Water Efficient Landscape
DUAL CERTIFICATION PROGRAM

A MWD, QWEL, CLCA, WATERSENSE PARTNERSHIP






CLCA Water Management Certification Program
Supplemental Study Guide

Version 1.01. Draft 9

Information and Requirements

Introduction

The California Landscape Contractors Association's (CLCA) Water Management Certification Program was formally established in 2008 after a one-year pilot program in 2007. The program was created by members of CLCA's Resource Management Committee along with the California Urban Water Conservation Council and Irrigation Association in response by a request by the California legislature to create a certification program dedicated to promoting water efficiency. This certification helps reduce landscape water usage by certifying individuals that are proficient and perform site-specific landscape water budgeting. This unique program qualifies for an EPA WaterSense professional certification under the irrigation system audits category.

Requirements for CWM Certification

- You must attend at least 90 percent of the four classes (missing no more than 2 of the 24 scheduled instructional hours).
- You must pass a 120-question multiple choice written test with 70% or better.
- You must participate in the group hands-on irrigation audit.
- You must enroll one landscape site to manage in CLCA's online water budgeting software.
- You must successfully manage at least one landscape site to a water budget for a twelve-month period. This can be achieved retroactively, but verifiable third-party water records may be required to verify.
- You must successfully pass a landscape site budget review by CLCA administration. All site past performance data and landscaped area must be reviewed before certification is granted. Performance site review requests to CLCA administration must be submitted in writing to watermanagement@clca.org.

Requirements to CWM Maintain Certification

In order to keep your CWM professional certification current, CWMs must:

- Continue to manage at least one landscape site
- Keep meter readings updated monthly
- Meet your water budget and re-certify each July

More information at clca.org/certification-center/water-management-certification/about-the-program/

CWM Certification Benefits

There are benefits to becoming a Certified Water Manager™ through CLCA:

- Individual recognition on CLCA and EPA WaterSense website, lookforwatersense.epa.gov/pros/
- Company recognition on CLCA and EPA WaterSense website
- Ability to provide clients with a monthly third-party water savings report using CLCA's water budgeting software
- Ability to audit irrigation systems for EPA WaterSense labeled new homes, epa.gov/watersense/watersense-labeled-homes
- Ability to perform third party MWELO irrigation reports

Landscape Water Budgeting is the Foundation of Our Program

CLCA's Water Management Certification Program is built around the concept of landscape water budgeting and on-site landscape water management. In addition to being a valuable tool for water retailers to promote lowering water costs, water budgeting can also be a valuable tool for the landscape industry to responsibly manage efficient irrigation use.

We feel that a water manager is someone who can successfully manage any landscape site using water budgeting and proactive site inspections. Through their efforts in this program, they can show measurable savings via usage reports.

Credit: Hunter Industries

1 2 3 4 5

The Five Basic Steps to Successful Landscape Water Management

Successful water management involves a process of data collection, calculations based on data collection and using site usage reports to evaluate performance. A water manager is able to take the following steps to manage the irrigation on a landscape site:

M.D.P.E.F. Method

1. **Map and Measure the Landscape Site**
   You need to know square footage of irrigated landscaped area, location of plant material, number of irrigation controller stations, location of irrigation controllers, etc.

2. **Document Potential Water and Cost Savings**
   Figure out how much water you can save, how much it will cost in materials and labor. What is the potential ROI (Return on Investment) for your landscape water management project?

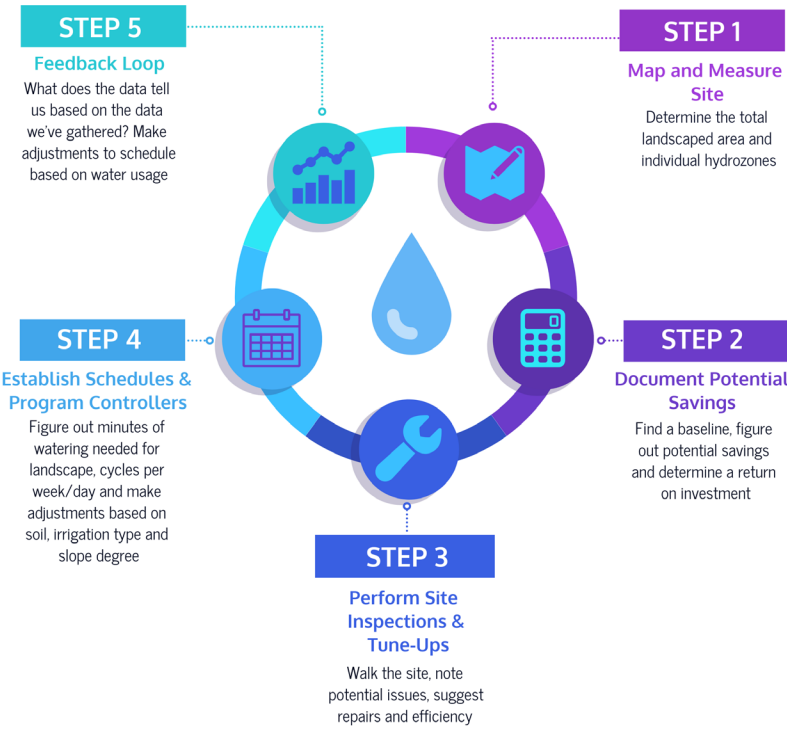
3. **Performing Site Inspections and Tune-Ups**
   When managing a new landscape site, conduct an initial physical inspection of the site to make sure the irrigation system is in good working condition. Be sure to note and prioritize potential issues and create an action plan to address.

