Water Smart Toolkit
Your guide to creating a water smart landscape
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Seattle Tilth is a nationally recognized educational nonprofit organization that inspires and educates people to build an equitable and sustainable local food system while safeguarding our natural resources. We offer classes and hands-on training in sustainable agriculture and environmental stewardship for all ages.
Introduction

Urbanization has dramatically altered the Puget Sound landscape. Over years of development, forests have been replaced with roads, buildings and houses. Trees and plants that once intercepted rain have been removed, and native, water-absorbent soils have been stripped away.

Now when rain falls, it runs over impervious surfaces like streets and driveways and carries polluted runoff into nearby waterways—everything from dirt and lawn chemicals to oil from cars and pet waste. Instead of being captured by soils that recharge groundwater, stormwater from winter storms now causes flooding and erosion.

But each of us can do something to help bring our urban watersheds back into balance with nature by adopting a water smart approach to managing our own landscapes.

WHAT IS WATER SMART?
Being “water smart” means drawing on natural systems that slow, clean and conserve water onsite. It’s an ecosystem approach to landscaping that includes building healthy soils, practicing natural yard care, conserving water and collecting and infiltrating rainwater before it leaves the site.

Creating a water smart landscape means treating your yard as its own little watershed, incorporating features that help manage rainwater during the fall and winter, and conserve water during the summer. This could be as simple as adding compost to your lawn, or installing a more complex system like a rain garden.

HOW TO USE THIS TOOLKIT
This toolkit provides the information and resources you need to create a water smart landscape using a three-step approach:

• Step 1 – Conduct a site assessment. Get to know your yard by creating a site map and assessing landscape features like soils, plants and hydrology.

• Step 2 – Build a water smart landscape. Find out about the water smart projects that are right for your yard.

• Step 3 – Maintain your landscape. Learn about water smart landscape maintenance.

Each section concludes with a list of technical resources to help you with your planning. Templates for conducting a site assessment and creating a site map, along with information on how to choose a professional contractor are in the Appendices.

This toolkit is intended to be a resource for homeowners and contractors in the Puget Sound area; it is not meant to serve as a stand-alone technical document. Always research best practices for any project, as well as state and local requirements that may apply. Contact the Garden Hotline free of charge to answer gardening or landscaping questions by calling (206) 633-0224 or visiting gardenhotline.org.

This project was made possible by generous funding from the Rose Foundation for Communities and the Environment, and the King Conservation District.
Get to know your landscape by assessing your site and creating a site map. After gathering information on the features, soil and hydrology of your landscape, you’ll be able to identify opportunities and determine your goals for creating a water smart landscape.
To create a water smart landscape, you first need to understand your landscape as a whole system. Everything from sun, soil, slopes and wind, to the location of the buildings and driveways, influences how water moves through your site. Before you can determine which water smart projects are right for your yard, it’s essential to understand how all these elements work together.

You’ll start this process by conducting a site assessment and creating a site map that shows major features like buildings and driveways, microclimates, and characteristics of vegetation, soil and hydrology (see samples on pages 5-7). When complete, you’ll have enough information to identify opportunities for your site, and create goals for how to make your yard water smart.

Templates for your site map and assessment are in Appendix A. If you have a large landscape with many different areas, you may want to conduct assessments for each unique area. To do so, simply use the Site Assessment Template for different areas of your landscape.

**GATHER BASIC INFORMATION**

Using graph paper, create a base layer for your site map that illustrates major features, microclimate and topography. As you go along, keep track of notes, calculations and measurements in the appropriate sections of the Site Assessment Template. Be sure to include the information below, using the checklist included in the template.

### Major Features
- Draw the location of the house, pathways, driveways, fences and other structures, including those adjacent to your site.
- Draw impervious surfaces (pavement, concrete, roofing, etc.) and pervious surfaces (mulch, bark, gravel, etc.).
- Measure impervious surface areas and note measurements on your map and in your assessment; calculate the percentage of property that is covered by impervious surfaces.
- Draw and measure vegetation areas, such as flower beds, lawn, trees and shrubs, vegetable gardens, etc. Also note significant vegetation adjacent to the site.

### Microclimate and Topography
- Note areas that are either hot and dry or wet and cool.
- Note the direction of the wind and any exposed areas.
- Note areas of sun and shade. How do they vary throughout the day and with the seasons?
- Note slopes, both on and adjacent to the property. Include the slope aspect (i.e., which compass direction it faces) and calculate approximate slopes. Are there visible signs of erosion?
- Note other unique topographic features, such as low spots or depressions.

You’ve now completed a base layer for your site map and are on your way to completing your site assessment. Next, you’ll add information about soils and hydrology. This information will serve as a foundation for planning your water smart landscape.
**Major Site Features**

<table>
<thead>
<tr>
<th>Structures and features</th>
<th>House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impervious surface areas</td>
<td>Driveway, path, deck, porch</td>
</tr>
<tr>
<td>Vegetation areas</td>
<td>SW corner: mixed shrubs &amp; trees</td>
</tr>
</tbody>
</table>

**Microclimate and Topography**

<table>
<thead>
<tr>
<th>Sun/shade</th>
<th>SE corner: full sun</th>
<th>SW corner: shade</th>
<th>NE: shade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot/cool areas</td>
<td>Full sun on lawn in SE corner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topography</td>
<td>Yard slopes to the east</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind direction</td>
<td>From SW, some exposure in SE corner (no trees)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Soil**

