

This presentation premiered at WaterSmart Innovations

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USING DESIGN TECHNOLOGY TO MEET WATER EFFICIENT LANDSCAPE REQUIREMENTS

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LEARNING OBJECTIVES

Attendees participating in this educational session will:

- learn how to quickly define hydrozones that report water needs and areas.

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- understand design strategies used to incorporate non-potable water collection elements.
- recognize how water needs data can be appended to plant symbols, which can quickly fulfill your MWELO/LEED/SITES compliant proposed landscape plan.

WATER EFFICIENT LANDSCAPE DESIGN OVERVIEW

Section 3: Site Design—Water

Prerequisite 3.2: Reduce water use for landscape irrigation

Required

INTENT

Conserve water resources and minimize energy use by reducing the use of potable water, natural surface water, and groundwater withdrawals for landscape irrigation after the establishment period.

P3.2



Water Efficiency

WE Credit 1.1: Water Efficient Landscaping: Reduce by 50% 1 Point

Intent

Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation.

Requirements

Reduce potable water consumption for irrigation by 50% from a calculated mid-summer baseline case.

Reductions shall be attributed to any combination of the following items:

☐ Plant species factor

☐ Irrigation efficiency

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WUCOLS IV Water Use Classification of Landscape Species

Home Page

User Manual

Plant Search Instructions

Plant Search Database

Download WUCOLS IV Plant List

Download WUCOLS IV User Manual

Water Requirements for Turfgrasses

Partners

Acknowledgements

Home Page

GETTING STARTED

If you are using the WUCOLS list for the first time, it is essential that you read the *User Manual*. The manual contains very important information regarding the evaluation process, categories of water needs, plant types, and climatic regions. It is necessary to know this information to use WUCOLS evaluations and the plant search tool appropriately. To access the *User Manual*, click on the tab (on left) and view specific topics.

Water conservation is an essential consideration in the design and management of California landscapes. Effective strategies that increase water use efficiency must be identified and implemented. One key strategy to increase efficiency is matching water supply to plant needs. By supplying only the amount of water needed to maintain landscape health and appearance, unnecessary applications that exceed plant needs can be avoided. Doing so, however, requires some knowledge of plant water needs.

WUCOLS IV provides evaluations of the irrigation water needs



- by the client
- by jurisdiction
 - ordinances (MWEL0)
 - tax incentives

WATER EFFICIENT LANDSCAPE DESIGN OVERVIEW

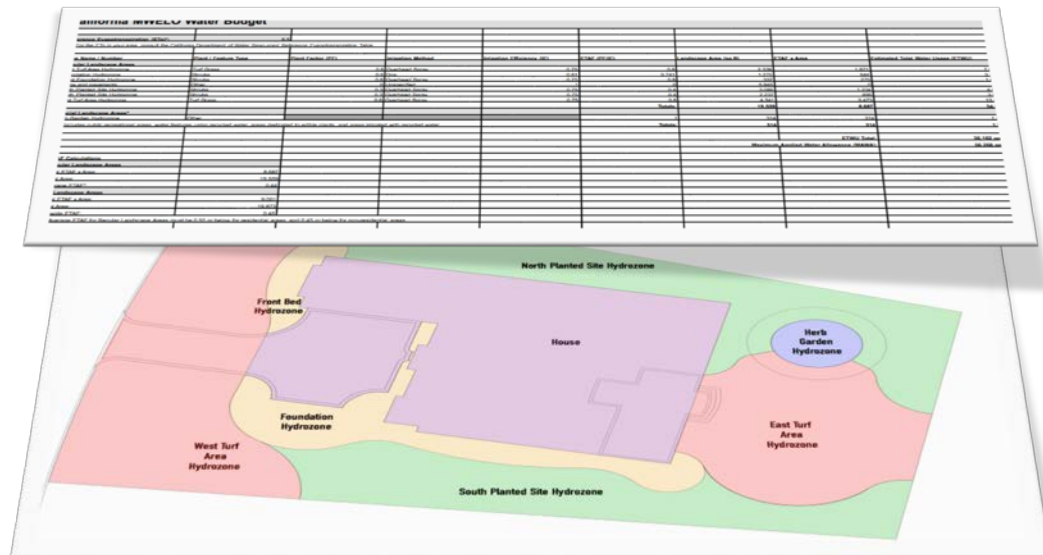
HOW CAN DESIGN TECHNOLOGY HELP?



Charting hydrozones for
proposed irrigation

WATER EFFICIENT LANDSCAPE DESIGN OVERVIEW

HOW CAN DESIGN TECHNOLOGY HELP?

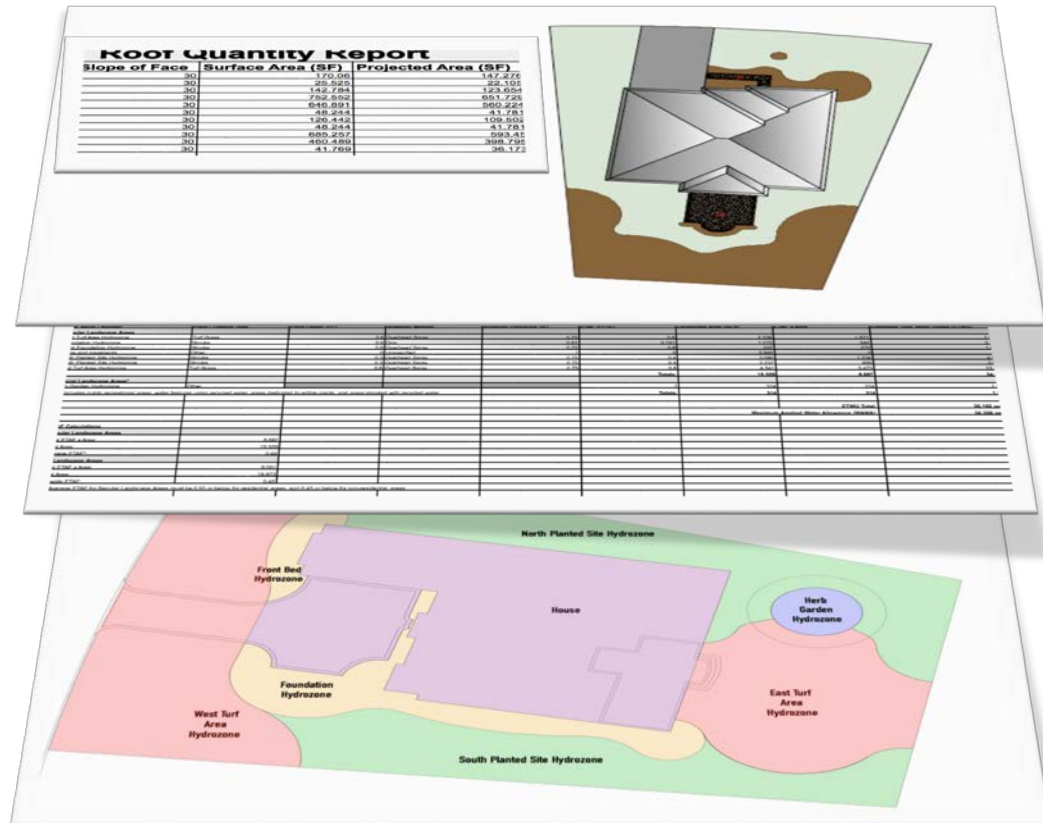


Performing water budget calculations

Charting hydrozones for proposed irrigation

WATER EFFICIENT LANDSCAPE DESIGN OVERVIEW

HOW CAN DESIGN TECHNOLOGY HELP?



Estimating for non-potable uses

Performing water budget calculations

Charting hydrozones for proposed irrigation

WATER EFFICIENT LANDSCAPE DESIGN OVERVIEW

HOW CAN DESIGN TECHNOLOGY HELP?

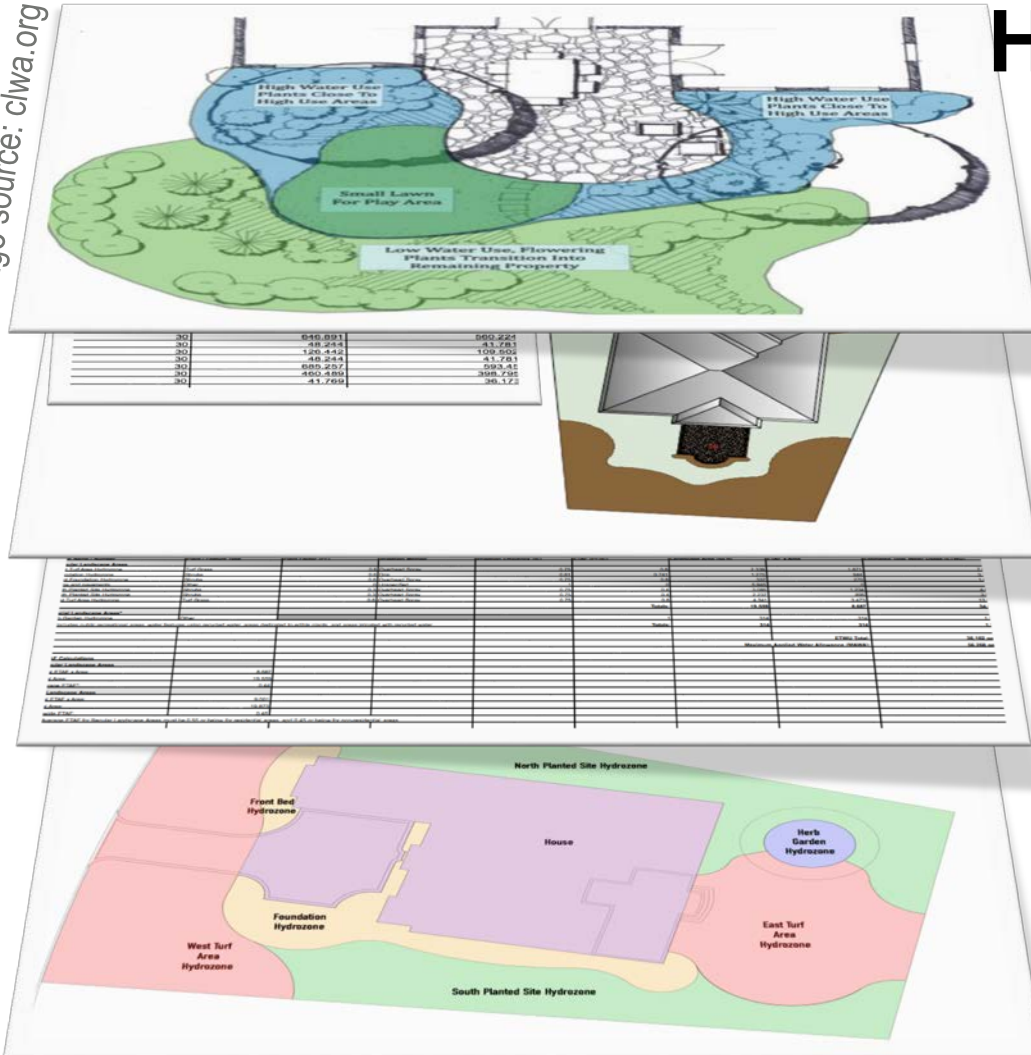
Choosing the best plant based on water requirements factor