4. **Establish Irrigation Schedules and Program Controllers**
   Use the information you have gathered about your landscape site to create a proper irrigation schedule for your landscape water management project. You may also use additional data collected from an irrigation system audit to fine tune your irrigation schedule.

5. **Feedback Loop**
   Perhaps this is the most important of all the five steps. It involves you recording your sites weekly and monthly meter readings to evaluate your performance. Adjustments to your schedules may be made by analyzing data. Determine if you are overwatering or underwatering based on the data.

Five Steps To Successful Water Management

M.D.P.E.F.



1. Map and Measure the Landscape Site

In order to create an accurate water budget, we need to know the type of plants, location of hydrozone area (HA) and the square footage of the irrigated landscaped area (LA) you will be entering into the program.

Map Hydrozones and Controller Stations

Hydrozones are used in landscaping so that plants with similar watering requirements can be irrigated within a common zone. Create a site map noting where watering zones are grouped by the controller and note the type of plant material within each hydrozone. Using Google Earth Pro (google.com/earth/versions/) or GoiLawn (goilawn.com), aerial photos or a measuring wheel, measure the site for the each hydrozone's square footage. Make sure the sum of the area of the hydrozones equals the total area of the entire site. If a system is designed correctly, all of the plants on a given station will already have similar watering requirements (hydrozones). A controller station zone map can contain mixed hydrozones.

Zone	HA	LA
1	Turf	4,100 sq. ft
2	Shrubs	12,550 sq. ft
3	Trees	800 sq. ft
4	Natives	1200 sq. ft
Total		**18,650 sq. ft**

Measuring

A proper landscape water budget requires an accurate measurements of a site's landscaped area, expressed in square footage. **Landscaped area measurements are curb-to-curb only and only apply to planted, irrigated areas. Non-irrigated planting areas cannot be included in the landscaped area measurements.** Although square footage can be determined using a variety of tools, the most accurate method is manually walking the site and physically measuring, firsthand.

Sample Site Maps

Water Meter Legend

SERIAL:42893183
TURF AREA:39,990 SQ FT (0.92 ACRES)
SHRUB AREA: 4, 585 SQ FT (0.11 ACRES)

SERIAL: 19099250
TURF AREA: 38,035 SQ FT (0.87 ACRES)
SHRUB AREA: 8,512 SQ FT (0.19 ACRES)

SERIAL: 29595570
TURF AREA: 51,897 SQ FT (1.19 ACRES)
SHRUB AREA: 3, 410 SQ FT (0.08 ACRES)

Lakeridge Park HOA

ADDRESS: 1440 ROBIN LANE, EL CAJON, CA 92020
WATER MANAGER:
COMPANY:
TOTAL IRRIGATED TURF: 129,922 (2.98 ACRES)
TOTAL IRRIGATED SHRUB: 16,507 SQ FT (0.38 ACRES)

3-YEAR HISTORICAL AVERAGE	4,357 H.C.F.
MAWA (ETAF=.7, ET_0=50.53	3.796 H.C.F.
WATER SAVINGS POTENTIAL	561 H.C.F.

Water Meter Legend

SERIAL:0898775
TURF AREA:98,063 SQFT (2.25 ACRES)
SHRUB AREA: 10,389 SQ FT (0.24 ACRES)

SERIAL: 63407163
TURF AREA: 4,027 SQ FT (0.96 ACRES)
SHRUB AREA: 6,926 SQ FT (0.16 ACRES)

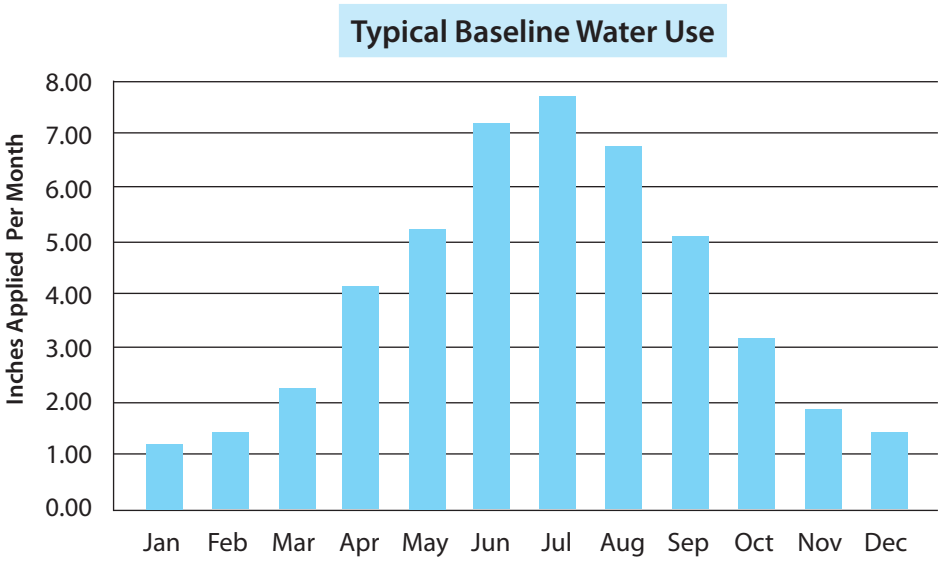
Jockey Club

ADDRESS: 7410 ALMADEN LANE, CARLSBAD, CA 92009
WATER MANAGER:
COMPANY:
TOTAL IRRIGATED TURF: 140,090 SQ FT (3.22 ACRES)
TOTAL IRRIGATED SHRUB: 17,315 SQ FT (0.40 ACRES)

