Protection, University of California and California State University systems. The State Architect oversees the building of all K-12 and community college buildings. Recently, the State Architect has established its own version of the California Green Building Standards Code (CALGreen), with an adopted ordinance for water use in 2015.

There are approximately 2,400 higher education institutions throughout the State. Many of these institutions, such as University of California and California State University facilities, already operate at a high standard of landscape management and have dedicated staff for maintenance. There are also college water efficiency groups where staff on campuses work collaboratively to employ initiatives to cut water use. While the majority of campus water use is either indoors or for athletic fields, nearly all landscaped areas can be irrigated with a higher degree of efficiency.

[22] Department of General Services, Statewide Inventory of Property as of February 1, 2016 http://www.dgs.ca.gov/resd/Home/SPIhomepage/SPISummary.aspx

Caltrans is also a primary water user of the State, with approximately 30,000 acres of land under its jurisdiction requiring approximately 9 billion gallons of water annually. Caltrans received a directive from the Governor resulting from the severe drought conditions, and set its own goal to reduce water demand by 50%. It is recognized that additional measures could be implemented with additional appropriated resources.

Purpose Statement

The purpose of this recommendation is to ensure that landscapes of State-owned facilities are meeting or exceeding water use efficiency standards. In this way, the State can lead by example, provide education on *sustainable landscapes*, and promote stewardship towards landscape water use efficiency.

It is recommended that facilities with *customer service buildings* be addressed with the highest priority as they are frequented by a significant number of people and thus have high visibility. Their "lead by example" demonstrations will further help to educate the public, demonstrating ideas of how beautiful water-efficient sustainable landscaping can be.

The Panel also encourages this recommendation to be applied at federally owned facilities, and private university and college campuses.

The Independent Technical Panel Recommends That:

1. Each State agency responsible for its facilities be provided with sufficient authority, funding and resources, in collaboration the California Department of Water Resources (DWR) to implement sustainable landscaping at its facilities, including the following actions:

    1) Each State agency shall continue to update and maintain per Government Code 11100,[23] sustainable landscaping initiatives through implementation of Management Memo directives. The University of California and California State University systems shall implement similar actions within their own policies and standards.

    2) At minimum, require all its State-owned facilities to comply with the *Model Water Efficient Landscape Ordinance* (MWELO) including water budget requirements pursuant to Section 493.1 by January 1, 2021. Said compliance should include mandatory rainwater and/or stormwater capture where site conditions permit.

    3) Have an overarching goal to retrofit all its State-owned buildings or facilities from *traditional landscape*/turf to *sustainable landscapes* within 20 years. Note that

[23] California Department of Transportation has a large platform developed for online training of Best Management Practices (BMPs). This training platform can be utilized to provide water training to other state agencies. This would leverage the financial investment the State has already made.

functional/recreational, or registered historical site landscape is exempted from this requirement.

4) Prioritize for retrofit, State-owned *customer service buildings* (any building that is open to the public and that agency customers commonly visit) from traditional *ornamental turf* to sustainable landscaping at a rate of 10% per year (to achieve complete retrofit in 10 years).[24] Note that *functional*/recreational, or registered historical site landscape is exempted from this requirement. These sites may be prioritized based on the level of visitation by the public.

5) Install demonstration/educational signage at each high visibility site to identify sustainable landscaping and resulting water savings on select landscapes, primarily around customer service buildings. It is assumed that this may encompass a minimum of 10% of the *customer service buildings* in the State depending on the threshold for visitation set in updated Management Memos or other directives to State-owned facilities.

6) Seek to employ and/or contract with sufficiently trained landscape design professionals and managers to help ensure that the investment in landscape upgrades or new landscapes are sufficiently designed and maintained to protect the shift in *social norms* to aesthetic benefits of sustainable landscaping. (Landscapes left in disrepair may serve to negatively impact the public perception that State leadership is intending to promote with this effort.)

7) Encourage the optimized use of recycled and non-potable water on landscapes.

2. The State take the following actions to enable all state agencies to implement the above recommendations:

1) Resolve the lack of current funding to allow for more full execution of Management Memo directives.

2) Require educational training for identified job classifications that serve in the capacity of State-employed landscape managers. Training shall include *irrigation efficiency*, water budgets and landscape management with sustainable landscaping concepts as the focus. DWR shall oversee a universal training curriculum hosted online, including a library of educational materials and landscape design templates

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ITP Member Votes
Support – All Members

[24] The State Capitol has historical gardens with some high water use plants. The *Model Water Efficient Landscape Ordinance* has an exception for existing plant collections that are part of botanical gardens and arboretums, such as these gardens.

SECTION 6: STATE MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO) FUTURE REVISIONS AND PROCESS UPDATES

This section presents the Independent Technical Panel's recommendations about future revisions and process updates to the State *Model Water Efficient Landscape Ordinance* (*MWELO*). It includes recommendations for the next *MWELO* review cycle, an approach to align the California Green Building Standards Code (CALGreen) Title 24 revision process with *MWELO* as a means to maximize enforcement, and an approach to improved State facility water use efficiency leadership for new landscapes.

RECOMMENDATION #1: MWELO Future Revisions for the Next Review Cycle

Background

In response to Governor Brown's emergency water conservation Executive Order (EO) B-29-15 in April 2015, the California Department of Water Resources (DWR) undertook an extensive and expedited revision of MWELO. The Independent Technical Panel (ITP) contributed a set of recommendations to DWR during the revision process in the summer of 2015. Many, but not all, of the ITP's suggested revisions were integrated into the new MWELO, released in July 2015. DWR has expressed a desire to regularly update MWELO to ensure that the model ordinance stays relevant while advancing water conservation and efficiency. The following recommendations support DWR in this goal by providing: 1) specific recommendations for the next MWELO update that will continue to maximize landscape water savings; and 2) a general recommendation for DWR to examine and improve the scope and impact of MWELO as it applies to existing landscapes.

Purpose Statement

Although the latest update to MWELO has taken effect only recently, several revisions or additions to the ordinance were previously recommended to DWR by the ITP or have been brought to the ITP's attention during the past year. Previously submitted recommendations were largely not accepted because they were outside the language of the Governor's EO and/or the complexities of the proposals required more vetting by stakeholders than could be accomplished in the expedited timeframe for the 2015 MWELO update.

To increase the efficacy and relevance of MWELO, it is recommended that DWR incorporate the proposed changes in Table 1 below in the next revision of MWELO, incorporating them as proposed amendments in a draft circulated for public comment. The most consequential of these recommendations are:

- That MWELO provide a statewide minimum standard for the retention of rainwater from rooftops in new development, giving a boost to the "*watershed approach*" to

sustainable landscaping and providing a consistent floor for any additional stormwater control measures that may be instituted through other means at the local, regional, or State level.

- That the additional water allowance first authorized in 1992 for "*special landscape areas*" (SLAs) be reduced for new SLAs to take into account two decades of progress in irrigation technology and plant propagation for lower water use.
- That landscapes that are altered as part of major renovations to a building be covered by the requirements of the ordinance.

The specific revisions are intended to strengthen the power of MWELO, when implemented and enforced, to achieve *functional*, high value, multi-benefit landscapes.

The ITP also reaffirms its recommendation that MWELO should effectively address water use efficiency on existing landscapes. It is recommended that DWR examine the structure of MWELO as it applies to existing landscapes. While it is critically important for MWELO to guide efficiency improvements in newly developed and renovated landscapes, the vast majority of landscape water use is – and will continue to be – attributable to landscapes installed before 2015. The ITP shares the view of many stakeholders that the standards for existing landscapes in the current MWELO are not actionable, and that a practical pathway to the application and enforcement of these standards needs to be found.

The Independent Technical Panel Recommends That:

(1) DWR incorporate the changes recommended in Table 1 below in the next update of the MWELO as proposed amendments in a draft circulated for public comment and

(2) DWR examine the structure of the MWELO as it applies to existing landscapes, and report within one year to the Governor and Legislature on its findings and recommendations for improving MWELO's effectiveness.

Table 1: Specific sections recommended for revision in the next MWELO update; an (ITP) annotation indicates the recommended revision was previously included in the Panel's recommendations to DWR for the 2015 MWELO update.

Topic & Recommendation	References	Language	Justification
Applicability – expand MWELO triggers for existing landscapes to include high-cost building renovations	§490.1	(ITP) *addition:* (a)(3) existing landscapes with a landscape alteration greater than 500 square feet associated with any additions or renovations to the building with a valuation exceeding $200,000.00 requiring a building permit.	This additional MWELO cost trigger would capture smaller but *significant landscape renovations* that would otherwise be excluded based on the 2,500 sq. ft. renovation size threshold. When major renovations are happening to a building, it is as if a new development is being constructed, and therefore this cost trigger is simply capturing landscape renovations that are similar in scope to new development at the same size threshold as the new development MWELO provision (500 sq. ft.).

***Recycled water* – update definition of recycled water to match Water Code**	§490.1	"Recycled water" means water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.	MWELO's definition of *recycled water* should be consistent with Water Code Section 13050(n).
***Evapotranspiration Adjustment Factor (ETAF)* for *Special Landscaped Areas* – reduce from 1.0 to 0.8**	§491	(ITP) (s) . . . . The ETAF for - new ~~and existing (non-rehabilitated)~~ Special Landscape Areas shall not exceed ~~1.0~~ 0.8, except where such area is irrigated entirely with recycled water, in which case the ETAF shall not exceed 1.0. The ETAF for any existing or rehabilitated Special Landscape Area shall not exceed 1.0.	*Irrigation efficiency* and water conservation should be cultivated as a standard practice for all irrigated plantings, including new special landscaped areas (SLAs) that are capable of thriving with an ETAF of 0.8. By decreasing the ETAF for new SLAs from 1.0 (a level first adopted in 1992) to 0.8, MWELO would account for improvements in plant husbandry and irrigation technology and help instill a consistent conservation ethic. An exception is provided for SLAs irrigated with *recycled water* to account for potential need for leaching applications to maintain proper salt balance in the soil.
***Special Landscaped Areas* – expand the designation to include all areas irrigated solely with non potable water sources including graywater and harvested rainwater**	§491	(ttt) "Special Landscape Area" (SLA) means an area of the landscape dedicated solely to: edible plants; recreational areas; areas entirely irrigated with recycled water, graywater, or harvested rainwater; or water features using recycled water	By designating landscaped areas irrigated solely with non-potable water as SLAs, MWELO would incentivize the use of alternate water sources beyond municipality-provided *recycled water* such as *graywater* and rainwater. Additionally, areas partially or periodically irrigated with potable water should not receive this additional water allowance.
Pool/Spa Covers – require pool/spa covers	§492.6	(a)(2)(D) Pool and Spa Covers are ~~highly recommended~~ required.	Having pool and spa covers required on new development/renovations would increase their appropriate use by the end user. This is a straight-forward requirement that can significantly reduce pool and spa water consumption. As with any new pool, covered pools should be surrounded by a barrier of appropriate height and secure entry. Pools and spas are considered water features in MWELO, and have been considered as such since 1993.
***Irrigation Schedule* & *Hydrozone Maps* – require that a copy of the *hydrozone map* is left on site with the automated irrigation controller itself**	§492.10 and Appendix C (Part 3)	(a)(6) *addition*: Current versions of landscape hydrozone maps shall be placed and maintained in the appropriate irrigation controller housing and shall include relevant information necessary to adjust the scheduling as needed considering all the parameters listed in §492.10(a)(4) and (5).	The inclusion of a readily accessible and detailed *hydrozone map* and scheduling tools - physically associated with the irrigation controller – would make it easier for landscape managers (internal staff or third-party contractors, e.g., auditors) to identify key scheduling factors and to set up and maintain an irrigation system to efficiently meet the needs of the landscape. The necessary institutional knowledge would be at the finger-tips of the individual(s) who is best able to implement best practices with the information provided. Although some *ET-based controllers* will keep the irrigation schedule embedded in its system, for *conventional controllers*, *irrigation schedules* are necessary.
***Irrigation Efficiency* – require no overspray or runoff to receive certificate of completion**	§492.12	(c)(2) *addition*: Prevention of overspray and runoff must be confirmed during the irrigation audit in order for the local agency to accept the certificate of completion.	Though the requirement for no overspray or runoff is implied throughout MWELO (e.g., $492.7 (a)(1)(U)(3)), it should be stated clearly that a *local agency* is not to approve a certificate of completion without an audit report that confirms the absence of overspray and runoff under regular irrigation scheduling conditions. If the irrigation system is not achieving efficient watering immediately after installation and original scheduling, it is unlikely to ever achieve compliance by improving efficiency over time.
***Audit Sampling* –**	§492.12	(b) In large projects or projects with multiple landscape	There is no allowance for *audit sampling* for large projects to ensure the appropriate selection of the landscapes to be

Add provisions for sample selection and acceptance criteria for landscapes approved on the basis of sampling		installations (i.e., production home developments) an auditing rate of 1 in 7 lots or approximately 15% will satisfy this requirement.[revisions to be developed during MWELO update]	sampled for audit, the criteria for acceptance of aggregated results of sampling, and requirements for unaudited sites if any sampled sites fail the audit.
Rainwater Retention – require the retention of rainwater from roofs	§492.16	(d) ~~It is strongly recommended that~~ Landscaped areas must be designed for capture and infiltration capacity that is sufficient to prevent runoff from impervious roof surfaces ~~(i.e., roof and paved areas)~~ from either: the one inch, 24-hour rain event, or the 85th percentile, 24-hour rain event, or, if precluded by documented site conditions, such lesser volume that is the maximum that can be accommodated on site, […]	A discrete and actionable step towards making the use of alternate water sources a common practice, this recommended revision would require property managers/developers to implement a downspout re-direct, moving their roof drainage into permeable ground or rainwater cisterns. This revision would augment potable water supplies used for irrigation and would help to replenish groundwater and lighten the burden on already-stressed stormwater systems. An exception to this on-site standard can be made where documented site conditions preclude retention of the specified 24-hour rain event volume.
Public Education – provide information on how to hire trained landscaped professionals	§492.17	(ITP) (a)(2), (b)(2) *addition*: Information available shall include consumer-friendly explanations of how to hire trained and licensed landscape architects, contractors, designers, landscape managers and maintenance workers and the benefits of using such professionals.	Permitted renovation applicants and model home owners should be provided with constructive educational material on how to hire qualified landscape workforce. These workforce hires should be qualified individuals who are capable of maintaining an MWELO-compliant landscape at peak efficiency and prime aesthetic appeal. It is well understood that landscapes need quality maintenance, and a homeowner provided with the information on how and why to hire a qualified workforce has an advantage in achieving or sustaining the potential *water efficiency* benefits associated with MWELO compliance.
***Irrigation Audit, Irrigation Survey,* and *Irrigation Water Use Analysis*.**	§493.1	(a) (1) For all landscapes in 493.1 (a) that have a water meter, the local agency shall administer programs ~~that may include, but not be limited to, irrigation water use analyses, irrigation surveys, and irrigation audits to evaluate water use and provide recommendations as necessary~~ to reduce landscape water use to a level that does not exceed the Maximum Applied Water Allowance for existing landscapes. The Maximum Applied Water Allowance for existing landscapes shall be calculated as: MAWA = (0.8) (ETo) (LA) (0.62). (a)(2) For all landscapes in 493.1(a), that do not have a meter, the local agency shall administer programs ~~that may include, but not be limited to, irrigation surveys and irrigation audits~~ to evaluate water use and provide recommendations as necessary in order to prevent water waste.	The ambiguous language in MWELO Section 493.1 is a source of confusion for *local agencies*. While actions are required to monitor water use in existing landscapes, the options given seem voluntary. By removing the ambiguous language, MWELO clearly states that programs to reduce water use are required. However, the *local agency* and local water purveyor have flexibility in implementing appropriate program actions.

