

Sustainable Landscapes in California: A Guidebook for Commercial and Industrial Site Managers

Sonali Abraham, Cora Kammeyer, and Heather Cooley



August 2020



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ISBN: 978-1-940148-06-9

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About the Pacific Institute

The Pacific Institute envisions a world in which society, the economy, and the environment have the water they need to thrive now and in the future. In pursuit of this vision, the Institute creates and advances solutions to the world's most pressing water challenges, such as unsustainable water management and use; climate change; environmental degradation; food, fiber, and energy production for a growing population; and lack of access to freshwater and sanitation. Since 1987, the Pacific Institute has cut across traditional areas of study and actively collaborated with a diverse set of stakeholders, including policymakers, scientists, corporate leaders, international organizations such as the United Nations, advocacy groups, and local communities. This interdisciplinary and nonpartisan approach helps bring diverse interests together to forge effective real-world solutions. Since 2009, the Pacific Institute has also acted as co-secretariat for the UN Global Compact CEO Water Mandate, a global commitment platform that mobilizes a critical mass of business leaders to address global water challenges through corporate water stewardship.

More information about the Pacific Institute and our staff, directors, and funders can be found at www.pacinst.org.

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Acknowledgements

This work was generously supported by the Land-Sea Connection program of Resources Legacy Fund, made possible by the Keith Campbell Foundation for the Environment, and the Disney Conservation Fund.

We would like to thank all of those who offered ideas, data, and information for the report, including Pamela Berstler of the Green Gardens Group (G3) and Sarah Diringer of the Pacific Institute.

We would also like to thank our reviewers: Ian Achimore of the Santa Ana Watershed Project Authority, Joe Berg of the Municipal Water District of Orange County, Lisa Cuellar of the California Water Efficiency Partnership, Aimee Haasteby and Regina Hirsch of Watershed Progressive, Krista Reger of the Metropolitan Water District of Southern California, Morgan Shimabuku of the Pacific Institute, and Mackenzie Styrlund of the Target Corporation.

Finally, we would like to thank Brendan McLaughlin for copy editing the report and Bryan Kring for creating the final layout.

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What Is This Guidebook?

his guidebook provides simple steps for considering, selecting, and installing sustainable landscape practices. While not the only resource needed, it can serve as a useful reference and direct you to other helpful resources. The guidebook is intended for site managers of commercial and industrial properties interested in adopting sustainable landscape practices. This includes those involved with the dayto-day operations of the site, such as a facility manager, or those involved in operations or sustainability at the corporate level. In this guidebook, we use "you" to refer to the user of the guidebook; "company" and "business" to refer to the organization that is seeking to adopt sustainable landscape practices; "site" to refer to the area where the sustainable landscape practices would be installed; and "project" refers to the sustainable landscape being considered, which encompasses the continuum from initial ideas to a concrete plan and professional design.

Sustainable Landscapes: What and Why?



California Cities Face Many Water Sustainability Challenges

Pressures on water resources are intensifying due to aging infrastructure, population growth, and climate change, among other factors. With vast expanses of water-intensive turf and impermeable pavement, California's urbanized communities are ill-adapted to these pressures. **Outdoor use represents about half of all water used in urban areas**, and even more in the hottest, driest parts of the state. Runoff from lawns carries fertilizers and pesticides into waterways. Impermeable pavement impedes groundwater recharge; contributes to higher peak flows; and carries oils, metals, and other toxins into rivers, estuaries, and the ocean.

Sustainable Landscapes Foster Water-Resilient Communities

The good news is that there are sustainable landscape options available for California's communities, and businesses can be part of the solution. In this guidebook, we use the term "sustainable landscapes" to refer to landscapes that are in balance with the local climate and ecology and actively contribute to community and watershed health by providing economic, social, and environmental benefits. This could include practices like turf replacement, as well as the installation of bioswales and rain gardens, permeable pavement, green roofs, and rain tanks and cisterns (Appendix B).





Figure 1. The Key Elements of Sustainable Landscapes



Build healthy, living soils.

Healthy soils are the foundation for all the benefits of sustainable landscapes.



Choose climateappropriate plants.

Using plants, preferably natives, that are suited to the local climate boosts biodiversity and saves water.



Treat rain as a resource.

Sustainable landscape design helps water slow down and sink into the soil in rain gardens or bioswales.



Irrigate efficiently.

With healthy soils and the right plants, supplemental irrigation needs will be low after an initial period to establish the plants. When irrigation is needed, it should be applied efficiently.



Urban green Being in space improves nature makes Trees provide Climate-appropriate plants people happy biodiversity and efficient irrigation shade and cool the and habitat and reduces air, reducing urban save water, energy, and corridors. stress levels. maintenance time. temperatures. 南山市にいまいが来るの Healthy soils Rain gardens reduce and

slow storm flows, helping to prevent flooding and improve water quality. Healthy soils help store water and nutrients for later.

Healthy soils help combat climate change by sequestering carbon.

Sustainable Landscapes Provide Benefits to Your Business and Your Community

Sustainable landscape practices provide multiple benefits. Replacing turf with climate-appropriate plants that are irrigated efficiently can save water and reduce vulnerability to drought. Incorporating bioswales, rain gardens, and other green infrastructure into sustainable landscapes reduces

pressure on local water supplies, reduces flooding, and improves water quality. In addition, utilizing rainwater to irrigate plants is more cost effective than using potable water. Sustainable landscape features like rain gardens and bioswales help slow rainwater so that it can sink into the soil. They can also provide habitat for wildlife, sequester carbon, improve air quality, improve soil health, boost property values and community livability, and increase resilience to climate change.