3-YEAR HISTORICAL AVERAGE	5,687 H.C.F.
MAWA (ETAF=.7, ET_0=45.73	4,176 H.C.F.
WATER SAVINGS POTENTIAL	1,511 H.C.F.

2. Document Potential Water and Cost Savings

Begin by obtaining water meter history and examining past usage. Often these can be found on the client's water bill.



Compare your site's usage to **Baseline Water Use** which is a reflection of Evapotranspiration rate (ET). Baseline usage is referenced to the Evapotranspiration rate in inches lost per month. Baseline usage should reflect a bell-shaped curve following the ET curve. Typically, usage will peak in the month of July when ET is highest, and your landscape's water need is highest. Therefore, if July is 100% of your budget or the peak, your budget each month before and after should be a fraction (or lower percentage) of July's water needs.

Establish a baseline or average of how much water is used and compare it to recent water usage. Subtract the current amount being used from the average amount to get an amount over or under. **To get from inches per month to gallons or cubic feet used, you must use conversion factor of 0.62.**

To document potential savings, multiply the number over the average rate by local water rates. The following chart shows an example of statewide water rates for various California water retailers as of 2013. Some retailers use tiered pricing (where the water user pays different prices per unit of water used, with a higher price charged for larger quantities categorized in tiers).

Company	Service Area	Billing	Unit	Base Rate	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6
City of Fresno	Fresno	Monthly	HCF	$0.745					
County of Sacramento Water	Rancho Cordova	Monthly	HCF	$0.800					
Irvine Ranch Water District	Irvine, Costa Mesa	Monthly	HCF	$0.910	$1.240	$2.760	$4.700	$9.840	
City of Pomona	Pomona (inside city limits)	Bi-Monthly	HCF	$0.920	$1.670	$2.070			
Azusa Light & Water	Azusa	Monthly	HCF	$1.007	$1.953				
California Water Co.	Chico - Hamilton City	Monthly	HCF	$1.031					
City of Folsom Water	Rancho Cordova	Monthly	HCF	$1.080	$1.300	$1.600			
Pasadena Water & Power	Pasadena	Monthly	HCF	$1.125	$2.719	$3.219	$3.970		
Carmichael Water Dist.	Carmichael	Bi-Monthly	HCF	$1.130					
Burbank Water & Power	Burbank	Monthly	HCF	$1.140	$1.372	$1.727			
City of San Bernadino	San Bernadino	Monthly	HCF	$1.150					
City of Pomona	Pomona (outside city limits)	Monthly	HCF	$1.160	$2.080	$3.750			
Golden State Water Co.	Rancho Cordova	Monthly	HCF	$1.271					
Desert Water Co.	Palm Springs	Monthly	HCF	$1.290					
Victorville Water District	Apple Valley, Victorville	Monthly	HCF	$1.470					
California Water Co.	Bakersfield	Monthly	HCF	$1.511					
Eastern Municipal WD	Perris, Hemet	Monthly	HCF	$1.610	$2.960	$5.306	$9.706		
California Water Co.	Oroville Area	Monthly	HCF	$1.783					
City of El Segundo	El Segundo	Monthly	HCF	$1.787	$2.402	$3.017	$3.631		
Great Oaks Water Company	San Jose	Monthly	HCF	$1.846	$1.999	$2.305			
Western Municipal WD	Riverside	Monthly	HCF	$1.908	$2.102	$2.774	$4.312	$5.202	
California Water Co.	Stockton	Monthly	HCF	$1.957					
Las Virgenes Municipal WD	Calabasas	Monthly	HCF	$1.960	$2.370	$3.290	$4.680		
City of Oceanside	Oceanside (Multiple Family)	Monthly	HCF	$1.990	$2.280				
California Water Co.	Salinas	Monthly	HCF	$2.007					
City of Milpitas	Milpitas (Residential)	Bi-Monthly	HCF	$2.020	$2.980	$4.020	$4.500		
California Water Co.	King City	Monthly	HCF	$2.089					

Determining ROI

Through analyzing a potential site serviced by City of El Segundo, you calculate the site is overwatering by 2,100 HCF (hundred cubic feet) per year or based on the price of water (from the above chart) for this site.

2,100 HCF X ($1.79 per HCF) = $3,759 potential savings

2,100
x 1.79
3,759

Compare the potential savings below to the costs of water management. Does the potential savings warrant a year one estimate of $1,224.60 in billable water management services? Even after subtracting the first year of water management costs, the owner of the potential site still has $2,534.40 left in potential savings. The cost for additional years of water management should decrease, and increase the owner's initial ROI.