ITP Member Votes

Support – Peter Estournes, David W. Fujino, William E. Granger, Lisa Maddaus, Edward R. Osann
Can Live With – Penny M. Falcon
Opposed – Jeff Stephenson

SECTION 6: MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO) FUTURE REVISIONS & PROCESS UPDATES

RECOMMENDATION #2: MWELO Revision: Aligning with the California Green Building Standards Code Title 24 Revision Process to Maximize Enforcement

Background

One of the most significant areas of uncertainty regarding the effectiveness of California's *Model Water Efficient Landscape Ordinance* (MWELO) pertains to enforcement. Numerous stakeholders appearing before the Independent Technical Panel (ITP) voiced concerns about the rigor and consistency of enforcement by local land use and housing agencies.

In April 2015, Governor Brown's Executive Order (EO) B-29-15 brought new attention and urgency to landscape water use enforcement issues:

- In response to Directive 11 of the EO, the California Department of Water Resources (DWR) initiated an update of MWELO effective December 1, 2015 with new requirements for local agencies to report to the State on enforcement activities;

- In response to Directive 7 of the EO, the Building Standards Commission (BSC) and the Department of Housing and Community Development (HCD) conducted an emergency rulemaking that for the first time, placed water budget requirements in the mandatory portion of the California Green Building Standards Code (CALGreen) (California Code of Regulations Title 24, Part 11).

Placing landscape irrigation hardware and water budgeting requirements inside the code books used by the statewide network of local building code officials raised the prospect of more consistent and effective enforcement of MWELO – not immediately, but over time. However, since the CALGreen revisions were completed in late May 2015, while the MWELO revision process extended through June and July 2015, there arose almost immediately a concern that CALGreen would be left with provisions that were not consistent with MWELO as subsequently revised. Indeed, some provisions of the final 2015 version of MWELO were not the same as the emergency additions to CALGreen adopted in May 2015. To avoid the potential for future inconsistency between CALGreen and MWELO, a coordinated schedule is needed.

The ITP has been informed by DWR staff of interest in the Department to establish a regular periodic review of MWELO to consider and adopt revisions as technology and other circumstances impacting landscape water use continue to evolve in California. The ITP welcomes this concept, and believes that the benefit of periodic review of MWELO could be amplified greatly if the cycle of review were harmonized with the *triennial code review cycle* of the CALGreen building code.

CALGreen and other State building standards are required by statute to be updated at least once every three years.[25] The ITP believes that statutory direction to establish a similar timetable for MWELO review would provide assurance to all State and local agencies, code officials, and other stakeholders that DWR will be a reliable and consistent partner to update building standards that improve landscape water use efficiency. Coordination with CALGreen should begin as soon as possible, on a schedule that is mutually agreeable to State agencies. In its comments on this proposal, the BSC has noted that current regulations provide a process for State agencies to submit CALGreen regulations to the BSC during the rulemaking cycle, and that the BSC notifies State agencies six months in advance of the deadline to submit their proposed regulations.

Purpose Statement

The purpose of this recommendation is to maximize MWELO enforcement, and maintain steady progress toward improved *landscape water efficiency*, by establishing a standardized MWELO revision process on a triennial cycle that complements the CALGreen Title 24 triennial revision cycle. The MWELO revision cycle should be coordinated with the CALGreen cycle in order to finish MWELO revisions in advance of the finalized CALGreen revisions, such that MWELO revisions could then be adopted in the pending round of CALGreen revisions. This standardized revision process between MWELO and CALGreen would allow for building departments to upgrade MWELO enforcement while avoiding uncoordinated, unanticipated, and excessive or redundant administrative update processes that seek to occasionally adopt various new regulations in a confusing or ad hoc manner. Coordination under existing regulations between DWR, the BSC, and other code adopting agencies should begin as soon as practical.

The Independent Technical Panel Recommends That:

The Water Conservation in Landscaping Act (Government Code, Article 10.8, sections 65591 – 65599), be amended at the appropriate place to add the following:

Sec._____. (a) At an interval no greater than once in every three years, the department, after holding one or more public hearings, shall:

> (1) by regulation, update the *Model Water Efficient Landscape Ordinance* adopted pursuant to Chapter 1145 of the Statutes of 1990; or
>
> (2) make an affirmative determination that an update to the model ordinance at such time is not a useful or effective means to improve either the efficiency of landscape water use or the administration of the ordinance.

[25] Section 18942(a) of the *Health and Safety Code* states in part: The [Building Standards Commission] shall publish, or cause to be published, editions of the code in its entirety once in every three years. In the intervening period the commission shall publish, or cause to be published, supplements as necessary.

(3) submit such elements of the *Model Water Efficient Landscape Ordinance* as are appropriate for inclusion in State building standards to the Building Standards Commission.

ITP Member Votes
Support – All Members

SECTION 6: STATE MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO) FUTURE REVISIONS & PROCESS UPDATES

RECOMMENDATION #3: State Facility Leadership for New Landscapes

Background

There are several opportunities for the State to take leadership in improving water efficiency at State facilities. In recognition of these opportunities, State requirements and policies (including a 2012 Governor's Executive Order [EO]) are now in place for State buildings to become more water efficient, with some requirements pertaining to improvements in sustainable landscaping and on-site water management. However, the implementation of these policies and requirements are lacking due to insufficient funding availability by numerous State departments and board that comprise the Sustainable Building Task Force.

A summary of governing policies and procedures that include or support the *sustainable landscape* requirements that are currently in place include the following:

- *EO B-18-12 (04/25/2012):* Calls for State agencies to reduce water use, and monitor and report that use consistent with goals of the 20x2020 Water Conservation Plan.
- *Green Building Action Plan (05/07/2012):* A detailed implementation guide to achieve the goals of EO B-18-12.
- *Water Use Reduction Guidelines (02/28/2013):* Guidelines written by California Department of Water Resources (DWR) Water Use Efficiency (WUE) program staff to provide additional guidance to State agencies.
- *Management Memo (MM) 14-02 (01/13/2014):* *2014* MM14-02 from the State Administrative Manual describing exactly what agencies must do to reduce water use and track progress. (DWR WUE program had lead authorship to write the memorandum).
- *Management Memo (MM) 15-06 (10/15/2015)*: 2015 MM15-05 from the State Administrative Manual describing building and grounds maintenance, which instructs State agency landscape managers to manage to a water budget. (DWR had minimum input into this document.)

Based on information provided by the DWR along with a review of the documents listed above, the ITP recommends strengthening the requirements, budget priorities, and implementation for designing, installing and maintaining sustainable landscaping at State facilities. There are mutual benefits to improve water use efficiency above the State code requirements at all new and majorly renovated State facilities, especially those with high visibility due to customer service functions or other drivers for visitation. Leadership to be shown by the State on this topic is an important catalyst to change *social norms*, even if benefits cannot be quantified (i.e., where some renovated facilities are not metered).

Currently, new and majorly renovated State buildings are subject to compliance with the *Green Building Action Plan – For Implementation of Executive Order B-18-12.* For water conservation, the standard is found within Section 7 of the Plan:

> *Section 7. New and major renovated State buildings and build-to-suit*[26] *leases larger than 10,000 square feet shall obtain Leadership in Energy and Environmental Design (LEED*) *"Silver" certification or higher, using the applicable version of LEED.*
>
> *7.1. Certification to an equivalent or higher standard is acceptable when approved by the Sustainable Building Task Force.*
>
> *7.2. Buildings smaller than 10,000 square feet authorized to begin design after January 1, 2013, shall meet applicable California Green Building Standard's Tier 1 measures.*
>
> *Section 12.*
> *State agencies shall reduce water use at the facilities they own by 10% by 2015 and by 20% by 2020, as measured against a 2010 baseline.*
>
> *12.2. All new and renovated State buildings and landscapes shall utilize alternative sources of water wherever cost-effective. Sources may include, but are not limited to: recycled water, graywater, rainwater capture, stormwater retention, and other water conservation measures.*
>
> *12.3. Landscape plants shall be selected based on their suitability to local climate and site conditions, and reduced water needs and maintenance requirements.*

The water efficiency standards for *LEED* are relatively minimal and focused more on indoor water use, while landscape benefits are generally through implementation of either (a) Option 1: to contain no *supplemental irrigation* on site or (b) Option 2: to save 30% from a *baseline peak month* demand using the *EPA WaterSense*® Water Budget Tool. It should be noted that the *LEED* requirements for indoor are less stringent than the current California Green Building Standards Codes (CALGreen) for California and 30% savings on *outdoor peak month* irrigation only is less stringent then the current MWELO that saves 20% on a *maximum applied water allowance* with *irrigation efficiency* requirements.

Given that the California Department of Transportation (Caltrans) has the most irrigated *landscape area* of the State agencies, it seems prudent to expand the online training required for storm water best management practices by identified Caltrans maintenance employees as part of compliance with the Caltrans National Pollutant Discharge Elimination System permit.[27] Since Caltrans numerous other facilities have stormwater requirements, there would likely be

[26] Build-to-suit is defined as when the building owner will specifically customize the building interior to suit the tenants' needs.
[27] http://www.dot.ca.gov/hq/construc/stormwater/swppp_training.html

significant overlap and therefore mutual benefit with DWR, the State Water Resources Control Board (State Board) and Caltrans collaborating on the implementation of this directive.

Purpose Statement

This proposal focuses on new and renovated State facilities only.[28] The ITP is recommending to strengthen the requirements for *sustainable landscape* design and maintenance policies and commitments on the same level of commitment as Energy Section 2.0 of the Green Building Action Plan[29] for *Zero Net Energy Approach*[30], where on the same 10-year implementation schedule, buildings be designed with landscaping requiring no supplemental potable irrigation beyond the maximum two year establishment period (LEEDv4 Water Efficiency, Outdoor Water Use Reduction, Option 1).

The Independent Technical Panel Recommends That:

1. The State, in consultation with the Department of General Services, Department of Water Resources (DWR), and the State Water Resources Control Board (State Board), set up a training and education program along with certification for irrigation managers. This may be a similar program to what the State Board currently supports for the Storm Water Monitoring and Report Tracking System (SMARTS) program for stormwater system designers. The SMARTS program could include all landscape managers (and may include designers and practitioners that are working on the same sites). This program may function similar to the requirements for Qualified Storm Water Pollution Prevention Plan (SWPPP) Developers and Qualified SWPPP Practitioners [31] by the State Board through an online database system. This program may leverage off of the US *EPA WaterSense®* Landscape Irrigation Professionals Program.

2. The State "lead by example" through innovative design of new and majorly renovated buildings, which will further help to educate the public, and provide ideas about how to beautifully apply water-efficient *sustainable landscaping*.

3. The State provide near-term staff and funding resources dedicated to the fullest extent possible in order to complete the multi-year effort to implement the EO B-18-12 Green Building Action Plan. This should follow the completion of the "Roadmap" to meet EO B-18-12 (being worked on by the all the State departments as of April 2016).

[28] Note Recommendation #5-3 focuses on retrofitting existing State *customer service buildings* for educational purposes, which includes a mandated *watershed approach*, and demonstration type gardens that would include detailed signage explaining the landscaping and identifying various features in the garden (versus other facilities with small signs).
[29] https://www.gov.ca.gov/docs/Green_Building_Action_Plan_B.18.12.pdf
[30] Buildings that function on a basis of energy production meeting energy load (demand) for the facility such that the building is not adding an "new' demand to the existing energy used by a community. A parallel concept in water would be "*watershed approach*" of using on water that is produced or natural precipitation to irrigate the landscape (without any supplemental water).
[31] http://www.waterboards.ca.gov/water_issues/programs/stormwater/training.shtml

4. By January 1, 2017, the State shall, in consultation with DWR Water Use Efficiency Office, require the use of landscape design templates that are accessible to new building developers for all new State facilities, ideally that extend beyond the *Model Water Efficient Landscape* Ordinance (MWELO) standards. This follows the same approach used by the City of Los Angeles and elsewhere for their municipally owned facilities, and to the extent practical, these resources should be leveraged to expedite application of MWELO given the on-going drought conditions.

5. By January 1, 2017, the State shall in consultation with DWR Water Use Efficiency Office, establish a landscape and *irrigation system* Water Efficiency Building Commissioning Protocol, such that proper installation occurs and transfer to the landscape maintenance staff is successfully completed.

6. By January 1, 2018, the Governor update EO B-18-12 and the Green Building Sustainable Task Force update the associated Green Building Action Plan, State Administration Manual. and Management Memorandums as necessary such that in all new State buildings and major renovations where water use efficiency standards are applicable, *supplemental irrigation* shall be minimized and/or eliminated (similar to the State's *Zero Net Energy* policy in the Green Building Action Plan outlined in Section 2.0).

    a. Projects beginning landscape designs after January 1, 2025 shall be constructed to the maximum extent practicable[32] to implement the *watershed approach*, through eliminating supplemental potable irrigation on site, maximizing non-potable water sources where cost effective, rainwater infiltration, and on-site reuse.

    b. As an interim target, 50% of new facilities beginning design after 2020 should be targeted to achieve this goal in line with LEEDv4 Water Efficiency Outdoor Water Use Reduction, Option 1, requiring that the landscape does not require a permanent *irrigation system* beyond a maximum two-year establishment period or only use reclaimed water for *supplemental irrigation*.

    c. Where practical and feasible, these facilities should include demonstration gardens with accompanying, appropriate educational signage.

    d. Means to incentivize certified landscape professionals trained in the most up to date design and maintenance practices should be contracted such that the investment of State staffing and funding resources are maximized for the aesthetic appeal of these landscapes for public benefit.

ITP Member Votes
Support – All Members

[32] Where determined by the State that irrigation demand on its facilities can be minimized or eliminated based on existing site conditions. Noting in some cases for wastewater disposal, *recycled water* demands are needed and also if some water features are needed public health and safety (like aeration ponds for *recycled water*, plant barriers for separation of public spaces, etc.).

SECTION 7: COMPLEMENTARY POLICES AND REGULATIONS

This section presents the Independent Technical Panel's recommendations about complementary policies and regulations. It includes recommendations about product standards for irrigation controllers and sprinkler bodies, an approach to require permits for irrigation system installation, a recommendation to establish a pilot program to promote landscape efficiency through connection charges, and recommendations for labeling of plant material and upgrades to the California Irrigation Management Information System.