<table>
<thead>
<tr>
<th>Soil texture</th>
<th>Sandy, loose soil in SW corner, clay in SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic matter</td>
<td>Low in organic matter around shrubs in SW</td>
</tr>
<tr>
<td>Drainage rate</td>
<td>Good draining in SW corner – 2”/hr, but &lt; ½”/hr in SE corner</td>
</tr>
</tbody>
</table>

**Hydrology**

<table>
<thead>
<tr>
<th>Areas of ponding</th>
<th>Bottom of slope in back yard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downspouts</td>
<td>5 downspouts</td>
</tr>
<tr>
<td>Flow path</td>
<td>Front → street, back → bottom of slope</td>
</tr>
<tr>
<td>Stormwater runoff</td>
<td>EPA tool result: 43% runoff, 51% infiltration</td>
</tr>
</tbody>
</table>

**Other Observations**

- Creek to the east of property
- Road on 2 sides

**Opportunities and Goals**

- Sunny near back porch – veggie garden?
- Disconnect downspouts & redirect runoff in backyard rainbarrels?
- Manage stormwater runoff from roof into raingarden in SW corner?
- Add trees, shrubs, perennial vegetation
- Reduce lawn
<table>
<thead>
<tr>
<th>Location</th>
<th>Plant Species</th>
<th>Type (Annual, perennial, groundcover, shrub, tree)</th>
<th>Sun Needs (Sun, part shade, shade)</th>
<th>Moisture Needs (Wet, moist, dry)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front yard (near porch)</td>
<td>Heather</td>
<td>Groundcover</td>
<td>Sun</td>
<td>Moist</td>
<td></td>
</tr>
<tr>
<td>Front yard (SW)</td>
<td>Azalea</td>
<td>Shrub</td>
<td>Part shade/shun</td>
<td>Moist</td>
<td>Lace bug</td>
</tr>
<tr>
<td>Front yard (SW)</td>
<td>Boxwood</td>
<td>Shrub</td>
<td>Full sun</td>
<td>Dry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shore pine</td>
<td>Tree</td>
<td>Sun</td>
<td>Dry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dogwood</td>
<td>Tree</td>
<td>Partial sun</td>
<td>Loamy, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grass (turf)</td>
<td>Perennial</td>
<td>Full sun</td>
<td>Dry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sedum autumn joy</td>
<td>Perennial</td>
<td>Full sun</td>
<td>Dry</td>
<td></td>
</tr>
<tr>
<td>Backyard (near deck)</td>
<td>Rose</td>
<td>Shrub</td>
<td>Sun</td>
<td>Moist</td>
<td>Powdery mildew, black leaf spot</td>
</tr>
<tr>
<td>Backyard</td>
<td>Photinia</td>
<td>Shrub</td>
<td>Partial sun</td>
<td>Balanced/moist</td>
<td>Leaf spot</td>
</tr>
</tbody>
</table>
CONDUCT SOIL TESTS

Soil is a mixture of minerals, organic matter, living organisms, water and air. The proportions at which these elements combine dramatically influences the capacity of a soil to store or drain runoff, so knowing your site’s soils is essential for developing your goals for a water smart landscape.

A few simple tests can get you started. Because soil conditions will vary throughout your site, be sure to test soils in different areas (e.g. lawn, shrub beds, low spots). For more accurate results, take samples from several spots within each area and mix them together prior to testing.

Soil Texture

Soil texture refers to the proportion of sand, silt and clay particles that make up your soil. You can test your soil texture using one of two easy methods – by feel, using the “ribbon test,” or by measurement in the “soil-in-a-jar” test (see instructions in Recommended Resources).

Organic Matter

The amount of organic matter in soil is a strong indicator of its water holding capacity. As a rule of thumb, the darker your soil, the richer it is in organic matter. During your soil texture tests, note the color of the soils.

Drainage Rate

The amount of time it takes water to soak into the ground is known as the soil drainage rate. To calculate drainage rate, first dig a hole at least 12 inches deep and 12 inches wide. Fill it completely with water, let it drain, then immediately fill again with six inches of water (be sure to measure it). Time how long it takes for the hole to drain completely, then calculate the drainage rate in inches per hour by dividing six inches by the number of hours it took for the hole to drain. In well-drained soil the water level will go down at a rate of about 1 to 2 inches an hour.

Be sure to add the following information to both your site map and site assessment:

- Soil textures for different areas around your site.
- Locations with poor soil, low in organic matter.
- Soil drainage rate calculations.

Professional Soil Testing

Soil testing laboratories can provide additional information, such as soil nutrients, deficiencies, organic matter and pH. When taking soil samples to a laboratory for testing, follow their directions on how to collect and submit a sample.
ASSESS SITE HYDROLOGY
Site hydrology refers to the movement, distribution and quality of water on a site. Understanding how water flows in and around your site will enable you to choose plants, water catchment systems and other landscape features that will manage water efficiently year-round, from controlling runoff when it rains to conserving water to use for irrigation.

To assess the hydrology for your site, take note of where water collects in your yard and what direction it flows. It’s also important to know how much water your site receives, so you’ll want to calculate the stormwater runoff when planning your management strategy. The best time to assess site hydrology is during the rainy season, when temporary features (like seasonal ponding) are present, and the direction of flowing water can be observed. Remember that water flows downhill, so that even if you don’t see any flowing water, that’s the direction water will move across your site.

Note the following information and add it to your site map and site assessment. Use arrows to show the direction of flow.

- Location of roof downspouts and paved or impervious areas.
- Direction of water flow onto, within and from the site.
- Areas of ponding, such as at the base of slopes, low spots, drainage swales and ditches.
- Vegetation or other features that may intercept or influence water movement.
- Calculate stormwater runoff. To find out how much stormwater runoff your site generates, download the EPA’s National Stormwater Calculator from: epa.gov.