Year One

Task	#	Hours	Internal Cost	Total Cost	Billable Rate	Billable Amount
Initial data collection & basic color map	1	5	$40.00	$200.00	$65.00	$325.00
Develop watering schedule(s)	1	0.5	$40.00	$20.00	$65.00	$32.50
Install schedule(s) in controller	1	0.25	$40.00	$10.00	$65.00	$16.25
Inspect site/adjust schedule(s)	1	1.5	$40.00	$60.00	$65.00	$97.50
Turn on controller (Spring)	1	0.1	$40.00	$4.00	$65.00	$6.50
Modify schedule (April)	1	0.33	$40.00	$13.20	$65.00	$21.45
Modify Schedule (May)	1	0.33	$40.00	$13.20	$65.00	$21.45
Inspect site/ adjust schedule(s)	1	1.5	$40.00	$60.00	$65.00	$97.50
Modify Schedule (June)	1	0.33	$40.00	$13.20	$65.00	$21.45
Modify Schedule (July)	1	0.33	$40.00	$13.20	$65.00	$21.45
Inspect site/adjust schedule(s)	1	1.5	$40.00	$60.00	$65.00	$97.50
Modify schedule (August)	1	0.33	$40.00	$13.20	$65.00	$21.45
Modify Schedule (September)	1	0.33	$40.00	$13.20	$65.00	$21.45
Inspect site/ adjust schedule(s)	1	1.5	$40.00	$60.00	$65.00	$97.50
Modify schedule (October)	1	0.33	$40.00	$13.20	$65.00	$21.45
Modify schedule (November)	1	0.33	$40.00	$13.20	$65.00	$21.45
Turn off controller (Winter)	1	0.1	$40.00	$4.00	$65.00	$6.50
Rainy weather shut down (inc. travel)	3	0.75	$40.00	$90.00	$65.00	$146.25
Submit annual report/upgrade proposals	1	2	$40.00	$80.00	$65.00	$130.00
TOTAL YEAR ONE				$753.60		$1,224.60

Additional Years — Annual Cost

Task	#	Hours	Burden	Cost	Billable Rate	Billable Amount
Turn on controller (Spring)	1	0.1	$40.00	$4.00	$65.00	$6.50
Modify schedule (April)	1	0.33	$40.00	$13.20	$65.00	$21.45
Modify schedule (May)	1	0.33	$40.00	$13.20	$65.00	$21.45
Inspect site/adjust schedule(s)	1	1	$40.00	$40.00	$65.00	$65.00
Modify schedule (June)	1	0.33	$40.00	$13.20	$65.00	$21.45
Modify schedule (July)	1	0.33	$40.00	$13.20	$65.00	$21.45
Inspect site/adjust schedule(s)	1	0.5	$40.00	$20.00	$65.00	$32.50
Modify schedule (August)	1	0.33	$40.00	$13.20	$65.00	$21.45
Modify schedule (September)	1	0.33	$40.00	$13.20	$65.00	$21.45
Inspect site/adjust schedule(s)	1	0.5	$40.00	$20.00	$65.00	$32.50

Cost Estimate

Assumes site is typical, free-standing concrete tilt-up building with shrubs, ground cover and turf. Maximum 24 station controller. No rain sensor.

Review the chart on page 9 and figure out where water management begin to pay off.

HINT: Typically, larger landscape sites that use more irrigation, and are located in regions of the state where the price of water is more expensive per unit, will yield a better ROI for the client.

Water Management Pays Off

Property Size Irrigated	ETo Inches (annual)	Water Cost (ccf)	Water Cost for 100% ETo	Annual Savings of 20% over budget	First year Water Management Cost	2nd & 3rd year Water Management Costs	3 Year Net Value of Water Management
1 acre	49.2	$1	$1,785	$357	$1,225	$591	($1,336)
2 acres	49.2	$1	$3,570	$714	$1,838	$887	($1,469)
5 acres	49.2	$1	$8,924	$1,785	$3,675	$1,773	($1,866)
10 acres	49.2	$1	$17,849	$3,570	$6,738	$3,251	($2,529)
1 acre	49.2	$2	$3,570	$714	$1,225	$591	($252)
2 acres	49.2	$2	$7,139	$1,428	$1,838	$887	$673
5 acres	49.2	$2	$17,849	$3,570	$3,675	$1,773	$3,488
10 acres	49.2	$2	$35,697	$7,139	$6,738	$3,251	$8,180
1 acre	49.2	$3	$5,355	$1,071	$1,225	$591	$806
2 acres	49.2	$3	$10,709	$2,142	$1,838	$887	$2,815
5 acres	49.2	$3	$26,773	$5,355	$3,675	$1,773	$8,843
10 acres	49.2	$3	$53,546	$10,709	$6,738	$3,251	$18,889
1 acre	49.2	$4	$7,139	$1,428	$1,225	$591	$1,877
2 acres	49.2	$4	$14,279	$2,856	$1,838	$887	$4,957
5 acres	49.2	$4	$35,697	$7,139	$3,675	$1,773	$14,197
10 acres	49.2	$4	$71,395	$14,279	$6,738	$3,251	$29,598

Additional notes on cost

- Water management cost 1 acre first year = $1225, following years =$591
- Water management cost for additional acres increases water management cost per acre 50% of 1 acre cost

Additional notes on ETo

- ETo will vary by location. The 49.2 inches annually, used in the chart, is an example.

