enhance your yard

green stormwater solutions:

homes for a healthy puget sound

green stormwater

a. rain barrel

b. permeable pavement

c. soil amendment

d. rain garden

e. downspout disconnection

f. trees and plants

green

What are Green Stormwater Solutions?

This guide focuses on ways that homeowners can manage the stormwater that flows onto and through their property. Practices that slow, filter, or eliminate runoff are collectively referred to as "green stormwater solutions" (GSS). GSS use plants and soil to manage stormwater on site or collect it for reuse.

Want a healthier home? A cleaner Puget Sound? With careful planning, you can create a home that combines beauty, efficiency, comfort and convenience with health and conservation. It's an approach to home improvement with the goal of not only making your home look better, but work better—for both you and the environment.

why

Why Consider Greening Your Project?

REDUCE ECOLOGICAL IMPACT
Installing green stormwater solutions minimizes pollutants and debris entering local creeks, rivers, lakes, wetlands, and Puget Sound. These pollutants are harmful to aquatic life and recreational activities such as swimming and fishing. When you capture or slow runoff, you protect water quality, wildlife, and help to restore natural ecological functions to your landscape. A green approach with a home project will benefit you, your community, and the environment.

MAKE A HEALTHIER HOME
Rain that falls on hard surfaces like roofs and driveways collects quickly, typically leaving sites through ditches and pipes. This stormwater runoff can back up during big storms and flood homes, and erode hillsides and stream banks. By capturing, slowing and cleaning the runoff from your home you can filter out pollution and allow rain to seep into the ground, recharging groundwater and streams while avoiding property damage. The techniques described in this guide present attractive and functional solutions.

managing rainwater

Millions of people depend on Puget Sound for natural resources, transportation, and recreation. This iconic water body defines Western Washington, but it is also a fragile ecosystem threatened by human activity. Stormwater runoff has been identified as the single biggest threat to Puget Sound – nearly three feet of rain per year runs off our roads, driveways, sidewalks, lawns, and rooftops, carrying fertilizer, petroleum, and other harmful pollutants. This polluted runoff degrades natural habitats, harms wildlife, and lowers water quality. A collective effort among homeowners can have a positive impact on the Sound's health and our health.

Fortunately, better options exist for managing stormwater. A number of retailers and contractors offer products and services for building green stormwater solutions. These tools can make your house more beautiful while improving ecological function.

Cover Photo: David Hymel

contents

Keep this guide as a resource for both your small and large home remodel projects.

rethink home projects

Using this Guide

This guide will help homeowners learn how to better manage the rain that falls on their property. Please check with your local permitting agency (Kitsap County or your local city planning department) to find out if your home or landscape project requires a permit or a drainage review.

This guide provides a general overview of how to improve soil, plant trees, select and install permeable paving, and direct roof runoff to cisterns or rain gardens.

Health & Safety	Are the materials and maintenance products non-toxic? Do the design and materials reduce the risk of trips, slips, and other injuries?
Functionality	Do the design and materials fit your intended purposes? Can the materials be reused for a future project? Does your design have multiple uses? For example, can your cistern be incorporated into a deck for your home to create more living space?
Reduce Maintenance	Do the materials and product require low maintenance? Can the product or materials be maintained without toxic chemicals?
Beauty	Do the design and materials appeal to you? Will they still look good years from now? Do they enhance your landscape and home's outdoor elements?
Ecological Benefit	Do the materials enhance and protect the natural environment? Do the products protect water quality by helping to absorb or retain stormwater? Are they free of toxic chemicals that can enter the soil, water or air? Do they contain recycled content? Can they be recycled or reused? Are they manufactured locally? Do they avoid or reduce environmental harm during their production or disposal?

Installing any of the projects described in this booklet will help us recover Puget Sound. We've provided a helpful guide to assist you with selecting your projects. The projects are ranked below for their effort and benefit to Puget Sound. The greatest effort and benefit to waterways is at the top with the least at the bottom.