What’s Below the Surface?
What’s below the soil surface can be as important as what’s above when it comes to site hydrology. An impenetrable soil layer or water table located close to the soil surface will prevent stormwater from draining in that location. To determine if you have these conditions in your yard, dig a 12 inch deep test pit to see if standing water is close to the surface. If it is, measure its depth from the surface and add this information to your site assessment and site map.
COMPLETE A VEGETATION INVENTORY

Now that you’ve assessed the environmental conditions for your site, you need to determine if you have the right plants. Conducting a vegetation inventory and comparing your plants’ ideal site requirements to the conditions you currently have will help you determine how to incorporate plants to make your yard water smart.

Use the plant identification tools found in the list of resources at the end of this section to identify your existing vegetation and record their ideal sun and drainage conditions. Compare this with the actual conditions and record this information in the vegetation inventory section of your site assessment.

☑ Complete the vegetation inventory section of your site assessment.

ESTABLISH GOALS

Do you have a soggy lawn that you want to replace? Poorly draining soil that leads to flooding? Plants that aren’t well suited to their microclimates? Use the information from your site map and site assessment to identify what your goals are for developing your water smart landscape.

☑ Complete the opportunities and goals section of your site assessment.

TAKE THE NEXT STEPS

Now that you know what you have to work with and where you want to go, it’s time to choose water smart projects that will help you accomplish your goals.
RECOMMENDED RESOURCES

Site Mapping
- **Landscape Design: Putting Your Yard on Paper – Site Measurements and Base Maps**, University of Florida
  ufl.edu

Soil Testing
- **Estimating Soil Texture**, Colorado State University
  colostate.edu
- **King Conservation District Soil Testing Program**
  kingcd.org
- **Soiltest Farm Consultants, Inc.**
  soiltestlab.com

Plant Identification
- **Plants of Washington Identification Key**, Burke Museum of Natural History and Culture
  washington.edu
- **Woody Plant Identification System**, Oregon State University
  oregonstate.edu

Calculating Stormwater Runoff
- **National Stormwater Calculator**, U.S. Environmental Protection Agency
  epa.gov
Learn about different options for creating a water smart landscape, including what to consider when choosing the right projects for your yard.
It’s time to choose the projects that can best help manage water on your site. In this section, we’ll look at the different types of projects to choose from, and give you tools to help decide which ones are right for you. Projects range from simple, inexpensive options like amending soils with compost, to more complex options, like installing a cistern or a porous concrete driveway.

**CHOOSE A WATER SMART PROJECT**
This toolkit features nine water smart projects that are applicable for most residential settings in the Pacific Northwest.

Many of these projects are commonly referred to as green stormwater infrastructure (GSI), because they recreate hydrologic processes that occur in a natural ecosystem. For example, you might connect your roof downspout to a rain garden, where rainwater can collect and infiltrate into the soil like it would in a natural landscape instead of running off streets and into our waterways.

Some water smart projects – like rain barrels – are aimed at conserving water, collecting and storing it during the rainy season for use during the dry summer months. On-site water conservation can be further enhanced by using drip irrigation and soaker hoses, which can reduce the amount of water needed for irrigation by half compared to sprinklers.

To decide which water smart projects are right for your yard, you need to consider all the information gathered during your site assessment. Keep in mind that not all options are suitable for all site conditions. For example, some projects are not recommended for use on steep slopes, near existing structures, where limited space is available, or where soils are poorly draining. When deciding on a particular project, it’s also important to consider cost, installation and maintenance requirements.

To help you evaluate which projects are right for your landscape, use the Water Smart Projects comparison chart on the next page. Site suitability ratings indicate which projects are best suited for specific site conditions.
<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
<th>Installation</th>
<th>Maintenance</th>
<th>Site Suitability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Steep slopes</td>
</tr>
<tr>
<td>Compost and mulch</td>
<td>$</td>
<td>very easy</td>
<td>easy to moderate</td>
<td>$</td>
</tr>
<tr>
<td>Trees and vegetation</td>
<td>$</td>
<td>very easy</td>
<td>easy</td>
<td>$</td>
</tr>
<tr>
<td>Downspout disconnect</td>
<td>$</td>
<td>easy</td>
<td>easy</td>
<td>$</td>
</tr>
<tr>
<td>Rain barrel</td>
<td>$</td>
<td>easy</td>
<td>easy</td>
<td>$</td>
</tr>
<tr>
<td>Drip irrigation and soaker hoses</td>
<td>$$</td>
<td>easy to moderate</td>
<td>moderate</td>
<td>$</td>
</tr>
<tr>
<td>Conveyance &amp; infiltration trenches</td>
<td>$$</td>
<td>easy to moderate</td>
<td>moderate</td>
<td>$</td>
</tr>
<tr>
<td>Rain garden</td>
<td>$$</td>
<td>moderate</td>
<td>easy</td>
<td>$</td>
</tr>
<tr>
<td>Cistern</td>
<td>$$</td>
<td>complex</td>
<td>moderate</td>
<td>$</td>
</tr>
<tr>
<td>Permeable paving</td>
<td>$$-$$</td>
<td>complex</td>
<td>high</td>
<td>$</td>
</tr>
</tbody>
</table>

**Site Suitability**

- Steep slopes: Suitable in most cases; may require special design considerations
- Space limitations: Almost always suitable
- Poorly draining soils: Low cost $, Moderate cost $$, Highest cost $$$

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USE COMPOST, MULCH OR VEGETATION
Building healthy soils and planting trees and vegetation are the easiest, most affordable ways to start making your yard water smart. Because of this, we’ve devoted a whole section on how to put these tools to work for you.

