Step-By-Step To Water Wise Landscaping
Reducing Irrigation Water Use By Design

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I. INTRODUCTION

• HISTORICALLY LANDSCAPES HAVE USED TURF GRASS AND A HIGH PERCENTAGE OF HIGH WATER USE PLANTS

• PAST IRRIGATION SYSTEMS HAVE LOW WATER EFFICIENCY

• THE RESULTS ARE HIGH WATER CONSUMPTION AND HIGH MAINTENANCE LANDSCAPES
HOW MUCH WATER IS NEEDED TO KEEP TURF GRASS HEALTHY?

A LOT!

- But it depends on the type of grass, soil conditions and the efficiency of the irrigation system

- Fescue turf with a 100% efficient irrigation system needs a 60” high column of water a year

- Fescue turf with a 70% efficient system requires a 86” high column

- Fescue turf with a 50% efficient system requires a 120” high column or **10 FEET!**
TRADITIONAL CALIFORNIA RESIDENTIAL LANDSCAPE

• LARGE AREAS OF TURF
• HIGH WATER USE PLANTS HIGH MAINTENANCE HEDGES
CALIFORNIA CLIMATE APPROPRIATE LANDSCAPES

• NO TURF
• COLORFUL LOW WATER ALTERNATIVES
• GRASSES THAT REQUIRE LITTLE OR NO MAINTENANCE
TYPICAL STREETSCAPE PLANTING

- LARGE LONG TURF STRIPS
- HIGH WATER USE PLANTS
- HIGH MAINTENANCE HEDGES
LOW WATER STREET LANDSCAPES

• NO TURF, EASIER TO MAINTAIN
• COLORFUL ALTERNATIVES
• GRASSES THAT REQUIRE LITTLE OR NO MAINTENANCE
TYPICAL BUSINESS PARK PLANTING

- LARGE EXPANSIVE TURF AREAS REQUIRE WEEKLY MAINTENANCE AND HIGH FERTILIZER USE
- HIGH WATER USE PLANTS & HIGH MAINTENANCE HEDGES
TYPICAL RETAIL PLANTING

• PERIMETER TURF MAY LOOK GREAT IN THE SPRING BUT BY SUMMER WILL BE BROWN
• MOUND TOPS WILL DRY OUT FASTER THAN BOTTOM AREAS LEADING TO MORE WATER USE
LOW WATER COMMERCIAL LANDSCAPES

• GROUND COVER ALTERNATIVES WITH MINIMAL TURF
• GRAVEL OR WOOD MULCHES HELP TO ACCENT PLANTING
• GRASSES THAT REQUIRE LITTLE OR NO MAINTENANCE
LOW WATER COMMERCIAL LANDSCAPES CONTINUED
WHAT DETERMINES A LOW WATER USE LANDSCAPE

WUCOLS + CIMIS + MWELO = WATER USE

- **WUCOLS = WATER USE CLASSIFICATION OF LANDSCAPE SPECIES.**
  Provides anticipated water use for plants within a region

- **CIMIS = CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM.**
  Provides evapo-transpiration data from state monitored weather stations

- **MWELO = MODEL WATER EFFICIENT LANDSCAPE ORDINANCE.**
  Uses WUCOLS data, evapo-transpiration data, site areas and irrigation system efficiency data
STATE WATER ALLOWANCE FOR LANDSCAPES

Water Efficient Landscape Worksheet

MAWA = \( \text{Eto} \times (0.62) \times [(0.7 \times \text{LA}) + (0.3 \times \text{SLA})] \)

ETWU = \( \text{Eto} \times (0.62) \times [(\text{PF} \times \text{HA} / \text{IE}) + \text{SLA}] \)

Net Evapotranspiration for Clovis (inches per year)

These numbers have been modified to remove effective precipitation (Eppt) from the affected months

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Total Annual Eto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic Eto</td>
<td>1.0</td>
<td>1.5</td>
<td>3.2</td>
<td>4.8</td>
<td>6.4</td>
<td>7.7</td>
<td>8.5</td>
<td>7.3</td>
<td>5.3</td>
<td>3.4</td>
<td>1.4</td>
<td>0.7</td>
<td>51.4</td>
</tr>
</tbody>
</table>

Maximum Applied Water Allowance Calculation

\[
\text{MAWA} = \text{Eto} 	imes (0.62) 	imes [(0.7 \times \text{LA}) + (0.3 \times \text{SLA})]
\]