Transforming to a Sustainable Landscape Is Within Reach

Through a series of simple steps, this guidebook will help you to consider, select, and install sustainable landscape practices.

Step 1:

CONSIDER Motivations and Concerns

Step 2:

UNDERSTAND Decision Making

Step 3

ASSESS the Site

Step 4:

SELECT Landscape Design

Step 5

TRANSFORM the Landscape



Consider Motivations and Concerns

When considering a landscape project, the first step is to examine the motivations for the project and any concerns. Gathering this information early in the process will help to make more informed choices, prioritize landscape designs, and address potential obstacles. **Worksheet A** can help you document your motivations and concerns.



Step

Worksheet A: Understanding the Why and Why Not

The following questions can help you explore motivations and concerns. If you do not know an answer, ask for input from your supervisor, coworkers, or landscape maintenance provider.

What motivates your company to consider changing the landscape? (check all that apply)

- Conserve water
- Reduce water bills
- Improve aesthetics
- Meet corporate sustainability goals
- □ Improve property value
- Be a steward of the environment
- Demonstrate sustainability commitment to local community/employees
- Obtain sustainability certification (e.g., LEED¹)
- □ Reduce maintenance costs and/or time
- Reduce flooding or water damage
- Other: _____

What are your company's **concerns** about changing the landscape? (check all that apply)

- Installation cost
- Maintenance cost
- Time investment
- Changed aesthetics
- Disruption to operations (parking, noise, etc.)
- Other: _____

At the end of step 1, you should be able to identify:

- 1) The desired outcomes from the project
- 2) Any potential concerns

1 Leadership in Energy and Environmental Design, https://www.usgbc.org/leed.

Understand Decision Making

Numerous people are likely involved in decisions about the landscape, from those responsible for financial decisions to those responsible for maintaining the landscape. To alter the landscape, it is important to consider how decisions are made for your site, who should be involved, and what information is needed. Decision-makers typically fall into the following categories:

- 1. Property management: those who own the property or control its management;
- 2. **Financial management:** those who make decisions about facility budgeting and/or project financing, such as the site manager or company finance department;
- **3. Compliance:** those responsible for ensuring compliance with internal and/or external policies and guidelines. See Box 1 for guidance on local agencies who may play a role;²
- 4. Landscape maintenance: those who manage and perform landscape maintenance;³ and
- 5. Others: those who may be affected by or interested in the project, such as staff involved in the operational aspects of the project, community members impacted by its outcomes, or others.

² Other than public entities, there might also be an employee within your company, such as an environmental health and safety manager, sustainability manager, or operations and maintenance manager who may also need to be consulted.

³ A sustainable landscape requires specific care and expertise and often requires more care during an initial period of establishment, and less maintenance in the long-term.

In addition to identifying the decisionmakers, it can also be useful to identify those that may care about specific project outcomes. **Sustainable landscapes can provide multiple benefits, and these benefits may be of interest to people inside and outside the company.** In some cases, the benefits accrue to the business or site owner; in other cases, they accrue to employees or the broader community.



For example, replacing a lawn with a sustainable landscape that includes several trees can reduce water use and provide additional community benefits. The business would benefit from costs savings due to reduced water use, while staff get an improved green space in which to spend their lunch break. Further, the whole community may benefit from more trees.

The multiple benefits provided by sustainable landscapes can improve the cost-effectiveness of the project and provide an opportunity to publicly demonstrate the company's commitment to the triple bottom line: people, planet, and profit. Lastly, identifying those who care about project benefits will help advance the process. Engaging with those who affect the process (like regulators, leaders within your company, or investors) and those affected by the process (like employees and local community members) can help garner support for the project and avoid hindrances later on. This engagement is important throughout the process.



Box 1.

Permitting Requirements or Other Specifications for Businesses to Follow

Your local water utility, city, or county likely has permitting requirements or other specifications for businesses to follow when installing a sustainable landscape. These include:

Local Permitting

Depending on the size of your property and of proposed changes, local government may require a permit or official review of the project. While the department in charge may vary, it is typically the planning or engineering department, either for the city or county. To understand what permits the site may be subject to, it is best to consult city staff who can direct you as needed.

Model Water Efficient Landscape Ordinance

The Model Water Efficient Landscape Ordinance (MWELO) establishes a structure for planning, designing, installing, maintaining, and managing water-efficient landscapes in California. It applies to rehabilitated landscape projects equal to or greater than 2,500 square feet that require a building or landscape permit, plan check, or design review. It also applies to new landscaping projects greater than 500 square feet. Check with your local water utility to determine MWELO requirements and whether the site is subject to them.

Stormwater Permits

Some large sites are subject to stormwater permitting requirements. Check whether your site has a stormwater permit, and if so, its requirements. To get clarity on stormwater permitting regulations, check with your local water utility who can direct you to the relevant stormwater department.

Worksheet B: How Are Decisions Made and What Information Is Needed?

There are multiple people who might play a role in the project, whether to plan, implement, or maintain the new landscaping. Recall your company's motivations from Step 1 and consider any cobenefits, beyond water savings, that you might want to incorporate into the sustainable landscape. These can inform decision making and any information needed to support that process.

Answering the following questions will help you better understand decision making. If you do not know an answer, seek input from your supervisor or coworkers.

Property management

Who owns the site?	
who owns the site?	

Who has management control of the landscape? _____

Financial management

Who makes decisions about budget and finances for the site? List their name(s), position(s), and what role they play in budget decisions

How would the project be funded?