RECOMMENDATION #1: Product Standards for Irrigation Equipment – Controllers

Background

A number of studies, many of which are summarized in a 2014 Lawrence Berkeley National Laboratory (LBNL) report,[33] have shown the potential for significant water savings from landscape irrigation controllers that adjust *irrigation schedules* based on weather data and/or ability to shut off during rain events. The estimates contained in the LBNL report suggest savings of approximately 15%, although savings attributable to rain shut-off devices may not be representative of California conditions.

There are significant regulatory gaps that diminish the widespread installation of efficient irrigation controllers. Some existing California regulations, such as the *Model Water Efficient Landscape Ordinance* (MWELO), now address landscape irrigation controllers. However, not all new landscape installations are covered by MWELO, nor do these regulations cover sales of replacement controllers for an existing landscape. Replacement controller sales are likely to make up the majority of product sales, since the lifetime of a new building (30 or more years) substantially exceeds the lifetime of a controller (approximately 10 years). Replacement controller sales are not currently regulated, and most replacement units sold in California do not contain the types of water efficiency features recommended here. Additionally, even where controller installations are covered, MWELO does not contain performance standards or reference test methods.

Purpose Statement

The ITP recommends that the California Energy Commission (CEC) adopt Title 20 water and energy efficiency standards for landscape irrigation controllers. The Title 20 standards would address the regulatory gap that exists for replacement units and for units serving new landscapes not covered by MWELO. The Title 20 standards would also have the effect of

[33] Lawrence Berkeley National Laboratory. 2014. Williams, A., Fuchs, H., and Dunham Whitehead, C. 2014. "Estimates of Savings Achievable from Irrigation Controllers", Lawrence Berkeley National Laboratory. https://ees.lbl.gov/sites/all/files/lbnl-6604e.pdf.

addressing the current lack of performance requirements for units installed in new landscapes since Title 20 applies to all product sales in California.

The recommended standards can be adopted in two stages. The first stage, which is recommended to be adopted this year, should apply to basic controllers that are neither *weather-based* nor *soil moisture-based*. Standards for basic controllers should at least require the following:

- controls capable of accommodating local watering restrictions;
- preservation of program settings when the controller's power source is lost;
- limits on standby power consumption; and
- controller to be packaged and sold with an automatic rain shut-off device.

The first two items are based on requirements in the current *EPA WaterSense®* specification for irrigation controllers, and are features widely available in more advanced controllers.

Note that this is not identical to the requirements for new landscape controllers in MWELO, which requires the new controller to be either Evapotranspiration (ET)-based or *soil moisture-based*, plus have a *rain sensor*. Thus, the proposed initial stage of the Title 20 standard would allow the sale of replacement controllers with a rain shut-off system in lieu of *ET-based* or soil moisture-based controllers, which would not meet the requirements of MWELO, but would offer a significant step up in performance over many replacement controllers sold in California today, and would apply to a much large set of controller installations. Additionally, the performance requirements and test methods in the Title 20 proposal would help ensure that all newly-sold rain shut-offs were capable of meeting a specific standard.

For rain shut-offs, manufacturers would be required to meet a performance standard based on data showing that rain shut-offs can detect at least 95% of significant precipitation events.[34] The test method would be based on an Irrigation Association method plus additional specifications to turn the testing protocol into a test method. These changes include adding a lower simulated precipitation rate that is based on California's climate, and specifications for the quality of water used to simulate rainfall events.

The stage 1 standard should also include a standby power consumption standard. Reports from the Natural Resources Defense Council and others show levels ranging from one to eight watts.[35] The higher end of this range is significantly higher than standby standards for many other comparable products.

[34] For instance, see Cardenas-Lailhacar, B., and M. Duke. 2008. "Expanding Disk Rain Sensor Performance and Potential Irrigation Water Savings." Journal of Irrigation and Drainage Engineering. February 2008. [134(1), 67-73]; and Meeks L., et al. 2012. "Long Term Expanding-Disk Rain Sensor Accuracy." Journal of Irrigation and Drainage Engineering. January 2012. [138(1), 16–20]

[35] Delforge, P., Schmidt L., Schmidt, S. 2015. "Devices Wasting Huge Amounts of Electricity when Not in Active Use." Natural Resources Defense Council. Issue Paper. May 2015; [LBNL] 2009. Lawrence Berkeley National Laboratory. Brown, R. "Energy

The second stage of this regulation would apply to *weather-based* and soil moisture-based controllers and should be adopted as soon as evaluation of a test method and performance metric for soil moisture-based controllers is completed. For *weather-based controllers*, the proposed Title 20 standards would require manufacturers to meet the U.S. Environmental Protection Agency's (EPA) *WaterSense*® Specification Version 1.0. [36] For *soil moisture sensor*-based controllers, the EPA has announced[37] its intention to release a draft *WaterSense*® test method and specification in the summer of 2016 for controllers that adjust irrigation in response to soil moisture data. This *WaterSense*® specification will be based upon a test method under development by the American Society of Agricultural and Biological Engineers. After review of this draft specification by the Commission, the CEC should adopt the second stage of Title 20 standards for irrigation controllers based on *WaterSense*® criteria if adequate for purposes of a Title 20 standard and should require rain shut-off capability, as envisioned by MWELO. Until a performance standard and test method is developed for soil moisture-based controllers, both *weather-based* and soil moisture-based controllers would be sold in California without restriction.

Finally, the CEC should be encouraged to consult with the California Department of Water Resources (DWR), as well as other relevant agencies and stakeholders, regarding the proposed standards. In addition, DWR should include information on the proper installation and configuration of irrigation controllers in the MWELO training and guidance materials, which should improve compliance of the Title 20 standards.

The Independent Technical Panel Recommends That:

1. California Energy Commission (CEC) adopt Title 20 standards for landscape irrigation controllers in two stages. The first stage standards should be adopted in 2016 and take effect in 2017. The second stage standards should be adopted and implemented as soon as practical after the release of the draft *EPA WaterSense*® specification for soil moisture-based controllers.

   Stage One – Basic Irrigation Controllers

   1) Basic landscape irrigation controllers must be shipped and sold with an automatic rain shut-off device.
   2) Automatic rain shut-off devices must be tested and certified using a proposed test method based on the Irrigation Association's Smart Water Application Technologies "Turf and Landscape Irrigation System Smart Controllers Climatologically Based

Consumption of Irrigation Controllers." Environmental Energy Technologies Division, June 1, 2009. http://www.energy.ca.gov/appliances/irrigation/documents/2009-06-01_workshop/presentations/Brown_Rich_LBNL_Irrigation_Controls.pdf

[36] *WaterSense® Specification for Weather-Based Irrigation Controllers*. Volume 1.0. November 3, 2011.

[37] http://www3.epa.gov/watersense/products/soil_moisture_based_technologies.html

Controllers: 8th Testing Protocol" (September 2008) along with additional elements specified by the Title 20 standards to address rainfall rates that are more common in California. Automatic rain shut-off devices as shipped must detect 95 percent of rainfall events of 1/4 inch or 6 millimeters.

3) The controller shall be capable of accommodating watering restrictions as follows:
    a. Operation on a prescribed day(s)-of-week schedule (e.g., Monday-Wednesday-Friday, Tuesday-Thursday-Saturday; any two days; any single day, etc.).
    b. Either even day or odd day scheduling, or any day interval scheduling between two and seven days.
    c. The ability to set *irrigation runtimes* to avoid watering during a prohibited time of day (e.g., between 9:00 a.m. and 9:00 p.m.).
    d. Complete shutoff (e.g., on/off switch) to accommodate outdoor irrigation prohibition restrictions.
4) The controller shall be capable of preserving the contents of the irrigation program settings when the power source is lost and without relying on an external battery backup.
5) The controller shall meet limits on standby power consumption consistent with other California and European product standards.

Stage Two – Weather-Based and Soil Moisture-Based Controllers

6) *Weather-based controllers* must meet the requirements in the *EPA's WaterSense®* Specification for Weather-Based Irrigation Controllers Version 1.0 (2011), including testing for irrigation adequacy and irrigation excess.
7) Soil-moisture based controllers must perform to the metrics, test methods, and functional requirements contained in the draft *WaterSense®* specification for Soil Moisture-Based Irrigation Controllers (forthcoming ≈2016), if the CEC determines that they are sufficient to establish a T20 compliance option.
8) All landscape irrigation controllers must be shipped and sold with an *automatic rain shut-off device* (or built-in functionality).[38]
9) All controllers shall meet limits on standby power consumption consistent with other California and European product standards.
10) CEC should consult with the California Department of Water Resources (DWR), as well as other relevant agencies and stakeholders, regarding these proposed standards.

[38] There is currently an emergency order that calls for no irrigation for 48 hours after a measurable rain event. All controllers must be able to adhere to such a requirement.

2. DWR provide information on the proper installation and configuration of landscape irrigation controllers to better ensure that potential water savings from both Title 20 standards and the Model Water Efficient Landscape Ordinance will actually be achieved.

ITP Member Votes
Support – All Members

SECTION 7: COMPLEMENTARY POLICES AND REGULATIONS

RECOMMENDATION #2: Product Standards for Irrigation Equipment – Sprinkler Bodies

Background

Sprinkler bodies and other types of landscape irrigation emission devices can be purchased either with or without water saving features. It is well known in the landscape industry that the most common overhead popup spray-type sprinkler bodies sold are not efficient with regards to pressure regulation and the ability to prevent low head drainage. This is a documented source of water waste in many landscapes and can lead to misting and runoff. For instance, a recent study shows that one model of pressure regulating spray body achieves 14% less water use at 60 pounds per square inch inlet pressure (psi) and 19% less water use at 80 psi.[39]

Millions of pop-up sprinkler bodies are sold in the State each year. However, the large majority of these products lack basic water conservation efficiencies that built-in pressure regulators and low-head *drainage check valves* provide.

There are significant regulatory gaps that diminish the widespread installation of water efficient emission devices. The *Model Water Efficient Landscape Ordinance* (MWELO) requires that landscape irrigation emission devices meet the requirements of the American Society of Agricultural and Biological Engineers (ASABE) and International Code Council (ICC) Landscape Irrigation Sprinkler and Emitter Standard (ASABE-ICC 802-2014). However, not all new landscape installations are covered by the MWELO, nor does the MWELO cover sales of replacement units for an existing landscape. Replacement units are likely to make up the majority of product sales, since the lifetime of a new building (30 or more years) substantially exceeds the lifetime of most emission devices (perhaps 5-10 years). Since replacement sales are not currently regulated, most replacement units purchased in California do not contain the types of water efficiency features recommended here.

Additionally, ASABE-ICC 802-2014 contains test methods for a variety of products and features but relatively few performance standards (it does contain *anti-burst requirements*, for instance). Notably, requirements for *integral pressure regulation* are limited to sprinkler bodies for spray nozzles but not for bodies used with *rotors*.

[39] The Metropolitan Water District of Southern California awarded Rain Bird Corporation an Innovative Conservation Program grant for a blind study conducted by the University of Arizona. Project results are contained in the Final Executive Summary for Innovative Conservation Program Project 143542: "Project PRS: Study of Pressure Regulated versus non-Pressure Regulated Sprays and Rotors." Excess pressure leads to excessive water application, misting, and potentially worse distribution uniformity and excessive throw distances.

Purpose Statement

The Independent Technical Panel recommends that the California Energy Commission (CEC) adopt Title 20 water efficiency standards for landscape irrigation emission devices this year. The Title 20 standards would address the regulatory gap that exists for replacement units and for units serving new landscapes not covered by MWELO. The Title 20 standards would also have the effect of addressing the current gap in performance requirements for units installed in new landscapes since Title 20 applies to all product sales in California.

Additionally, the U.S. Environmental Protection Agency (EPA) is considering a *WaterSense®* specification for pressure regulated sprinkler bodies and *high efficiency nozzles*.[40] Potential EPA test data and proposed *WaterSense®* standard(s) and test method(s) could help inform the CEC's efforts.

The Independent Technical Panel Recommends That:

1. California Energy Commission (CEC) adopt Title 20 standards requiring pressure regulation and a built-in low-head *drainage check valve* for new sprinkler bodies by the end of 2016, to take effect in 2017.

2. CEC evaluate additional potential standards for features and product types addressed by ASABE-ICC 802-2014 performance standards and/or test methods.

3. CEC consult with *EPA WaterSense®* staff, the California Department of Water Resources, as well as other relevant agencies and stakeholders, regarding these proposed standards.

ITP Member Votes
Support – All Members

[40] U.S. Environmental Protection Agency, *WaterSense®* Notice of Intent (NOI) to Develop a Draft Specification for Landscape Irrigation Sprinklers, May 22, 2014. http://www3.epa.gov/watersense/docs/irrigation_sprinklers_NOI_508.pdf

SECTION 7: COMPLEMENTARY POLICIES & REGULATIONS

RECOMMENDATION #3: Permit Required for Irrigation Installation

Background

It has been the goal of the State since at least 1990 that new landscapes and major renovations of existing landscapes should be designed and installed to be water-efficient. The State's *Model Water Efficient Landscape Ordinance* (MWELO), now in its third iteration, carries standards and criteria for new and renovated landscape projects that are included in projects that require a local permit, plan check or design review such as the construction of a new building, the extension of electric or natural gas lines from an existing building, or major excavation and re-grading. However, the coverage of MWELO as specified in the Model Ordinance has a major gap that leaves a very significant portion of new landscape projects not subject to any standards. This is because it is common practice in most parts of the State for home builders to leave the back yards of new homes un-landscaped. What's more, in some parts of the State, it is common for front yards to be left un-landscaped by home builders as well. Thus, in many cases the building permit for the new home does not include the landscape, and the owner-initiated landscape projects that may follow new home construction by anywhere from a few months to a few years are not subject to MWELO because in most localities, the installation of landscape materials and an *irrigation system* as a stand-alone project do not require a permit.

Purpose Statement

The proper design, installation, and control of automatic landscape *irrigation systems* is essential to the efficient use of water and avoidance of water waste. Stand-alone landscape projects are common in California, and should not be exempt from permitting. While the planting of landscape materials can take place over an extended period of time, the *irrigation system* largely controls the delivery of water to the landscape. Thus, the installation of an *irrigation system* for a large landscape is itself an appropriate "trigger" for a permit subject to all requirements of MWELO. Unpermitted installations would be evident, as the difference between irrigated and unirrigated space can be readily identified, either on-site or through aerial imagery. Developer-installed landscape projects would continue to be covered by a building permit, without requiring a separate permit for the *irrigation system*.

The third version of MWELO took effect on December 1, 2015, and DWR has indicated a preference for a multi-year revision cycle. We recommend that the Legislature directly incorporate a requirement for the permitting of stand-alone irrigation installations for commercial and large residential landscapes into the Water Conservation and Landscaping Act. The effect will be to bring stand-alone landscape projects under the scope of the revised MWELO in all local jurisdictions without further rule-making action by DWR.

In light of the diverse and challenging conditions in which ornamental landscapes are installed, and the frequent changes in irrigation technology and plant varieties, the avoidance of waste requires that all large new landscapes and major additions should require a permit.