Two factors that make water management cost effective and will yield a better project ROI for your client are:

- Cost of water per unit — How much does 1 HCF cost from your site's water retailer?
- Size of landscaped area — How many acres of landscaped area is your site?

Review the above chart to spot examples of where the impact of these factors is evident.

Example #1
A 1-acre site with water cost of $1 per HCF
Water management equals ($1,336) in losses in the third year of water management
This is not cost effective.

Example #2
A 2-acre site with water cost of $2 per HCF
Water management begins to show a positive value of $673 in the third year of water management
This is close to breaking even.

Example #3
A 10-acre site with water cost of $4 per HCF
Water management equals a value of $29,598 in gains in the third year of water management
This is cost effective.

3. Performing Site Inspections and Tune-Ups

Site inspections or site system checks are the best way to physically manage a site and verify that all parts of the delivery system are in good working order. Some visual inspection and inventory of the working system should be done every time a water manager is on the property. Note all issues, the cost to fix such issues and priority of any issues should be presented to your client for approval. The format of this document may vary, but the information that should be collected and categorized is as follows:

Urgent Items: Defined as problems or conditions that, if not immediately corrected, will result in major water waste that will cause runoff, flooding and draw unwanted attention to your client's landscape by the public.

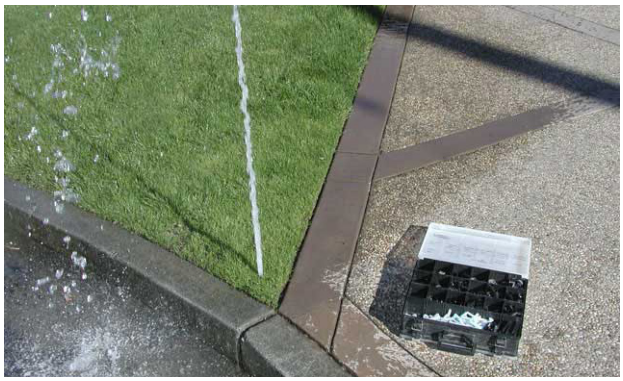
Needed Items: Defined as problems or conditions that prevent the irrigation system from operating at peak efficiency. Examples might include sprinklers leaning or positioned in a way that affects performance, but will not cause the imminent loss of plant material. Products with a history of defects and/or engineering deficiencies can also be in this category. Repair of needed items will restore the irrigation system to the level of operation intended at the time of the original design.

Upgrade Items: Defined as repairs or corrections that will allow the system to operate at peak efficiency. This can include adding or relocating sprinklers, correction or improvement of sun and shade issues and correcting mixed hydrozones.

A punch list or diagnostic report may be used to document issues. You should note cost to correct the issue and indicate the priority level for the managed landscape site. Below is a sample of a punch list with some noted issues and cost for repair on a hypothetical landscape site.

Sample Punch List

Problem	Station Number								Total Quantity	Urgent Repair Cost
	1	2	3	4	5	6	7	8		
Broken shrub sprinkler	1			4					5	$40.60
Broken shrub riser			2	1					3	$41.13
Broken bubbler		1							1	$15.64
Broken 4" pop-up										
Broken 6" pop-up										
Broken Hunter PGH 12" rotor					2				2	$156.38
Broken Hunter I-20						1			1	$51.44
Broken Hunter I-25								2	2	$145.72
Replace damaged nozzle						5	3	6	14	$192.50
Leaking valve (external)					1				1	$110.00



To properly perform the site tune-up, you should take the following steps when performing an inspection on the landscape site:

Credit: Hunter Industries

- **Remove or replace damaged equipment.**
- **Properly test dynamic pressure of the system.** Remember, if measuring PSI of a conventional pop-up spray, remove the nozzle and thread on a pressure gauge, then put the nozzle back on. If you are testing the pressure on a conventional rotor, you may need to use a pitot tube to measure PSI. Adjust the pressure at each valve to ensure ideal pressure for the entire system. Consult the manufacturer's product catalog to find the ideal operating pressure for the particular equipment you are using.
- **Adjust the grade or height of any sprinkler *(if necessary)* and straighten crooked sprinklers.**
- **Examine nozzles to make sure water is flowing out correctly. If not, be sure to make necessary changes.**
- **For low elevation heads, considering using a check valve which allows the water to only flow in one direction and prevents seepage after the system shuts off.**

4. Establish Irrigation Schedules and Program Controller

Now it is time to assign each valve to a controller station, based on the type of plants used in the landscape below: (Some controller stations can contain mixed hydrozones, but ideally you want to schedule your programs based on highest to lowest water needs.)

Sample program based on ***highest to lowest*** water needs:

1. **Turf and Annual Color Program**
2. **Groundcover and Shrubs Program**
3. **Shrubs and Trees Program**
4. **Special (e.g., Natives)**

To create a sample irrigation schedule for your irrigation controller, consider the following factors:

- Minutes per watering cycle
- How many cycles per day/week
- Adjustments for plant types, density, climate and slope of the property

After you have created an irrigation schedule and programmed it into the irrigation controller, you'll want to monitor the site. After one week with the new schedule, inspect the soil with a probe. Look for areas that have too much water or not enough, plants that are discolored or dying, dry or cracked soil or areas of too much water. Adjust the controller according to your observations.