- Are there any restrictions or requirements associated with this funding source? For example, is there a return on investment threshold, a certain number of bids required, or a certain timeline to follow?
- Are rebates available from the local water provider or stormwater agency? (See Box 2)

What other information would be needed?____

Compliance

Who influences or controls decisions around internal and/or external regulatory compliance, including enforcement of permits pertaining to stormwater management and/or outdoor water use? This could include the employee in charge within your company and/or regulatory agencies in your region (see Box 1 for guidance). List their name(s), position(s) if applicable, and the role they play in making decisions about the landscape.

Landscape maintenance

It is important to understand the current approach to landscape maintenance at the site so you can assess whether it is appropriate for a new type of landscape. The following questions will help in that consideration.

- a) Who maintains the landscape and irrigation system at the site?
- b) Do they have sustainability experience? (refer to Box 4 for guidance)
- c) If not, would they be willing to obtain training on how best to maintain a sustainable landscape?

Other decision-makers

Are there any other people or organizations that may play a role in influencing the decision to convert to a sustainable landscape? For example: local watershed managers, neighbors adjacent to the site, etc. List their name(s), position(s) if applicable, and the role (if any) they play in making decisions about the landscape.

At the end of step 2, you should be able to identify:

- 1) Relevant stakeholders involved in this decision
- 2) Any specific information or justification stakeholders may need
- 3) Any relevant local permitting requirements or regulations

Step 3

Assess the Site

The site assessment is an opportunity to explore how the landscape functions and identify possible improvements. The time required depends on the size of the site, with small sites taking less than 30 minutes and large sites taking 60 minutes or more. Consider asking those responsible for maintaining the landscape and those familiar with the irrigation system to join you on the assessment. Note that in some regions, water utilities offer free site assessments.

Box 2.

Your Water Utility Can Help



An early check of the information and resources available can save time and effort in the long run. Consult with your local water utility to find out if site assessments and/or irrigation audits are available. In addition, check to see if any rebates are offered for landscape transformation. **Some water utilities**

provide rebates of \$1 to \$3 per square foot of turf replaced. If rebates are available, check eligibility requirements and review the application process before making any changes.

Note: If the site is in California, this tool can help identify your local water utility: www.waterboards.ca.gov/waterrights/water_issues/programs/drought/water_supplier.shtml

Gather Key Information Before the Site Assessment

There are several pieces of information that would be helpful to review before and during the assessment. These include:

 Site plan: The site plan provides the layout of the site, including landscaped areas, roads, walking paths, etc. This plan will help you stay oriented during the assessment and identify landscape zones. Ideally, it should include measurements or estimates of turf area, other planted area, hardscape area, and building footprint.



If a site plan is not available, a screenshot from Google Maps can be a good alternative. Search for your site on Google Maps using satellite view, zoom in until your site fills the frame, and print a screenshot.



© Google



- 2. **Irrigation system and schedule:** The irrigation system and schedule should include information on the locations of the water meter(s), irrigation controllers, irrigation zones, type of irrigation system in each zone, and the duration and frequency of irrigation.
- 3. **Maintenance schedule:** The maintenance schedule should include the frequency, duration, and cost of maintenance. This information will help you assess the resource-intensity of the existing landscape and opportunities to save time and/or money.
- 4. Stormwater management or drainage plan (if available): The stormwater management plan should include a map and/or description of the stormwater infrastructure located on the site. This will help you identify stormwater drains, downspouts, and other stormwater infrastructure.
- 5. **Tree care plan (if applicable):** While typically requiring less frequent maintenance, trees require specialized care. If your landscape has trees, there may be a separate schedule and plan for maintaining them.
- 6. Lawn or turf care plan (if applicable). Turfgrass typically requires more care and maintenance than other plants. If your landscape has turfgrass, there may be a different irrigation or care plan for those areas.



Conduct the Site Assessment

Evaluate each section using the table in Worksheet C. Before you start, consider dividing the space into smaller sections. As shown in Figure 2, areas can be divided intuitively. This initial assessment will help you to identify the major issues and improvements needed in each area. If you decide to move forward with the project, a landscape professional will develop a more detailed landscape design. However, it can be helpful to think about the kinds of changes you would like to see based on your company's motivations and concerns (Step 1) and the current condition of the landscape.

Figure 2. Example of a Site Divided into Zones



© Google

Worksheet C: Current Landscape Conditions

Landscape Area

Write a short description of each landscape area. If you have access to an irrigation plan, it is helpful to divide these areas based on irrigation zones (also sometimes called "hydro zones"). **Area 1**:

Area 2:	 	 	
Area 3:			
Area 4:			

Landscape Area Conditions (check all that apply for each area)

Drainage and Grading	Area 1	Area 2	Area 3	Area 4
Do you have a stormwater or drainage plan for this area? (Y/N)				
Is there visible damage from water pooling on any part of the pavement? (Y/N)				
Where does the water flow to?				
Visible storm drains in paved areas				
Visible gutters that empty into paved area				
Visible gutters that empty into planted area				
Hidden gutters (built into the building) that empty into storm drain				
Other				

Hardscape	Area 1	Area 2	Area 3	Area 4
Concrete or asphalt				
Gravel, decomposed granite, cobblestone, other				

Irrigation	Area 1	Area 2	Area 3	Area 4
Do you have an irrigation plan for this area? (Y/N)				
Is the area irrigated with recycled water (purple pipe)? (Y/N)				
Type of irrigation				
Spray irrigation ^₄				
Drip irrigation ⁵				

4 A device for applying irrigation water by spraying it into the air through sprinklers. See Glossary in Appendix B for more details.

5 Method of controlled irrigation in which water is slowly delivered to the root system of multiple plants. See Glossary in Appendix B for more details.