Estimating for non-potable uses

Performing water budget calculations

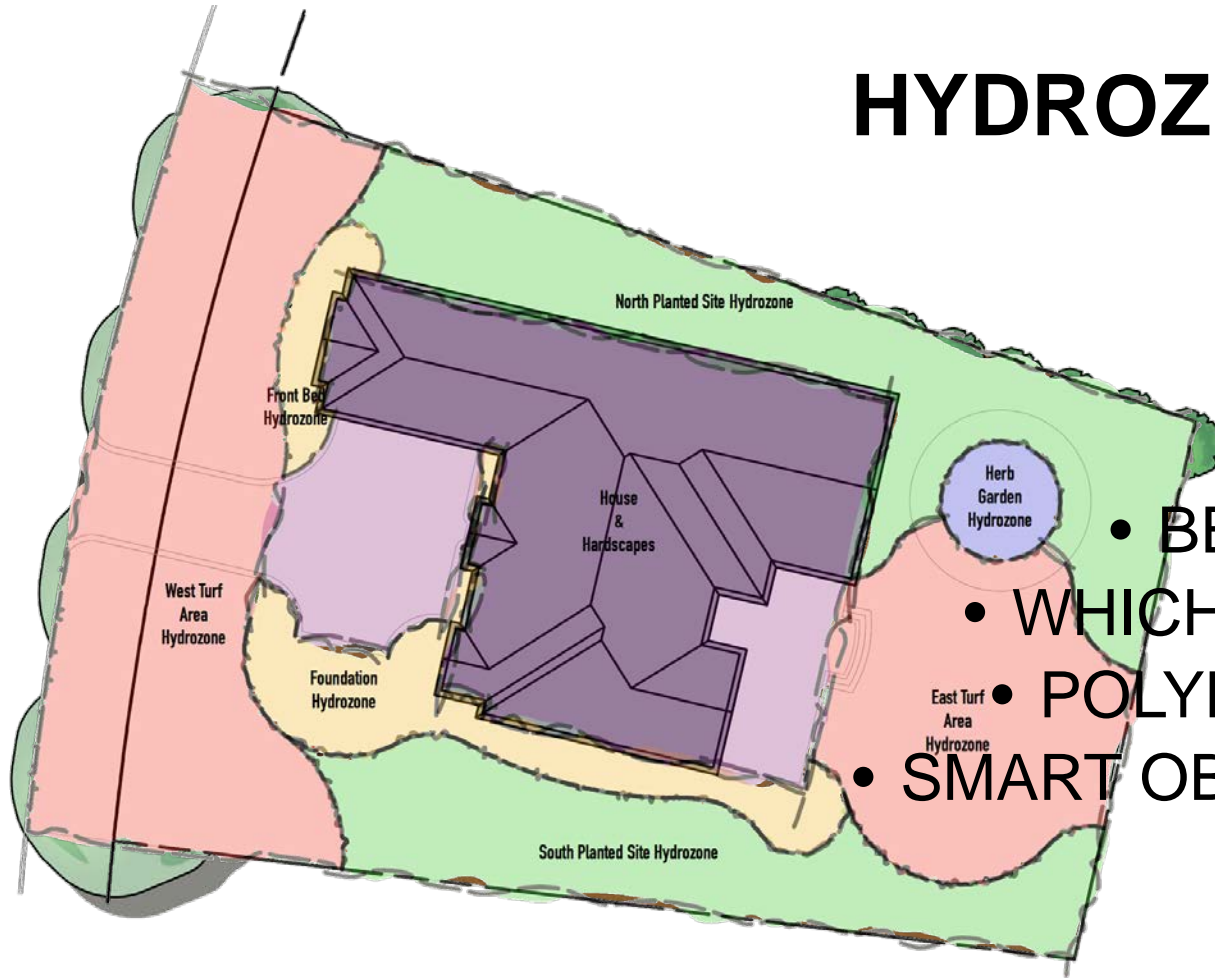
Charting hydrozones for proposed irrigation

Image source: clwa.org



CHARTING INTELLIGENT HYDROZONES

HYDROZONES: ZONES OF SIMILAR WATER NEEDS



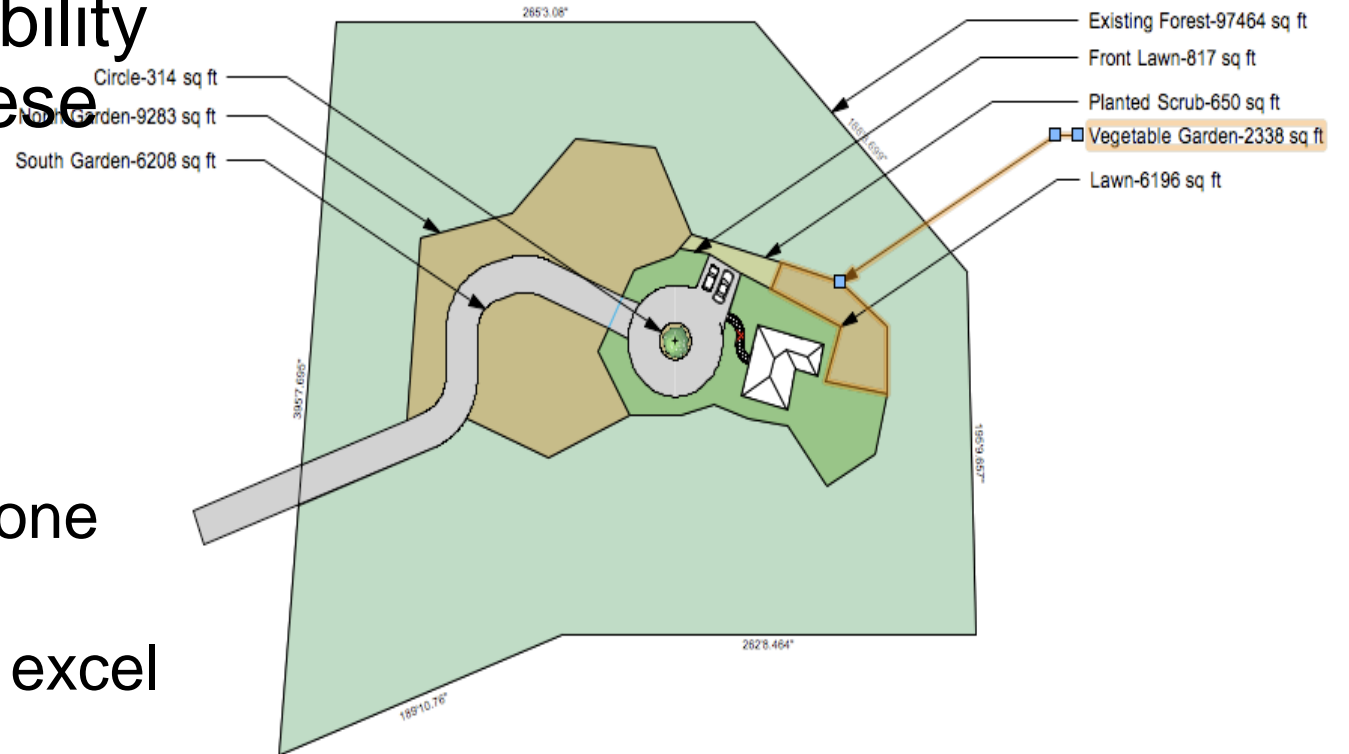
- BEFORE OR AFTER PLANTING PLAN?
- WHICH PROCESS IS EASIEST TO REVISE?
- POLYLINES IN CAD = QUICK AREA CALCS
- SMART OBJECTS = FASTEST WATER BUDGET

CHARTING INTELLIGENT HYDROZONES

Geometry is just half the process

Every CAD program has the ability to delineate areas, such as these hydrozones with polylines, or polygons.

- Click on each shape
- Recognize the area
- Create a label with the hydrozone name and area
- Enter name and number in an excel spreadsheet
- Manually update when reconfiguring to meet budget



CHARTING INTELLIGENT HYDROZONES

HYDROZONES: SMART OBJECTS = LESS TIME

- Right click on shape
- Convert to Hydrozone object
- Populate with irrigation data needed for LEED, SITES or MWELo water budget.
 - Built-in LEED, SITES or MWELo worksheet does the rest.

Properties

Shape Data Render

Hydrozone

Class: Irrigation-Hydrozone-Low

Layer: Hydrozone Information

Plane: Layer

X: 72'5.734"

Y: 231'2.953"

Z: 0"

Rotation: 0.00°

General

Name: Foundation Hydrozone

Method: Drip

Water Use: Low

Water Use Value: 0.3

☒ Class By Water Use

Plant Type: Shrubs

Note: Trees, Shrubs Groundcovers

☐ Attach Tag/Label

Information

Hydrozone Area: 1274.595 sq ft

Site Area: 18024.245 sq ft

% of Site Area: 7.072

Hydrozone Site Area Settings...



PERFORMING WATER BUDGET CALCULATIONS



Just like **spreadsheets** and **databases** are to financial budgets, **worksheets built in to your design application** can be to complex calculations like water budgets.

Actually...they're even better!

Source: EPA WaterSense Water Budget Approach, December 2009

PERFORMING WATER BUDGET CALCULATIONS

SPREADSHEETS AND WORKSHEETS:

When considering the complicated calculations...its no wonder some designers would prefer to either pass on water budgets, or use spreadsheets or built-in worksheets.

What is the advantage of **built-in** over **stand-alone**?



PERFORMING WATER BUDGET CALCULATIONS

In some cases, a designer will find that water budgets start with a **Baseline water requirement for a site.**

Baseline:

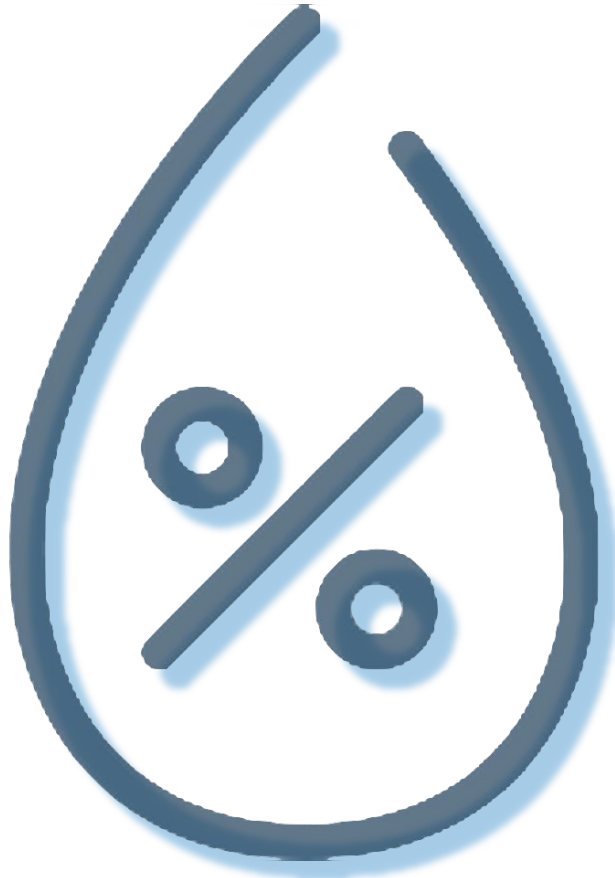
the amount of water required by a site if the landscaped area is watered at 100 percent of local reference evapotranspiration (ET_o).