The Independent Technical Panel Recommends That:

The following be added at the appropriate place in the Water Conservation in Landscaping Act (*Government Code*, Article 10.8, sections 65591 – 65599):

_____. (a) On or after July 1, 2018, the installation of any automatic *irrigation system*, or the expansion of an existing automatic *irrigation system* to increase the irrigated area by 25% or more, for a landscape project subject to this article and not otherwise within the scope of a *local agency* permit shall require a written permit, *provided that*, such irrigation system is to serve:

(1) a non-residential landscape of 500 square feet or greater, except a cemetery; or

(2) a residential landscape of 10,000 square feet or greater.

(b) Before issuing any permit required by this section, the governing body of a *local agency* may adopt an ordinance prescribing fees for filing an application for such permit, but the fees shall not exceed the amount reasonably required by the *local agency* to issue such permits, and shall not be levied for general revenue purposes.

(c) An application for a permit required under this section for an *irrigation system* serving a residential landscape may be submitted by a property owner, property manager, *landscape contractor*, *landscape architect*, or any other agent designated by the property owner.

_____

ITP Member Votes
Support – Peter Estournes, David W. Fujino, William E. Granger, Lisa Maddaus, Edward R. Osann
Can Live With – Penny M. Falcon
Opposed – Jeff Stephenson

SECTION 7: COMPLEMENTARY POLICIES & REGULATIONS

RECOMMENDATION #4: Piloting Connection Charges that Promote Landscape Water Efficiency

Background

In the single-family residential sector, landscape water use is a major factor in the capacity required to provide water service to a new home. In turn, landscape water use drives the peak season demand for nearly all urban water suppliers in California. The 2015 revisions to the *Model Water Efficient Landscape Ordinance* (MWELO) reduce *Evapotranspiration Adjustment Factor* (ETAF) by over 20%, which should have the effect of reducing the requirements for capacity to serve new MWELO-compliant homes. Landscapes installed and maintained to better-then-MWELO standards should provide even greater savings.

Most public water suppliers have a set of one-time charges for a new dwelling to connect to the public water system. Some small portion of these charges may relate to the cost of a meter, a short service lateral, and costs associated with adding a new customer account. The majority of these charges, however, are typically for the recovery of the costs of water system capacity – capital costs associated with supply, transmission, treatment, and distribution of water – that are assigned to new connections as a matter of equity with existing customers. These one-time charges for system capacity are separate from the recurring charges for water service. Any differentiation in these charges is typically based upon meter size categories, with connections requiring larger meters facing a higher charge.

In California, connection charges range from modest to quite high.[41] The average water connection charge for single-family homes reported in the 2013 survey by the Cal-Nevada Section of American Water Works Association was $3,656, while the highest was $28,600. A forthcoming 2015 survey is likely to show even higher figures.

The Independent Technical Panel received a presentation at its April 2015 meeting by Western Resource Advocates (WRA)[42] on a forthcoming report (subsequently released) on the role that water connection charges can play in encouraging water efficiency in new growth.[43] Based on an examination of four case studies, the report found that meter size alone is an imprecise predictor of the capacity requirements imposed on the system, when dwellings served by comparable meters can have substantially different peak season water demand profiles. Case studies found strong interest by homebuilders in bringing to market, new homes that qualify for lower connection charges based on locally determined water efficiency criteria.

[41] One exception: Investor-owned water companies that are regulated by the California Public Utilities Commission are not authorized to assess connection charges.

[42] http://www.water.ca.gov/calendar/materials/incentivizing_water_conservation_with_connection_fees_nuding_18966.pdf

[43] A. Nuding, S. Leurig, J Hughes, *Water Connection Charges: A Tool for Encouraging Water-Efficient Growth*, Western Resource Advocates, University of North Carolina Environmental Finance Center, and Ceres. August 2015. Available for download at https://www.ceres.org/resources/reports/water-connection-charges-a-tool-for-encouraging-water-efficient-growth/view

The WRA report recommended that:

- Utilities should consider refined, multi-factor connection charges to encourage water efficiency of new developments and capture the true costs of new development.
- Utilities should consider putting in place mechanisms to ensure longevity of water savings.
- Utilities should invite customers and developers into the connection charge design process.
- Local policymakers and planners should recognize the importance of connection fees in shaping future water demand and development patterns, and in managing costs of this fundamental service.

In essence, connection charges that are differentiated based on the construction of new homes and landscapes that effectively shrink the *capacity footprint* of a new customer represent an alignment of interests between the homebuilder, the water supplier, and the new occupants. When new homes and landscapes are built to standards that ensure lower *peak demand* than business-as-usual construction, real savings are created and an opportunity exists for shared savings among all stakeholders.

In California, MWELO 2015 and the incorporation of landscape standards into the mandatory portion of the California Green Building Standards Code (CALGreen) signify a potential sea change in outdoor water use in new development. The benefit of this change can be readily monetized if water suppliers with connection charges take these new regulations into account when connection charges are next reviewed. MWELO 2015 lowers the ETAF for new residential landscapes from 0.7 to 0.55, a reduction of 21%. So the standards are more stringent and the enforcement of these standards should improve. The California Department of Water Resources should assist water suppliers to evaluate the impact of MWELO on *peak demand* and system capacity, and water suppliers may take this into account when setting or revising their connection charges.

Additionally, water suppliers willing to explore this concept should be supported through State financial assistance to consider landscape design or performance standards of the water suppliers' own devising. These standards would ideally define a better-than-code landscape that would be sufficiently more water-conserving such that it would allow for a specific reduction in the connection charge that applies to all code-minimum connections. This would be designed by the water supplier and would have to be durable enough to give the agency confidence that a lower connection charge is warranted.

Purpose Statement

Connection charges that are based on a reasonably predictable reduction in *peak demand* of new buildings and landscapes are a new concept in California, but represent a strategy with

unknown potential to achieve further reductions in water use. The purpose of this proposal is to secure assistance to local water suppliers that are willing to 1) identify the demand-reducing effects of 2015 MWELO and CALGreen revisions; and, 2) explore the development of better-than-code landscape criteria that would support a differentiated connection charge for eligible new homes.

The Independent Technical Panel Recommends That:

1. The California Department of Water Resources (DWR) develop and test one or more methods for relating improvements in the water efficiency of new landscapes required by MWELO 2015 with the *peak demand* and system capacity requirements of new buildings and landscapes connecting to a water system.

2. DWR develop a grant solicitation specifically to fund innovation in differentiated connection charges. Specifically, grant funds should be made available to cover a portion of the discount from standard connection charges that are offered to new buildings and landscapes meeting locally-developed better-than-code installation and durability criteria for water efficiency.

ITP Member Votes
Support – Peter Estournes, David W. Fujino, Lisa Maddaus, Edward R. Osann
Can Live With – William E. Granger
Opposed – Penny M. Falcon, Jeff Stephenson

SECTION 7: COMPLEMENTARY POLICIES & REGULATIONS

RECOMMENDATION #5: Plant Labeling

Background

To ensure that landscape water use goals will be met, living plant material must be properly identified and categorized by water use. This information is needed at both point of sale for "Do-It-Yourself" projects, and point of installation for contractor-installed projects.

Current plant labeling requirements are inconsistent and inadequate. The California Food and Agricultural Code (section 53481) states that all nursery stock sold in California "shall be labeled . . . if so required by regulations." However, the current regulations for Nursery Stock Grades and Standards, California Code of Regulations (CCR), Title 3 (and reproduced in the Nursery Inspection Procedures Manual, Item 5) do not require nursery stock labeling. CCR section 3061 stipulates that plants sold in the State *may* be labeled, and if so, must then comply with the Food and Agricultural Code's labeling requirements. CCR section 3062 then adds that nursery stock offered for sale need not be graded or tagged, at the discretion of the person offering the stock for sale. Clearly, improved labeling requirements are needed for all ornamental plant materials sold and installed in California.

Labeling the Water Use of Ornamental Plants Sold at Retail

An estimated 41% of the households in the United States (47 million) consider themselves gardeners (National Gardening Association, *What Gardener's Think,* 2009). Of these gardeners, it is estimated that only 9% are Master Gardeners and garden enthusiasts, who are considered to be plant knowledgeable. This demonstrates the need and the importance of providing horticultural information (botanical and common name and cultural information) at the point of sales for all consumers. Independent gardening surveys indicate that one of the most important considerations when purchasing a landscape plant is that the plant purchased is accompanied with an informative label containing specific plant information.

Ornamental plants are labeled by the wholesale nursery and floricultural growers to provide consumer information - for example: a) botanical name; b) common name; c) cultivar name; d) plant description; e) location (sun or shade); f) water requirement; g) climate zone; h) growth habit. This information is provided by either the plant label manufacturer, or from their customer (wholesale grower) and derived from horticultural references. Horticultural references are most often written by horticultural experts whose basis of information is from landscape experience and not by field based-research. Therefore, specific to plant water use (very low, low, medium or high), there is very little field, science-based research (statistical) that exits for ornamental plants in California. Adding to the complexity for specific plant water use or requirement are the myriad climate zones (24) and soil types in California, which affects plant water use and availability.

There is no legal or scientific authority that provides landscape water use requirements of ornamental plants in California. The Water Use Classification of Landscape Species (WUCOLS) is the primary source of information on plant water use referenced by the *Model Water Efficient Landscape Ordinance* (MWELO) and provides water use information for 3,546 plant taxa in six climate regions of California based on the California Irrigation Management Information System evapotranspiration zones. The assignment of plant water use in WUCOLS was conducted by horticultural and academic professionals with many years of landscape experience who served in committees representing six California regions. Based on a qualitative research approach, professionals employed a consensus process to assign water use classifications to plants in six regions of the State. If no horticultural experience or knowledge of a plant's water use was known, the professionals passed on assigning a water use rating. While WUCOLS represents 3,546 plant taxa, less than 6% have been scientifically researched for water use and there are thousands more plants sold in California that are not in WUCOLS, nor have been scientifically researched.

Labeling of Ornamental Plants at Point of Installation and Inspection

For installation of ornamental plants at a permitted project, MWELO requires that plant palettes be chosen according to the landscape hydrozone and plant water usage. MWELO prescribes a *Maximum Applied Water Allowance* that must be calculated and may not be exceeded during the design and permit approval stage. Specific plants are chosen, approved and installed to meet the MWELO requirements. The newly updated MWELO calls for a third party audit to ensure that every landscape subject to the ordinance is installed per plan, including plant material.

The typical process for most landscape projects is for containerized ornamental plants to be delivered directly to the job site. The *landscape contractor* then installs these plants according to the landscape design. Once planted, it is typical to remove plant labels (which may have been affixed to containers that were removed from the site after plants were installed), leaving these plants with no identification. Therefore, unless the building inspector, water conservation specialist, or MWELO auditor is thoroughly knowledgeable in plant identification and nomenclature, verification of installed plants as consistent with MWELO ordinance requirements might not be possible without the installed plants being labeled.

The Independent Technical Panel Recommends That:

Water Use Labeling: Require that all plant taxa sold in California be identified at the point of sale by water use classification (e.g., low, medium, high) by an approved process Water Use Classification of Ornamental Species ([WUCOLS], science-based research, or a California Department of Water Resources- [DWR] approved process) and organization.

Point of Installation Identification: Require that representative plants (at a minimum two plants per taxa per plan) delivered to a landscape job site remain labeled until the project is inspected and signed off.

Programmatic: Revise State regulations to make labeling for plant identification and water use mandatory, rather than voluntary.

Proposal (Administrative):

For the Department of Food and Agriculture: The Plant Health and Pest Prevention Services Division should use its current authorities to modify its Regulations for Nursery Stock Grades and Standards to ensure that all taxa of ornamental landscape plants are properly identified and characterized as to water use, both at retail and upon installation in a landscape subject to the *Model Water Efficient Landscape Ordinance* (MWELO). Specifically, California Code of Regulations (CCR), Title 3, Section 3061 pertaining to plants being sold should be amended to replace the words "may be labeled" with "shall be labeled". Additionally, CCR section 3062 should be amended to change the words "Nursery stock, when offered for sale, need not be graded and tagged at the discretion of the person offering the stock for sale;" to the following: "Nursery stock, when offered for sale, shall be graded and tagged;". These changes should become effective January 1, 2017.

For the California Department of Water Resources (1): DWR should commission a stakeholder group to develop a project plan with deliverables and a timeline that will enable all ornamental plant material sold in California to be labeled as per MWELO water use ratings.

1. Commission a qualified academic project representative as the project leader for project plan development, implementation and database management.
2. Identify stakeholder groups (landscape professionals [designers, architects, and contractors], academics, non-governmental organizations, wholesale plant growers and retailers, plant label manufacturers) and convene such representatives to identify requirements for labeling all ornamental plants with water ratings.
3. Identify current methodology for classifying plants for water use (WUCOLS process, science-based research, American Society of Agricultural and Biological Engineers X623 or other) and choose the method or methods to be used for evaluating plant water use.
4. Define project plan deliverables and timeline once the methodology for validating plant water use is accepted.
5. As part of the project plan, there should be investigation of the following requirements:
    a. Plant database (WUCOLS or equivalent) & ongoing maintenance
    b. "Quick Response" code technology
    c. Geographic Information System technology
    d. Plant photographs (seasonal)
    e. Plant descriptions
    f. Link to existing database (UC Integrated Pest Management) for pest and disease information

g. Water resistant paper strip label that will remain on the plant for at least one month; or biodegradable labels that rapidly decomposes into innocuous products safe to humans, flora and fauna

For the California Department of Water Resources (2): DWR should modify MWELO to require that at least two representatives of each plant species planted in every landscape subject to MWELO requirements be identified by a label affixed to the plant(s) itself with the correct nomenclature to ensure that installed plants can be verified for consistency with an approved landscape design plan during final site inspection or audit process.

Proposal (Legislative):

The following provisions of Division 18, Chapter 5 (Nursery Stock Grades and Standards) of the Food and Agricultural Code should be revised as indicated:

Article 4. Regulations

53391. The director may adopt regulations which may be necessary to carry into effect the purposes of this chapter and each section of it, and may issue in relation to this chapter explanatory data and charts.

53392. The director by regulations may provide for grade sizes of the different kinds of nursery stock, and may provide that nursery stock shall be labeled with grade sizes which are established by such regulations. The director may make such other regulations as are necessary to carry out the provisions of this chapter.

53393. Not later than January 1, 2017, the director shall adopt regulations to implement sections 53481, 53482, and 53483 of this chapter.

Article 7. Labeling

53481. When nursery stock is sold, it shall be labeled plainly and legibly as to the grade size, if so required by regulations, and as to the correct name and water use characteristics as follows:

(a) The correct name for ornamentals, except roses, fruit trees, and annual or herbaceous perennial ornamental plants, shall be the botanical name including subspecies, hybrid, cultivar or variety (if any).

(b) The correct name for fruit trees shall be the recognized common name and cultivar.

(c) The correct name for turf shall be the kind and cultivar.

(d) The correct name for roses, annual or herbaceous perennial ornamental plants, dormant bulbs, tubers, roots, corms, rhizomes, pips, and other kinds of nursery stock shall be the cultivar

name and botanical name (if available), except that the recognized common name (if any) shall be required whenever no cultivar name has been given or can be determined.

(e) The correct water use classification for any taxa listed in the Water Use Classification of Landscape Species.