Irrigation	Area 1	Area 2	Area 3	Area 4
Condition of irrigation system				
Are there irrigation lines or fixtures that are visibly broken?				
Is this area regularly wet and soggy?				
Are some spots drier than the rest of the landscape?				
Are some spots wetter than the rest of the landscape?				
Is there visible damage from water spray on building walls or pavement?				

Planting	Area 1	Area 2	Area 3	Area 4
Soil conditions				
Does the soil seem hard packed?6				
Is there moss growing on the soil? ⁷				
Is there 3 inches of bark or mulch on the soil?8				
Plant type(s)				
Turfgrass				
Flowers				
Shrubs and bushes				
Trees				
Desert plants (cactus, succulent)				
Other				
Plant conditions				
Overgrown				
Healthy				
Unhealthy				
Dead				

Maintenance	Area 1	Area 2	Area 3	Area 4
Are pesticides and/or herbicides used? (Y/N)				

Critters and Creatures	Area 1	Area 2	Area 3	Area 4
Gopher holes				
Bird nests				
Leaves eaten by bugs				
Wildlife (birds, squirrels, butterflies, etc.)				

Miscellaneous	Area 1	Area 2	Area 3	Area 4

6 Plants do not grow well in highly compacted soil since it is difficult for the roots to penetrate.

7 Moss is an indication of overwatering.

8 MWELO regulations require 3 inches of mulch on all exposed soil surfaces of planting areas except in turf areas.

While your company will likely hire a professional to design the landscape (see Step 4), you may have ideas for possible changes after assessing the site. Table 1 provides a list of sustainable landscape practices for consideration (see Appendix B for definitions of sustainable landscape terms). These practices can save money, decrease water use, reduce flood risk, improve landscape health and aesthetics, and more.

If you are interested in understanding your site's current water use, check whether your site has a readable outdoor irrigation meter. If not, outdoor water use may be listed separately on your water bill. You can estimate the potential water savings of your transformed landscape through a simple calculation (see Box 3).

Table 1.

Examples of Landscape Changes to Improve Sustainability

Planting	Convert to climate-appropriate plants
	Apply mulch or compost to soil
	Add trees for shade
	Remove turfgrass
	Install a rain garden
	Install rain barrel(s) at gutter downspouts
Drainage and Grading	Direct gutter downspouts into planted area instead of paved area
	Change pavement grading so water flows towards planted areas
	Add contours to the landscape to help retain rainwater
Hardaaana	Replace concrete or asphalt with permeable pavement
пагизсаре	Install curb cuts to allow water in paved area to flow into planted area
	Eliminate or decrease irrigation where possible
Irrigotion	Install a weather-based irrigation controller
Irrigation	Convert from spray irrigation to drip irrigation
	Fix damaged or broken irrigation lines and fixtures
	Reduce or stop use of pesticides and herbicides
Maintenance	Utilize organic fertilizers

Estimating Water Savings

How much water can be saved by adopting sustainable landscape practices? Water savings can be estimated using a simple formula:

Water Use (gal/yr) = (Area x ET0 x Plant Factor x 0.62) / Irrigation Efficiency

Where: Area = the landscaped area to be converted, measured in square feet.

ET0 = Evapotranspiration refers to the process of water evaporating from the soil and plant surfaces, and being transpired by the plant. ET0 refers to evapotranspiration from a reference surface. Use the table in Appendix C to determine your evapotranspiration (ET) zone and the total annual ET0 associated with your site, or consult your local water utility for a more accurate value.

Plant Factor = Factor for adjusting the ET value based on plant type. General values can be found in Appendix C.

Irrigation Efficiency = A measure of the irrigation system efficiency. Guidance from MWELO sets this at 0.75 for spray and 0.81 for drip irrigation.

0.62 = A static conversion factor.

Let's say that we are replacing a 3000 sq. ft. lawn in Riverside County in Southern California (ET zone 9) that is spray irrigated with low water-use plants that are drip irrigated. In this example, ET0 is 55.1, and we use a plant factor of 0.8 for turf and 0.3 for low water-use plants. Additionally, we assume an irrigation efficiency of 75 percent (0.75) for the existing landscape and 81 percent (0.81) for drip irrigation on the converted landscape.

Here is how the example calculation looks:

Current Water Use = (3,000 x 55.1 x 0.8 x 0.62) / 0.75 = 109,318 gallons per year

minus

New Water Use = (3,000 x 55.1 x 0.3 x 0.62) / 0.81 = 37,958 gallons per year

Water Savings = 71,360 gallons per year

Additionally, you can use your local water rate (\$/gal) to calculate cost savings associated with this.

Note: The Model Water Efficient Landscape Ordinance (MWELO) governs new development and retrofitted landscape water efficiency standards <u>https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Model-Water-Efficient-Landscape-Ordinance</u>.

At the end of step 3, compile:

1) Current status and possible issues with your existing landscape

2) Potential improvements that could be made at your existing landscape (optional)

Bonus: Estimate of potential water savings (Box 3)

Select Landscape Design

At this stage, you should understand the motivations for installing sustainable landscape practices, the decision-making process, and some of the practices that could be adopted. The next step is to identify and select a landscape professional(s) that can help design, install, and/ or maintain the landscape.⁹ The selection process depends on both landscaping needs and the company's decision-making process. If you already have a landscape professional(s) in mind, the steps below can help you to determine whether they have adequate experience with sustainable landscapes.

Step

9 This could be for design, architecture, maintenance, or construction. Some companies specialize in one of these activities while some are equipped to do two or more.



Identify Landscape Professional(s) to Design, Install, and Maintain the Landscape

Proper design, installation, and maintenance of a sustainable landscape requires skills and techniques that differ from those associated with a conventional landscape. To select an appropriate professional, you can either search online or seek recommendations from other businesses that have undertaken a similar project. When selecting a landscape professional, some things to consider include:

What kind of landscape professional(s) do you need?