ET_o is representative of the amount of water lost from a well- maintained expanse of average-height green grass and the surrounding soil.

Source: EPA WaterSense Water Budget Approach, v 1.02 July 2014



PERFORMING WATER BUDGET CALCULATIONS



LWA (Landscape Water Allowance) is the target allowance for water usage on site typically 70% of the Baseline.

MAWA:

(Maximum Applied Water Allowance) is essentially the same thing as the LWA, for those in California utilizing the water budget calculations required by the Water Efficient Landscape Ordinance (WELO).

Source: EPA WaterSense Water Budget Approach, v 1.02 July 2014
& California's Updated Model Water Efficient Landscape Ordinance, July 2015

PERFORMING WATER BUDGET CALCULATIONS



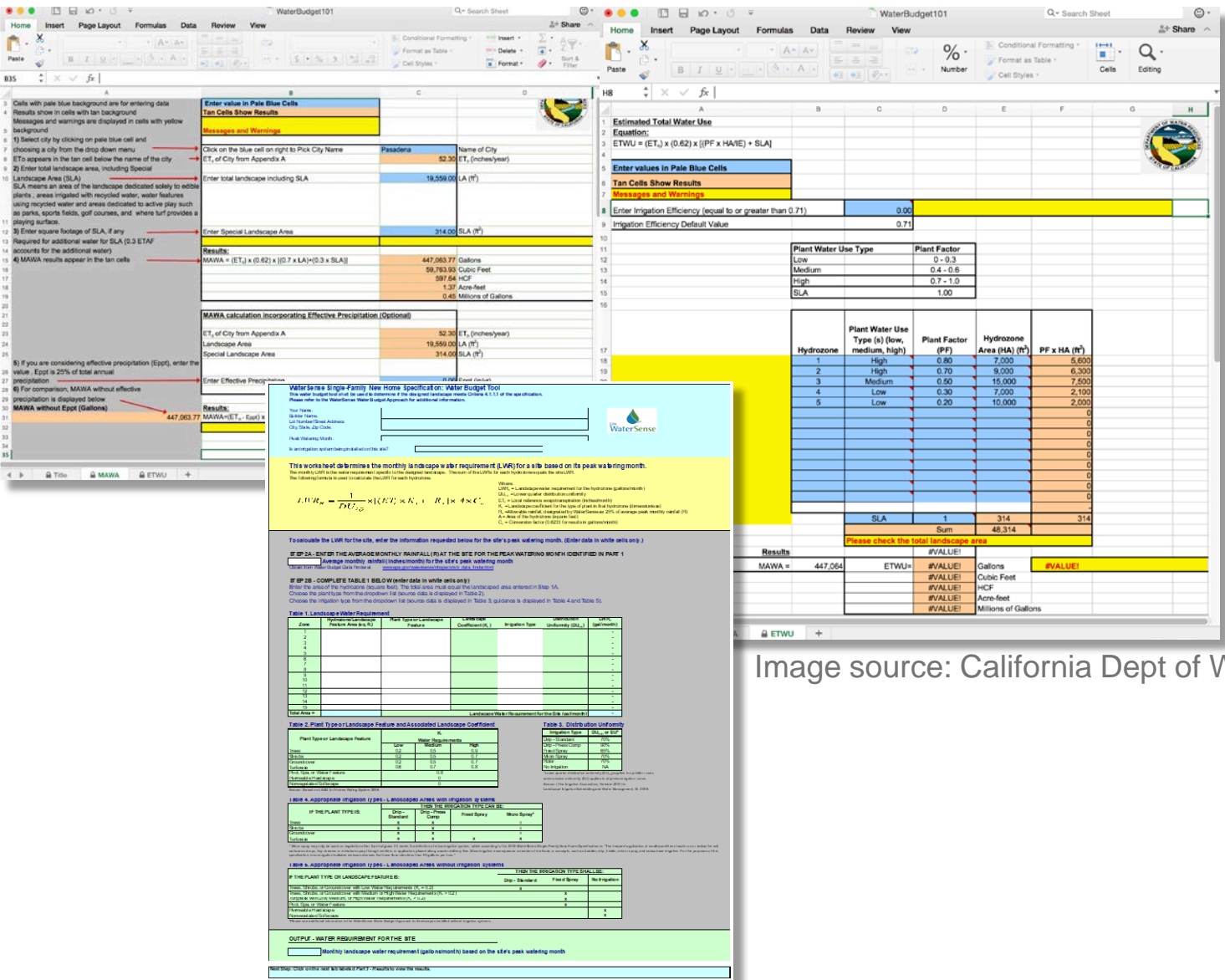
The proposed **LWR (Landscape Water Requirement)** must fall within the calculated **LWA**.

ETWU:

(Estimated Total Water Use) is essentially the same thing as the LWR, for those in California utilizing the water budget calculations required by the Water Efficient Landscape Ordinance (WELo).

Source: EPA WaterSense Water Budget Approach, v 1.02 July 2014
& California's Updated Model Water Efficient Landscape Ordinance, July 2015

PERFORMING WATER BUDGET CALCULATIONS



Excel, Sheets or other **spreadsheets** solutions manage the calculations.

Pre-made spreadsheet files help reduce set-up time.

But... manually entering and revising the data takes time away from design.

Image source: California Dept of Water Resources

Image source: EPA Water Sense

PERFORMING WATER BUDGET CALCULATIONS

Also...

both **stand-alone spreadsheets** and **built-in worksheets**:

- calculate
- estimate
- document
- save as a template
- revise for future use

	A	B	C	D	E	F	G
1	Name	Plant Water Use Types	Plant Factor (PF)	Landscape Area (LA) (sq ft)	Hydrozone Area (HA) (sq ft)	Special Landscape Area (SLA) (sq ft)	PF x HA (sq ft)
2		B	4.2	123,270	120,933	2,338	33,509
2.1	Existing Forest	LW	0.2	97,464	97,464	0	19,493
2.2	North Garden	HW	0.7	9,283	9,283	0	6,498
2.3	Circle	MW	0.5	314	314	0	157
2.4	South Garden	MW	0.6	6,208	6,208	0	3,725
2.5	Planted Scrub	LW	0.2	650	650	0	130
2.6	Vegetable Garden	SLA	1	2,338	0	2,338	0
2.7	Front Lawn	MW	0.5	817	817	0	409
2.8	Lawn	MW	0.5	6,196	6,196	0	3,098
3							
4	Reference Evapotranspiration						
5	ETo	51.1					
6							
7	Maximum Applied Water Allowance						
8	ETo	CF	ETAF	LA	SLA	MAWA (gallons)	
9	51.1	0.62	0.7	123,270	2,338	2,756,034	
10							
11	Estimated Total Water Use						
12	ETo	CF	IE	PF x HA	SLA	ETWU (gallons)	
13	51.1	0.62	0.71	33,509	2,338	1,569,335	

PERFORMING WATER BUDGET CALCULATIONS

Both also enable
reuse.

A **Hydrozone
Table** can be
reused as a
foundation for the
Water Budget.

Name	Plant Water Use Types	Plant Factor (PF)	Landscape Area (LA) (sq ft)	Hydrozone Area (HA) (sq ft)	Special Landscape Area (SLA) (sq ft)	PF x HA (sq ft)
Existing Forest	LW	0.2	97,464	97,464	0	19,493
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Planted Scrub	LW	0.2	650	650	0	130
Vegetable Garden	SLA	1	2,338	0	2,338	0
Front Lawn	MW	0.5	817	817	0	409
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Reference Evapotranspiration						
ET_o	51.1					
Maximum Applied Water Allowance						
ET_o	CF	ETAF	LA	SLA	MAWA (gallons)	
51.1	0.62	0.7	123,270	2,338	2,756,034	
Estimated Total Water Use						
ET_o	CF	IE	PF x HA	SLA	ETWU (gallons)	
51.1	0.62	0.71	33,509	2,338	1,569,335	