Building Healthy Soil with Compost and Mulch
Compost, mulch and other organic soil amendments increase your soil’s capacity to hold and filter water while building a complex soil ecosystem that will help your plants thrive.

Rich in organic matter, compost is the natural byproduct of decomposition. It is generally used as a soil amendment, mulch or as a component of topsoil and potting mixes. Adding compost to your soil can greatly benefit soil health by improving soil structure in areas that are compacted and erosion-prone, and where soils are low in organic matter.

The following guidelines can be used for applying compost.

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>New Lawns (prior to seeding)</th>
<th>Vegetable or Flower Gardens</th>
<th>Shrub Borders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glacial till</td>
<td>Break up soil with a pickaxe, till in 3” of compost.</td>
<td>Break up soil with a pickaxe, till in 3-4” of compost.</td>
<td>Break up soil with a pickaxe, till in 2-3” of compost. Spread 3” of woody mulch on top.</td>
</tr>
<tr>
<td>Sandy soil</td>
<td>Till in 1 3/4” of compost 6” or deeper.</td>
<td>Till in 2-3” of compost 6” or deeper (add 1” each year).</td>
<td>Till 2 1/2” of compost 6” or deeper or plant into 2” of compost and 2” of chip mulch.</td>
</tr>
<tr>
<td>Clay</td>
<td>Till in 1 1/4” of compost 6” or deeper.</td>
<td>Till in 2” of compost 6” or deeper (add 1” each year).</td>
<td>Till 1 1/2” compost 6” or deeper or plant into 2” of compost and 2” of woody mulch.</td>
</tr>
</tbody>
</table>
Mulch is any material placed around plants to reduce weeds, increase or decrease soil temperature, retain soil moisture and reduce soil compaction. Organic mulches such as compost, wood chips, leaves, seed hulls and nut shells have the added benefit of adding nutrients to the soil as they decompose.

Like compost, these types of mulch need to be reapplied periodically. When adding mulch, always leave space around plant stems.

The guidelines below can be used when applying mulch.

<table>
<thead>
<tr>
<th>Planting Type</th>
<th>Mulch Type</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawns</td>
<td>Compost, or leave grass clippings after you mow</td>
<td>On top, 1/2-1” after aerating</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Compost, deciduous leaves or straw</td>
<td>1/2-1”</td>
</tr>
<tr>
<td>Perennials</td>
<td>Composted sawdust manure, wood chips or deciduous leaves</td>
<td>1-2”</td>
</tr>
<tr>
<td>Shrubs and trees</td>
<td>Wood chips or leaves</td>
<td>2-4”</td>
</tr>
</tbody>
</table>

Healthy Soil for New Lawns
The secret to a healthy, low maintenance lawn is great soil. If you’re planning to establish a new lawn by seeding, create healthy soil before adding seeds by covering the planting area with a four-inch layer of compost and rototilling the top 10-12 inches. Tilling is valuable for improving drainage in the root zone and it will also break up hard and compacted soil beneath.

Since grass prefers more alkaline soil than we typically have in the Pacific Northwest, you may want to add agricultural lime or dolomite. It would be wise to get a professional soil test before adding these amendments, since compost may have already buffered your soil towards a more neutral pH.
Trees and Vegetation
Trees and shrubs help manage stormwater by intercepting rainfall on their leaves, where it evaporates before it can hit the ground. They also help improve water infiltration by increasing soil porosity through a complex network of roots. Evergreen plants, in particular, reduce runoff because they keep their foliage through the rainy winter months. Trees and large shrubs can also lower your yard’s watering needs and mitigate the drying effects of winter winds and summer heat by providing shade.

Choosing Plants
Plants that are well-adapted to site conditions require less irrigation and maintenance, and will be better able to resist pests and disease. Plants can be selected that will thrive even in troublesome spots such as deep shade, exposed slopes and areas with seasonal ponding.

Refer to the vegetation inventory you conducted for your site assessment and consider the following when choosing new plants:

- **Biodiversity.** Including a variety of plants and plant types (groundcovers, shrubs, trees, flowering plants, etc.) will protect soil health and encourage biodiversity. Diverse plants suited to your site conditions will not only make maintenance easier, they can help reduce or eliminate the need to use pesticides.

- **Native and climate-adapted plants.** Native plants are well adapted to our wet winters and dry summers. Once established, they require little to no irrigation and minimal maintenance. They have fewer pest and disease issues and provide habitat to a variety of native fauna and beneficial insects. Many non-native plants are also available that are well adapted to our climate.

- **Perennial plants.** Perennial plants require less irrigation and soil amendments than annual flower beds, vegetable gardens and lawns. If your site goals include growing vegetables or adding lawn areas, keep in mind that they do best in sunny, well-draining locations and require more maintenance — including irrigation — than other types of vegetation.

Planting Techniques
Once you’ve chosen the right plants for your landscape, give them a good start by planting into healthy soil, watering deeply, and mulching to retain moisture. Here are some tips for proper planting:

- Plant trees and shrubs in the fall to support root establishment before the growing season.
- Dig a hole slightly larger, but not any deeper, than the root ball of your plant.
- Massage the rootball to spread roots loosely.
- Place the plant in the hole and ensure that the root collar (top of the root ball) is level with the ground.
- Backfill the hole, pushing soil down as you go, to avoid air pockets.
- Water immediately to settle the soil.
- Once planted, add mulch around the base of the plant, leaving some space around the stem.
EXPLORE WATER CATCHMENT AND IRRIGATION SYSTEMS

Installing water catchment and irrigation systems requires a little more expense and expertise than building healthy soil or planting trees and shrubs. Still, most of these projects can be installed by the motivated homeowner by referring to technical guidance.