<table>
<thead>
<tr>
<th>Landscaped Area</th>
<th>18,920</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x )</td>
<td>0.7</td>
</tr>
<tr>
<td>=</td>
<td>13,244</td>
</tr>
</tbody>
</table>

\[
\text{MAWA} = 51.4 \times 0.62 \times 13,244 = 422,060 \text{ gallons per year}
\]
# PLANT MATERIAL AND IRRIGATION EFFICIENCY

## Estimated Total Water Use Calculation

<table>
<thead>
<tr>
<th>Hydrozone</th>
<th>Plant Water Use Type</th>
<th>Plant Factor (PF)</th>
<th>Hydrozone Area (HA) (sq ft)</th>
<th>Type of Irrigation (rotors, spray, drip, bubblers, etc.)</th>
<th>Irrigation Efficiency (IE) (71-100%, see below)</th>
<th>PF x HA/IE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-NEES FRONTAGE</td>
<td>LOW</td>
<td>0.30</td>
<td>9,180</td>
<td>SUB-SURFACE DRIP</td>
<td>85%</td>
<td>3,240</td>
</tr>
<tr>
<td>2-TANK SITE NORTH</td>
<td>LOW</td>
<td>0.30</td>
<td>4,100</td>
<td>SUB-SURFACE DRIP</td>
<td>85%</td>
<td>1,447</td>
</tr>
<tr>
<td>3-TANK SITE SOUTH</td>
<td>LOW</td>
<td>0.30</td>
<td>5,640</td>
<td>SUB-SURFACE DRIP</td>
<td>85%</td>
<td>1,991</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td></td>
<td></td>
<td><strong>18,920</strong></td>
<td></td>
<td></td>
<td><strong>6,678</strong></td>
</tr>
</tbody>
</table>

\[ \text{ETWU} = 51.4 \times 0.062 \times 6,678 = 212,803 \text{ gallons per year} \]

**Plant Factor Typical Ranges (PF)**

- Low Water Use: 0.0 - 0.3
- Medium Water Use: 0.4 - 0.6
- High Water Use: 0.7 - 1.0

**Irrigation Efficiency Ranges (IE)**

- Stream Rotor Heads: 71 - 75%
- Spray Heads: 71 - 75%
- Bubblers: 75 - 85%
- Drip Emitters: 80 - 90%
- Subsurface Irrigation: 80 - 90%
II. WATER SAVING OPPORTUNITIES

1. LANDSCAPE WATER DEMAND
2. PLANT SUITABILITY & SUSTAINABILITY
3. IRRIGATION SYSTEM EFFICIENCY
4. IRRIGATION WATER SOURCE

“In arid locations, irrigation water use can be as much as 60% - 90% of the total water use for a facility”
II. WATER SAVING OPPORTUNITIES

• LANDSCAPE WATER DEMAND – Minimum amount of water req’d for a healthy plant (varies by species).
  
  – DETERMINE WATER DEMAND FOR EXIST. LANDSCAPES (HIGH / MOD / LOW)

  – IDENTIFY AREAS TO LOWER EXIST. WATER DEMAND
    
    • REPLACE TURF GRASS WITH XERISCAPING
    • REPLACE COOL SEASON TURF WITH DROUGHT TOLERANT TURF
    • REPLACE TURF GRASS WITH ARTIFICIAL TURF
    • REPLACE HIGH WATER USE PLANTS WITH LOW WATER USE PLANTS
II. WATER SAVING OPPORTUNITIES

“REDUCING THE EXISTING WATER DEMAND REPRESENTS THE GREATEST POTENTIAL TO REDUCE WATER USE, HOWEVER IT TYPICALLY HAS THE HIGHEST IMPLEMENTATION COST”

WEST HILLS COLLEGE – XERISCAPE

TULARE PUBLIC LIBRARY – LEED GOLD
II. WATER SAVING OPPORTUNITIES

1. LANDSCAPE WATER DEMAND
2. PLANT SUITABILITY & SUSTAINABILITY
3. IRRIGATION SYSTEM EFFICIENCY
4. IRRIGATION WATER SOURCE

“All plants have preferences, just like people – some like full sun, others prefer shade, so it's important to put plants in their preferred location”
II. WATER SAVING OPPORTUNITIES

- PLANT SUITABILITY & SUSTAINABILITY – Proper placement of plants on the site will determine the sustainability of a landscape.
  - CLIMATE ZONE – Plants must be compatible with weather conditions
  - MICROCLIMATES – Match plant preferences to site microclimates
  - HYDROZONES – Group plants with similar water needs on the same station
  - LANDSCAPE MOUNDING – Makes efficient irrigation practices more difficult
II. WATER SAVING OPPORTUNITIES