PERFORMING WATER BUDGET CALCULATIONS

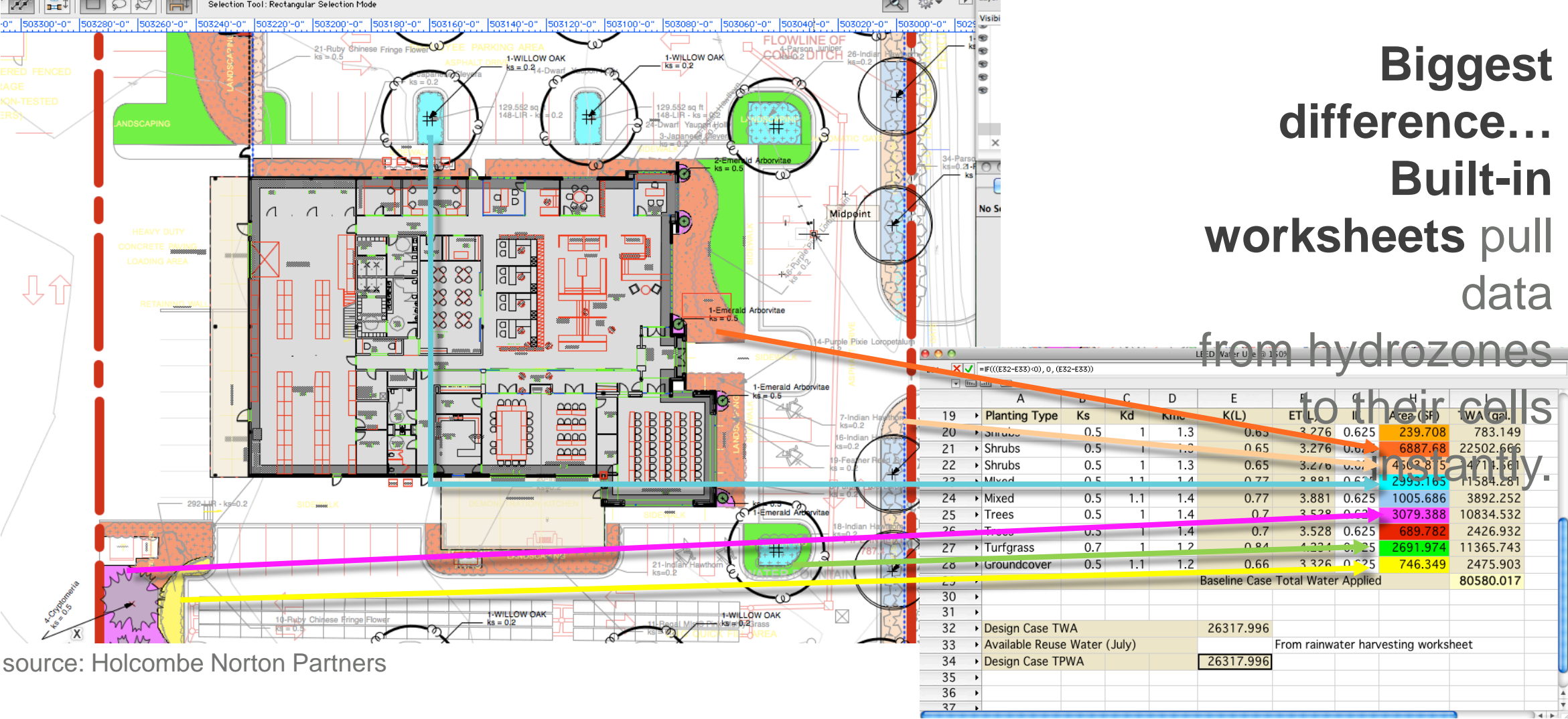


Image source: Holcombe Norton Partners

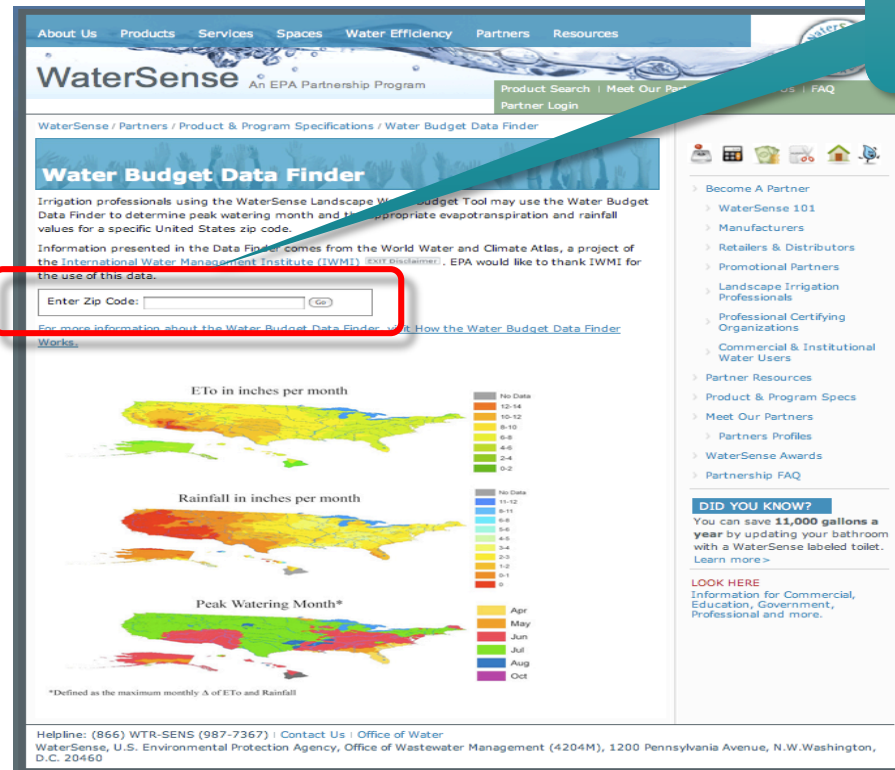
PERFORMING WATER BUDGET CALCULATIONS

California MWELO Water Budget									
Reference Evapotranspiration (ET _o):		52.3							
* = For the ET _o in your area, consult the California Department of Water Resources' Reference Evapotranspiration Table.									
Zone Name / Number	Plant / Feature Type	Plant Factor (PF)	Irrigation Method	Irrigation Efficiency (IE)	ETAF (PF/IE)	Landscape Area (sq ft)	ETAF x Area	Estimated Total Water Usage (ETWU)	
Regular Landscape Areas									
East Turf Area Hydrozone	Turf Grass	0.6	Overhead Spray	0.75	0.8	2,339	1,871	60,682	
Foundation Hydrozone	Shrubs	0.6	Drip	0.81	0.741	1,275	944	30,615	
Front Foundation Hydrozone	Shrubs	0.6	Overhead Spray	0.75	0.8	337	270	8,749	
Home and pavements	Other	0	Unspecified	1	0	5,945	0	0	
North Planted Site Hydrozone	Shrubs	0.3	Overhead Spray	0.75	0.4	3,085	1,234	40,012	
South Planted Site Hydrozone	Shrubs	0.3	Overhead Spray	0.75	0.4	2,237	895	29,016	
West Turf Area Hydrozone	Turf Grass	0.6	Overhead Spray	0.75	0.8	4,341	3,473	112,603	
Totals:						19,559	8,687	281,677	
Special Landscape Areas*									
Herb Garden Hydrozone	Other					1	314	10,187	
Totals:						314	314	10,187	
* = Includes public recreational areas, water features using recycled water, areas dedicated to edible plants, and areas irrigated with recycled water.									
							ETWU Total:	291,864 gal/yr	
							Maximum Applied Water Allowance (MAWA):	454,142 gal/yr	
ETAF Calculations									
Regular Landscape Areas									
Total ETAF x Area:	8,687								
Total Area:	19,559								
Average ETAF*:	0.44								
All Landscape Areas									
Total ETAF x Area:	9,001								
Total Area:	19,873								
Sitewide ETAF:	0.45								
* = Average ETAF for Regular Landscape Areas must be 0.55 or below for residential areas, and 0.45 or below for non-residential areas.									
This budget is a tool to assist in the completion of the Water Efficient Landscape Worksheet required by the State of California.									

Worksheets can still accept custom data provided by the designer...
Site-specific factors, such as **ET_o** can be incorporated with assigned
information from these hydrozones and the other equations
to help make the numbers calculate.

PERFORMING WATER BUDGET CALCULATIONS

information about
rainfall
evapotranspiration



www.epa.gov/watersense/nhspecs/wb_data_finder.html

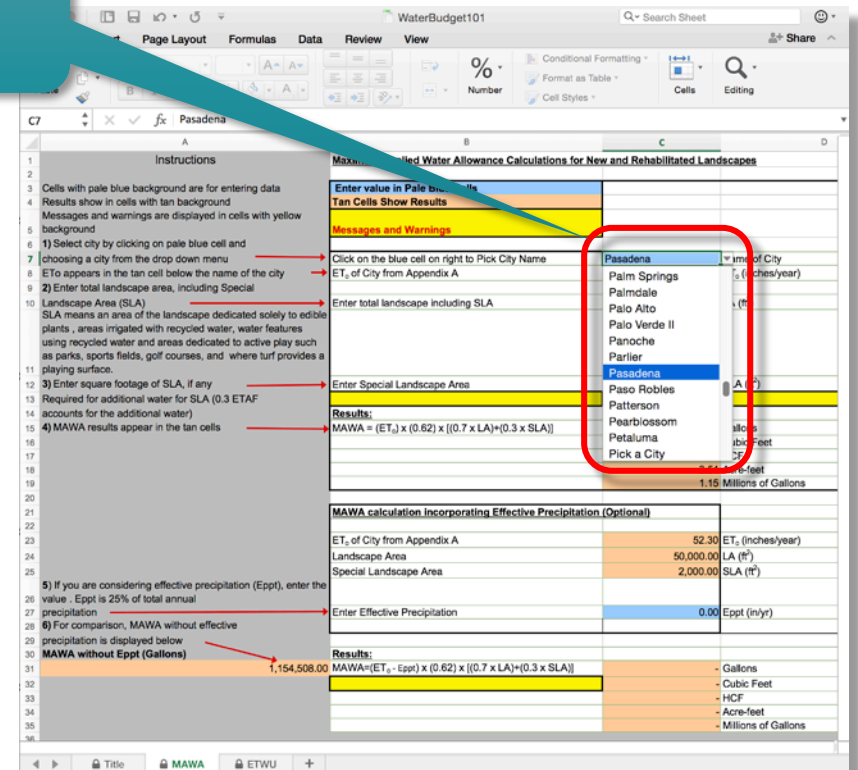


Image source: California Dept of Water Resources

ESTIMATING NON-POTABLE SOURCES



Non-potable Sources (NPS) of water

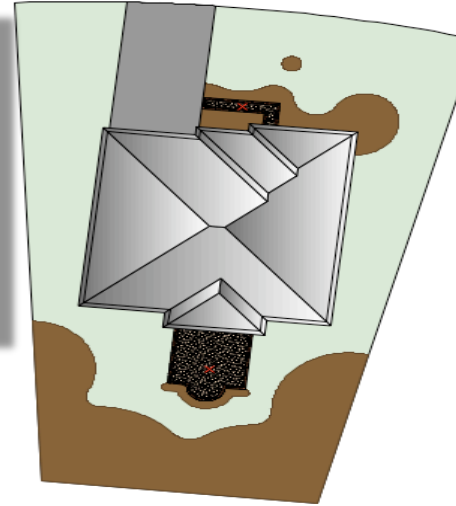
- can help significantly in reducing the potable water estimated for landscape water use
- valuable in earning LEED and SITES water efficiency credits
- managed differently in MWELO (considered for Special Landscape Areas)

NPS may not be relied on in all Catchment Areas (CA), though...

- salinity and other contaminants
- substantial rainwater may be a

ESTIMATING NON-POTABLE SOURCES

Roof Quantity Report		
Slope of Face	Surface Area (SF)	Projected Area (SF)
30	170.06	147.276
30	25.525	22.105
30	142.784	123.654
30	752.552	651.729
30	646.891	560.224
30	48.244	41.781
30	126.442	109.502
30	48.244	41.781
30	685.257	593.45
30	460.489	398.795
30	41.769	36.173



$$\begin{array}{l} \text{Harvested} \\ \text{water (gal)} \end{array} = \begin{array}{l} \text{catchment} \\ \text{area (ft}^2\text{)} \end{array} \times \begin{array}{l} \text{rainfall} \\ \text{depth} \\ \text{(in.)} \end{array} \times \begin{array}{l} 0.623 \\ \text{conversion} \\ \text{factor} \end{array}$$

Within CAD applications, the data associated with polygonal objects, such as roofs or other catchment features, helps to accurately and quickly calculate potential rainfall collection.

Calculated with regional rainfall amounts and other related data, rainwater catchment and storage systems can be properly sized.