Water smart catchment and irrigation projects are summarized below, with links to detailed technical guidance for planning and installing them included at the end of this chapter. Some of the most complex projects may require a contractor — refer to Appendix B for help choosing one with the right experience.

**Rain Barrels**

Rain barrels are small to medium-sized containers that collect under 100 gallons of water, typically from a downspout. They include a mesh screen (to prevent mosquitos from breeding), a spigot and drain valve for overflow.

They’re easy to install, take up very little space and cost less money than large cisterns. However, they fill up quickly and can only hold a small amount of water, so stormwater management and water conservation benefits are minimal.

Water collected in rain barrels from most roofs can often be used for irrigating edible crops; however, some roofing materials may introduce unacceptable levels of contamination. Refer to the EPA study (Roofing Materials Assessment) included in the reference section to see if water from your roof is safe to use for edibles.

**Downspout Disconnect**

Disconnecting downspouts involves redirecting roof runoff from municipal stormwater systems to onsite catchment systems, such as rain gardens, cisterns and infiltration trenches.

By disconnecting downspouts, you can help protect regional water quality by allowing storm water from roofs to infiltrate into the ground rather than flow into our water ways through storm drains.

Although disconnecting a downspout is relatively straightforward, it is important to have a plan in place to manage the redirected rainwater. Redirected downspouts require minimum distances from homes and property lines and may require trenches or pipes to avoid flooding sidewalks, basements and crawl spaces, or a neighbor’s property.
Conveyance and Infiltration Trenches
Many stormwater management systems incorporate natural and artificial conveyance systems to direct and help infiltrate flowing water.

Bioswales use vegetation to slow and filter runoff, and convey water to other stormwater infrastructure (e.g. a rain garden). Rock-filled conveyance and infiltration trenches function similarly to bioswales and rain gardens, respectively, and may be more appropriate in small spaces or where vegetation is not desired.

Trenches require planning to avoid steep slopes, underground utilities and tree roots. Deeper trenches are likely to require engineering and permitting. Maintenance, primarily to prevent clogging, is critical to ensuring the longevity of the trench.

Rain Gardens
Rain gardens are shallow depressions with unique soil and vegetation that infiltrate runoff diverted from roofs and driveways by a pipe or trench. They are an attractive water management solution that can be customized to suit many landscapes. Like any garden, they can provide year round interest, as well as food and habitat for wildlife.

However, rain gardens require careful planning. They need specialized soil and plants, must be appropriately sized for the amount of runoff they will receive and have adequate space for potential overflow. They are not appropriate in all locations and should not be used in areas with poorly draining soil, space limitations or steep slopes. They require some maintenance, such as weeding, plant and soil care, mulching and watering until plants are established – usually the first three years.

Drip Irrigation and Soaker Hoses
Drip irrigation and soaker hoses are a water smart alternative to traditional sprinkler systems. This irrigation technique slowly delivers water to the roots of plants, avoiding overspray, evaporation, runoff and erosion. Because they keep foliage dry, they also reduce fungal disease.

With the exception of lawns, drip irrigation and soaker hoses are the most water smart ways to water your landscape. They require backflow protection, timers and a pressure regulator to work properly, and can be used on slopes with specialized equipment. Maintenance is necessary to avoid clogs and ensure irrigation functions properly.
Cisterns
Cisterns are large containers that hold hundreds to thousands of gallons of water. They typically collect roof runoff from downspouts, and are usually made of metal, heavy plastic or fiberglass.

Since cisterns can manage a significant amount of water, they can effectively be used for irrigation and other non-potable uses. As with rain barrels, water collected from certain roofing materials may not be appropriate for irrigating edible plants — be sure to refer to EPA guidance in the references section.

Full cisterns can weigh thousands of pounds and will require careful placement, sturdy foundations and even earthquake protection if they are taller than they are wide. Underground cisterns are an alternative, though more expensive, option.

Permeable Paving
Permeable paving replaces asphalt and concrete pathways, patio and driveways with interlocking pavers that allow water to infiltrate into the ground below, which reduces runoff. Porous asphalt and concrete materials are also available and are specially designed to contain air spaces to assist with infiltration.

Permeable paving options retain the functionality of concrete or asphalt, and can enhance the look of a landscape.

Replacing walkways and patios is less complex than driveways and parking areas, which must support the weight of vehicles and may require permitting due to size. Porous concrete and asphalt are newer materials and have greater maintenance needs, such as vacuuming, to maintain porosity.

CONSIDER BEFORE YOU BUILD
By now, you should have a good idea of which water smart projects will help you meet your goals for a water smart yard. We recommend reviewing the technical resources and maintenance requirements for each project you are considering before making your final choices.