EFFORT	BENEFIT TO PUGET SOUND
Permeable Paving	**Rain Gardens**
Rain Gardens	**Planting trees**
Cisterns	**Soil Improvements**
Soakage Trenches	**Permeable Paving**
Downspout Disconnection	**Soakage Trenches**
Soil Improvements	**Downspout Disconnection**
Planting trees	Cisterns
Rain Barrels	Rain Barrels

Decide What you Want

Planning a landscape, plumbing or yard project can be overwhelming. Where do you start? Generally, the closer you work with your landscape and home's existing features, the less you'll spend on your project. The most effective projects begin when you thoroughly assess your wants, needs, and constraints. By identifying your priorities and considering your options carefully, you can make sure your chosen materials and products meet your goals.

Expand Your Definition of *Cost*

Initial prices only give a peephole view of a design or product's true cost. Investing in green solutions can often be more cost effective than conventional remodel projects. Green remodeling focuses on long-term savings, ease of maintenance and conservation. A higher purchase price may mean a better deal in the long run. Long-lasting products require less frequent replacement. A low purchase price may be simply a good deal, or it may signify a lack of quality or durability. Or it may mean that some environmental, health or social costs are not reflected on the price tag.

Clean Water Kitsap is committed to getting residents the help they need to reduce stormwater runoff from their property using green stormwater solutions. Homeowners can receive technical help and in some areas, financial assistance for rain gardens and other green stormwater solutions that are designed to collect stormwater runoff. To find out about help with your project, see page 18 – Rain Garden Incentive Program.

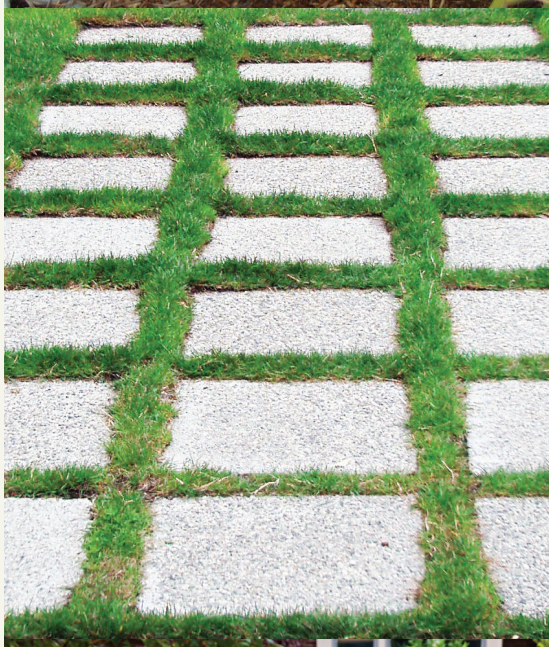
Not only can your green remodel look great, it can have a positive impact on the environment. Your green remodel can filter air and water pollutants, decrease heat gain from summer sun, stabilize soil to prevent erosion, provide wildlife habitat, reduce the public cost of stormwater management, and provide flood control.

