American Society of Irrigation Consultants
4700 South Hagadorn Road, Suite 195F, East Lansing, MI 48823

June 22, 2015

Julie Saare-Edmonds
Senior Environmental Scientist
Landscape& Green Building Programs
ITP Project Manager
Water Use and Efficiency
CA Department of Water Resources

RE: Responses to the proposed revision to the Model Water Efficient Landscape Ordinance (MWELO)

The latest Public Draft of the Model Efficient Landscape Ordinance was released Friday, June 12, 2015. The responses below represent the position of the American Society of Irrigation Consultants. American Society of Irrigation Consultants was incorporated in 1971 in the State of California and represents irrigation design professionals across the United States, Canada, England, France and Australia. ASIC Members develop a large percentage of the irrigation designs for systems installed in the State of California.

The following comments are of upmost interest to ASIC membership. The preservation of water resources is an important commonality within our membership. ASIC stands with Governor Brown, his administration and the California Department of Water Resources in preserving California's water resources for the importance of our State's long term growth. The ASIC places its value in the implementation of proper and practical solutions that yield water savings during the design, installation, and long term management stages of a landscape. The following are items of discussion and recommendation to not only reduce water resources required by California's landscapes, but also to achieve this goal with practical and attainable methodology:

1. Irrigation Efficiency

Current Public Draft Language:

*(bb) "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. The minimum average irrigation efficiency for purposes of this ordinance is **0.85 for residential areas and 0.92 for non-residential areas, averaged on a site-wide basis**. Greater irrigation efficiency can be expected from well designed and maintained systems.*

Discussion

A. A slight modification was made to the irrigation efficiency definition to clarify it is averaged on a site-wide basis. We understand this as it is clearly stated in the 2009 publication "White Paper Evapotranspiration Adjustment Factor." However, the proposed numbers are unattainable.

B. According to the Evapotranspiration Adjustment Factor (ETAF) White Paper prepared by DWR staff in January 2009 in support of the 2010 updated MWELO, the equation for Irrigation Efficiency is:

IE = (DU) (IME)

Where DU = DUlh (Distribution Uniformity Lower Half) and IME (Irrigation Management Efficiency) is fixed by DWR at 90%.

C. Irrigation Efficiency is set in the current MWELO at 0.71. The 2009 DWR White Paper carefully considered Irrigation Efficiency and supported its analysis with science. The 2009 DWR ETAF White Paper calculates Irrigation Efficiency as follows:

IE = (DUlh) (IME) or 0.71 = (0.79) (0.90)

D. DWR is now proposing an increase in IE from 0.71 to 0.85 for residential and 0.92 for commercial irrigation designs. Assuming DWR intends to continue to use its 2009 ETAF White Paper method for calculating IE and IME remains at 0.90, the proposed DUlh requirement increases to 94% for residential and 102% for commercial.

IE of 0.92 = (**1.02**) (0.90) Commercial

IE of 0.85 = (**0.94**) (0.90) Residential

E. There is also no combination of irrigation products on the market today, including drip irrigation, that will achieve 94% DUlh and a DUlh of greater than 100% is unattainable.

F. Based on current available technology, expected DUlq for high efficiency spray heads and rotator nozzles is 73%. This results in a DUlh of 83%. Conversion was made using the formula DUlh=.386 + (0.614 x DUlq) in conformance to the above referenced White Paper.

G. Drip irrigation and microspray utilize Emission Uniformity (EU) in determination of efficiency and based on current available technology, EU is expected to be 90%. The White Paper averages spray, microspray and drip irrigation to arrive at a minimum efficiency (.83 + .90 + .90) / 3 = 0.88. This minimum efficiency eliminates the ability to use high efficiency spray for specialized landscapes.

H. Drip irrigation is an effective and efficient application method, but it is not the best application for providing water to landscapes on both manufactured slopes and fuel modification zones. Manufactured slopes are required to have a planted crop cover to eliminate soil erosion and comply with current grading Code. Portions of fuel modification areas are required to be irrigated with specialized crop cover. While these areas can certainly be planted or seeded with low water use planting, they are most effective when irrigated with high efficiency overhead rotary irrigation to provide full crop coverage with uniform soil moisture.

I. It is imperative to maintain the effectiveness of both erosion control and fuel modification to maintain the public safety and welfare in California. Many new housing communities are being built to sustain growth in this State - many are located in sloped areas requiring both erosion control planting on slopes and fuel modification.

J. Therefore the minimum IE should be: IE= (DUlh)(IME) = (.83)(.90) = 0.75

Recommendation:

Revise the minimum Irrigation Efficiency (IE) to 0.75.

This is an improvement from the original value of 0.71 and provides the ability to utilize high efficiency spray nozzles, where they are most applicable on manufactured slopes and fuel modification areas.

2. Evapotranspiration Adjustment Factor (ETAF)

Current Public Draft Language:

(p) "ET adjustment factor" (ETAF) means a factor of 0.5 for residential areas and 0.4 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. A combined plant mix with a site-wide average of 0.425 for residential areas and 0.37 for other areas is the basis of the plant factor portion of this calculation. For purposes of the ETAF, the average irrigation efficiency is 0.85 for residential and 0.92 for non-residential areas. Therefore, the ET Adjustment Factor for residential and non-residential is (0.5) = (0.425/0.85) and (0.4) = (0.37/0.92), respectively. The ETAF for a new and existing Special Landscape Areas shall not exceed 1.0. The ETAF for existing non-rehabilitated landscapes is 0.8.