Some professionals may specialize in installation, maintenance, or design. Others may do all three. There are also landscape professionals who specialize in the care of plants or trees. Before selection, check the services provided and review their portfolio to ensure that their landscape 'style' aligns with your vision for the company's landscape.

Do they have sustainability expertise and experience?

Whether you use a professional you are already familiar with or a new one, it is important to ensure that they have experience working with sustainable landscapes (see Box 4). One way to assess

their expertise is based on professional degrees, accreditations, or memberships in trade associations.¹⁰ These qualifications provide an indication of the quality of service, and some provide accreditation specific to sustainable landscapes. If your company is committed to a landscape professional that does not have relevant experience or expertise, a number of training programs are available.¹¹

Are they properly licensed and insured?

Ensure that the landscape professional has a certification of insurance for liability and workers' compensation. Without this, your company could be liable for accidents during the landscape project. It is also important to check to make sure they have a business license and are certified to perform the services offered.

Do they have a good reputation?

Conduct a simple online search to ensure that reviews for the landscape professional are positive. An online search through the Better Business Bureau (www.bbb.org) can also provide information on whether there have been any complaints against the landscape professional in the past. Be sure to ask for references so that you can personally assess their work.



- 10 The Chino Basin Water Conservation District has a list of some relevant accreditations: <u>https://www.cbwcd.org/412/</u> <u>Hiring-Certified-Landscape-Professionals</u>. Examples include the Qualified Water Efficient Landscaper (<u>www.qwel.net</u>) and the California Landscape Contractors Association Water Management Certification Program (<u>https://www.clca.</u> <u>org/certification-center/water-management-certification/</u>).
- 11 Examples include Green Garden Group's Watershed Wise Training (<u>https://greengardensgroup.com/watershed-wise-landscape-training/wwlt-landscape-professionals</u>), ReScape Landscape's programs (<u>https://rescapeca.org/education/for-professionals/</u>), the Qualified Water Efficient Landscaper (www.qwel.net), and California Landscape Contractors Association Water Management Certification Program (https://www.clca.org/certification-center/water-management-certification/).

Communicate Priorities and Concerns

It is important to communicate your company's priorities and concerns (Step 1) and findings from the initial site assessment (Step 3) to your potential landscape professional(s). Inquire whether the professional can help with local permitting or regulations the site might be subject to (Box 1). This will help the professional design and install a sustainable landscape best suited to your business's needs. Further, if you would like the landscape to be certified by a third party as sustainable (Box 5), it is important to bring that up with your



landscape professional. As part of this process, consider whether your company's work style and ethic align with that of the landscape professional. It is very important to be able to have an open and constructive channel of communication with whomever you choose.



Choose a Landscape Design and Professional

Assemble the findings from sub-steps 4.1 and 4.2, the site assessment (Step 2), the landscape bids (if applicable), and information from Step 1 to make a final decision about whether to move forward with a landscape conversion, and what design and professional you want to go with. After selecting a landscape professional, create a clear contract to make sure that this working relationship will go as smoothly as possible.¹²

12 The Morton Arboretum provides guidance on how to write a strong contract. See page 16 of <u>https://www.mortonarb.</u> <u>org/files/14CT_SLRCA_02-25-14_CP_fin.pdf</u>. Once the design is selected, it may be possible to get more detailed estimates of the benefits of converting the landscape, such as water savings and stormwater capture.¹³ In many cases, the landscape professional can help with this. You can also refer to Box 3 for guidance on estimating water savings. If you know how much the company pays for water, you can also calculate cost savings.

Box 4.

Identifying Landscape Professionals with Sustainability Expertise

Sustainable landscapes require expertise and care to both install and maintain. When hiring a landscape professional, use these guiding questions to identify whether the professional has the necessary background and experience in caring for sustainable landscapes.

- What is your firm's experience installing and/or maintaining sustainable landscapes?
- · Can you give me some examples of methods you use?
- Are you familiar with Green Garden Group's watershed approach to landscaping? (greengardensgroup.com/watershed-approach-to-landscaping/)
- Does your firm have expertise or experience in plant and soil types, i.e. what works best for the environment, the type of care it needs, etc.?
- What experience do you have installing water-efficient irrigation systems?
- What is your experience in selecting and installing climate-appropriate plants?
- What do you know about permeable hardscapes?
- Do you have experience with water-efficient irrigation systems, and improved irrigation demands such as pruning, mulching, and earthworks?
- Do you have any experience working with stormwater management and water reuse?
- · Can you share some photos of projects you have done involving sustainable landscaping?
- 13 There are many tools that can help quantify environmental benefits. The Multi-Benefit Resource library can help to narrow down and identify available resources: <u>https://pacinst.org/multi-benefit-resource-library/</u>.

Sustainability Certification Programs

Certification from a respected third-party organization is a great way to publicly demonstrate your company's commitment to sustainability. The two most common sustainability certification programs related to landscapes are LEED and SITES, both international programs. Other certification programs include Ocean Friendly Gardens, California ReScape Rating System, and Audubon Lifestyles Certification.

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LEED Existing Building Operations and Maintenance (EBOM) Certification

www.usgbc.org/resources/leed-v4-building-operations-and-maintenance-current-version_

LEED EBOM is a green building certification program that encompasses an entire site, so it is broader that just the landscape. But if your company is already considering pursuing LEED certification for the site, sustainable landscaping is a key component under the Sustainable Sites credit category. Sustainable Sites allows projects to earn points based on how the landscape is sustainably designed and maintained.