“HYDROZONES WITH PLANTS OF DIFFERENT WATER DEMANDS AND LANDSCAPE MOUNDING MAKE EFFICIENT IRRIGATION OF A FACILITY MORE DIFFICULT”
II. WATER SAVING OPPORTUNITIES

1. LANDSCAPE WATER DEMAND
2. PLANT SUITABILITY & SUSTAINABILITY
3. IRRIGATION SYSTEM EFFICIENCY
4. IRRIGATION WATER SOURCE

“New irrigation technologies and products make an overall irrigation efficiency of 70% - 90% possible”
II. WATER SAVING OPPORTUNITIES

“BUCKET TEST IS A USEFUL TOOL TO DETERMINE IRRIGATION EFFICIENCIES FOR SMALLER SITES”
II. WATER SAVING OPPORTUNITIES

“COMPUTER SIMULATIONS CAN SAVE TIME AND MONEY TO ESTIMATE THE IRRIGATION EFFICIENCIES FOR LARGER SITES”

DENSограм – SIMULATED SPRINKLER PATTERN: DU = 0.56 (POOR)
II. WATER SAVING OPPORTUNITIES

• IRRIGATION SYSTEM EFFICIENCY – It's not uncommon for existing irrigation systems to be less than 50% efficient.

  – DISTRIBUTION UNIFORMITY (DU) – Measure of irrigation efficiency

  • MATCHED PRECIPITATION RATES – Helps improve irrigation efficiencies

  • FIXED SPRAY SPRINKLERS – Typically 50% efficient, however 72% efficiencies possible

  • ROTOR SPRINKLERS – Typically 70% - 80% efficient, however 85% efficiencies possible

  • DRIP IRRIGATION – High efficiencies, but requires more maintenance and is less sustainable

  • LOW FLOW BUBBLERS – High efficiencies without the difficulties of drip irrigation
II. WATER SAVING OPPORTUNITIES

- IRRIGATION SYSTEM EFFICIENCY (cont’d) –
  - IRRIGATION WATER PRESSURE – Proper water pressure is essential
  - REDUCE / ELIMINATE RUNOFF – Runoff equals wasted water
  - ET BASED CONTROLLERS – These are essential to save water
  - CENTRAL COMPUTER CONTROL SYSTEM – A must for large sites
  - WATER METERS & BACKFLOW PREVENTION DEVICES – Critical to document and track success with water saving measures and to protect public health.
II. WATER SAVING OPPORTUNITIES

WATER WASTING CONDITIONS

LOW WATER PRESSURE RESULTS IN POOR IRRIGATION EFFICIENCIES

RUNOFF = WASTED WATER
II. WATER SAVING OPPORTUNITIES

1. LANDSCAPE WATER DEMAND
2. PLANT SUITABILITY & SUSTAINABILITY
3. IRRIGATION SYSTEM EFFICIENCY
4. IRRIGATION WATER SOURCE

“If we can replace a potable water irrigation source with a non-potable source, we can save a lot of water”
II. WATER SAVING OPPORTUNITIES

- IRRIGATION WATER SOURCE — It’s worth the effort to investigate if a non potable water source can be identified or developed to replace an existing potable water irrigation source.
  - THIS COULD RESULT IN A 100% SAVINGS OF POTABLE WATER
  - NON POTABLE WATER SOURCES ARE OFTEN LESS EXPENSIVE
  - BEWARE THAT POOR WATER QUALITY OR CONTAMINANTS WON’T CREATE COSTLY PROBLEMS
III. INTEGRATED PROJECT PLANNING & IRRIGATION SYSTEM MANAGEMENT

1. IRRIGATION SYSTEM MANAGEMENT
2. INTEGRATED PROJECT APPROACH

“It’s important to remember, fancy equipment does not save water, People Save Water”
III. INTEGRATED PROJECT PLANNING & IRRIGATION SYSTEM MANAGEMENT

- **IRRIGATION MANAGEMENT** — Fine tuning of the irrigation system is essential to the success of the project.
  - EDUCATION OF DECISION MAKERS AND FACILITY USERS
  - FIELD OBSERVATIONS
  - PROGRAMMING ADJUSTMENTS
III. INTEGRATED PROJECT PLANNING & IRRIGATION SYSTEM MANAGEMENT

- INTEGRATED APPROACH – Involve everyone who will play a part in the project planning, design, construction and ultimate management of the new irrigation system. Everyone has a voice and buys into the project goals. Everyone is a stake holder to realize the project goals.
IV. PROJECT RESULTS

WHEN YOU SAVE WATER – YOU SAVE MONEY!
THANK YOU!

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