Once you choose which projects you plan to install, take a few extra steps before you start your installation:

- Check with your local municipality. Many smaller projects do not require permits, but it is always best to confirm requirements for your project and obtain permits, if necessary.
- Discuss your project with neighbors. Managing water onsite has a variety of benefits to your local watershed, but it can also impact your neighbors. Projects that affect the flow of runoff should be discussed with neighbors to avoid potential flooding.
- Call before you dig. Many landscape projects will require digging or excavation. Call 811 to confirm the location of existing utilities (water, sewer, gas, electric, phone and cable) and avoid conflicts.
RECOMMENDED RESOURCES

Project-Specific Technical Information

- **Seattle Rain Barrel User Guide**, City of Seattle
  seattle.gov
  wa.gov
- **Downspout Disconnection**, City of Seattle
  seattle.gov
- **Using Rock-filled Trenches**, City of Seattle
  seattle.gov
  wa.gov
- **Drip Irrigation and Soaker Hoses**, Saving Water Partnership
  savingwater.org
- **Installing a Cistern**, City of Seattle
  seattle.gov
- **Reducing Pavement & Permeable Paving Options**, City of Seattle
  seattle.gov
  wa.gov
  wa.gov

Building Healthy Soil

- **Erosion Control**, University of Washington
  washington.edu
- **Growing Healthy Soil**, City of Seattle
  seattle.gov
- **Alternative Soil Amendments**, ATTRA/The National Sustainable Agriculture Information Service
  uark.edu
  wa.gov
- **Compost Calculator**, Soils for Salmon
  soilsforsalmon.org
- **Composting Yard and Food Waste at Home**, City of Seattle
  seattle.gov
- **The Plant List**, Saving Water
  savingwater.org
Plant Guides and Planting Techniques

- **The Plant List**, Saving Water Partnership
  seattle.gov

- **Great Plant Picks**, Elisabeth Carey Miller Botanical Garden
  greatplantpicks.org

- **Drought Tolerant Plants for the Pacific Northwest**, King County
  naturalyardcare.info

- **Plant Selection Guide**, Washington State Department of Ecology
  wa.gov

- **Going Native**, King County
  kingcounty.gov

- **Planting Trees and Shrubs in the Landscape**, King County
  wsu.edu

- **Slope Stabilization and Erosion Control Planting Techniques**, Washington State Department of Ecology
  wa.gov
Step 3. Maintain Your Landscape

Learn how to maintain your water smart landscape using natural yard care and other best practices.
Practicing natural yard care isn’t just good for the environment, it also saves you time and money, and keeps your kids, family and pets safe, too. Natural yard care principles underlie the water smart approach to landscape maintenance. Whatever maintenance your landscape requires, you can put nature to work for you by following the five steps to natural yard care:

- **Build healthy soil.** Healthy plants grow in healthy soil, so feed your soil with compost and add mulch regularly to conserve water, prevent weeds and add nutrients. Avoid chemical pesticides and fertilizers, which damage beneficial soil life and end up in our streams and lakes.

- **Plant right for your site.** Save yourself time on future maintenance by planting the right plant in the right place. Choose plants suited to our Northwest climate and limit lawn areas to where you need them.

- **Practice smart watering.** Watering too much (or too little) is the cause of many common plant problems in our area. Be sure to water deeply but infrequently and moisten the entire root zone. Use soaker hoses or drip irrigation where you can, which uses less than half the amount of water when compared with sprinklers.

- **Think twice before using pesticides.** Clean up diseased plants, pull weeds before they go to seed and allow time for good bugs to bring pests under control. Use chemicals only as a last resort and replace problem plants with pest-resistant ones.

- **Practice natural lawn care.** Mow lawns higher (1–2 inches), leaving the clippings in place. Use “natural organic” or “slow release” fertilizers and avoid “weed and feed” products. Overseed thin areas with Northwest-adapted grass seed blends and consider alternatives to lawn that take less time and require less money to maintain.

### Savvy Tips for Smart Watering

- Water deeply but infrequently, and water the entire root zone.
- Water trees and shrubs weekly during the first few summers. Once established, they usually don’t need regular watering.
- Water vegetable and flower gardens at the first sign of wilting, although tougher perennials only need water if they stay droopy in the evenings. Watering in the morning or evening is better than watering in the heat of the day.
- Water lawns one inch per week in the summer (adjusted for rain), or allow to go brown. To determine how much to water, mark one inch in straight-sided containers and scatter them on your lawn. Turn on the sprinkler, and see how long it takes until most containers have one inch of water in them. Adjust your sprinkler to run for this long each week in summer.

1Adapted from Natural Yard Care: Five steps to make your piece of the planet a healthier place to live by King County, the City of Seattle, and the Saving Water Partnership. See Recommended Resources for link.
SET UP A MAINTENANCE ACTIVITY SCHEDULE

The type and frequency of maintenance activities will vary depending on the water smart features you’ve installed. Water smart features with vegetation or specialized soils (e.g. a rain garden) will require routine plant care (like watering and weeding), and adding compost and mulch to keep soils healthy. These activities may be weekly during the growing season, or just once or twice a year.

Projects that collect runoff or have mechanical components require specialized maintenance to ensure they continue to work properly. This includes inspecting the systems for leaks or breaks, replacing components and adjusting them to weather conditions. In addition to checking components once or twice a year, more frequent monitoring and adjusting may be necessary based on the amount of rainfall at any time during the year.

Pervious pavement will require special maintenance – be sure to consult the specifications provided by the contractor or manufacturer.

The Maintenance Recommendations chart on the following page provides an overview of activities required for different water smart projects including which season maintenance typically takes place. These are meant to provide general information only, as each project will have unique needs to ensure optimal function.