SITES Certification

www.sustainablesites.org/

SITES is Green Business Certification Inc.'s comprehensive rating system for developing sustainable landscapes. SITES certification is based on a point system: the number of points that a project earns determines the certification level it receives. The SITES certification process allows projects to benchmark against performance criteria.

Ocean Friendly Garden Certification

www.surfrider.org/programs/ocean-friendly-gardens

The Ocean Friendly Gardens program, run by the Surfrider Foundation, is focused on the principles of conservation, permeability, and retention. To receive recognition as an Ocean Friendly Garden, a site must adhere to simple criteria aligned with those three principles. Ocean Friendly Gardens are designed to mimic nature and restore the natural water cycle by conserving water and reducing runoff that causes pollution at beaches and in local waterways.

Sustainability Certification Programs (continued)

California ReScape Rating System

www.rescapeca.org/rated-landscapes/process/

The ReScape Rating process gives companies and property owners confidence that specific environmental goals have been met, and publicly demonstrates the company's commitment to environmental stewardship and a healthy community. Project teams use the ReScape Landscape Scorecard to set their environmental improvement goals at the start of the landscape design process and to track their progress toward achieving those goals. Presently, ReScape is only active in northern California.

Audubon Lifestyle Certification

www.thesustainabilitycouncil.org/programs/workbooks/SLP-Commercial.pdf

Through participation in the Audubon Lifestyle Certification process, ISC-Audubon assists business owners and landscape professionals who desire to manage their landscapes sustainably. The program is geared toward assisting those seeking to become local, regional, national, and international models of sustainability by incorporating sustainable principles, concepts, and management strategies.

These programs all require planning, action, and documentation beginning at the design phase, so if your company is interested in pursuing certification it is important to start early. Talk to potential landscape professionals about their familiarity and expertise with these programs. All five programs have associated professional accreditation programs, so you can find landscape professionals who are specially trained to help sites achieve the sustainability goals defined by each rating system. In the LEED rating system, a project can receive extra points for having a LEED Accredited Professional working on the project.

At the end of step 4, compile:

- 1) Names of selected landscape professional(s)
- 2) Landscape design provided by selected landscape professional

Transform the Landscape

As the new landscape is being installed, it is important to **verify that the landscape is being installed according to sustainable landscape principles and as defined in the plan**. A simple check is to assess whether the four sustainable landscape principles identified in Figure 1 and any permitting requirements are being met (see Box 1). For quality control and assurance, consider to what extent the following items match the site plan developed:

- number and type of plants;
- · irrigation system components;
- · depth of mulch applied; and
- direction of water flow on and off the project site.

In addition, consider conducting an irrigation audit to help ensure that water savings goals are achieved. Ask about the kind of **warranty** provided by the landscape professional and ensure they stick to it. For example, will they replace a plant if it dies within a year of being planted? Will they guarantee that the landscape can handle large storm events?



Step 5





As the new landscape nears completion, ask your landscape professional to **develop a maintenance plan**.¹⁴ This will help ensure that the new landscape can flourish after installation. Remember to incorporate this maintenance plan into the landscape maintenance contract. Further, consider developing a performance-based maintenance and irrigation contract such that, for example, your company would only pay for the water needed to maintain the landscape, not for excess irrigation.¹⁵

Once the landscape conversion is complete, you may want to **measure and track the benefits of the new landscape**, such as reductions in water and energy use, cost savings, improvements in employee wellbeing, etc. This can help support the case for future sustainability projects and verify the benefits of a sustainable landscape. It can also provide the basis for a performance-based maintenance plan. To monitor water use, consider installing a separate outdoor irrigation meter if the site does not already have one. Alternatively, a simple sensor working in tandem with your main meter can provide real-time information on outdoor water use.¹⁶ It is important to note that water savings might not appear immediately with a new landscape since plants need additional water to get established.

¹⁴ Douglas Kent + Associates (http://www.bewaterwise.com/assets/ca-friendly-maintenance-book.pdf), and the Association of Professional Landscape Designers (http://apldca.org/wp-content/uploads/2018/08/G3-APLD-CA-Watershed-Approach.pdf) have developed landscape maintenance guides that serve as good references.

¹⁵ A summary of this type of contract is explained by Heaviland Landscape Management: https://www.heaviland.net/ landscape-agreements/.

¹⁶ For example, Flume Tech provides these types of easy-to-use sensors: https://flumetech.com/.

Measuring and tracking these changes can also create information that can encourage adoption of other sustainable practices within your company—either on your site or on other properties that the company may own. This information, if published or circulated, can encourage other companies to install sustainable landscapes, scaling your company's contribution to the environment and community (refer to Box 6 for ways to publicize your company's sustainable landscape). These measurements can be conducted in-house if staff have relevant expertise, or the company can work with a third-party partner.

Box 6.

Publicizing Your Sustainable Landscape



Your new landscape is now a beautiful example of sustainability in action, and you probably want to celebrate and share the success story! There are many ways you can do this, including:

- Partner with a research institution (such as a university or nonprofit organization) to monitor benefits. This can result in publishable findings that will verify the benefits of your landscape and motivate others to replicate them.
- Develop communication materials for your website. By taking photos, creating infographics, and producing flyers to be posted on your website or other platforms, you can show your community and clients your commitment to sustainability.
- Create educational opportunities. Installing informational signs on the landscape can raise awareness and teach your employees and the community about the importance of sustainable landscapes and your contribution.
- Check whether your water utility or city has recognition programs. Often, utilities and cities have programs that publicly acknowledge companies that install sustainable landscapes for their contribution to betterment of the community and environment.

