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IRRIGATION CONSULTANTS

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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 are a combination of mine and others. These following responses highlighted in **RED** are for the areas of greatest concern.

- **Irrigation Efficiency (IE) is raised to 0.85 for residential and 0.92 for commercial projects**.
- **Evapotranspiration Adjustment Factor (ETAF) is lowered to 0.5 for residential and 0.4 for commercial projects**. **This will eliminate turf use as we know it.**
- **Precipitation Rate is capped at 1.0 in/hr.**
- **Elimination of turf in parkways**

A. Irrigation Efficiency (IE)

1. A slight modification was made to the irrigation efficiency definition to clarify that it is averaged on a statewide basis. We knew this and it is clearly stated in the 2009 White Paper. However, it does not address the fact that the numbers are unattainable. Current public draft language:

   (bb) (z) "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.*

(Source: http://www.water.ca.gov/wateruseefficiency/landscapeordinance/Model-Water-Efficient-Landscape-Ordinance/Documents-Relied-Upon/ETAFWhite%20Paper012609.pdf)

   a. 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%.

   b. *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)

c. DWR is proposing an increase in IE from 0.71 to 0.85 for residential and 0.92 for commercial irrigation designs.

   The values and formula used to calculate the proposed IE are unknown to Rain Bird. Rain Bird assumes DWR intends to continue to use its 2009 ETAF White Paper method for calculating IE. Solving for *DULH* with the assumption that IME remains at 0.90, DULH requirements are increasing to 94% for residential and 102% for commercial.

   0.92 = (1.02) (0.90) Commercial

   0.85 = (0.94) (0.90) Residential

d. 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.

e. First, there is no drip, or other sprinkler irrigation applications that can realistically achieve these values in the landscape. This is in part due to uniformity limitation and maintenance efficiency factors.

f. Secondly, 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 with high efficiency overhead rotary irrigation to provide full crop coverage with uniform soil moisture. Due to the reduced amount of exposed materials, this type of irrigation is less threatened during common slope maintenance and is more readily maintained because of its visibility. For example; an overhead sprinkler system with 100 sprinklers spaced on 35’ x 30’ spacing will cover approximately 105,000 square feet. This same area will require 46,666 drip emitters installed on an 18” x 18” grid. If there is a 2% failure rate, maintenance would need to repair 2 sprinklers or 933 drip emitters. Once the planted crop cover on a slope is established, it will be next to impossible to find the failed drip emitters, then repair the failed drip emitters and to replace the landscape that would need to be removed in the maintenance process would cause damage to the existing drip system. It is imperative to maintain the effectiveness of both erosion control and fuel modification to maintain the public safety and welfare in our State. 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.

Recommendation:

a. *Time constraints in this emergency environment seem to have resulted in an increase in IE and a resulting ETAF recommendation that is unattainable. Change the value of Irrigation Efficiency 83% in the ETAF calculation per the following IE calculation*

   1) *The minimum operational lower quarter distribution uniformities for spray, rotor, and drip/micro-spray cited by the Irrigation Association Best Management Practices Guidelines are 55%, 70%, and 80%, respectively. Based on changes in irrigation technology over the last 20 years, the lower quarter distribution uniformities for spray, rotor, and drip/micro-spray have changed. Now High Efficiency nozzles can obtain 70% for sprays, 75% for rotors, and 85% for drip and microsprays.*

2) *As outlined in the white paper, the Irrigation Association uses the following equation to convert DUlq to DUlh is DUlh = 38.6 + (0.614) (DUlq) therefore the DUlh for plants with spray/rotor irrigation systems is 38.6+ (0.614) (75) = 84%. For plants irrigated with drippers and micro-sprayers, emission uniformities, EU = 90%. Therefore, the average uniformity for the landscape is [(84 + 90 + 90) / 3] = 88%. This is the highest DU attainable using a combination of High Efficiency spray and rotor nozzles along with drip and microspray. The IE now becomes (DULH) (IME) or (0.88 x 0.9) = .79*

B. Evapotranspiration Adjustment Factor (ETAF)

1. The ETAF values did not change from the previous draft. They are still recommended at 0.5 for residential and 0.4 for commercial. Current public draft language:

   *(q) "**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.*

a. Currently in the 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 of 83% as follows:

b. ETAF = Plant Factor/IE = (0.5/.79)100 = 0.63.

c. Areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface have been eliminated as Special Landscape Areas.