53482. In order to identify nursery stock properly, whenever it is shipped, delivered, or transported to any purchaser, each plant shall be individually labeled as to the correct name and water use classification. The director may create exceptions to this section by regulation, consistent with the need to correctly identify plants that are subject to inspection after installation in a landscape subject to the Model Water Efficient Landscape Ordinance or any local landscape ordinance.

53483. Nursery stock on display for sale at retail ~~may~~ shall be individually labeled ~~by a sign on any block of stock of the same kind and species~~, except that plants of the same taxa when packaged inseparably together may be identified by a single label on each such package. Turf shall be labeled by a sign showing the required correct name and water use classification of the stock on display.

ITP Member Votes
Support – All Members

SECTION 7: COMPLEMENTARY POLICIES & REGULATIONS

RECOMMENDATION #6: Upgrades to the California Irrigation Management Information System

Background

The California Irrigation Management Information System (CIMIS) is a program unit in the Water Use and Efficiency Branch, Division of Statewide Integrated Water Management (DSIWM), California Department of Water Resources (DWR) that manages a network of over 150 automated weather stations in California. Archived data is also available for an additional 92 inactive stations that have been disconnected from the network for various reasons. CIMIS was developed in 1982 by DWR and the University of California, Davis (UC Davis). It was designed initially for agricultural interests to assist irrigators in managing their water resources more efficiently but has since grown to include landscaping, water providers and even fire fighters. Efficient use of water resources benefits Californians by saving water, energy, and money.

Thirty years ago, scientific research successfully responded to the need for improving *irrigation efficiency* and management for agricultural use with the development of the CIMIS program. The program provided evapotranspiration (ET) data used by farmers for creating a water budget for a specific agricultural crop. The use of ET data has resulted in significant agricultural water savings through improved *irrigation efficiency* in agriculture throughout California. Throughout its tenure, the CIMIS network has also become useful to other interests such as the landscape industry. A peer reviewed article written in 1997 points out the history, usage, benefits and potential future of CIMIS.[44] During the past 14 years, irrigation manufacturers have focused on testing and introducing to the market, *weather-based* irrigation controllers that utilize the same CIMIS ET data for improving *irrigation efficiency* as agriculture. These "smart" controllers access and utilize ET data to achieve landscape water savings by creating a water budget for a specific *urban landscape*. Therefore, the more accurate and consistent the ET data, the more opportunity for agricultural and landscape water savings through efficiency.

In its time, the CIMIS program and network has become the standard for scientifically measuring ET to assist in crop and landscape water usage and budgeting. With the current and future drought emergencies, landscape and agricultural water usage are and will be under scrutiny. Providing science/research and standardized metrics provides the consuming public confidence that the landscape and agricultural sectors are properly managing water.

Unfortunately, the CIMIS program is consistently underfunded and is not able to meet the obligations set forth in its charter. There are gaps in the system making for an incomplete picture of ET rates. It is not designed for urban and suburban areas and attempts to infill gaps within its current structure (as stated, it was originally intended for agricultural applications)

[44] *California Agriculture* 54(3):21-25. DOI: 10.3733/ca.v054n03p21. May-June 2000

rely on spatial data that is not accurate enough. There are too few standard weather stations and a need to create new modified or different weather stations aimed at urban and suburban areas, plus a way to link them all together. The way the information is retrieved by professionals needs to be looked at as well.

Purpose Statement

Although the program has shown a steady growth over the years to accommodate the needs of over 50,000 primary registered users and thousands more secondary and non-registered users, the current system has spatial data gaps (as described above). While satellite information is being used in conjunction with active CIMIS stations and spatial data is available down to a 2 kilometer area, the accuracy of the spatial CIMIS data depends on the density of ground stations and accuracy of station data. Adding more stations with quality data can significantly improve CIMIS's usefulness as a water conservation tool. Finding an appropriate site for new CIMIS stations is one of the limiting factors in the expansion of the CIMIS network. An ideal CIMIS site would require a well-watered cool-season grass with adequate fetch of about 600-ft in all directions. Providing an incentive in the form of a tax reduction or exemptions from certain ordinances can motivate landowners to provide the required field.

Despite significant increases in user base and CIMIS data uses, the operational budget for the program has remained about the same for more than three decades. Currently, CIMIS has less than five full-time employees statewide that deal with installation and maintenance of the stations, data quality analyses and monitoring, research and development, and user assistance. This makes it very difficult for the program to provide quality services to its users and to respond to station problems in a timely manner. At a time where California is in the fourth year of an unprecedented drought, the viability of the CIMIS program is critical.

The CIMIS user interface can also be improved by upgrading the system using current technologies. CIMIS provides an invaluable weather information for landscape water budgeting and irrigation scheduling as prescribed by the *Model Water Efficient Landscape Ordinance* (MWELO). A simpler method (for example a *user dashboard*) should be determined and implemented to create and link CIMIS information to irrigation professionals as well as the general public to provide guidelines for crop and landscape water scheduling among other uses. This should include an appropriate number of reporting stations, an upgrade in technology and adequate funding for a reliable program.

With the importance of reducing water waste in California, and recognizing the large amount used for irrigation of crops and landscapes, tools such as the CIMIS network are important to water managers to meet State mandated water budgets for agriculture and landscapes meeting State guidelines and MWELO requirements.

The Independent Technical Panel Recommends That:

1. The California Irrigation Management Information System (CIMIS) network be updated to current technologies and more reporting stations installed, including the creation and installation of stations for urban and suburban areas, as well as improved development of spatial CIMIS.

2. The Department of Water Resources (DWR) work in conjunction with academic institutions and others to create a user friendly, public domain process to identify, collect and distribute weather information (such as ET data, precipitation, and soil temperature) and automated irrigation scheduling networks (such as California Sprinkler Adjustment Notification System or Santa Rosa's WaterSmart® program).

3. Pursuant to the CIMIS program charter, the State fund these improvements by providing necessary funding for DWR to restore, update, expand, operate and manage the program as a complete budget, beginning with the 2017 budget in recognition of the overall importance of managing agricultural water use and reducing potable water use for landscapes in California.

ITP Member Votes
Support – All Members

SECTION 8: WORKFORCE TO ACCOMPLISH THE TRANSFORMATION

This section presents the Independent Technical Panel's recommendations about landscape industry workforce transformation. It includes recommendations for certification of professionals, and questions to be included in the California C-27 examination covering water use efficiency and sustainable practices.

RECOMMENDATION #1: Certification of Professionals

Background

In 2005, the Assembly Bill 2717 Landscape Task Force recommended "a common foundation for the education, training, and certification of landscape professionals across the disciplines involved in designing, installing, maintaining, and managing water-efficient landscapes." The California Urban Water Conservation Council arrived at a similar conclusion by identifying the need for more workforce education in the landscape industry in their draft 2015 report on *Sustainable Landscaping: Market Transformation Framework*. During its investigative process and discussions with horticultural industry professionals and public officials, the Independent Technical Panel (ITP) found a strong case for a more comprehensive education program for landscape professionals that would lead to certification.

Given the ITP's vision to have enhanced, functional, aesthetically pleasing water wise landscapes, transforming the workforce is necessary to help accomplish this goal. One objective to meet this goal is to enforce the recent expansion of the *Model Water Efficient Landscape Ordinance* (MWELO) to include smaller new and renovated irrigated *landscape areas,* including thresholds that now trigger compliance needed by a much larger number of residential property owners. Design and approval of landscape designs includes aspects of site drainage that when aligned with the *watershed approach* (i.e., to enhance on-site *rainwater retention* and infiltration), requires qualifications that need to be substantiated by an authoritative State agency or directed non-profit organization with State agency oversight. This certification is also necessary as there are health and safety considerations when designing water wise landscapes, such as minimizing standing water for mosquito abatement, slope for site drainage, trip and fall hazards in public spaces, etc.

A certification program can address a critical need that is lacking in transforming California's landscapes. Currently, approvals for MWELO (Certificates of Completion) are only allowable per Section 492.9 by qualified professionals (the signer of the landscape plan, the signer of the irrigation design plan or licensed *landscape contractor*). In Section 492.12 *Irrigation Audit*, *Irrigation Survey* and *Irrigation Water Use Analysis,* a *local agency* landscape irrigation auditor or a third party certified landscape irrigation auditor is required. The ITP understands that it is now incumbent upon the California Department of Water Resources (DWR) to review the eligibility criteria for approvals of landscape and irrigation designs and based on Section 7, Recommendation #3 in this report, if implemented, the approval of *irrigation system* permits.

It is the ITP's goal to also have a clearer point of entry for landscape design professionals from this certification process or another means to have their qualifications validated for participation in the MWELO and other applicable processes to aid in compliance with MWELO.

One example of the State both certifying and licensing within a trade is California's Electrician Certification Program. Electricians employed by a licensed electrical contractor are required to be certified pursuant to certification standards established by the Division of Labor Standards Enforcement (Division) in the Department of Industrial Relations. Electricians must pass a test and renew their certification by completing 32 hours of continuing education every three years. Community colleges, public school districts, other public educational institutions, and approved Electrician Trainee Schools may provide this education. The Division contracts with a provider to conduct its examination program. This example is not intended to require both certification and licensing for any individual, but rather to show that the State is involved in both certification and licensing within a single trade.

While the State run Electrician Certification Program requires electricians to be certified, rather than contractors or business owners, it is recommended that a State certification in water-efficient landscaping apply to business owners only and for those businesses subject to meeting MWELO requirements. In this way, the business owner is responsible to meet MWELO requirements and will then educate and train themselves and their employees accordingly.

Purpose Statement

The State should require certification and continuing education in water-efficient landscaping for all businesses that design, install, manage, audit or repair landscape irrigation systems as a means to improve industry knowledge about *landscape water efficiency* and to achieve better water use savings as a result.

The Independent Technical Panel Recommends That:

The State require specific certification in water-efficient landscaping for all businesses that design, install, manage, audit and/or repair landscape irrigation systems. Further, this certification shall be linked to the *Model Water Efficient Landscape Ordinance* (MWELO) in its scope and continuing education units required to maintain certification. The California Department of Water Resources shall by 2018, (or prior to the next MWELO update cycle) complete the following actions:

1. Identify and review current certification and continuing education programs and higher education programs/degrees.
2. Develop metrics for evaluating current certification programs and higher education programs/degrees. Identify what is working, what is not working and where the gaps are in the certification and/or degree programs.

3. Select the criteria for creating the program along with continuing education requirements needed for ongoing certification.
4. Complete a public process with other appropriate State agencies to solicit input from landscape professionals (designers, architects, contractors and irrigation professionals), University of California, California State Universities and community colleges, non-governmental organizations, irrigation manufacturers and brokers, agencies, industry trade organizations and consultants in the certification program design process
5. Define project plan deliverables and a timeline for program design, development, testing and implementation along with identifying a process to audit the program once established.
6. Work with the appropriate State agency (or contracted non-profit) to implement the certification program and update MWELO to cite the certification(s) eligible for approval of landscape planning, documentation and permits.
7. Create an online database or other references for local agencies to check to ensure that appropriate certifications are in place when enforcing MWELO.
8. Design and implement a certification program evaluation process that ensures ongoing program updates and improvements as per the MWELO update cycle.

ITP Member Votes
Support – All Members

SECTION 8: WORKFORCE TO ACCOMPLISH THE TRANSFORMATION

RECOMMENDATION #2: C-27 Examination Questions Covering Water Use Efficiency and Sustainable Practices

Background

In 2005, the Assembly Bill 2717 Landscape Task Force recommended "a common foundation for the education, training, and certification of landscape professionals across the disciplines involved in designing, installing, maintaining, and managing water-efficient landscapes." The California Urban Water Conservation Council arrived at a similar conclusion by identifying the need for more workforce education in the landscape industry in their draft 2015 report on *Sustainable Landscaping: Market Transformation Framework*. During its investigative process and discussions with horticultural industry professionals and public officials, the Independent Technical Panel (ITP) found the need for a more comprehensive education program for landscape professionals and the need to update current curriculum trade exams to be consistent with new landscape practices and regulations.

In the State of California there are three license classifications able to provide landscape installations. These are General Contracting A and B categories, and specialty license C-27 (specifically for *landscape contractors*). The contractor's trade exam for individuals applying for a license which allows for landscaping currently consists of about 100 questions, similar to the exams for the other license classifications. These trade exams must cover a very broad spectrum of industry knowledge depending upon the type of license being applied. Landscaping practices are changing or will soon change as a result of the drought and recent actions taken by the California Department of Water Resources to update the *Model Water Efficient Landscape Ordinance* as well as the State agencies that oversee building standards. Therefore, it follows that the trade exam should be updated to be consistent with changing landscape practices and updates to building codes.

Purpose Statement

The ITP recommends that the California State Licensing Board be directed to include questions with more *sustainable landscape* content and to add a resource on *sustainable landscape* construction to its list of recommended study materials for the exam.

The Independent Technical Panel Recommends That:

The California State Legislature enact legislation to direct the Department of Consumers Affairs to require the California State Licensing Board (CSLB) to formally work with the California Landscape Contractors Association (CLCA) and California Department of Water Resources (DWR) when revising sections of the existing exams for General contracting classes A and B specific to landscaping and the specialty C-27 license. This includes CSLB, DWR and CLCA

consensus on questions in the trade portion that are specific to water use efficiency and *sustainable practices* to help ensure that the State's water efficiency needs called for the California Water Action Plan are sufficiently supported. As such, the CSLB will continue to include MWELO and add other collateral material specific to sustainability into the reference study material.

ITP Member Votes
Support: All Members

SECTION 9: PUBLIC PERCEPTIONS & SOCIAL NORMS

This section presents the Independent Technical Panel's recommendations about public perceptions and social norms. It includes a recommendation to emphasize recognition of low water use landscape examples and a sustainable statewide approach to outreach and information.

RECOMMENDATION #1: Defining Professionals: Recognition of Examples of Low Water Use Landscapes and a Sustainable Statewide Approach to Outreach and Information

Background

During its investigative process and discussions with horticulture industry professionals and public officials, the Independent Technical Panel (ITP) found a significant lack of information into the process and procedures to locate and hire the appropriate professional for residential landscaping. The differences between Landscape Designers, *Landscape Architects*, *Landscape Contractors*, garden centers, irrigation professionals, landscape maintenance companies and gardeners is typically not known or clear to residential property owners in need of landscape services. Property owners often require education, advice and guidance from qualified landscape professionals at a price they can afford and should therefore know who to turn to for that. While information about landscape professionals exists and is typically produced and disseminated by each specific professional service, it seems difficult to get it into the hands of consumers when they are ready to hire such services. Examples of the difficulty to find information about the correct landscape professional to contact and utilize was presented during ITP discussions about this topic. Therefore, while this information is available, it is difficult for the consumer to locate it.

It is every homeowner's responsibility to be a water manager, both inside and outside of their home. When asked, nearly all homeowners say they conserve water. Unfortunately, when pressed further about their water conservation activities, it becomes apparent that most homeowners lack even basic information on outdoor water use efficiency. In addition, most do not measure or track their actual water use nor are they knowledgeable about their irrigation systems or the type of plant material in their yards. The Save Our Water website provides examples of *low water using landscapes* from throughout the State and includes dialogue from the owners of the properties. However, additional information would increase the website's usefulness. Such information might include details about the landscape, including before and after photos, how the landscape was designed and by whom, a list of the plants used, irrigation system information, type of hardscape features and material used, type of mulch, and whether the installation was done by the homeowner or a professional. In addition, a methodology for a sustainable (long-term) approach to educate and communicate to homeowners with respect to the items discussed above, including information on how to identify the appropriate landscape professional for each type of project, should be developed as well as a process to disseminate these examples to consumers.