ESTIMATING NON-POTABLE SOURCES

For Holcombe Norton Partners, seeking LEED credits required them to use NPS to go beyond pre-required potable water reductions.

They used a separate worksheet in the same file to generate this volume calculation.

The water budget for LEED and SITES provides for the NPS

	A	B	C	D	E	F	G	H	I
32	Design Case TWA				26317.996				
33	Available Reuse Water (July)				29156	From rainwater harvesting worksheet			
34	Design Case TPWA				0				
35									
36	Percent Reduction of Potable Water								
37	Design TPWA				0				
38	Baseline TWA				80580.017				Must be ≥50% to meet Option 1 (2 points); must be 100% to qualify for Option 2
39	Percent Reduction of Potable Water						100		
40									
41	Percent Reduction of Total Water								
42	Design TWA				26317.996				
43	Baseline TWA				80580.017				
44	Percent Reduction of Potable Water						67.339		Must be ≥50% to achieve Option 2 (4 points)
45									
46									
47									

Image source: Holcombe Norton Partners

ESTIMATING NON-POTABLE SOURCES

POC 'D' - PRIVATE IRRIGATION
WATER EFFICIENT LANDSCAPE WORKSHEET
PROJECT NAME: Westview Village
PROJECT TYPE: Residential
PROJECT LOCATION: Ventura, CA
REFERENCE ETO: 43.5
TOTAL IRRIGATED LANDSCAPE AREA: 17,125 sf

Maximum Applied Water Allowance (MAWA)

MAWA = (ETo) (0.62) [(ETAF x LA) + ((1 - ETAF) x SLA)]

MAWA= Maximum Applied Water Allowance
ETo = Reference Evapotranspiration (inches per year)
0.62 = Conversion factor (to gallons per square foot)
ETAF = Evapotranspiration Adjustment Factor = 0.45 for Non-residential Areas
LA = Landscaped Area including SLA (sq ft)
SLA = Portion of Landscape Area identified as Special Landscape Area - see Definitions (square feet)

Applicant to fill in boxes below:

17,125	Irrigated Landscape Area including Special Landscape Area/SLA (square feet)							
0	Portion of Landscape Area identified as Special Landscape Area (square feet)							
ETo	ETAF	AREA (sf)	Conversion	MAWA				
43.5	x	0.55	x	17,125	x	0.62	254,019	
MAWA for Total LA								
MAWA for SLA*	43.5	x	0.45	x	0	x	0.62	0
Total MAWA							254,019 (gallons per year)	

Estimated Total Water Use (ETWU)
ETWU = (ETo) (0.62) [(PF x HA) / IE + SLA]

ETWU = Estimated Total Water Use
ETo = Reference Evapotranspiration (inches per year)
0.62 = Conversion factor (to gallons per square foot)
PF = Plant Factor from WUCOLS (see Table A)
HA = Hydrozone Area (square feet)
IE = Irrigation Efficiency (see Table B)
SLA = Portion of Landscape Area identified as Special Landscape Area - see Definitions (square feet)

ETAF Calculations

Regular Landscape Areas

B - Total ETAF x Area 9,128

A - Total Area 17,125

Average ETAF (B / A) 0.53

All Landscape Areas

Total ETAF x Area 9,128

Total Area 17,125

Sitewide ETAF 0.53

Average ETAF meets requirement for this site type.

ETWU arrived from Hydrozone Table below = 246,170 gallons per year ETWU meets MAWA requirement.

HYDROZONE TABLE

hydrozone	plant water use	plant factor (PF)	irrigation method	irrigation efficiency (IE)	ETAF (PF/IE)	hydrozone area (HA) (sf)	ETAF X Area	% of landscape area	Hydrozone ETWU
POTABLE WATER IRRIGATED LANDSCAPE AREAS									
6 - Park Edible	mod	0.5	dripline	0.85	0.59	405	238	2%	6,425
Regular Landscape Area Subtotal						405	238	2%	6,425
GREYWATER IRRIGATED LANDSCAPE AREAS									
3 - Park Shrubs	low	0.3	dripline	0.85	0.35	1,423	502	8%	13,542
4 - Park Trees	low	0.2	dripline	0.85	0.24	226	53	1%	1,435
5 - Park Orchard Trees	high	0.7	ECO-mat	0.89	0.79	254	200	1%	5,398
7 - Park Turf	high	0.8	ECO-mat	0.89	0.90	4,878	4,384	28%	118,247
8 - Park No-mow Turf	mod	0.5	ECO-mat	0.89	0.56	1,300	731	8%	19,704
10 - Private Shrubs	low	0.3	dripline	0.85	0.35	8,384	2,959	49%	79,805
12 - Private Trees	low	0.2	dripline	0.85	0.24	254	60	1%	1,615
Greywater Landscape Area Subtotal						16,720	8,889	97%	239,745
SPECIAL LANDSCAPE AREAS (SLA) - GREYWATER IRRIGATION									
Special Landscape Area Subtotal						0	0	0%	0
Total						17,125	9,128	99%	246,170

Table A - PF (Plant Factor)

Cool Season Turf*	0.8
Warm Season Turf**	0.6
High Water Using Plants	0.8 can be between 0.7 - 0.9
Moderate Water Using Plants	0.5 can be between 0.4 - 0.6
Low Water Using Plants	0.2 can be between 0.1 - 0.3
Very Low Water Using Plants	0.1 below 0.1

* species include tall fescue, ryegrass, bentgrass and Kentucky bluegrass
** species include bermudagrass, zoysiagrass, St. Augustinegrass

Table B - IE (Irrigation Efficiency)

Overhead Spray	0.75
Drip	0.81
Dripline	0.85
ECO-mat	0.89

*note: adjustment can be made based on exact type of equipment, see irrigation legend

For Pacific Coast Land Design used built-in worksheets for the MWEL0, and the potential non-potable water (greywater), which was used to recognize the potential reduction of potable water use in the landscape.

POC 'D' - POTABLE VS. GREYWATER USE

HZ# HYDROZONE		ESTIMATED WATER USAGE PER MONTH (gallons)												
		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	ANNUAL
DEMAND - POTABLE SYSTEM STATIONS														
6	Park Edible	325	384	473	561	679	694	812	724	606	502	369	295	6,425
DEMAND - GREYWATER SYSTEM STATIONS														
3	Park Shrubs	685	809	996	1,183	1,432	1,463	1,712	1,525	1,276	1,058	778	623	13,542
4	Park Trees	73	86	106	125	152	155	181	162	135	112	82	66	1,435
5	Park Orchard Trees	273	323	397	472	571	583	682	608	509	422	310	248	5,398
7	Park Turf	5,960	7,068	8,699	10,330	12,504	12,776	14,951	13,320	11,145	9,242	6,796	5,437	118,247
8	Park No-mow Turf	997	1,178	1,449	1,721	2,084	2,129	2,491	2,219	1,857	1,540	1,132	906	19,704
10	Private Shrubs	4,036	4,770	5,871	6,971	8,439	8,623	10,090	8,989	7,522	6,238	4,586	3,659	79,805
12	Private Trees	82	97	119	141	171	174	204	182	152	126	93	74	1,615
SUPPLY - GREYWATER LAUNDRY COLLECTION*														
96 Block D Occupants		29,760	27,120	29,760	28,800	29,760	28,600	29,760	29,760	28,800	29,760	28,800	29,760	
SURPLUS														
Greywater Surplus		17,635	12,790	12,124	7,857	4,408	2,897	-553	2,754	6,203	11,021	15,022	18,737	
Potable Water Backup		0	0	0	0	0	0	553	0	0	0	0	0	
ESTIMATED WATER USE														
TOTAL POTABLE USE		325	384	473	561	679	694	1,365	724	606	502	369	295	6,978
% OF TOTAL USE		3%	3%	3%	3%	3%	3%	4%	3%	3%	3%	3%	3%	3%
TOTAL GREYWATER USE		12,125	14,330	17,636	20,943	25,352	25,903	29,760	27,006	22,597	18,739	13,778	11,023	239,192
% OF TOTAL USE		97%	97%	97%	97%	97%	97%	96%	97%	97%	97%	97%	97%	97%

*Assumed a daily wastewater generation rate of 50 gallons per day per person, based on typical text book generation rates (Metcalf and Eddy, 2014). The daily per capita generation rate of greywater that is only collected from washing machines would be approximately 20% of total wastewater generation (AWWA, 1999; EMBUD, 2010; DeOreo, 2011), or approximately 10 gallons per person per day.

Calculations identified only 3-4% water used would be from a potable source.

MANAGING PLANT WATER NEEDS DATA

In a water budget, this need for water is considered its **Plant Factor (PF)**...aka:

- **Landscape Coefficient (K_l or K_s)**
- water requirement
- water needs factor

In general terms, water needs are represented as **Low**, **Medium** and **High**...



MANAGING PLANT WATER NEEDS DATA

Table 1. Plant Factors (PF) for established landscape plants, turfgrasses, and garden crops to provide acceptable performance in California¹.

Plant Type	Plant Factor
Tree, Shrubs, Vines, Groundcovers (woody plants)	0.5
Herbaceous Perennial Plants	0.5
Desert Adapted Plants	0.3
Annual Flowers & Bedding Plants	0.8
General Turfgrass Lawns, cool-season (tall fescue, Ky. bluegrass, rye, bent)	0.8 ^{2, 3}
General Turfgrass Lawns, warm-season (bermuda, zoysia, St, Augustine, buffalo)	0.6 ^{2, 3}
Home Fruit Crops, Deciduous	0.8 ²
Home Fruit Crops, Evergreen	1.0
Home Vegetable Crops	1.0 ²
Mixed Plantings	<i>PF of the planting is that of the plant type present with the highest PF</i>

Table 2. Plant Type or Landscape Feature and Associated Landscape Coefficient




Plant Type or Landscape Feature	K _L		
	Water Requirements		
	Low	Medium	High
Trees	0.2	0.5	0.9
Shrubs	0.2	0.5	0.7
Groundcover	0.2	0.5	0.7
Turfgrass	0.6	0.7	0.8
Pool, Spa, or Water Feature	0.8		
Permeable Hardscape	0		
Nonvegetated Softscape	0		

Source: Based on LEED for Homes Rating System 2008.

...while in water budgets, the **Plant Factor/Landscape Coefficient** is the factor assigned to plants **(or other landscape objects)** to recognize its typical need for water.