If you observe signs of overwatering, your irrigation schedule may need to be adjusted. Your current irrigation schedule may also be causing excessive water to run off to the hardscape because it is being applied too rapidly to the landscape. To avoid runoff, you should always review the following:

- **Irrigation Type**
  Whether it is a conventional spray, stream rotor or rotating nozzle, each type of irrigation applies water differently or has a set precipitation rate.
- **Soil Type**
  You should know the soil type throughout your landscape. Different soils have different water-holding capacities to retain water. For example, clay soil has a higher water-holding capacity than sandy soils and therefore can accommodate longer intervals between water events.
- **Slope Degree**
  The degree of slope contributes to how quickly runoff occurs on your landscape and is a contributing factor on your schedule's maximum runtimes.

Minimum and Maximum Station Runtimes

Soil Type	Slope	Spray Heads		Gear Rotor*		Impact Rotor*		Stream Rotor		Rotating Nozzle	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
		1.8 in./hr.		.7 in./hr.		.65 in./hr.		.6 in./hr.		.45 in./hr.	
Sand	Mild	16	5	33	8	37	6	37	8	50	10
Sand	Moderate	10	5	21	8	22	6	24	8	31	10
Sand	Steep	7	5	12	8	8	6	10	8	13	10
Sandy Loam	Mild	13	5	23	8	25	6	26	8	36	10
Sandy Loam	Moderate	8	5	15	8	17	6	18	8	24	10
Sandy Loam	Steep	5	4	8	8	8	6	9	8	13	10
Loam	Mild	10	5	18	8	21	6	23	8	30	10
Loam	Moderate	7	5	12	8	17	6	14	8	19	10
Loam	Steep	4	4	8	8	7	6	8	8	11	10
Clay Loam	Mild	8	5	15	8	17	6	18	8	24	10
Clay Loam	Moderate	5	4	8	8	10	6	11	8	16	10
Clay Loam	Steep	3	3	8	8	6	6	8	8	10	10
Clay	Mild	5	4	10	8	12	6	13	8	18	10
Clay	Moderate	3	3	8	8	8	6	10	8	13	10
Clay	Steep	3	3	8	8	6	6	8	8	10	10

Flat to Mild Slope = 0 to 5 degrees | **Mild to Moderate Slope** = 5 to 20 degrees | **Steep Slope** = More than 20 degrees

Rotating Nozzles: MP Rotator nozzles are .45 in./hr.

Rain Bird R13-18 nozzles are .70 in./hr.

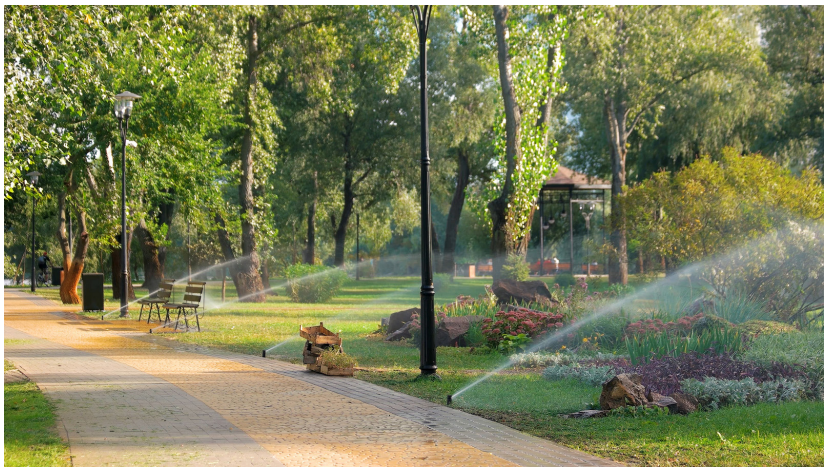
Rain Bird R17-24 nozzles are .75 in./hr. at most pressures

***NOTE: Minimum runtimes for rotary sprinklers** — The engineered rotational speed is 1 to 1½ minutes per rotation of the sprinkler. Four passes or rotations are needed to apply adequate amounts of water per cycle for full circle sprinklers. If valved separately, 180 degree-sprinklers runtimes can be reduced 50%. 90 degree sprinklers can be reduced 75%.

CAUTION: These station runtimes are approximate and are intended to be used as a guide as you develop the optimum runtimes for your specific property.

Calculated minimum precipitation per cycle is as follows: **Spray Heads** — (1.8 in./hr.) @ 5 minutes =.15 in./cycle @ 3 minutes = .09 in./cycle; **Gear Rotors** — (.7 in./hr.) @8 minutes = .0 in./cycle; **Impact Rotors** —(.65 in./hr.) @ 6 minutes = .065 in./cycle; **Stream Rotors** — (.60 in./hr.) @ 8 minutes = .08 in./cycle; **Rotating Nozzles** — (.45 in./hr.) @ 10 minutes = .075 in./cycle.

Avoid runoff by not exceeding maximum runtimes



Weather-Based Irrigation Controllers (WBICs)

Credit: Hunter Industries

Ways to Maximize Water Efficiency When Using Weather-Based Irrigation Controllers
Weather-based irrigation controllers (WBICs), also known as controllers, are one of the many valuable water-saving technologies available to help make landscape water usage more efficient. These devices adjust the amount of water applied to a landscape in response to environmental changes.