Discussion

A. Currently in the DWR white paper, the statewide average plant factor of 0.5 from the existing model ordinance is 1/3 high, 1/3 medium, and 1/3 low plant mix. Accordingly, ETAF calculations for a landscape with a 1/3 plant mix each of high, medium, and low water use plants should be adjusted using the IE (with managed efficiency) of 75% as follows:
B. ETAF = Plant Factor / IE = (0.5/.75) = .67

Recommendation:
Change the value of the ETAF to 0.67 to allow for attainable irrigation efficiencies while utilizing the Irrigation Management Efficiency factor.

3. Precipitation Rate

Current Public Draft Language:

(M) The irrigation system must be designed and installed in such a manner that a precipitation rate of 1.0 inches per hour is not exceeded in any portion of the landscape.

Discussion

A. In the design of sprinkler devices, there are trade-offs between precipitation rate, losses due to wind drift and evaporation, distribution uniformity and soil moisture uniformity. This has been shown through research conducted by the University of Arizona, University of Florida, California State Polytechnic University – Pomona, Irrigation Association, and Rain Bird.
B. In a University of Arizona study, lower Precipitation Rate devices (1.0 in./hr.) had wind drift and evaporation losses 15-20% worse than higher Precipitation Rate devices (1.6 in./hr.) in 5 mph wind speeds (average wind speed in California.)
C. Low precipitation rate nozzles work well in certain conditions such as slopes with clay soils, but data suggests that in general, the more precipitation rate is reduced, the more irrigation efficiency tends to decline due to losses from wind drift and evaporation. The temptation may be to further reduce precipitation rates, but to do so will further reduce efficiency in real world conditions.
D. Lowering precipitation rate to 0.75 will eliminate the use of nearly all large area turf rotors and many part circle small and medium rotary sprinklers. It also encourages the designer and installer to use more full circle sprinklers and as such provides less control of where the water is applied.
E. Drip and microspray are becoming more prevalent as an irrigation method under the existing MWELO, but application rates frequently exceed 1.0 in/hr. and for good reason. There are many examples of subsurface drip under turf that have failed due to a low application rate and wider than acceptable spacing. Changing to a higher application rate emission with tighter spacing solves this issue but would not be permitted under the new MWELO.

Recommendation:

Do not introduce a new limit on precipitation rates in addition to the existing limit of 0.75 inches per hour on slopes greater than 3:1. Require Smart Controllers that use precipitation rate, soil type, root zone depth, and plant factor to eliminate run-off and apply the desired amount of water utilizing the well-established practice of 'cycle and soak'.

4. **Budget Based Allocation**

Discussion

A. Creating a landscape with a limitation on outdoor water use is the most simple and effective method to promote water resource conservation during the design, installation, and long term maintenance phase of a project.

B. A budget allocation brings water use into the forefront of the landscape process providing dialogue at the conceptual design level where it is most effective. Ideas and innovation for water resource development, storage, demand, planting concept and irrigation system type reside tandem to the form and function of the project.

C. Water agencies that implement a budget allocation tied to tiered rates have been extremely effective in providing incentive for the Owner and maintenance contractors to be mindful of water use. In the opinion of the ASIC, this is the largest potential for long term water savings in the State. In Irvine Ranch Water District, it is well known that maintenance contractors read water meters on a weekly basis to compare actual and allocated use. This self-imposed practice saves water and negates the need to require and monitor the five-year audit process. Furthermore, water usage in that region is extremely reduced and continues well after project completion.

D. The budget based allocation is the simplest solution to reducing water use in new construction, easy to enforce through tiered rate budget based allocations with water purveyors, provides maximum flexibility with regard to design and promotes future innovation and design creativity. It extends the liability beyond design and installation to long term maintenance.

Recommendation:

Revise the MWELO to incorporate water based budget allocations directly linked to the ETAF.

5. **Definitions for flow sensor / flow meter**

Discussion

A. The term flow sensor and flow meter is used interchangeably to describe an in-line device that produces a repeatable signal, proportional to the rate of liquid flow through a closed pipe system. When a flow sensor is located at the supply point of the irrigation piping system and is connected to a totalizer, flow monitor or to an automatic irrigation controller with flow measuring capabilities, it may function as a landscape water meter or sub-meter.

Recommendation:

Revise the MWELO to refine the following definitions:

A. Water meter means an inline device installed at the supply point that measures the flow of water into the irrigation system and is connected to a totalizer to record water use.

B. Flow Sensor means an inline device installed at the supply point of the irrigation system that produces a repeatable signal proportional to flow rate. Flow sensors must be connected to an automatic irrigation controller, or flow monitor capable of receiving flow signals and operating master valves. This combination flow sensor/controller may also function as a landscape water meter or submeter.

Conclusion:

The existing MWELO has changed the face of landscape and irrigation in California and in many ways has contributed to greatly improved efficiency in irrigation design, but reductions in water use have not uniformly been achieved. Concluding that regulations on new irrigation design should be tightened however, may be false; requirements for reporting of water use post-installation should be reviewed since this is where the most significant savings can be made as highlighted by the Irvine Ranch Water District (IRWD) where water budgets are strictly enforced.

Respectfully submitted,

Ivy Munion, ASIC
President

Steve Hohl, ASIC
Immediate Past President

Corbin Schneider, ASIC
Vice President

Janet Luehrs, ASIC
Board of Directors

Carol Colein
Executive Director