MANAGING PLANT WATER NEEDS DATA

Vectorworks® Landmark **Plant Database**


IMAGES	NAMING	GENERAL INFORMATION	
Plant Form Image	LatinRosmarinus officinalis 'Barbeque'	Growth Habit	Narrow
	CommonBarbeque Rosemary	Persistence	Evergreen
Detail Image	CategoryShrubs	Height	3 - 5 ft
	<input type="checkbox"/> Mark as favorite item	Spread	24 - 36 ft
Misc. Image	Variety	Price	
	User Notes	Size Notes	Moderate growing 4 to 6 ft. tall, 2 to 3 ft. wide.
Image Credits	Used in Project	Native Region	
Proven Winners		Native Notes	
HARDINESS/CLIMATE ZONE		LEAVES	
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6		Characteristic	
<input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11		Color	Green
Value: 4-24, 26-32		Autumn Color	
USES		FLOWER	
<input type="checkbox"/> Border <input type="checkbox"/> Low Maintenance		Season	<input type="checkbox"/> Year Round
<input type="checkbox"/> Container <input type="checkbox"/> Rock Garden			<input type="checkbox"/> Spring <input type="checkbox"/> Autumn
<input type="checkbox"/> Decorative Bark <input type="checkbox"/> Screening			<input checked="" type="checkbox"/> Summer <input type="checkbox"/> Winter
<input type="checkbox"/> Decorat. Fruit/Seeds <input type="checkbox"/> Shade Garden		Season Notes	Blue flowers in summer
<input type="checkbox"/> Erosion Control <input type="checkbox"/> Specimen		Characteristic	
<input type="checkbox"/> Ground Cover <input type="checkbox"/> Street Tree		Color	Purple
<input type="checkbox"/> Hedge <input type="checkbox"/> Wildlife Habitat			
Other Edible		FRUIT	
TOLERANCE		Color	
<input type="checkbox"/> Deer <input type="checkbox"/> Moist Location		Type	
<input checked="" type="checkbox"/> Drought <input type="checkbox"/> Pollution		SOIL	
<input type="checkbox"/> Heat <input type="checkbox"/> Rabbits		Type	
<input type="checkbox"/> Humidity <input type="checkbox"/> Salt		pH	
Other		WATER NEEDS	
LIGHT RANGE		<input type="checkbox"/> Arid <input type="checkbox"/> Moist	
<input type="checkbox"/> Shade <input type="checkbox"/> Sun/Part Shade		<input type="checkbox"/> Dry <input type="checkbox"/> Wet	
<input type="checkbox"/> Shade/Part Sun <input checked="" type="checkbox"/> Sun		Normal	
Value: .2			
COMMENTS 1		COMMENTS 2	
Foliage of this selection has especially good flavor and aroma for cooking. Quickly forms an upright hedge of aromatic needle-like foliage. Profuse, clear blue flowers add to the effect. Takes to pruning well, perfect for screens. Evergreen.		Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Feed with a general purpose fertilizer before new growth begins in spring. For a tidy, neat appearance, shear annually to shape.	
COMMENTS 3		Tree & Shrub Food	
Data Source Proven Winners		PROVEN WINNERS® The #1 Plant Brand®	

PLANT DATABASES
Built-in or Stand-alone... designers should seek to make use of the fields that report an individual plant's water needs as this is becomes its Plant Factor/Landscape

PlantMaster 6.71 Current Project: Sample Project

ePlant

Botanical Name: Clematis 'Hagley Hybrid'
Common Name: Clematis
Family: Ranunculaceae



Anatomy Culture Design

Sun
Full, Half
Water
Medium
Growth Rate
Fast
Hydrozones
3
Soil Type
Loam
Soil Condition
Rich, Well-drained
Soil pH
Neutral
Adverse Factors

<< Photo Photo >> Prev Plant Next Plant Add to Project Print Plant

Description	Maintenance	Notes	Pest/Disease
The flowers of the deciduous vine "Hagley Hybrid" are rosy mauve in color, reaching a size up to 7" across. It blooms during the summer. This vine should receive sun to part shade, with average watering. It prefers shaded, cool roots. -Monterey Bay Nursery			

GardenSoft

Source: www.gardensoft.com

MANAGING PLANT WATER NEEDS DATA

Finding data that is **regionally relevant** will be crucial...
Alabama's extension service is a great resource to aid in properly choosing plants based on their tolerances.



ANR-1336

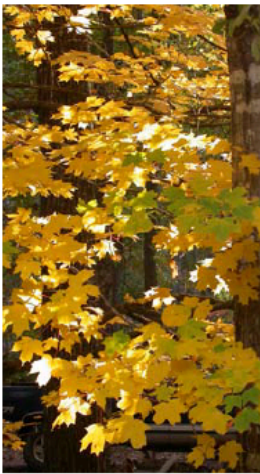
Introduction

A well-designed and managed landscape can reduce the amount of water needed for home landscape irrigation. This conservation of water becomes increasingly important as municipal governments impose broad watering bans in response to drought situations that create water shortages and strained water supplies. Overhead landscape irrigation is usually the target of these water conservation policies because it

is used as noncritical consumption. Thoughtfully planned, attractive landscapes are important because they provide environmental benefits and add value and beauty to homes. Environmental benefits include reducing soil erosion and storm water runoff, providing wildlife habitats, reducing carbon dioxide and pollutants in the atmosphere while producing oxygen, and keeping homes cooler in the summer and protecting them from cold winds in the winter. Homeowners can ensure a sustainable landscape by planning for water conservation, choosing drought-tolerant plants, improving the soil, establishing plants properly, mulching, fertilizing correctly, and watering efficiently.

ALABAMA A&M AND AUBURN UNIVERSITIES

Drought-Tolerant Landscapes for Alabama



Some plants perform well with only occasional irrigation.



Planning for Efficient Use of Water

It is important to plan a design for the landscape. The types of plants used and their location, the condition of the soil, and other factors all affect how much water must be used to maintain the landscape.

Hydrozoning is locating plants according to a landscape's differing levels of shading, soil evaporation rates, and exposure to ambient weather conditions. Early in the design process, divide the landscape into low-, moderate-, and high-water-use

areas, or hydrozones. Walk around the landscape and identify places where the soil stays moist longer and separate them from the areas fully exposed to the sun where the soil tends to dry quickly.

Low-water-use hydrozones should comprise as much of the landscape as possible when water conservation is desired. Generally, low-water-use hydrozones are located away from the most traveled areas of the landscape, but this is not a requirement. Moderate-water-use hydrozones should include established plants that only require

www.aces.edu

Table 3. Noncanopy Trees

Scientific name	Common name	Native*
Deciduous		
<i>Acer buergerianum</i>	trident maple	n
<i>Acer truncatum</i>	Shantung maple	n
<i>Amelanchier</i> spp. and cultivars	juneberry	y
<i>Asimina triloba</i>	pawpaw	y
<i>Cercis canadensis</i>	eastern redbud	y
<i>Chilopsis linearis</i>	desert willow	y
<i>Clethra pringlei</i>	Mexican sweetspire	n
<i>Cotinus coggygria</i>	common smoketree	n
<i>Cotinus obovatus</i>	American smoketree	y
<i>Crataegus crus-galli</i>	cockspur hawthorn	y
<i>Crataegus marshallii</i>	parsley hawthorn	y
<i>Crataegus mollis</i>	downy hawthorn	y
<i>Cydonia oblonga</i>	fruiting quince	n
<i>Erythrina x bidwillii</i>	hybrid fireman's cap	n
<i>Ilex verticillata</i>	winterberry	y
<i>Koeleruteria paniculata</i>	goldenrain tree	n
<i>Lagerstroemia fauriei</i>	Japanese crapemyrtle	n
<i>Lagerstroemia indica</i>	crapemyrtle	n
<i>Magnolia x soulangeana</i>	saucer magnolia	n
<i>Nyssa sylvatica</i>	black gum	n
<i>Oxydendrum arboreum</i>	sourwood	y
<i>Prunus americana</i>	American plum	y
<i>Prunus angustifolia</i>	Chickasaw plum	y
<i>Prunus 'Okame'</i>	Okame cherry	n

MANAGING PLANT WATER NEEDS DATA

Region 1

North-Central Coastal (California Climate Zones 14, 15, 16, and 17) (CIMIS ET_o Zones 1, 2, 3, 4, 6 and 8)²

Region 2

Central Valley (California Climate Zones 8, 9 and 14), (CIMIS ET_o Zones 12, 14, 15, and 16)

Region 3

South Coastal (California Climate Zones 22, 23 and 24), (CIMIS ET_o Zones 1, 2, 4 and 6)

Region 4

South Inland Valleys and Foothills (California Climate Zones 18, 19, 20 and 21), (CIMIS ET_o Zone 9)

Region 5

High and Intermediate Desert (California Climate Zone 11), (CIMIS ET_o Zones 14 and 17)

Region 6

Low Desert (California Climate Zone 13), (CIMIS ET_o Zone 18)

In California, **regionally relevant** is even more crucial...