Using sensors and/or weather information, these controllers adjust your irrigation system automatically in response to rain, wind or temperature changes. Weather-based irrigation controllers can help reduce landscape water usage, help you keep on budget and in some cases can offer dramatic savings. They also can help you maintain a healthier landscape. However, if used incorrectly, this device may not give the desired water-saving results.

1. **Program It Correctly**
   In order to maximize and maintain water efficiency, the weather-based irrigation controller needs to be programmed correctly. These mini-computers need in-depth information about soil, plants, exposure, type of irrigation, etc., because they are customized for your property.

   Like any computer, if it receives inaccurate information, it will not achieve the desired results — possibly resulting in over- or under-irrigated areas and damage plants or hardscapes.

2. **Monitor Your Site**
   Site conditions must be monitored, especially the first few weeks after programming this type of controller to fine-tune and adjust your settings. Look for runoff, poor plant heath, color changes and/or any other signs that settings might need to be modified — perhaps several times.

3. **Water Mandates and Restrictions**
   Weather-based irrigation controllers and good water management are often more effective at reducing landscape water usage than assigned watering days because many people soak their lawns during their allocated time, using more water than the site actually needs. Some cities and water districts are now allowing those with smart controllers to be exempt from limited day watering restrictions. Be sure to check with your site's local water district regarding restriction exceptions.

4. **Regular Maintenance of Current Irrigation System**
   It is important to regularly inspect your irrigation system and repair leaks and/or other problems. Since "smart" controllers consistently adjust your watering, if there is a leak or other problem with the irrigation system, even if programmed correctly, your landscape may not receive the correct amount of water that it needs. Learning to read your water meter will help you determine if you have a leak.

5. Feedback Loop

This step involves reading the water meter on your landscape site and analyzing usage. In some cases, this information is supplied to the client in the form of a water bill every two months. The best step a water manager can take to verify their landscape site is on budget is to read the water meter at least once a month.

Pro Tip

Proactive water managers read the meter once a week during regularly scheduled maintenance appointments. This way if there are any leaks detected, they can be repaired before your client gets an unwanted surprise on their next water bill.

Credit: Badger Meter

For successful completion of CLCA Water Management Certification you should:

1. **Read water meters the first week of the month**

   - Enter your information into CLCA's easy-to-use online water management program at clcaengine.com to track your information and instantly check your progress.
   - CLCA's monthly usage reports are easy to produce and let you know instantly the status of your property and whether it is on budget.

2. **Use CLCA's Water Budgeting online tool to manage your landscape site**

   CLCA's easy-to-use online water management program at clcaengine.com can help. Some adjustments that might be necessary include:

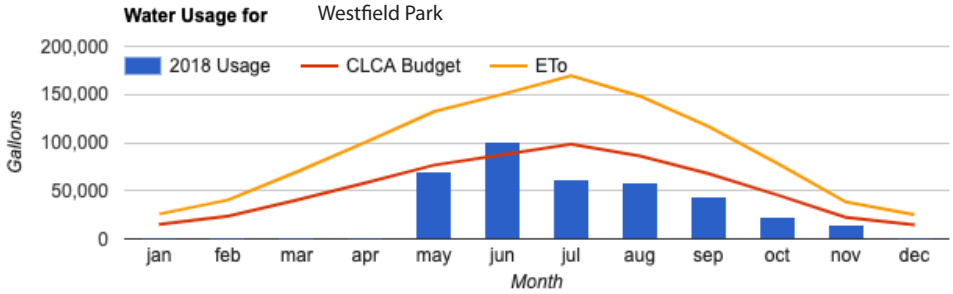
   - Making weekly/monthly site adjustments
   - Changing number of days per week watering
   - Adjusting the number of watering cycles per day
   - Adjusting the amount of overall water applied (turning up or turning down, based on findings)
   - Doing a site walkthrough using a soil probe to check soil moisture, finding wet or dry spots, or changes in a plant's appearance on the site

Sample Water Budgeting Reports from www.clcaengine.com

Site Managed By:
Blue Oaks Landscape

Site Manager
Tom Smith
Site Location
Westfield Park

Landscaped Area
35,630 square feet



2018 Estimated Savings: $2,330.29*

* Estimated savings calculated by using HCF under/over budget amount multiplied by most recent Sonoma County Water Agency average price per HCF:$6.64

2018 Water Use History						
month	ETo (inches)	Water Usage (Gallons)	% ETo	CLCA Water Budget (Gallons)		
				Water Budget (Gallons)	Over/Under (Gallons)	% Budget
jan	1.16	0	-	14,970.06	-	-
feb	1.82	410.00	1.01%	23,488.02	-23,078.02	1.75%
mar	3.13	390.00	0.56%	40,389.22	-39,999.22	0.97%
apr	4.51	1,000.00	1.00%	58,203.59	-57,203.59	1.72%
may	5.94	70,000.00	53.03%	76,654.19	-6,654.19	91.32%
jun	6.76	100,400.00	66.83%	87,238.02	+13,161.98	115.09%
jul	7.63	62,200.00	36.68%	98,465.57	-36,265.57	63.17%
aug	6.68	58,600.00	39.47%	86,205.09	-27,605.09	67.98%
sep	5.26	43,600.00	37.30%	67,881.74	-24,281.74	64.23%
oct	3.54	22,000.00	27.96%	45,681.14	-23,681.14	48.16%
nov	1.73	14,800.00	38.49%	22,327.84	-7,527.84	66.28%
dec	1.13	0	-	14,580.84	-	-
total	49.29	373,399.99	34.09%	636,085.33	-262,685.34	58.70%
ytd	47	373,399.99	35.75%	606,534.43	-233,134.44	61.56%