At the end of step 5, compile:

- 1) An installed sustainable landscape!
- 2) A maintenance plan
- 3) A monitoring and evaluation plan and partner (if applicable)

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Appendices

Appendix A: Example of the Multiple Benefits of Sustainable Landscapes – Rain Gardens



Source: Cooley, Heather, Anne Thebo, Cora Kammeyer, Sonali Abraham, Charles Gardiner, and Martha Davis. 2019 Sustainable Landscapes on Commercial and Industrial Properties in the Santa Ana Watershed. Pacific Institute, CEO Water Mandate, and CA Fwd. https://pacinst.org/publication/sustainable-landscapes-santa-ana-river-PDF.

Appendix B: Sustainable Landscapes Glossary

Created by the Pacific Institute and Green Gardens Group (G3)

Climate-appropriate plants	Permeable/porous paving
Contour planting area	Pesticides and herbicides
Curb cut	Rotary nozzles
Downspout redirect	Rain garden
Drip irrigation, in-line or on-line	Rain barrel/cistern
Green roof	Run-time, adjust
High water use plants	Spray irrigation
Impermeable surfaces	Turf
Organic mulch	Weather-based irrigation controller



Climate-appropriate plants

Plants that are adapted to the conditions of the local environment, including local natives and summerdry plants. There are more than 8,000 plants that are considered climate-appropriate for Southern California.

Definition source: G3



Contour planting area

Area where the shape of the land is adjusted with low spots and high spots to better capture stormwater by slowing the flow of water across the land. Contouring a site allows for the capture of rainfall to improve the soil moisture.

Definition source: G3



Curb cut

An opening in a raised curb that allows runoff from paved areas to enter into a vegetated area, such as a bioswale.

Definition source: US Environmental Protection Agency



Downspout redirect

Practice of directing water from downspouts away from impervious surfaces into mulched planting areas for absorption by plants or into rain barrels and cisterns for later use.

Definition source: City of Los Angeles



Drip irrigation, in-line or on-line

Method of controlled irrigation in which water is slowly delivered to the root system of multiple plants. Using this method, water either drips onto the soil above the roots or directly into the root zone. In-line drip has emitters built into tubing, while on-line drip places individual emitters into blank tubing.

Definition source: Maximum Yield



Green roof

A planting system that allows for the placement of live plants on a significant portion of a building's roof.

Definition source: City of Los Angeles



High water use plants

Plants that require a large amount of rainfall or supplemental irrigation because local rainfall is not sufficient. This includes many ornamental annuals, tropical plants, and cool season turfgrasses like fescue or rye. These kinds of plants are not well suited to the Southern California climate.

Definition source: National Geographic



Impermeable surfaces

Land surfaces such as roads, parking lots, driveways, sidewalks, and roofs that repel rainwater and do not permit it to infiltrate (soak into) the ground. These surfaces dramatically alter the flow of water and result in polluted runoff in nearby waterways, local flooding, and reduced groundwater recharge.

Definition source: Capital Regional District



Organic mulch

Material spread over the surface of the soil to retain soil moisture, suppress weeds, keep the soil cool, and make the garden look more attractive. Organic mulches also help improve soil health as they decompose.

Definition source: The Spruce



Permeable/porous paving

Permeable/porous pavement and sidewalks absorb water, allowing infiltration into the soil layer below. They are especially appropriate for highly urbanized areas where open space is scarce. Porous pavement usually needs to be vacuum swept periodically to keep pores unclogged.

Definition source: City of Los Angeles



Pesticides and herbicides

Chemical compounds that are used to kill pests, including insects, rodents, fungi, and weeds. By their nature, pesticides and herbicides are potentially toxic to other organisms, including humans, and need to be used safely and disposed of properly. Pesticides and herbicides disrupt the natural biological balance in soil, which often adversely affects landscape performance.

Definition source: World Health Organization



Rotary nozzles

A rotary nozzle is a small rotor that fits onto a popup spray head body to increase the size of the water droplet, producing less "mist" that evaporates before it reaches the plant. Rotary nozzles operate at a lower pressure and emit water at a lower flow rate.

Definition source: Irrigation Tutorials



Rain garden

A garden, created in a low spot on a site, that captures runoff from roofs and other impervious surfaces. It is designed to increase soil moisture and reduce irrigation requirements, though some supplemental irrigation may be required during a prolonged dry spell, such as a dry winter.

Definition source: City of Los Angeles



Rain barrel/cistern

Containers for storing rainwater from rooftop gutters and downspouts for later use. Rain barrels have less holding capacity than cisterns and generally are not intended for long-term water storage or high flow. Because of the smaller capacity, rain barrels are best utilized as short-term storage and as slowing devices which may overflow into rain gardens. Cisterns have larger storage capacity, usually greater than 100 gallons, and may be located above or below ground. Water may be removed from the cisterns via gravity when above ground, or with pumps when underground.

Definition source: National Geographic

Run-time

The amount of time that an irrigation valve is open, releasing irrigation water into the landscape, is called the run-time. To keep plants healthy and optimize water use, the time, duration, or frequency that an irrigation system runs may need to be adjusted.

Definition source: G3

A de into

Spray irrigation

A device for applying irrigation water by spraying it into the air through sprinklers.

Definition source: UN Food and Agriculture Organization





Turf

Turfgrasses, or turf, are narrow-leaved ornamental grass species that form a uniform, long-lived groundcover that can tolerate traffic and low mowing heights (usually two inches or below). Turfgrasses are usually identified as being cool season or warm season. Cool season turf grows best during the cooler periods of the year and requires supplemental water in the hot summer to survive. Warm season turf grows best during the warm periods of the year and goes dormant in the cool season. Cool season turf typically requires significant supplemental irrigation in Southern California.