WUCOLS has become the go-to publication for plant water needs by region

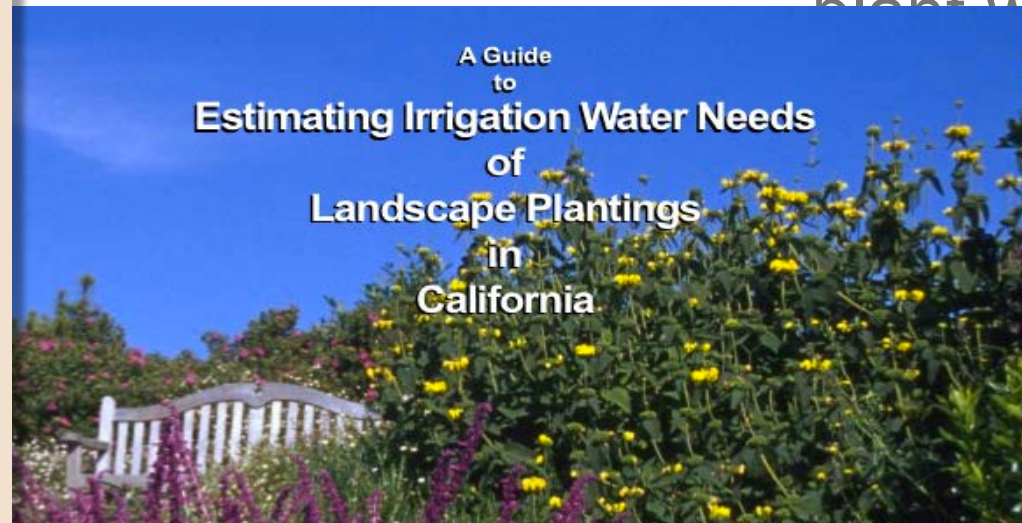
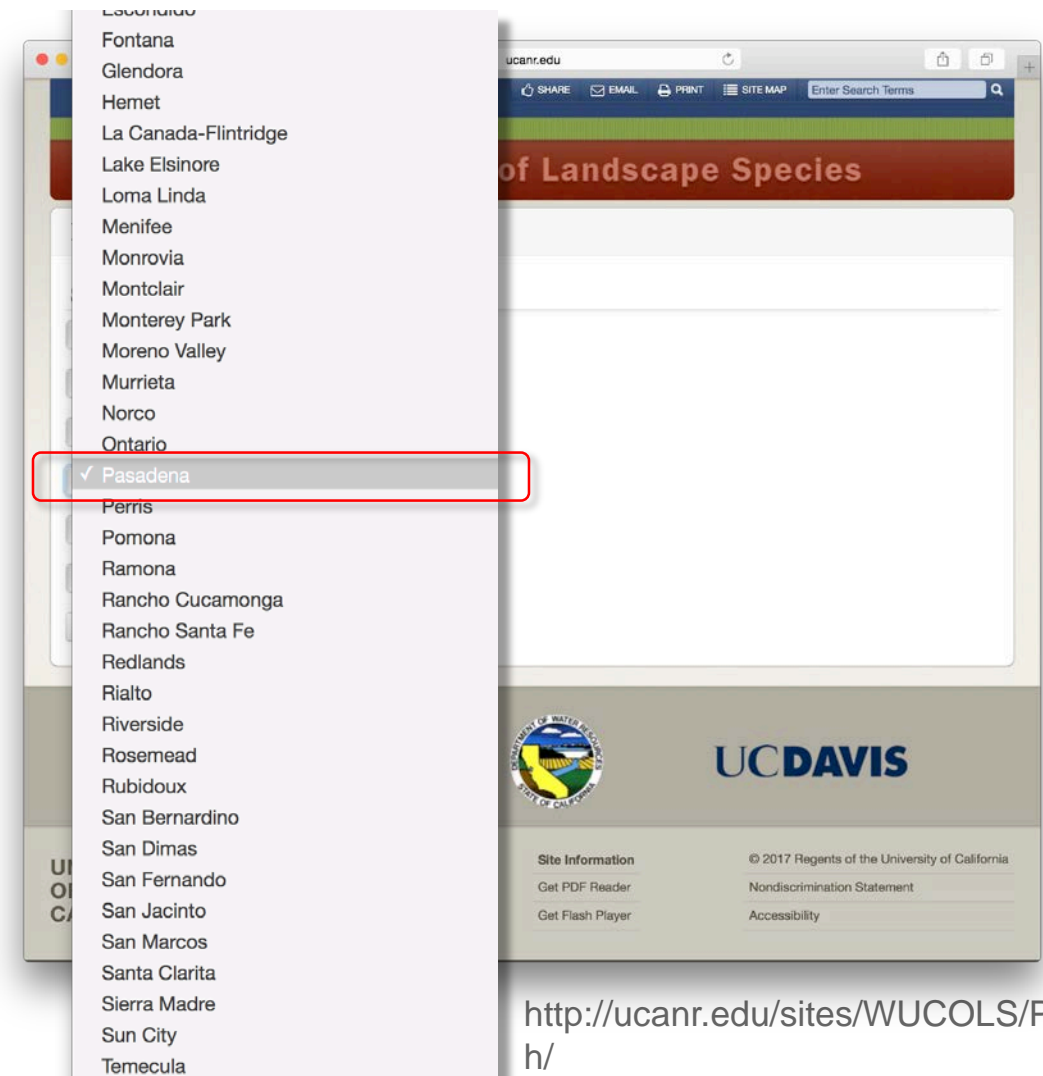


Image source: WUCOLS III

MANAGING PLANT WATER NEEDS DATA

And...if you thought WUCOLS I, II
and III was great...

Check out the online **WUCOLS IV**
searchable database to gain quicker
knowledge of the plant water needs
for the region in which your design
project is located.



http://ucanr.edu/sites/WUCOLS/Plant_Search/

MANAGING PLANT WATER NEEDS DATA

WUCOLS IV
Water Use Classification of Landscape Species

Plant Search Database

Plant Search

Pasadena, CA

Botanical Name

Search by Botanical Name

Common Name

Search by Common Name

Plant Type

☐ Gc (Ground Cover)
☐ P (Perennial)
☒ S (Shrub)
☐ T (Tree)
☐ V (Vine)
☐ Ba (Bamboo)
☐ Bu (Bulb)
☐ G (Grass)
☐ Pm (Palm and Cycad)
☐ Su (Succulent)
☐ N (California Native)
☐ A (Arboretum All-star)

Water Use

☐ Very Low
☒ Low
☐ Moderate/Medium
☐ High
☐ Unknown
☐ Not Appropriate for this Region

Search By Plant Type and/or Water Use

All Plant Data for the South Inland Valley Region

ccuh
CALIFORNIA CENTER FOR URBAN HORTICULTURE

UC DAVIS

UNIVERSITY OF CALIFORNIA

Division of Agriculture and Natural Resources

Site Information
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Accessibility

S N	Ribes californicum	hillside gooseberry	Low	<input type="checkbox"/>
S N	Ribes divaricatum	spreading gooseberry	Low	<input type="checkbox"/>
S N	Ribes indecorum	white flowering currant	Low	<input type="checkbox"/>
S N A	Ribes malvaceum	chaparral currant	Low	<input type="checkbox"/>
S N	Ribes menziesii	canyon gooseberry	Low	<input type="checkbox"/>
S N	Ribes quercetorum	yellow gooseberry	Low	<input type="checkbox"/>
S N	Ribes thackerianum	Santa Cruz Island gooseberry	Low	<input type="checkbox"/>
S N	Rosa californica	California wild rose	Low	<input type="checkbox"/>
S N	Rosa minutifolia	Baja California wild rose	Low	<input type="checkbox"/>
S N	Rosa woodsii subsp. ultramontana	mountain wood rose	Low	<input type="checkbox"/>
Gc S	Rosmarinus cvs.	trailing rosemary	Low	<input type="checkbox"/>
S	Rosmarinus officinalis	rosemary	Low	<input type="checkbox"/>
S	Ruellia peninsularis	Baja ruellia	Low	<input type="checkbox"/>
S N	Salvia 'Allen Chickering'	Allen Chickering sage	Low	<input type="checkbox"/>
S N	Salvia 'Aromas'	Aromas salvia	Low	<input type="checkbox"/>
Gc S N	Salvia 'Bee's Bliss'	Bee's Bliss sage	Low	<input type="checkbox"/>
P S N	Salvia 'Gayle Nielson' (also Trident as registered trademark name)	Gayle Nielson/Trident sage	Low	<input type="checkbox"/>
S	Salvia africana-lutea	golden sage	Low	<input type="checkbox"/>
S N A	Salvia apiana	white sage	Low	<input type="checkbox"/>
S N	Salvia brandegeei	Santa Rosa Island Sage	Low	<input type="checkbox"/>
S	Salvia californica	Baja California sage	Low	<input type="checkbox"/>
S	Salvia canariensis	Canary Island Sage	Low	<input type="checkbox"/>
S	Salvia chamaedryoides	blue sage	Low	<input type="checkbox"/>
S N A	Salvia clevelandii & hybrids	salvia Cleveland/Alan Chickering etc.	Low	<input type="checkbox"/>

Technology like this can really speed up the process of getting plant water needs for the plants you did not already have experiences with.

http://ucanr.edu/sites/WUCOLS/Plant_Search/

MANAGING PLANT WATER NEEDS DATA

Getting this data in the searchable plant database is next...

In order to sort for the plants with desired **water needs/climate zones**, the values will need to be entered in searchable fields.

Enter climate zone

Vectorworks® Landmark **Plant Database**



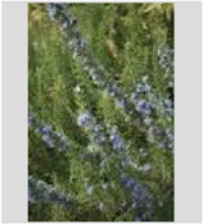
IMAGES Plant Form Image		NAMING Latin Rosmarinus officinalis 'Barbeque'		GENERAL INFORMATION Growth Habit Narrow Persistence Evergreen	
HARDINESS/CLIMATE ZONE <div><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11</div> <div>Value: 4-24, 26-32</div>				LEAVES Characteristic Color Green Autumn Color	
USES <div><input type="checkbox"/> Border <input type="checkbox"/> Low Maintenance <input type="checkbox"/> Container <input type="checkbox"/> Rock Garden <input type="checkbox"/> Decorative Bark <input type="checkbox"/> Screening <input type="checkbox"/> Decorat. Fruit/Seeds <input type="checkbox"/> Shade Garden <input type="checkbox"/> Erosion Control <input type="checkbox"/> Specimen <input type="checkbox"/> Ground Cover <input type="checkbox"/> Street Tree <input type="checkbox"/> Hedge <input type="checkbox"/> Wildlife Habitat</div> <div>Other Edible</div>				FLOWER Season <input type="checkbox"/> Year Round <input type="checkbox"/> Spring <input type="checkbox"/> Autumn <input checked="" type="checkbox"/> Summer <input type="checkbox"/> Winter Season Notes Blue flowers in summer. Characteristic Color Purple	
TOLERANCE <div><input type="checkbox"/> Deer <input type="checkbox"/> Moist Location <input checked="" type="checkbox"/> Drought <input type="checkbox"/> Pollution <input type="checkbox"/> Heat <input type="checkbox"/> Rabbits <input type="checkbox"/> Humidity <input type="checkbox"/> Salt</div> <div>Other</div>				FRUIT Color Type	
LIGHT RANGE <div><input type="checkbox"/> Shade <input type="checkbox"/> Sun/Part Shade <input type="checkbox"/> Shade/Part Sun <input checked="" type="checkbox"/> Sun</div>				SOIL Type pH	
WATER NEEDS <div><input type="checkbox"/> Arid <input type="checkbox"/> Moist <input type="checkbox"/> Dry <input type="checkbox"/> Wet <input type="checkbox"/> Normal</div> <div>Value: .2</div>					