Purpose Statement

The definitions, roles and requirements of and for landscape professionals should be made easily available to homeowners in order to provide them with informed choices when considering landscape services. Examples of well-designed and correctly installed water-efficient *sustainable landscapes* should be readily available and recognized on a local level. The Water Use Classification of Landscape Species (WUCOLS) website and plant list should also be readily available and easy to use.

The Independent Technical Panel Recommends That:

1. The California Department of Water Resources (DWR), in partnership with the Association of California Water Agencies (ACWA), convene a work group with representatives from academia, the California Urban Water Conservation Council, industry and others to develop an educational campaign for homeowners that identifies the variety of professional horticulture services and irrigation systems available in the marketplace. The campaign will also identify and make available to homeowners, examples of properly designed and installed low-water use landscapes for each of the State's climate zones. The campaign will provide information on how homeowners can access and utilize the Water Use Classification of Landscape Species (WUCOLS) plant list.

2. DWR request funding to complete the following:

    a. Convene representatives from horticulture groups (landscape designers, architects, and contractors), academia, irrigation professionals, nurseries (wholesale and retail), water agencies, industry trade organizations, consultants, arboretums and botanical gardens.
    b. Review of and search for existing definitions and campaigns and current levels of funding.
    c. Identify services performed by each type of landscape professional.
    d. Identify a process to obtain examples of water-efficient *sustainable landscapes*.
    e. Consider the role of invasive plants.
    f. Consider the role of and how to address concerns related to licensure (e.g. lack of insurance, business licenses, contractor license, etc.).
    g. Develop metrics to evaluate residential type of work for current professionals. Identify who typically does what and what is working, what is not working and where the gaps are in the different roles.
    h. Develop a marketing campaign to promote the WUCOLS plant list and other DWR approved sources for plants and plant lists and their use (reference Recommendation #10-2 in this report).

i. Select the criteria for creating the information and identify how to best disseminate (e.g. through the realtor community, water agencies, cities, retail garden stores, etc.).

j. Develop an implementation plan that includes a timeline for program roll-out, a list of deliverables, roles and responsibilities, and impact evaluation to measure effectiveness.

k. Continue operating the Save Our Water campaign, or similar statewide program.

ITP Member Votes
Support – All Members

SECTION 10: INNOVATIVE AND QUANITATIVE RESEARCH AND DOCUMENTATION NEEDS

This section presents the Independent Technical Panel's recommendations to support innovative and quantitative research and documentation needs. It includes recommendations to support a research program for landscape water conservation strategies, and the Water Use Classification of Landscape Species IV program.

RECOMMENDATION #1: Landscape Water Use Research Program

Background

Both the 2013 California Water Plan and 2016 California Water Action Plan Update call for reducing water now and in the future as a first strategy to meeting the State's future water needs.

> *There is broad agreement that the State's water management system is currently unable to satisfactorily meet both ecological and human needs, too exposed to wet and dry climate cycles and natural disasters, and inadequate to handle the additional pressures of future population growth and climate change. Solutions are complex and expensive and they require the cooperation and sustained commitment of all Californians working together. To be sustainable, solutions must strike a balance between the need to provide for public health and safety (e.g. safe drinking water, clean rivers and beaches, flood protection), protect the environment, and support a stable California economy. (California Water Plan Update, 2016)*[45]

With seven million more people projected to live in California by 2035 (Table 2), and in order to have a resilient environment and expand our $2 trillion economy, we need more advances in water use efficiency and conservation strategies.

Table 2. Projected California Population Growth

2015	2020	2025	2030	2035
38,896,969	40,619,346	42,373,301	44,085,600	45,747,645

Source: California Department of Finance, Table P-1, Last accessed: January 28, 2016.[46]

[45] http://resources.ca.gov/docs/california_water_action_plan/Final_California_Water_Action_Plan.pdf
[46] http://www.dof.ca.gov/research/demographic/projections/

The 2013 California Water Plan states that it is **"imperative to invest in innovation and infrastructure"** in State integrated water resource management strategies and calls for "**advancement in water science and technology"** (Figure 3). This must apply to water conservation and efficiency technologies. With more than three decades of active conservation programs implemented in many communities throughout the State, the easier water efficient solutions have already been employed.

Figure 3. State Integrated Water Management Categories (Box 1-1).

Box 1-1 State Integrated Water Management Investment Categories

Innovation:

- Governance of State integrated water management (IWM) improvements.
- Planning and public engagement improvements.
- Strengthening government agency alignment.
- Information technology (data and analytical tools) improvements.
- Water technology and science advancements.

Infrastructure (human and ecosystem), implemented at the following scales:

- Local.
- Groundwater basin.
- Watershed.
- Regional.
- Interregional.
- State.
- Interstate.
- International.
- Tribal.

Source: 2013 California Water Plan, Volume 1, Chapter 2, Imperative to Invest in Innovation and Infrastructure. Last accessed: January 29, 2016

This is most certainly true extending beyond 2020, when Senate Bill X7-7 targets are expected to be met, saving an estimated 2 million acre feet[47] (Figure 4). Approximately half of the conservation savings are estimated in the landscape sector; a sector that has significant needs for scientific and technological research.

[47] 2013 California Water Plan, Volume 3, Chapter 3, Table 3-4. Last accessed January 31, 2015. http://www.waterplan.water.ca.gov/cwpu2013/index.cfm

Figure 4. Projected Water Savings by Sector from SB X7-7

Table 3-4 Projected Savings by Sector [a]

Demand Reduction Sectors	Reduction	Projected Savings in 2020
Large landscape	3 gpcd	148,000 af
Commercial, industrial, and institutional	5 gpcd	170,000 af
Residential indoor	15 gpcd	739,000 af
Residential landscape	16 gpcd	789,000 af
Water loss control	5 gpcd	200,000 af
Total	**44 gpcd**	**2,046,000 af**

Notes:

af = acre-feet, gpcd = gallons per capita per day

Source: 2013 California Water Plan, Volume 3, Chapter 3, Urban Water Use Efficiency. Last accessed: January 29, 2016

In the last five years, there has not been funding by State agencies to adequately support quantitative water conservation and water efficiency research, including landscape related research needs. Science-based research data is necessary to determine which statewide rebate programs and services are estimated to generate the best return on investment. This research has an added direct benefit to the State by assisting individual water utilities and other interested stakeholders to design and implement local programs to achieve state mandated water conservation and efficiency goals.

As of 2015, millions of dollars have been allocated by State and local agencies on turf removal programs resulting in millions of square feet of turf removed and replaced with water conserving plants without the ability to clearly to demonstrate or quantitate water savings through science-based research. The California Urban Water Conservation Council (CUWCC) cited in their report, “Turf Removal & Replacement: Lessons Learned”, that “without sophisticated metering, let alone designated landscape meters, attributing water savings directly to turf replacement can be nearly impossible”. To quote the distinguished mathematician and physicist, Lord Kelvin (1824-1907), “To measure is to know," therefore if you cannot measure it, you cannot improve it. The need for science-based quantitative research is paramount to understand the impact of purported landscape conservation programs and initiatives. The extremely limited (less than two dozen) landscape water conservation studies completed in California are dated, most being more than 10 years old, and have been primarily locally funded. As a result, most information to planners, governmental officials and others on estimated water savings is anecdotal and not objective, lacking basic

scientific methodology (statistical design, treatment replication and reproducibility). Multi-year research is needed to minimize the effects of seasonal variation and to understand if water savings through conservation and efficiency can be sustained overtime.

In January 2010, the *Model Water Efficient Landscape Ordinance* (MWELO) was revised, and one of the new requirements was to reduce the *Evapotranspiration Adjustment Factor* (ETAF) from 0.8 to 0.7 for a new landscape over 2,500 square feet. This was assumed to have resulted in a 12.5% reduction in the required water budget. To date, there has been no study with data to confirm the benefits of water savings or other beneficial impacts, or unintended consequences associated with the ETAF reduction from 2010. On December 1, 2015, the ETAF was decreased another 21+%, again resulting in significantly less water allowable for the water budget of a new landscape. Again, there is no research on the horizon that will substantiate the reduction of the 0.7 ETAF to 0.55 for residential and 0.45 for commercial landscapes. With the most recently revised MWELO statute, there will be a significant shift in how California landscapes will be designed, implemented and maintained in the future. Determining how much shift has occurred in quantifiable water savings on landscapes through quantitative research is critical to understanding where additional water savings are most feasible from landscape water use. We need both pilot scale and readily transferable research findings given the diversity and complexity of our California environment and the need to address water use on existing and new *urban landscapes*.

An example of a State agency research program is the Research and Development Program under the California Energy Commission. This program has annual funding for energy research and has in place an Electric Program Investment Charge (formerly Public Goods Charge) as the sustainable funding source. While a sustainable funding mechanism (such as a public goods charge) may be controversial in the context of water supplies, it is time for agencies, academia, industry, and non-governmental organizations to invest in and provide leadership for a sustainable water conservation research program for California, particularly focused on landscape water use. Given the embedded energy in the water supply, especially when pumping in peak times to meet irrigation demands, this is a topic that provides mutual benefits to several resource use sectors and should either be allowed to share resources with the energy sector or have a stand-alone sustainable funding source.

Purpose Statement:

The Independent Technical Panel recommends that the California Department of Water Resources (DWR) collaborate with the CUWCC and academia such as the University of California (UC) to convene stakeholder meeting(s) to identify the priority needs for research that will result in short-, medium- and long-term conservation water savings. The CUWCC currently has a research and evaluation committee and a landscape committee that may assist in this effort. This effort could be an extension of the process used to develop the CUWCC's Market Transformation Framework for Sustainable Landscapes. It is envisioned that academic researchers would have a central role in facilitating the dialogue among stakeholders.

Prior to convening meeting(s), DWR or other organizations will conduct a science-based literature review to identify research conducted on best management practices for water conservation and water efficiency, with a key emphasis on landscape, and a synopsis of what specific research has resulted in significant landscape water conservation through best management practice implementation. The outcome of this research could become a part of the CUWCC's new Water Conservation Wiki and also shared and leveraged by DWR.

The Independent Technical Panel Recommends That:

The State Legislature appropriate $5 million to the California Department of Water Resources (DWR) to create and implement a road map to fund priority research needs that will result in water conservation. Furthermore, the Independent Technical Panel recommends that research money be directed to fund priority, science-based research. Research projects will need to be multi-year and will need to measure impact by providing empirical data and statistical analyses with the same scale and rigor as applied to and invested in the energy sector.

DWR will convene an industry stakeholder committee that will confirm priority research topics and defined requirements for proposal solicitation. A sample list of key topics is provided along with an example of a high priority research focus:

Potential Topics:

1. Irrigation Technology
    a. Low-cost, consumer friendly "standard" irrigation controller that can comply with one- or two-day mandatory water restriction. Having a "standard" controller for the majority of all residential homes will facilitate irrigation controller education by many organizations, industry professionals and institutions.
2. Social/Behavioral Modification (incentives)
    a. Effective stewardship messaging causing social/behavior change for promoting responsible water use without waste
3. Documentation
    a. Providing protocol manual for evaluation, measurement and verification of landscape water conservation
4. Programs (training and education)
5. Landscape Design (plants and hardscape)
6. Soil Technology
7. Irrigation Management

a. Research to determine if existing and new landscapes can perform to the *Model Water Efficient Landscape Ordinance, Evapotranspiration Adjustment Factor*

8. Alternative Non-Potable Water (such as *recycled water*, *graywater*, rain water, storm water, cooling equipment blowdown water, agriculture runoff, etc.) when applied to landscape irrigation.

ITP Member Votes
Support – All Members

SECTION 10: RESEARCH AND DOCUMENTATION NEEDS AND SUPPORT

RECOMMENDATION #2: Water Use Classification of Landscape Species IV Enhancement

Background

The publication Water Use Classification of Landscape Species (WUCOLS) is a guide to the water needs of landscape plants in California. First developed in 1991, the document has been revised/updated twice, with the third edition (WUCOLS III) being supported and published by the California Department of Water Resources (DWR) in 1999. In each new edition, additional species were evaluated and included. Since 2010, this publication has become a standard reference to select the most water-efficient plants and is the de facto reference source by the California *Model Water Efficient Landscape Ordinance* (MWELO; AB 1881).

In 2013, under the leadership of the California Center for Urban Horticulture, University of California Davis, the WUCOLS III plant list was reviewed and updated with an additional 1,600+ taxonomic plant groups (taxa), bringing the total to 3,546 taxa in the database. Funding support for that project (WUCOLS IV), was provided by DWR and stakeholders in the California horticulture industry and allowed for the development and implementation of an online searchable database.[48] The WUCOLS IV database has been online for two years and Google Analytics metrics have increased by 200% for the number of sessions, and by 228% for the number of users for 2014-2015.

Leveraging internet technology enabled the WUCOLS IV plant list to be accessible not only to horticultural professionals, but also to the general public. Feedback on the WUCOLS IV database from horticultural professionals has been overwhelmingly positive. The ability to search by specific city, water use (very low, low, moderate & high) and by plant category allows the user to create custom downloadable plant lists, which facilitates irrigating plants with similar water needs efficiently in the landscape. The most frequent request voiced by horticultural professionals is the need for an institutionalized process for updating and adding to the online plant list. Such a process does not exist. Over time, the lack of a predictable process for adding new plant varieties and their water use information to the WUCOLS list could discourage further investment in the development and commercialization of new water-efficient plants in California.

Feedback from the general public has been less positive than from the horticultural professionals, for the general public lacks the horticultural knowledge of plant appearance and cultural information. Unfortunately, WUCOLS IV funding could not support the addition of plant photographs and descriptions to the database, features that would enable the general public to utilize this online resource tool. Thus, the addition of plant photographs and descriptions to the WUCOLS IV database is considered by the Independent Technical Panel to

[48] http://ucanr.edu/sites/WUCOLS/

be a critical enhancement to WUCOLS, offering essential information to the gardening public to identify and select *water-wise plant material* for California landscapes.

Purpose Statement

The purpose of this recommendation is to ensure that WUCOLS is made more useful to the general public and is kept up to date to accommodate new varieties of water-efficient plants. To enhance the consumer utility of the database and to ensure that a stale list does not inadvertently prevent the introduction and installation of new water-efficient plants, legislation should authorize and direct DWR to review, update, and improve the WUCOLS IV online database, including each of the following:

- Expansion of the entries in the database to include a photograph, narrative description, and key cultural information (i.e., full sun, partial shade, etc.) for each entry;
- Establishment and implementation of a regular process to add new plant taxa to the listing, and to make corrections to existing listings where necessary.