A Word on Weeds and Pests

If you use compost and mulch, choose the right plants and water wisely, you’ll have healthy plants, beneficial insects and fewer disease problems. If you do need to address problems with weeds and pests, remember:

- A single weed can produce thousands of seeds, so if you have limited time, focus on removing weeds before they go to seed. Long-handled weed pullers with pincers work well for weeds like dandelions.
- Try physical and manual solutions to problems first, like spraying off aphids with water or using copper barriers or traps for slugs.
- Weed and feed products and other “two in one” products don’t work as well as managing pest, disease and nutrient problems separately. They can waste money and risk harming people, pets, wildlife, groundwater and local rivers and streams.
- Less toxic (but still effective) products like soaps and horticultural oils are widely available, although these may also harm beneficial insects.
- If you find yourself reaching for herbicides or pesticides on a regular basis, there is probably an underlying landscape design or soil problem to address.
<table>
<thead>
<tr>
<th>Season</th>
<th>Maintenance Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring</strong> March-May</td>
<td></td>
</tr>
<tr>
<td>Compost &amp; Mulch</td>
<td>Replenish mulch to protect plants and soils. Use woodchips for trees, shrubs and rain gardens. Use compost for vegetable beds. Add compost to lawns and a slow release fertilizer if needed.</td>
</tr>
<tr>
<td>Trees &amp; Shrubs</td>
<td>Water as needed. Trees, shrubs and rain garden plants will require little, if any, regular watering after the first 3 years. Replenish mulch if needed. Remove weeds. Prune while dormant.</td>
</tr>
<tr>
<td>Rain Barrels</td>
<td>Inspect and remove blockages like leaves and weeds. Keep roof gutters clean. Adjust for weather and water level to avoid overflow and flooding.</td>
</tr>
<tr>
<td><strong>Summer</strong> June-August</td>
<td></td>
</tr>
<tr>
<td>Compost &amp; Mulch</td>
<td>Mulch to protect plants and soils. Use woodchips for trees, shrubs and rain gardens. Use compost for vegetable beds. Add compost to lawns and a slow release fertilizer if needed.</td>
</tr>
<tr>
<td>Trees &amp; Shrubs</td>
<td>Water as needed. Trees, shrubs and rain garden plants will require little, if any, regular watering after the first 3 years. Replenish mulch if needed. Remove weeds.</td>
</tr>
<tr>
<td>Rain Barrels</td>
<td>Inspect screens, spigots and valves. Remove leaves and blockages on screen and overflow. Replace parts as needed. Adjust for weather and water level to avoid overflow and flooding.</td>
</tr>
<tr>
<td><strong>Fall</strong> September-November</td>
<td></td>
</tr>
<tr>
<td>Compost &amp; Mulch</td>
<td>Mulch to protect plants and soils. Use woodchips for trees, shrubs and rain gardens. Use compost for vegetable beds. Add compost to lawns and a slow release fertilizer if needed.</td>
</tr>
<tr>
<td>Trees &amp; Shrubs</td>
<td>Water as needed. Trees, shrubs and rain garden plants will require little, if any, regular watering after the first 3 years. Replenish mulch if needed. Remove weeds.</td>
</tr>
<tr>
<td>Rain Barrels</td>
<td>Inspect and remove blockages like leaves and weeds. Keep roof gutters clean.</td>
</tr>
<tr>
<td><strong>Winter</strong> December-February</td>
<td></td>
</tr>
<tr>
<td>Compost &amp; Mulch</td>
<td>Replenish mulch to protect plants and soils. Use woodchips for trees, shrubs and rain gardens. Use compost for vegetable beds. Add compost to lawns and a slow release fertilizer if needed.</td>
</tr>
<tr>
<td>Trees &amp; Shrubs</td>
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</tr>
<tr>
<td>Rain Barrels</td>
<td>Inspect screens, spigots and valves. Remove leaves and blockages on screen and overflow. Replace parts as needed. Adjust for weather and water level to avoid overflow and flooding.</td>
</tr>
<tr>
<td><strong>Drip Irrigation &amp; Soaker Hoses</strong></td>
<td><strong>Conveyance &amp; Irrigation Trenches</strong></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------</td>
</tr>
</tbody>
</table>
| • Check components such as filters and drip emitters for replacement.  
• Adjust flow for rainfall.  
• Inspect for leaks. | • Cut back plants and remove weeds to avoid blocking inlets and outlets. | • Water plants, especially during establishment (1-3 years).  
• Remove weeds. | • Check components for function. Replace if necessary.  
• Adjust for weather and water level to avoid overflow and flooding. | • Check for clogging. |
| • Adjust flow for rainfall.  
• Inspect for leaks. | • Cut back plants and remove weeds to avoid blocking inlets and outlets. | • Cut back plants and remove weeds to avoid blocking inlets and outlets.  
• Plant/replant in late fall. | • Check components for function. Replace if necessary.  
• Adjust for weather and water level to avoid overflow and flooding. | • Vacuum |
| • Check components such as filters and drip emitters for replacement.  
• Adjust flow for rainfall.  
• Inspect for leaks. | • Winterize systems. | • Winterize systems. | • Adjust for weather and water level to avoid overflow and flooding. | • Winterize systems. |

**MAINTENANCE RECOMMENDATIONS FOR WATERSMART PROJECTS**

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TAKE THE NEXT STEPS

Congratulations! Now that you’ve assessed your site, selected projects and reviewed maintenance needs, you’re well on your way to establishing a water smart landscape.

If you decide to hire a landscape contractor for general maintenance or a specific project, refer to Appendix B for tips on how to ensure they are environmentally responsible.

As you move ahead, remember to check with your local municipality about permits and regulations, discuss the project with neighbors and always call before you dig!