   (ppp) (iii) "Special Landscape Area" (SLA) means an area of the landscape dedicated solely to edible plants, recreational areas, areas irrigated with recycled water, and water features using recycled water ~~and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.~~

Recommendations:

a. *Change the ETAF to 0.63. This allows residential homeowners, multi-family properties and commercial properties to have flexibility in their landscape choices. If we remember that California landscapes use about 5% of the overall water supply and that new construction will be considerably less than 1% of the total existing landscape area. Then the change of the ETAF from 0.4 to 0.63 would change the overall water use by considerably less than .005.*

b. *We need to be aware that plant palette changes may have a direct impact on human health, safety and welfare, especially as it relates to wild fire protection. Also, we are very concerned about the plant factors being proposed, we will defer to experts in horticulture to comment.*

c. *This is an area where the public needs to be made aware how their landscapes will be changed forever into a desert like environment.*

d. *It is in the management phase of a project life cycle where an irrigation system, one that has been designed and installed with the most efficient products available, can suffer massive inefficiency due to poor maintenance and management. The MWELO needs to include responsibilities of the water districts to provide allocations and monitoring of water use to ensure proper implementation and success of the water ordinance. Eliminating choices will not go over well with the California public. Take note; the almond growers have taken there case of being a water waster to the public. See http://www.almonds.com/get-facts-about-almonds-and-water?gclid=CL3MzfO9j8YCFQ8paQodEBwAQg*

C. Precipitation Rate

1. The language on precipitation rate changed from the prior draft. The limit set in the public comment draft is 1 in./hr. Please note that DWR did not accept ITP's recommendation to apply this only to overhead sprinklers. The revised language states irrigation systems, which we believe, as the ITP did, that this includes drip. 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.***

2. DWR is proposing to impose a 1.0 in./hr. maximum Precipitation Rate on all irrigation in addition to the existing Precipitation Rate limitation of 0.75 in./hr. on slopes.

3. 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 may work well in certain conditions such as slopes with clay soils, but data that 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 for the DWR to further reduce precipitation rates but to do so would further reduce efficiency in real world conditions; picture a restaurant using misters on a warm, breezy day; the fine mist will evaporate or drift away before hitting the ground and to a lesser extent that is what we see with lower precipitation nozzles in 'real world' conditions.

   d. Lowering Precipitation Rate to 1.0 would eliminate from use nearly all large area turf rotors, eliminate all spray heads and eliminate some drip and micro-spray.

   e. Drip and microspray are becoming more prevalent as an irrigation method under the existing MWELO, but precipitation rates frequently exceed 1.0 in/hr. and for good reason. There are examples of subsurface drip under turf that have failed in large part due to a low precipitation rate and wider than needed spacing. When changed to a higher precipitation rate product at tighter spacing this would be solved – this would not be allowed under the new MWELO.

Recommendation:

a. *Do not introduce a new limit on Precipitation Rates in addition to the existing limit on slopes greater than 3:1.*

b. *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'.*

D. Drip in turf parkways

1. Turf in parkways has been eliminated except if irrigated by drip. MWELO now says:

   (F) Turf is prohibited in parkways less than 10 feet wide, unless the parkway is adjacent to a parking strip and used to enter and exit vehicles. Any turf in parkways must be irrigated by sub-surface irrigation or by other technology that creates no overspray or runoff.

2. Turf parkways adjacent to parking are necessary and functional in the landscape. Allowing only drip irrigation in turf parkways is problematic. Drip irrigation is not practical in turf due to specialized installation and long term maintenance requirements. There is limited allowance for aeration, fertilization, and tree root damage. Drip irrigation in turf is most effective in design and when first installed, if done with maximum controls. Over time, the efficiency and effectiveness decrease to levels below that of high efficiency overhead spray. Furthermore any water waste due to damaged tubing or leaks remains unseen below the soil profile and often goes unrepaired. There are also many current technologies available that minimize water waste due to damaged sprinkler heads - yet allow it to be seen and repaired.

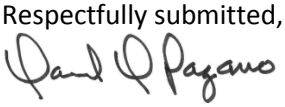
Recommendations:

a. It is recommended to allow high efficiency nozzles, including microspray, as an alternate technology to maintain higher irrigation efficiency over a longer period of time while eliminating runoff.

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,



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