The Independent Technical Panel Recommends That:

The following be added at the appropriate place in the Water Conservation in Landscaping Act (*Government Code*, Article 10.8, sections 65591 – 65599):

_____. (a) Not later than June 30, 2018, and thereafter no less frequently than once every three years, the department shall review and revise the publication entitled *Water Use Classification of Landscape Species* (WUCOLS) and its associated database to consider the addition of unlisted plant taxa and to correct known errors in existing listings.

(b) The department shall provide the following additional information for each listed plant taxa in the WUCOLS database:

(1) a photograph
(2) a narrative description, and
(3) key cultural information.

Information specified by this paragraph shall be added to the publication within five years at a rate not less than 20% of entries per year in each fiscal year beginning July 1, 2017.

_____

ITP Member Votes
Support – All Members, excepting David W. Fujino who recused himself from voting due to a conflict of interest

SECTION 11: Executive Leadership

This section presents the Independent Technical Panel's recommendations on Executive Leadership. It includes a recommendation for the Governor to combine all ITP recommendations for State agency administrative actions into an Executive Order directing their implementation.

RECOMMENDATION #1: Implementation of Independent Technical Panel Recommendations for State Agency Action Not Requiring New Legislation

Background

In the face of the most severe drought conditions since California became a State, Governor Brown has provided clear and effective leadership. Through a series of Executive Orders (EO) beginning in January 2014, the Governor has acknowledged and acted upon the need to curtail water use in the face of shortage and to make permanent improvements in water efficiency to prepare the State for further droughts to come. In April 2015, he was especially candid in his comments about the need to curtail landscape water use. The remarkable response of the people of California is due in no small part to the Governor's effective communication of the need for action by individual citizens and by local and State agencies.

Even before the current drought had reached its most severe proportions, Executive Branch agencies were directed to prepare a *Water Action Plan*[49] (Plan). The first recommended action in the plan is:

"Make conservation a California way of life."

The Plan further states that: "We must continue to build on our existing efforts to conserve water and promote the innovation of new systems for increased water conservation."

In the 2016 Update, the Plan makes clear that additional water-conserving strategies are needed: "Even after the current drought emergency recedes, we must continue to build on our efforts to conserve water and promote innovative strategies for increased water conservation."[50]

Much has been accomplished, but much more can be done to increase water use efficiency in the State. Under the clear guidance of EO B-29-15 in April 2015, the California Department of Water Resources quickly adopted major improvements in the State *Model Water Efficient Landscape Ordinance*, and the California Energy Commission adopted landmark improvements

[49] http://resources.ca.gov/docs/california_water_action_plan/2014_California_Water_Action_Plan.pdf
[50] *California Water Action Plan 2016 Update*: http://resources.ca.gov/docs/california_water_action_plan/Final_California_Water_Action_Plan.pdf

in water efficiency standards for plumbing products, to name just two very significant accomplishments.

While EOs operate within the framework of existing law, their clear direction to State agencies can bring new energy to tasks that might otherwise languish due to administrative inertia, competing priorities, or budgetary limitations. An EO can resolve doubts about priorities and align agencies toward complementary solutions to complex challenges. That is precisely what is called for in this report.

The Independent Technical Panel Recommends That:

1. By the end of this year, the Governor issue an Executive Order containing each of the Panel's recommendations for State agency action that do not require new legislation, with individual directives to each respective agency, incorporating the administrative actions proposed in each of the following:

Recommendation Number and Topic	Administrative Recommendation Summary
#5-2*: Irrigation System Evaluation for Landscapes Over One Acre	Regular inspection of irrigation system performance of landscapes over one acre, and reporting to a data portal maintained by the Department of Water Resources (DWR).
#5-3*: Existing Landscapes at State Owned Facilities	Retrofit of publically owned *customer service buildings* from *traditional landscape* at a rate of 10% per year, and retrofit of all other publically owned buildings or facilities within 20 years.
#6-1: *Model Water Efficient Landscape Ordinance* (MWELO) Future Revisions	Specific revisions to expand MWELO's scope and impact, for inclusion in the initial public review draft of DWR's next MWELO revision.
#6-2*: Aligning MWELO with California Green Building Standards Code (CALGreen) Title 24 Revision Process	Aligning the update of MWELO with scheduled revisions of state building standards, and the incorporation of key elements of MWELO within CALGreen.
#6-3*: State Facility Leadership for New Landscapes	New landscapes at State facilities to follow the *watershed approach* in landscape planning and operation; establish a training and education program for certification of irrigation managers of state-owned landscapes; update EOB-18-12 and green building guidance to minimize and/or eliminate *supplemental irrigation*.
#7-1: Product Standards for Irrigation Equipment: Controllers	The California Energy Commission to adopt Title 20 efficiency standards for irrigation controllers.
#7-2: Product Standards for Irrigation Equipment: Sprinkler Bodies	The California Energy Commission to adopt Title 20 efficiency standards for sprinkler bodies.

#7-4*: Piloting Connection Charges that Promote Landscape Water Efficiency	DWR to develop methods for relating improvements in the water efficiency of new landscapes required by MWELO 2015 with the *peak demand* and system capacity requirements of new buildings and landscapes connecting to a water system, and to develop a grant solicitation to fund innovation in differentiated connection charges.
#7-5*: Labeling of Plant Material	The Department of Food and Agriculture to revise regulations to require that all plant taxa sold in California be identified at point of sale by water use classification; DWR, in consultation with academia and stakeholders, to develop the water use labeling program.
#7-6*: Upgrades to California Irrigation Management Information System (CIMIS)	DWR to upgrade CIMIS by installing more reporting stations, increasing program staff, and upgrading system technologies and user interface.
#8-1*: Certification of Professionals	DWR to develop a certification program in water-efficient landscaping for all businesses that design, install, manage, audit and/or repair landscape irrigation systems, linked to MWELO in its scope and the continuing education units required to maintain certification.
#9-1*: Defining Professionals: Outreach and Information	DWR, in cooperation with stakeholders, to develop an educational campaign for homeowners that identifies the variety of professional horticulture services and irrigation systems available in the marketplace.
#10-1*: Landscape Water Use Research Program	DWR, in cooperation with stakeholders, to create and implement a road map to fund priority landscape water research needs, prioritizing science-based research that will contribute to water savings.
#10-2*: Water Use Classification of Landscape Species IV (WUCOLS IV) Enhancement	DWR to update WUCOLS no less frequently than every 3 years, and enhance listings with a photograph, narrative description, and key cultural information for each plant taxa.

Note: Recommendations listed in table above identified with an asterisk (*) indicate funding is required for implementation.

2. The Governor assess the funding implications of the ITP's recommendations and accommodate the budgetary requirements of Executive Branch agencies in the administration's budget proposals for fiscal year 2016-2017 and beyond.

ITP Member Votes | *Support:* All Members

GLOSSARY OF TERMS

Terms identified with an asterisk (*) indicates definition is taken directly from the Model Water Efficient Landscape Ordinance (MWELO).

1. **85th Percentile** means the storm event that is greater than 85% of the storms that occur at the site based on measured local historical rainfall over a period of time. Stormwater best management practices are designed to capture and infiltrate the volume of water produced by storms up to the 85th percentile.
2. **Anti-burst Requirements** means a performance rating where sprinkler bodies are subjected to 1.5 times the maximum (not less than 150 psi) of maximum published operating pressure for 1 minute.
3. **Audit Sampling** means the rate at which representative sites are subjected to an irrigation audit within a multi-lot development.
4. **Automatic Rain Shut-off Device** means a "rain sensor*" or "rain sensing shutoff device" component which automatically suspends an irrigation event when it rains.
5. **Baseline peak month** means the peak month of outdoor water needs used when calculating the baseline landscape water allowance using the EPA Water Budget Calculation Tool.
6. **Bio-swale** means a linear vegetated depression for capturing, filtering, conveyance and infiltration of stormwater.
7. **Capacity Footprint** means the ability to supply an amount of water at any time and is related to infrastructure, energy use, water supply, planning and management of a water system.
8. **Conventional Controllers** means irrigation controllers that use time-based scheduling only, without sensors or other external modifiers.
9. **Customer Service Buildings** means buildings that are intended for frequent entrance by large numbers of private citizens. These buildings are high profile and offer opportunities for education and outreach.
10. **Drainage Check Valve*** means a "check valve" or "anti-drain valve" located under a sprinkler head or other location in the irrigation system, to hold water in the system to prevent drainage from sprinkler heads when the sprinkler is off.
11. **Energy Star Portfolio Manager** means an online energy and water management tracking tool developed by the U.S. Environmental Protection Agency.
12. **EPA WaterSense® Water Budget Tool** means an online interactive tool measure of efficiency and regional suitability for the amount of water applied to a landscape based on local climate data.
13. **ET-Based Controller** means an irrigation controller that uses evapotranspiration data to modify an irrigation schedule. The data may be historical ETo data, current data from

onsite sensors, data from an external sources or a combination of data sources.

14. **ETo*** means “reference evapotranspiration” or “ETo” means a standard measurement of environmental parameters which affect the water use of plants. ETo is expressed in inches per day, month, or year, and is an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool-season grass that is well watered. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowances so that regional differences in climate can be accommodated.
15. **Evapotranspiration Adjustment Factor (ETAF)*** means an “ET adjustment factor” (ETAF) factor of 0.55 for residential areas and 0.45 for non-residential areas, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape.
16. **Functional Turf / Lawns** means areas of turfgrass that have designated functions for recreation, such as parks, playing fields and areas of public assembly.
17. **Functional, High-Value, Multi-Benefit Landscapes** means landscapes that have the ability to provide active and passive recreation, improve local environmental conditions and enhance the value of the property and community.
18. **Graywater*** means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. "Graywater" includes, but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers. Health and Safety Code Section 17922.12.
19. **Harvested Rainwater** means rain water that has been captured, diverted, and stored for future beneficial use.
20. **High Efficiency Nozzles** means irrigation nozzles that deliver 85% of the applied water to the targeted area as large droplets reducing misting, evaporation and wind-drift. The precipitation rate is no greater than 1 inch per hour. This slower application rate allows soil to absorb water before it runs off.
21. **Hydrozone Maps** means a layer of a landscape design and/ or irrigation design delineating areas or groupings of plants by their relative water needs.
22. **Infiltration Capacity** means the rate of downward flow of water into the soil at the air-soil interface.
23. **Integral Pressure Regulation** means having the mechanism to regulate pressure built into a sprinkler body.
24. **Irrigation Audit*** means an in-depth evaluation of the performance of an irrigation system conducted by a Certified Landscape Irrigation Auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and

preparation of an irrigation schedule. The audit must be conducted in a manner consistent with the Irrigation Association's Landscape Irrigation Auditor Certification program or other U.S. Environmental Protection Agency *WaterSense*® labeled auditing program.

25. **Irrigation Consultant** means a person who performs professional services such as consultation, investigation, reconnaissance, research, design, preparation of drawings and specifications and responsible supervision, where the dominant purpose of such service is the design of landscape irrigation, in accordance with accepted professional standards of public health and safety.
26. **Irrigation Efficiency (IE)*** means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices.
27. **Irrigation Runtimes** means the time interval of application of irrigation water. This should be calculated based on irrigation system output rate and soil infiltration rate.
28. **Irrigation Survey*** means an evaluation of an irrigation system that is less detailed than an irrigation audit. An irrigation survey includes, but is not limited to: inspection, system test, and written recommendations to improve performance of the irrigation system.
29. **Irrigation Water Use Analysis*** means an analysis of water use data based on meter readings and billing data.
30. **Irrigation Schedules** means determining when to irrigate and how much water to apply, based upon measurements or estimates of soil moisture or crop water used by a plant.
31. **Landscape Architect*** means a person who holds a license to practice landscape architecture in the State of California Business and Professions Code, Section 5615.
32. **Landscape Area*** means all the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance calculation. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or non-pervious hardscapes, and other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).
33. **Landscape Contractor*** means a person licensed by the State of California to construct, maintain, repair, install, or subcontract the development of landscape systems.
34. **Landscape Designer** means a person permitted by the Business and Profession Code to prepare plans, drawings, and specifications for the selection, placement, or use of plants for single family dwellings. They may prepare drawings for the conceptual design and placement of tangible objects and landscape features. A landscape designer may not prepare construction documents, details, or specifications for tangible landscape objects or landscape features or prepare grading and drainage plans for the alteration of sites.
35. **Landscape Irrigation System** means all equipment required to convey water to or within the landscape area.
36. **Landscape Water Efficiency** means the ability of a landscape to use water efficiently

through plant choices, soil health, rainwater retention, mulching and irrigation efficiency.

37. **Leadership in Energy and Environmental Design (LEED)** means a certification program that include a rating system to guide the design, construction, operation, and maintenance of green buildings, homes, and neighborhoods[

38. **Local Agency*** means a city or county, including a charter city or charter county, that has land use authority and is responsible for adopting and implementing the Model Water Efficient Landscape Ordinance. The local agency is also responsible for the enforcement of this ordinance, including but not limited to, approval of a permit and plan check or design review of a project.

39. **Low Water Landscape** – please see water efficient landscaping.

40. **Maximum Applied Water Allowance (MAWA)*** means the upper limit of annual applied water for the established landscaped area as specified in Section 492.4. It is based upon the area's reference evapotranspiration, the ET Adjustment Factor, and the size of the landscape area. The Estimated Total Water Use shall not exceed the Maximum Applied Water Allowance.

41. **Model Water Efficient Landscape Ordinance (MWELO)** means a California regulation (Title 23) that is the basis for the minimum standards for landscape design and management.

42. **Ornamental Turf / Lawns** means areas of turfgrass intended for esthetic purposes only based on size, slope, position or location that make recreation function unlikely or impractical.

43. **Outdoor Peak Month** means the month that has the highest outdoor water demand resulting from local climate. In much of California the outdoor peak demand occurs in July or August.

44. **Peak Demand** means a period with the highest demand for water, may be based on time of day, day of the week or month of the year.

45. **Plant Factor*** means a factor, when multiplied by ETo, estimates the amount of water needed by plants. For purposes of this ordinance, the plant factor range for very low water use plants is 0 to 0.1, the plant factor range for low water use plants is 0.1 to 0.3, the plant factor range for moderate water use plants is 0.4 to 0.6, and the plant factor range for high water use plants is 0.7 to 1.0.

46. **Point Source Emitters** means a drip emitter that discharges water at a single emission point.

47. **Potential Water Efficiency** means the expected effectiveness of compliance with the Model Water Efficient Landscape Ordinance (MWELO) and the water budget.

48. **Qualified Contractors and Maintenance Workforce Professionals** means landscape workers with the skills and knowledge to design, install, manage and maintain landscapes for maximum resource efficiency and maximum benefits. Skills and knowledge could be obtained through a combination of education, testing, licensure, certification, apprenticeship and experience.