RECOMMENDED RESOURCES

- **Natural Yard Care**, King County
  kingcounty.gov
- **Grow Smart, Grow Safe**, Portland Metro, the Local Hazardous Waste Management Program in King County, Washington and Thurston County Environmental Health
growsmartgrowsafe.org
- **Natural Pest, Weed & Disease Control**, City of Seattle
  seattle.gov
- **Smart Watering**, City of Seattle
  seattle.gov
- **Sustainable Lawn Care**, City of Seattle
  seattle.gov
- **Rain Garden Care**, 12000 Rain Gardens
  12000raingardens.org
  wa.gov
- **Seattle Rain Barrel User Guide**, City of Seattle
  seattle.gov
Appendices

APPENDIX A: SITE ASSESSMENT TEMPLATES
APPENDIX B: PROFESSIONAL CONTRACTOR INFORMATION
**APPENDIX A: SITE MAP AND SITE ASSESSMENT**

Complete the checklist below for your own landscape, using the site assessment and site map templates on the following pages. To see a completed site map and site assessment, refer to the samples in pages 5-7 of the toolkit.

<table>
<thead>
<tr>
<th>Major Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draw the location of the house, pathways, driveways, fences and other structures, including those adjacent to your site.</td>
</tr>
<tr>
<td>Draw impervious (pavement, concrete, roofing, etc.) and pervious (mulch, bark, gravel, etc.) surfaces.</td>
</tr>
<tr>
<td>Measure impervious surface areas and note measurements on your map and in your assessment.</td>
</tr>
<tr>
<td>Draw and measure vegetation areas, such as flower beds, lawn, trees and shrubs, vegetable gardens, etc. Also note significant vegetation adjacent to the site.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Microclimate and Topography</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note areas that are either hot and dry or wet and cool.</td>
</tr>
<tr>
<td>Note the direction of the wind and any exposed areas.</td>
</tr>
<tr>
<td>Note areas of sun and shade. How do they vary throughout the day and with the seasons?</td>
</tr>
<tr>
<td>Note slopes, both on and adjacent to the property. Include the slope aspect (i.e., which compass direct it faces) and calculate approximate slopes. Are there visible signs of erosion?</td>
</tr>
<tr>
<td>Note other unique topographic features, such as low spots or depressions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine soil textures for different areas around your site.</td>
</tr>
<tr>
<td>Identify locations where soil is low in organic matter.</td>
</tr>
<tr>
<td>Calculate soil drainage rates.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydrology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate the locations of roof downspouts and paved or impervious areas.</td>
</tr>
<tr>
<td>Add the direction of water flow onto, within and from the site.</td>
</tr>
<tr>
<td>Note areas of ponding, such as at the base of slopes, low spots, drainage swales and ditches.</td>
</tr>
<tr>
<td>Note vegetation or other features that may intercept or influence water movement.</td>
</tr>
<tr>
<td>Calculate stormwater runoff.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vegetation Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete the vegetation inventory section of your site assessment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Developing Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete the opportunities and goals section of your site assessment.</td>
</tr>
</tbody>
</table>
## Site Assessment — Template

<table>
<thead>
<tr>
<th>Major Site Features</th>
<th></th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structures and features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impervious surface areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation areas</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Microclimate and Topography

|                                |                                |         |
| Sun/shade                      |                                |         |
| Hot/cool areas                 |                                |         |
| Topography                     |                                |         |
| Wind direction                 |                                |         |

### Soil

|                                |                                |         |
| Soil texture                   |                                |         |
| Organic matter                 |                                |         |
| Drainage rate                  |                                |         |

### Hydrology

|                                |                                |         |
| Areas of ponding               |                                |         |
| Downspouts                     |                                |         |
| Flow paths                     |                                |         |
| Stormwater runoff              |                                |         |

### Other Observations

|                                |                                |         |

### Opportunities and Goals

<p>| | | |
|                                |                                |         |</p>
<table>
<thead>
<tr>
<th>Location</th>
<th>Existing Vegetation</th>
<th>Ideal Site Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plant Species</td>
<td>Sun Needs (Sun, part shade, shade)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moisture Needs (Wet, moist, dry)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type (Annual, perennial, groundcover, shrub, tree)</td>
</tr>
<tr>
<td>Notes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B: PROFESSIONAL CONTRACTOR INFORMATION

Whether you’re considering hiring a contractor for general landscape maintenance or installing a water smart project, it’s important to find out whether they use a water smart approach to landscape installation and maintenance.

You can use the checklist below to determine whether a potential contractor is water smart by discussing the following topics:

- **Building healthy soils.** What are their practices around composting, mulching and organic soil amendment?
- **Trees and vegetation.** Do they choose plants suited to our climate and each site’s unique conditions?
- **Smart watering.** Do they use and offer regular maintenance for drip irrigation or soaker hoses?
- **Weeds, disease and pest control.** Do they practice natural yard care to limit or avoid the use of chemicals?
- **Natural lawn care.** Do they have experience in natural lawn care?

For larger or more complex projects such as permeable paving systems, cistern installation and rain garden construction, you might need to hire a specialized contractor. Check with your local municipality to find contractors and permit information for your area.

**Additional Resources**

The following resources will help in selecting landscape professionals that are committed to conserving water and protecting the environment.

- *How to Choose a Landscape Company* will give you tips on questions to ask and things to keep in mind when talking with prospective landscapers:
  seattle.gov
- EnviroStars is a regional program that certifies businesses for their demonstrated commitment to protecting the environment. For a list of EnviroStars-certified landscape professionals, see:
  envirostars.org
- Rainwise is a program of the City of Seattle that can help you explore stormwater management projects, find contractors and learn how to qualify for project rebates.
  seattle.gov