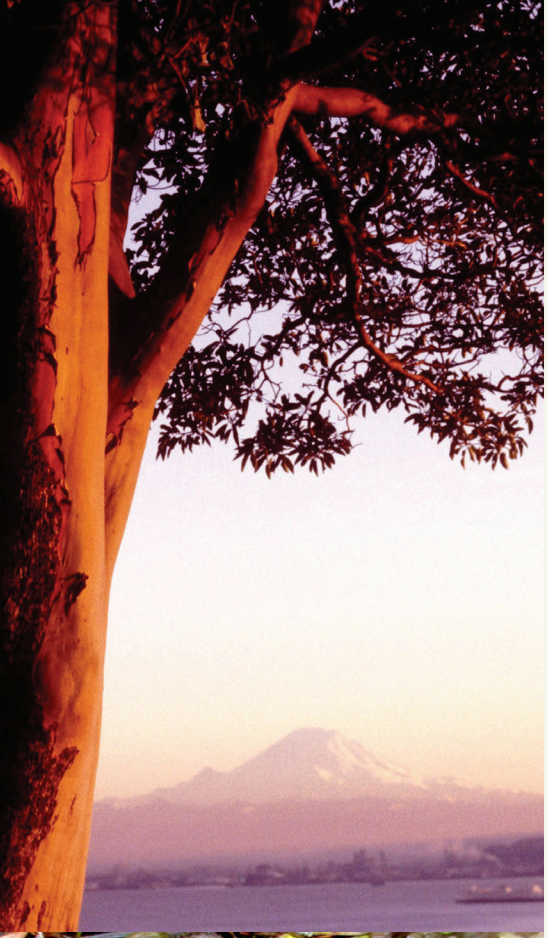
Do Your Homework

Research can uncover some of these hidden costs, and help you make more informed choices. By asking questions of retailers and avoiding suspect products, you're sending a market signal that these "big picture" costs matter, as well. Finding green products can sometimes be a challenge, but is becoming easier as the green building industry grows. Start early to look for businesses that carry the products you like. Find testimonials and reviews online but be aware of biases in information sources. Identify all the materials and products you want to use for your landscape or roof, down to the specific brands and specific material types. This will help you to determine their cost and availability while avoiding expensive and last-minute decisions.

Familiarize yourself with and follow local building codes to save yourself the hassle and costs of having to tear something out later. By complying, you address safety, health, and energy efficiency issues – all goals of a green remodel. If you have questions about permits or whether a particular material or design complies with code, contact your local permitting agency.

Kitsap Conservation District has installed several green stormwater practices at their office. You may call to schedule a tour at 360.204.5529. The location is great for viewing everything from cisterns to rain gardens in a home type environment. Please come by for a visit at 10332 Central Valley Road, Poulsbo, WA 98370. The location is near Silverdale.





managing rainwater

Why is managing rainwater at home important?

In forests, meadows, and other natural areas, rainwater is slowed down by trees, shrubs, and grasses before reaching the soil. As the water percolates into the ground, plant roots filter out pollution before it seeps down into the groundwater that feeds streams and rivers. When development replaces these natural drainage systems with impervious surfaces like roofs, roads, and sidewalks, rain becomes stormwater runoff, which carries pollution into our waterways and can cause flooding.

For single family properties in residential areas, about one half of each lot is typically covered with impervious surfaces — this adds up to a lot of runoff. During rain storms, stormwater can back up and flood homes, and erode stream banks. This is a problem that homeowners can reduce by managing rainwater on-site using relatively simple technology.

Water Quality

Clean water is fundamental for healthy people and ecosystems. Stormwater pollution from our drainage systems has contributed to a decline in salmon populations and threatens harvestable shellfish beds. Contaminated runoff can also damage estuaries, wetlands, and water-related recreation areas. Pollutants carried by stormwater include:

- Fertilizers, pesticides and other chemicals from gardens and homes
- Bacteria from pet and livestock wastes, and inadequate septic systems
- Soil from construction sites and other bare ground
- Soaps from car or equipment washing
- Oil, grease, metals, rubber, and coolants from vehicles

As community members caring for Puget Sound we can become part of the solution: prevent rainwater from becoming stormwater and adopt habits to reduce our contribution of pollutants to the landscape. This booklet is focused on the first part of the solution by providing you with information to clean and soak up rainwater before releasing it downstream to Kitsap's valuable small streams, lakes, wetlands and bays. However, keep in mind the simple ways you can lessen your impact: pick up pet waste, cover livestock manure piles, use chemicals sparingly – both in your yard and home, switch from copper to ceramic brake pads, fix leaky vehicles, and wash your car at a commercial car wash or on grass or gravel. For more information on what you can do to help Puget Sound visit www.cleanwaterkitsap.org.

Green Stormwater Solutions

This guide will help you navigate through a variety of materials, techniques, and products that can help your home make better use of rainwater.

Hardscape Solutions

Hardscape features you can use to reduce stormwater include soakage trenches, rain barrels, cisterns, and permeable paving. In some cases, it can be effective to disconnect your downspout and redirect that roof runoff into a rain barrel or rain garden. The purpose of these types of features is to capture, store, slow or infiltrate runoff while enhancing the existing elements of your home.