49. **Rain Garden** means a garden bed that collects rain runoff from impervious surfaces and slopes and absorbs the water quickly into the soil.
50. **Rainwater Capture** means the intentional retention of rainwater for beneficial use. This contrasts with conveyance to discharge rain.
51. **Rainwater Retention** means retaining rainwater onsite for future beneficial use. It may be in constructed storage (cisterns, rain barrels) or through an infiltration approach (rain gardens, swales, dry wells).
52. **Recycled Water*** (also known as "reclaimed water," or "treated sewage effluent water") means treated or recycled waste water of a quality suitable for non-potable uses such as landscape irrigation and water features. This water is not intended for human consumption.
53. **Rotors** means sprinklers that apply water in a pattern by means of one or more rotating streams to a defined landscape area.
54. **Significant Landscape Renovations** means a rehabilitation of landscapes involving both plant replacement and irrigation replacement throughout the majority of the site.
55. **Social Norms** means the rules of what is considered acceptable in a group or society and may change or modify over time.
56. **Soil Moisture-Based Sensor*** (also known as "soil moisture sensing device" or "soil moisture sensor") means a device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.
57. **Special Landscape Area* (SLA)** means an area of the landscape dedicated solely to edible plants, recreational areas, areas irrigated with recycled water, or water features using recycled water.
58. **Stormwater Retention** means the collection of rainwater and other sources of surface waste water from multiple sites that has entered the stormwater conveyance system and saved for future beneficial use.
59. **Supplemental Irrigation** means the irrigation supplied when rain is not sufficient to meet the needs of plants.
60. **Sustainable Landscape** means a stable and productive ecosystem that conserves the physical and biological processes occurring within that landscape system. Designed and managed sustainable landscapes maintain hydrological function, plant and animal diversity and biomass, soil integrity, and contribute to human wellness. To accomplish this, sustainable landscapes contain climate appropriate plants that can exist on rainfall and or other natural sources of water with little supplemental irrigation and can recover after periods of dry weather. The soil of a sustainable landscape contains adequate organic materials and air spaces, allowing for abundant micro- and macro-organisms and strong root systems. Any equipment, materials or practices used in constructing a sustainable landscape are highly efficient, sourced locally if possible, with a long life cycle and are recyclable or bio-degradable. A sustainable landscape will have a mix of plants including

long lived trees to provide shade and store carbon and other plants that provide multiple benefits including wildlife habitat. A sustainable landscape will have a regenerative effect and improve the environmental conditions of an area.

61. **Sustainable Practices** means practice in the design, installation, management and maintenance of landscapes that minimize the inputs needed (water, energy, etc.) and maximize the benefits (shade, habitat, carbon storage) of landscaping.
62. **Traditional Landscape** means a landscape style that is reliant on significant inputs in water, fertilizer, and chemical pest control and maintenance labor. Often comprised of mostly non-native, non-climate adapted plants.
63. **Triennial Code Review Cycle** means the process undertaken every three years, during which State agencies propose changes and through a public process, amend California Building Standards subject to review and approval by the California Building Standards Commission.
64. **Urban Landscape** means planned and installed areas with trees, shrubs, turfgrasses and other plants in an urban area. Does not include natural undisturbed vegetation and commercial agricultural activities.
65. **Urban Ornamental Landscapes** means landscapes in an urban setting with esthetics as the primary function.
66. **User Dashboard** means an easy to read and interpret user interface on a website.
67. **Water-Wise Landscapes** – please see water efficient landscapes.
68. **Water Efficient Landscaping** means a landscaping that has been designed and installed with water saving practices and products, including very low and low water needing plants (i.e. as described in Water Use Classification of Landscape Species IV (WUCOLS IV)).
69. **Water-Wise Plant Material** means plants used in landscapes that are adapted to living with a low amount of water compared to ETo.
70. **WaterSense®** means a U.S. Environmental Protection Agency (US EPA) program to encourage water efficiency in the United States through the use of a special label on consumer products and specifications.
71. **Watershed Approach** means a natural approach to integrated and site-specific landscape design, construction, and maintenance that transcends water-use efficiency to address the related benefits of rainwater capture, retention and use; reduction of pollution, greenhouse gases, and green waste; energy and cost savings; and human and wildlife habitat improvements.
72. **Weather-Based Controller** means controllers that monitor changing weather conditions with sensors to adjust an irrigation schedule. These products are also referred to as climate-based controllers, climatologically-based controllers and smart controllers.
73. **Weather-Based *versus* ET-based Controllers** means the term Weather-Based Irrigation Controller (WBIC) has replaced the term ET controller in most cases.

74. **Zero Net Energy Approach** for buildings means an energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy.

APPENDIX A: ITP Summary Table of Topic Suggestions from Water Use Efficiency Community and DWR's Urban Stakeholder Committee

An expanded version of this table is available for download from the Department of Water Resources website at:
http://www.water.ca.gov/calendar/materials/copy_of_itp_dmm_topic__recommendations_2_7_14_17257_17257.pdf

#	TOPIC NAME	SUMMARY
1	**Planning**	• Water Use Efficiency (WUE) within State and local planning process and financing opportunities • Influences to water supply planning
2	**Update Regulations**	• Water conservation offset for new developments • Regulations to prevent irrigation waste • Manufacturing standards for showerheads • Update Code standards • Federal, State, and local Codes and Regulations
3	**Reporting/ Compliance**	• Provide both a retailer guidebook and a wholesaler guidebook for urban water management plans (UWMPs) • Align water conservation reporting between State, USBR, CUWCC and other agencies • Focus demand management measure (DMM) compliance on reducing GPCD; not implementation of specific devices • Limit UWMP/CUWCC best management practice (BMP) reports to agency process in meeting SBX7-7 targets • Improve water conservation reporting • Improve water sales reporting
4	**Water/ Energy Nexus**	• Mimic energy sector for energy efficiency • Water/energy nexus • Water-energy greenhouse gas • Joint water-energy efficiency programs
5	**Public Education**	• Education and awareness programs • Implement public affairs program for urban California • Education
6	**Water Measurement**	• Water metering technology and other measuring tools • Advanced metering infrastructure (AMI) BMP • Low flow meters • Meter accuracy at low flows
7	**Rate Structures**	• Tiered rates • Rate structures • Pricing opportunities • Conservation pricing and financial sustainability of a water utility • Require wholesalers to allocate water to incentivize water conservation

8	**Landscape Water Conservation**	• Separate landscape water use (residential/non-residential) • Simplify landscape water demand estimating • Large landscapes • Landscape advisory committee • Develop a DWR/ACWA partnership for rolling out "new normal" for landscapes • Distribute resource lists • Landscape water conservation • Pressure regulation for landscape • Incentivize residential landscape water conservation • Program controllers using landscape water budgets • Perform a study on SMART controllers • Irrigation technology
9	**Residential Opportunities**	• Residential water conservation
10	**CII Opportunities**	• CII Water Conservation
11	**Fire Sprinkler**	• Fire sprinkler / fire suppression systems
12	**High Pressure Regulators**	• Rebates for high pressure regulators (>80 psi) • Pressure regulators • Home water pressure regulators
13	**Water Loss**	• Customer leak notification • Water loss
14	**Recycled Water**	• Application of on-site, non-potable sources • On-site reuse and recycled water • Recycled water / graywater / rainwater harvesting • Reclaimed / recycled water
15	**Research Needs**	• WUE Research Needs
16	**Drought Measures**	• Drought-specific efforts / restrictions for achieving water use reductions
17	**Investor Owned Utility**	• Amount retailer claims as savings as part of utility sales de-coupling and basis for revenue compensation

APPENDIX B: ITP Recommendations on MWELO Revisions Submitted to the Legislature June 2015, per Executive Order B-29-15

ITP RECOMMENDATION SUMMARY

Independent Technical Panel (ITP) for Demand Management Measures

May 29, 2015 | Meeting #21
June 8-9, 2015 | Meeting #22
Prepared by the Center for Collaborative Policy, CSUS

1. Introduction

Under Executive Order B-29-15, the Department of Water Resources (DWR) is required to make significant updates to the Model Water Efficient Landscape Ordinance (MWELO) to improve water use efficiency standards for new and existing landscapes through more efficient irrigation systems, graywater usage, onsite storm water capture, and turf limitations. DWR's Independent Technical Panel (ITP) for Demand Management Measures met on May 29, 2015 (meeting #21) and June 8-9, 2015 (meeting #22) to discuss its recommendations for updating MWELO. What follows is a record of the ITP's recommendations during these meetings.

2. May 29, 2015 ITP MWELO Recommendations

The meeting summary for the May 29, 2015 meeting is available from http://www.water.ca.gov/calendar/index.cfm?meeting=24128.

Final Agreements

The following recommendations are based on the current (2009) version of the MWELO document as approved by the California State Legislature and chaptered in *California Code of Regulations Title 23. Waters, Division 2. Department of Water Resources, Chapter 2.7. Model Water Efficient Landscape Ordinance*

Applicability § 490.1

ITP members recommend that the scope and size thresholds of the Model Ordinance be revised as follows --

- (a)(1) *new construction of public agency projects and private development projects with a landscape area greater than 500 square feet and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check or design review.*

- (a)(2) *new construction of developer-installed single-family and multi-family projects with a landscape area greater than 500 square feet and rehabilitated landscapes which are developer-installed in single-family and multi-family projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review.*

- (a)(3) *new construction landscapes which are homeowner-provided and/or homeowner-hired in single-family and multi-family residential projects with a total project landscape area equal to or greater than 3,000 square feet requiring a building or landscape permit, plan check or design review.*

- New (a)(4) *existing landscapes with a landscape alteration greater than 500 square feet associated with any additions or renovations to the building with a valuation exceeding $200,000.00 requiring a building permit.*

Landscape Design Plan § 492.6

- 492.6 (D) ITP members agreed to recommend prohibiting turf on street medians and parkways (areas between sidewalks and curbs) with the additional recommendation that "parkway" be defined by DWR.

3. June 8-9, 2015 ITP Recommended Changes to DWR's Expedited MWELO Recommendations

The meeting summary for the June 8-9, 2015 meeting is available from http://www.water.ca.gov/calendar/index.cfm?meeting=24167

On June 6, 2015, DWR provided the ITP with a working draft of its Expedited MWELO Recommendations (a document different from the original MWELO used on May 29. In some cases, section numbering changed between these versions of the Model Ordinance. The following recommendations are made to the text of the interim draft provided to the ITP on June 6 and are shown highlighted below.

Final Agreements

Applicability § 490.1

- Based on their review of the Expedited Recommendations version of the MWELO and their recognition that some recommendations from the May 29 meeting had not been adopted by DWR, the ITP reaffirmed its recommendation that MWELO should also address water use efficiency on existing landscapes.

Definitions § 491

- (aaa) The ITP unanimously agreed with DWR's new definition of "Parkway".

- (ccc) "plant factor" or "plant water use factor" is a factor, when multiplied by ETo, estimates the amount of water needed by plants. For purposes of this ordinance, the plant factor range for low water use plants is 0 to 0.3, the plant factor range for moderate water use plants is 0.4 to 0.6, and the plant factor range for high water use plants is 0.7 to 1.0. Plant factors cited in this ordinance are derived from the "Water Use Classification of Landscape Species". Plant factors may also be obtained from references cited in DWR Model Water Efficient Ordinance Implementation and Reporting Guidance.

- (hhh) "recreational area" means areas, excluding private single family residential areas, that are dedicated to recreation or public assembly such as parks, sports fields, picnic grounds, amphitheaters or golf course tees, fairways and greens where turf provides a playing surface.

- (q) The ETAF for a Special Landscape Area shall not exceed 0.8. The ETAF for existing non-rehabilitated landscapes is 0.8.

- (yyy) "WUCOLS" means the Water Use Classification of Landscape Species published by the University of California Cooperative Extension and the Department of Water Resources 2014.

    - NOTE: DWR to prepare definition for "Water Budget".

Landscape Design Plan § 492.7

- (a)(3)(B) For landscape installations, compost at a rate of a minimum of four cubic yards per 1,000 square feet of permeable area unless contra-indicated by soil tests, shall be incorporated (roto-tilled) to a depth of six inches into the soil. Sites with equal to or greater than a 3:1 slope are exempt from tilling. Soils with greater than 25% organic matter in the top 6 inches of soil are exempt from adding compost and tilling.

- (a)(3)(C) Retention and infiltration capacity is strongly recommended to be provided, sufficient to prevent runoff from roof surfaces and the landscape area from either the one inch, 24-hour rain event or the 85th percentile, 24-hour rain event, and such additional capacity, if any, as may be required by any applicable local, regional or State regulation.

- (b)(10) identify location, installation details, and 24 hour retention or infiltration capacity of any applicable storm water best management.

- (b)(11) identify any applicable rain harvesting or catchment technologies (e.g., rain gardens, cisterns, etc.), and their 24-hour retention or infiltration capacity.

- (b)(12) identify any applicable graywater outlet, system components, and area(s) of distribution.

- (a)(1)(M) Overhead type spray irrigation systems must be designed so that a precipitation rate of .75 inch per hour is not exceeded in any portion of the system.

Public Education § 492.17

- (a)(1) A local agency or water supplier / purveyor shall provide information to owners of new and permitted renovations, single-family residential homes regarding the design, installation, management, and maintenance of water efficient landscapes based on a water budget.

- (a)(2) A State agency, local agency, 501 (c)(3) non-profit, or water purveyor shall provide information about designing, installing, managing, and maintaining water efficient landscapes. Information available shall include detailed specifications on how to hire trained and licensed landscape architects, contractors, designers and maintenance workers and the benefits of using such professionals

- (b) Model Homes. All model homes shall be landscaped and use signs and written information to demonstrate the principles of water efficient landscapes described in this ordinance.

- (b)(1) Signs shall be used to identify the model as an example of a water efficient landscape featuring elements, such as hydrozones, irrigation equipment, and others that contribute to the overall water efficient theme. Signage shall include information about the design and site water use as per what the site water budget is, how it was designed compliant with the local ordinance, who designed and installed the water efficient landscape, and provide on-site demonstration of native plants, graywater and rainwater catchment systems.

- (b)(2) Information shall be provided about designing, installing, managing, and maintaining water efficient landscapes. Information shall include information about benefits of and detailed specifications on how to hire trained and licensed landscape architects, contractors, designers and maintenance workers.

Reporting § 495

- (a)Reports should be provided as prescribed by DWR MWELO Implementation and Reporting Guidance.

- (b)(1) At a minimum, the reporting period shall commence on October 1, 2015. The end of the reporting period shall be no sooner than December 15, 2015. In subsequent years, reporting will be for the calendar year with new entries made in previous reporting information if adjustments occur.

- (b)(4) State number and types of projects subject to the ordinance during the specified reporting period.

- (b)(8) Describe actions taken to verify compliance.
    - Identify any exemptions
    - Is plan check performed and if so by what entity?
    - Is site inspection performed and if so by what entity
    - Is a post installation audit required and if so by what entity?

Continuing Education

To work towards improving workforce education, the ITP recommended that DWR consider adding the following information about continuing education to MWELO during future revisions:

Continuing Education. Given the on-going need to continuously build knowledgeable landscape practitioners.

(1) DWR shall or may approve a designated 501(c)(3) non-profit, to maintain curriculum available to support the designing, installing and managing water efficient landscapes for landscape professionals.

(2) DWR shall work with other state agencies as appropriate to seek mandates for continuing education requirements for professions managing water on landscapes.

APPENDIX C: California Department of Water Resources' Comments on the Independent Technical Panel Report

This section forthcoming from the Department of Water Resources.