Sample Water Budgeting Reports from www.clcaengine.com

Site Managed By:

Blue Oaks Landscape

Site Manager

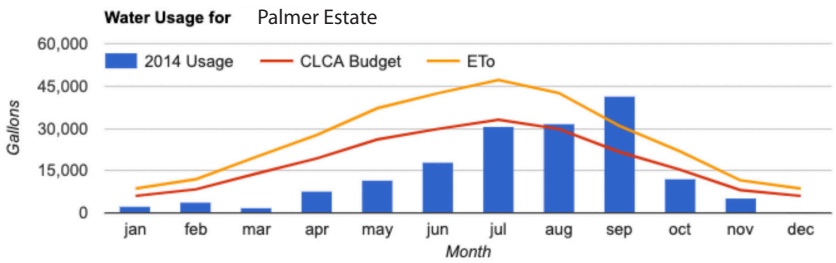
Tom Smith

Site Location

Palmer Estate

Landscaped Area

8,720 square feet



2014 Estimated Savings: $97.83*

* Estimated savings calculated by using HCF under/over budget amount multiplied by most recent Sacramento (City of) Department of Utilities average price per HCF:$1.45

2014 Water Use History

month	ETo (inches)	Water Usage (Gallons)	% ETo	CLCA Water Budget (Gallons)		
				Water Budget (Gallons)	Over/Under (Gallons)	% Budget
jan	1.59	2,200.00	25.44%	6,062.87	-3,862.87	36.29%
feb	2.20	3,800.00	31.76%	8,390.72	-4,590.72	45.29%
mar	3.66	2,020.00	10.15%	13,967.07	-11,947.07	14.46%
apr	5.08	7,880.00	28.52%	19,378.74	-11,498.74	40.66%
may	6.83	11,900.00	32.03%	26,055.39	-14,155.39	45.67%
jun	7.80	17,900.00	42.19%	29,760.48	-11,860.48	60.15%
jul	8.67	30,900.00	65.53%	33,076.35	-2,176.35	93.42%
aug	7.81	31,900.00	75.09%	29,797.90	+2,102.10	107.05%
sep	5.67	41,500.00	134.57%	21,631.74	+19,868.26	191.85%
oct	4.03	12,010.00	54.79%	15,374.25	-3,364.25	78.12%
nov	2.13	5,190.00	44.80%	8,128.74	-2,938.74	63.85%
dec	1.59	0	-	6,062.87	-	-
total	57.06	167,200.00	53.87%	217,702.10	-50,502.10	76.80%
ytd	55.47	167,200.00	55.42%	211,624.25	-44,424.25	79.01%

Water Budget Factors to Analyze on Your Monthly Report

- **ETo and Percentage of ETo** — Historical weather (expressed in inches) for your site's area that deals with the evapotranspiration from the reference surface, the so-called reference crop evapotranspiration or reference evapotranspiration.
- **Water Budgeted** — Water budgeted for your landscape based on ETo x Plant Water Needs x Landscaped Area.
- **Water Usage** — Water in HCF used on landscape (not including indoor use if you have a shared meter). Calculated by monthly meter readings by a water manager.
- **Net Over/Under** — This is the net of Water Budgeted and Water Usage. It is either green for positive (water saved) or red for negative (overwatering).
- **Percentage of Budget** — This number represents how much of the budget was used and may be over 100%, which means the site is being overwatered.

Summary

M.D.P.E.F. Method Completed!

✓ **M**ap and Measure the Landscape Site

✓ **D**ocument Potential Water and Cost Savings

✓ **P**erforming Site Inspections and Tune-Ups

✓ **E**stablish Irrigation Schedules and Program Controllers

✓ **F**eedback Loop

After completing the following steps, you should be on your way to successfully managing your landscape to a water budget.

- Make sure that any changes in the landscaped area such as plant type changes or an increase or decrease in the square footage is reflected in your water budget.
- Record any of these changes accurately into the online system. Landscape sites you manage will have many of these nuances throughout your time managing them. Remember, without updating these changes, the accuracy of your water budget might be compromised.
- Also, when possible landscape enhancements are proposed, you want to keep in mind that you are the water efficiency expert. Always do or suggest what is in the best interest of saving water for your clients!

WEL DCP Water Efficient Landscape
DUAL CERTIFICATION PROGRAM

CLCA Water Management Program
Supplemental Study Guide
Version 1.01

Study guide updates and support provided by Peter Estournes CLP, QWEL, David Silva CWM, CLIA, QWEL, Gabriel Michael, CWM, CLIA, QWEL, Sandra Giarde, CAE, John Sassaman, and Susan Carlson.

Original version of this study guide developed by Scott McGilvray, CWM, John Moore, Gary Kah and Chris Willig.