Data Source Proven Winners

PROVEN WINNERS®
The #1 Plant Brand®

Enter plant factor

MANAGING PLANT WATER NEEDS DATA

IMAGES Plant Form Image  Detail Image  Misc. Image  Image Credits Proven Winners	NAMING Latin Rosmarinus officinalis 'Barbeque' Common Barbeque Rosemary Category Shrubs <input type="checkbox"/> Mark as favorite item Variety User Notes Used in Project	GENERAL INFORMATION Growth Habit Narrow Persistence Evergreen Height 3 - 5 ft Spread 24 - 36 ft Price Size Notes Moderate growing 4 to 6 ft. tall, 2 to 3 ft. wide. Native Region Native Notes	
	HARDINESS/CLIMATE ZONE <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 Value: 4-24, 26-32	LEAVES Characteristic Color Green Autumn Color	
	USES <input type="checkbox"/> Border <input type="checkbox"/> Low Maintenance <input type="checkbox"/> Container <input type="checkbox"/> Rock Garden <input type="checkbox"/> Decorative Bark <input type="checkbox"/> Screening <input type="checkbox"/> Decorat. Fruit/Seeds <input type="checkbox"/> Shade Garden <input type="checkbox"/> Erosion Control <input type="checkbox"/> Specimen <input type="checkbox"/> Ground Cover <input type="checkbox"/> Street Tree <input type="checkbox"/> Hedge <input type="checkbox"/> Wildlife Habitat Other Edible	FLOWER Season <input type="checkbox"/> Year Round <input type="checkbox"/> Spring <input type="checkbox"/> Autumn <input checked="" type="checkbox"/> Summer <input type="checkbox"/> Winter Season Notes Blue flowers in summer. Characteristic Color Purple	
	TOLERANCE <input type="checkbox"/> Deer <input type="checkbox"/> Moist Location <input checked="" type="checkbox"/> Drought <input type="checkbox"/> Pollution <input type="checkbox"/> Heat <input type="checkbox"/> Rabbits <input type="checkbox"/> Humidity <input type="checkbox"/> Salt Other	FRUIT Color Type SOIL Type pH	
LIGHT RANGE <input type="checkbox"/> Shade <input type="checkbox"/> Sun/Part Shade <input type="checkbox"/> Shade/Part Sun <input checked="" type="checkbox"/> Sun	WATER NEEDS <input type="checkbox"/> Arid <input type="checkbox"/> Moist <input type="checkbox"/> Dry <input type="checkbox"/> Wet <input type="checkbox"/> Normal Value: .2		
COMMENTS 1 Foliage of this selection has especially good flavor and aroma for cooking. Quickly forms an upright hedge of aromatic needle-like foliage. Profuse, clear blue flowers add to the effect. Takes to pruning well, perfect for screens. Evergreen.	COMMENTS 2 Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Feed with a general purpose fertilizer before new growth begins in spring. For a tidy, neat appearance, shear annually to shape.	COMMENTS 3 Tree & Shrub Food	
Data Source Proven Winners		PROVEN WINNERS® The #1 Plant Brand®	

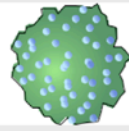
The ultimate goal is to get the **water needs data** to a place where **each plant specified** can prove it belongs in


Plant Symbol Name: Rosemary Get Plant Data...

Insertion Options
Schedule
Render
Plant Data

Plant Data

Field	Value
Latin Name	Rosmarinus officinalis 'Barbeque'
Common Name	Barbeque Rosemary
Category	Shrubs
Class Code	

Top/Plan Preview

Copy from Symbol...

3D OpenGL Preview

Copy from Symbol...
Generate...
Create from Image...

Purple
Summer
Green
Evergreen
Drought Drought
.2
Sun
4-24, 26-32
Shrubs
Foliage of this s
Follow a regu
Tree & Sh
<not

Value: Edit...

For Help, press F1 or click the ? icon

Cancel OK

MANAGING PLANT WATER NEEDS DATA

The image displays a Vectorworks software interface with three overlapping windows illustrating plant data management and hydrozone assignment.

Background Window: A site plan showing a landscape with a green area labeled "Foundation Hydrozone" and a brown area labeled "South Planted Site Hydro". A red arrow points from the "Foundation Hydrozone" area to the "Properties" window.

Edit Plant Definition Window: This window shows the "Plant Data" tab for a plant named "Rosemary". The "Water Range" field is set to ".2", which is circled in red. A red arrow points from this field to the "Properties" window.

Properties Window: This window shows the "Hydrozone" tab for the "Foundation Hydrozone". The "Water Use" field is set to "Low", and the "Water Use Value" is set to "0.3", which is circled in red. A red arrow points from this field to the "Foundation Hydrozone" area in the background window.

Text Overlay: The text "data stays with symbol" is written in the center of the image, with a red arrow pointing from the "Water Range" field in the "Edit Plant Definition" window to the "Water Use Value" field in the "Properties" window.

Where else better to prove **each plant** specified **belongs** in **each hydrozone** than in the design itself?

WATER EFFICIENT LANDSCAPE DESIGN REVIEW

Charting hydrozones for proposed irrigation

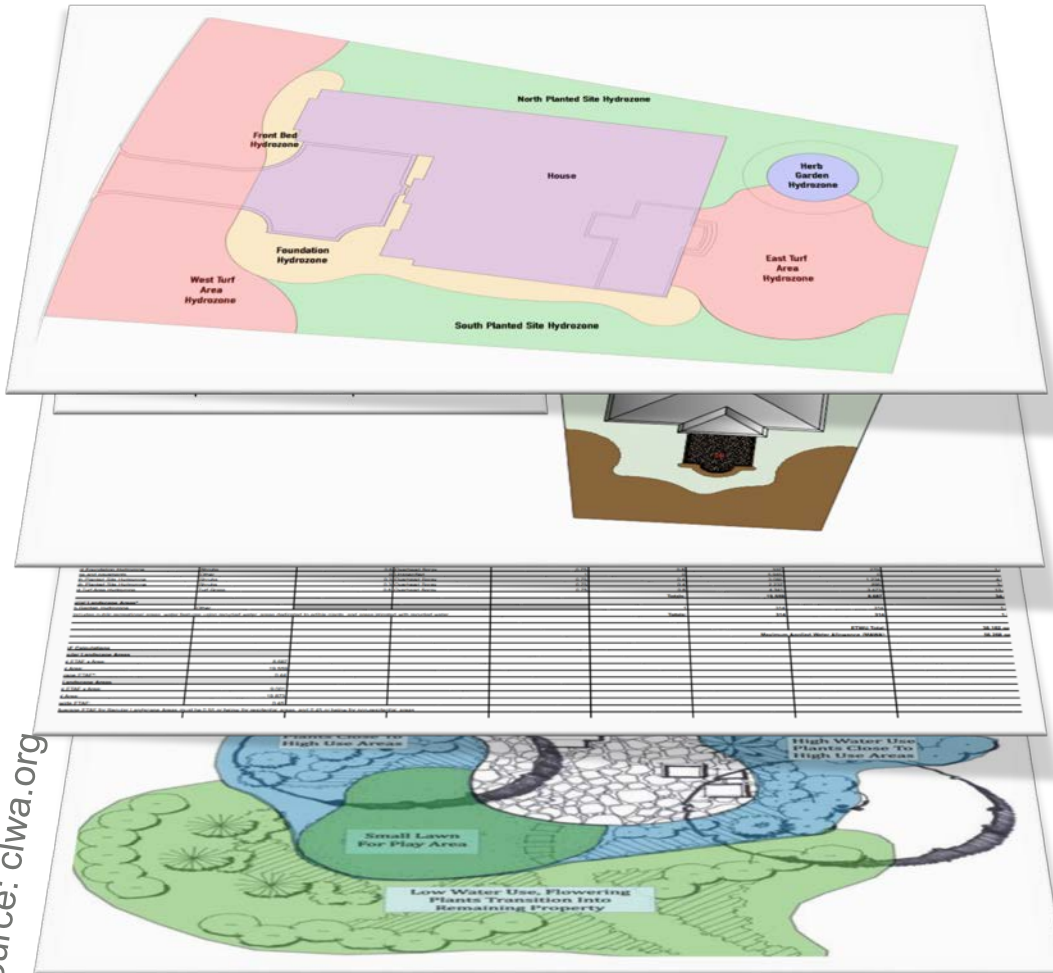
Estimating for non-potable uses

Performing water budget calculations

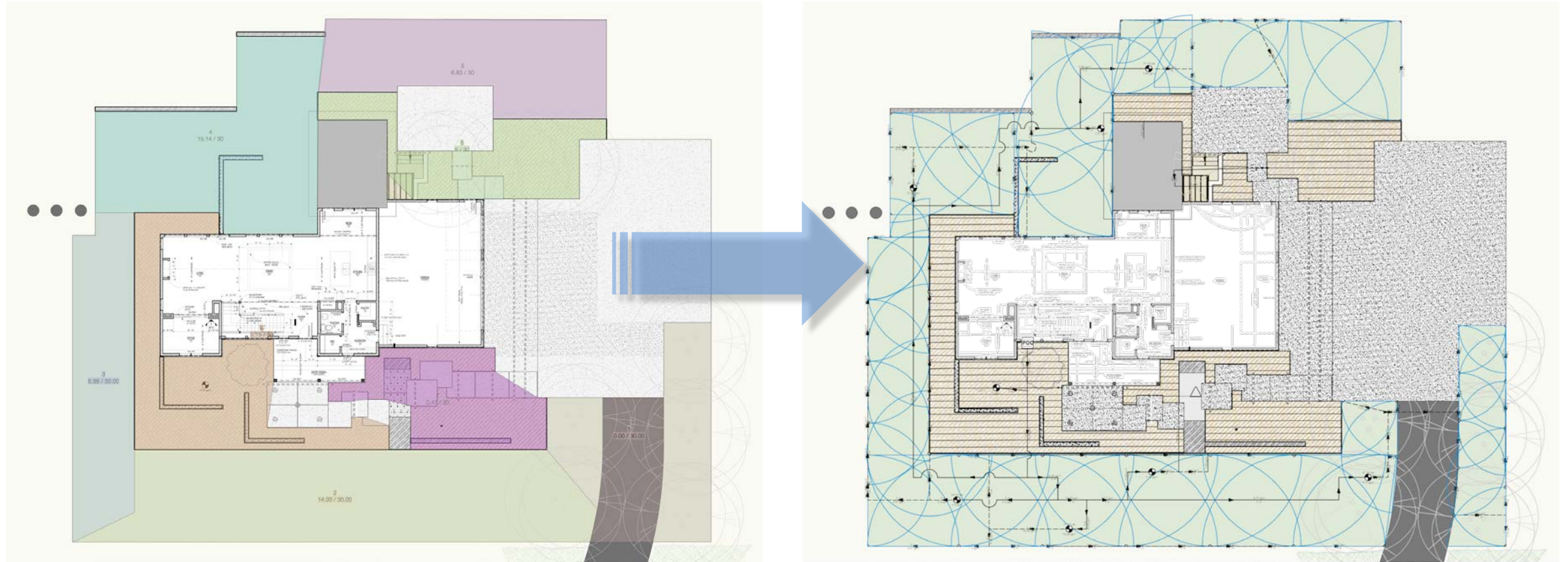
Choosing best plant based on plant factor

This specific order is not required...

- planting plan first?
- non-potable determined first?



WATER EFFICIENT LANDSCAPE DESIGN REVIEW



needed are made easier, Image Source: Grey Leaf Design, Inc.

The hydrozone plan can be the same zoned plan that **continues on in the irrigation layout phase**, whether the irrigation design is performed by you, or another professional.

QUESTIONS

OTHER SOURCES:

Evapotranspiration Data:

www.iwmi.cgiar.org/WAtlas/Default.aspx

MWELO Excel File:

www.water.ca.gov/wateruseefficiency/docs/WaterBudget101.xls

California Landscape Coefficients:

http://ucanr.edu/sites/WUCOLS/Plant_Search/

Precipitation Data:

www.epa.gov/watersense/nhspecs/wb_data_finder.html

EPA WaterSense Water Budget Excel File:

<https://www.epa.gov/watersense/water-budget-tool>





watersmart | 2018
INNOVATIONS

**THANK
YOU!**

ERIC GILBEY, PLA , ASLA, PROF MEMBER APLD