Definition source: Penn State Extension



Weather-based irrigation controller

A device, sometimes called a smart controller or evapotranspiration controller, that automatically adjusts the watering schedule for plants based on local weather conditions or soil moisture. The controller, which reduces the amount of watering when the weather cools down and adds time when it heats up, is designed to apply irrigation only when plants are actively evapotranspiring.

Definition source: City of Santa Cruz

Appendix C: Resources to Estimate Water Savings

Table C1.

Plant Factors for Different Plant Types to Provide Acceptable Performance in California

Plant Type	Plant Factor
Trees, shrubs, vines, groundcovers (woody plants)	0.5
Herbaceous perennial plants	0.5
Desert adapted plants	0.3
Annual flowers and bedding plants	0.8
General turfgrass lawns, cool season (tall fescue, Kentucky bluegrass, rye, bent)	0.8
General turfgrass lawns, warm season (bermuda, zoysia, St. Augustine, buffalo)	0.6
Home fruit crops, deciduous	0.8
Home fruit crops, evergreen	1
Home vegetable crops	1
Mixed plantings	PF of the planting is that of the plant type present with the highest PF

Note: Values do not apply to any plant production operations, such as nurseries, greenhouses, sod farms, or commercial farms. Plant Factor shown is the annual average turfgrass crop coefficient (Kc) values. Plant Factor does not apply to sports fields or golf greens.

Source: University of California Division of Agriculture and Natural Resources, Center for Landscape & Urban Horticulture. https://ucanr.edu/sites/UrbanHort/Water_Use_of_Turfgrass_and_Landscape_Plant_Materials/Plant_Factor_or_Crop_ Coefficient__What%E2%80%99s_the_difference/

Figure C1.

Reference Evapotranspiration Zones in California ${\bf Q}$



Q Click on this image for a higher resolution version.

Source: California Irrigation Management Information System (CIMIS), California Department of Water Resources. https://cimis.water.ca.gov/Content/pdf/CimisRefEvapZones.pdf

Table C2.

Monthly Average Reference Evapotranspiration by Zone (Inches/Month)

Zone Number	Zone Name	Annual Total Evapotranspiration
1	Coastal Plains Heavy Fog Belt	32.9
2	Coastal Mixed Fog Area	39
3	Coastal Valleys/Plains and North Coast Mountains	46.3
4	South Coast Inland Plains and Mountains North of San Francisco	46.6
5	Northern Inland Valleys	43.9
6	Upland Central Coast and Los Angeles	49.7
7	Northeastern Plains	43.3
8	Inland San Francisco Bay Area	49.4
9	South Coast Marine to Desert Transition	55.1
10	North Central Plateau and Central Coast Range	49.1
11	Central Sierra Nevada	53.1
12	East Side Sacramento-San Joaquin Valley	53.4
13	Northern Sierra Nevada	54.3
14	Mid-Central Valley, Southern Sierra Nevada, Tehachapi and High Desert Mountains	57
15	Northern and Southern San Joaquin Valley	57.9
16	Westside San Joaquin Valley and Mountains East/West of Imperial Valley	62.5
17	High Desert Valleys	66.5
18	Imperial Valley, Death Valley and Palo Verde	71.6

Source: California Irrigation Management Information System (CIMIS), California Department of Water Resources. https://cimis.water.ca.gov/Content/pdf/CimisRefEvapZones.pdf

Appendix D: Sustainable Landscaping Resources for Plant-Types

California Department of Water Resources Landscape and Plant Guidance Resources https://water.ca.gov/Water-Basics/Conservation-Tips/Plant-and-Landscape-Guide

California Native Plant Society (Help choosing the right plants and design ideas) https://www.cnps.org/gardening/choosing-your-plants Orange County sub-site: https://occnps.org/native-plants.html

Green Garden Group's California Watershed Approach to Landscape Design https://greengardensgroup.com/wp-content/uploads/2018/04/G3-APLD-Book_v8NoBleed_2.pdf

Habitat Corridor Project http://habitatcorridorproject.org/

Inland Empire Landscape Guidebook https://www.emwd.org/sites/main/files/file-attachments/inlandempirelandscapeguide.pdf

Inland Empire Water Saving Garden Friendly Resources http://www.ie.watersavingplants.com/

Inland Valley Garden Planner https://inlandvalleygardenplanner.org/

Las Virgenes Municipal Water District's California-Friendly Guide to Native and Drought Tolerant Gardens https://www.lvmwd.com/home/showdocument?id=711

Ojai Valley Land Conservancy's Native Flowering Plants Guide https://ovlc.org/native-flowers/

PlantMaster (Online plant database) http://www.plantmaster.com/

San Diego Sustainable Landscape Guidelines

https://www.sandiegocounty.gov/content/dam/sdc/dpw/WATERSHED_PROTECTION_PROGRAM/ watershedpdf/Residential-Outreach/English/San_Diego_Sustainable_Landscape_Guideline_Book. pdf

SoCal Water\$mart Program Be Water Wise Guides

- Native Plant Profiles: http://www.bewaterwise.com/california-native-plant-profiles.html
- California Friendly Maintenance Guide: http://www.bewaterwise.com/maintenance-guide.html
- Top Ten California Friendly Plants: http://www.bewaterwise.com/assets/ca_native_top_10_ plants_brchr-comp_6.pdf
- Garden examples: http://www.bewaterwise.com/gardensoft/garden_types.aspx?listType=tours

Theodore Payne Foundation

https:/www.theodorepayne.org

Tree of Life Nursery—San Juan Capistrano, Orange County (*Assistance finding landscape professionals*) https://californianativeplants.com/

University of California Landscape Plant Irrigation Trials

https://ucanr.edu/sites/UCLPIT/



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ISBN: 978-1-940148-06-9