Landscape Solutions

Landscape features include soil amendment and mulching, trees, rain gardens, groundcover, shrubs and other types of vegetation. Trees, shrubs, and perennials help filter and infiltrate more water than a typical lawn. Leaf litter and plant debris feed soil microbes that improve infiltration, break down pollutants, and provide natural fertility to your yard. Installing landscape features is a practical way to manage stormwater because you can retrofit an existing yard to better drain runoff. Landscape features can cleanse, absorb, infiltrate and slow runoff.

planting trees

Preserving existing trees and planting new ones are easy and effective ways to manage rainwater at home. Trees and plants do a good job of catching rainfall on their leaves and needles, detaining rainwater and returning much of it to the atmosphere. Evergreens (conifers) that have needles year round are optimal. Tree roots and leaf litter feed soil microbes that prevent erosion and allow more rainwater to soak into the ground.

Trees in your yard can also help improve air quality and moderate the microclimate around your home by providing cool shade during hot summer months and protecting your home from cold winds in winter. Because of their beauty and functional value, trees are known to add to property values — a well-placed mature tree can add thousands to the sale price of a home.

Getting Started

Site trees in places where they can thrive over time. You may want to consider factors like: is there enough room to accommodate the full canopy at maturity? Is there enough room for root growth away from underground foundations, above ground hardscapes, and utilities? You may also consider whether to plant an evergreen or deciduous tree:

- Evergreens keep their leaves or needles all year and are much more effective at reducing stormwater runoff. Evergreens planted north and west of your home block winter winds and hot afternoon sun.
- Deciduous trees help reduce stormwater runoff during non-winter months. These trees placed south and east of your home welcome winter sunlight and provide shade in summer.

Northwest natives are often a good choice because they have few pest problems and provide habitat for native birds and wildlife, including unseen but crucial soil microbes. However, many non-native trees are well adapted to our climate and can provide fruit, nuts, or other benefits. Weigh all of these factors carefully when selecting and planting trees – they'll be with you for a long time!

Maintenance

Newly planted trees need to be watered weekly for at least the first 2-3 summers and areas around trees should be weeded and mulched annually (see **Improving Soil with Compost and Mulch** on page 8 for more information). To protect tree health, avoid excavating, paving, or driving in the critical root zone (the area underneath the canopy), or damaging bark with string trimmers.

Resources

Learn how to plant trees properly by downloading the **RainWise** factsheet **Planting Trees** www.seattle.gov/util/rainwise

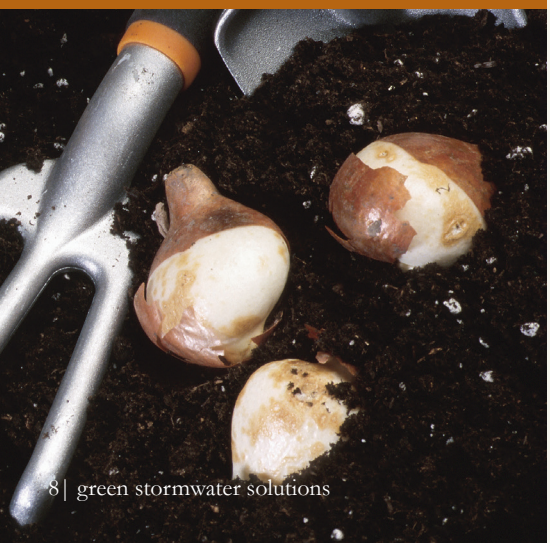
For a list of trees and shrubs try www.greatplantpicks.org/ or www.green2.kingcounty.gov/gonative/index.aspx

A good resource for native plants is the **Washington Native Plant Society** www.wnps.org and check out their lists of evergreen and deciduous trees.

For technical assistance contact the WSU Kitsap Masters Gardeners at kcmastergardener@hotmail.com 360.337.7158, or Kitsap Conservation District at kitsapcd.org 360.204.5529

Find native plants and trees at the Kitsap Conservation District's Annual Native Plant Sale. Order in January, and pick up in March. www.kitsapcd.org

Protect water quality as you grow. Organic fertilizers combined with Integrated Pest Management keep our water resources free of chemicals and pollutants.



improving soil with compost and mulch

An attractive and healthy lawn and garden requires soil rich in life and nutrients. Improving your soil makes plants healthier and saves you money by reducing irrigation, fertilizer, and pesticide needs. Compost and mulch added to your soil feed the beneficial soil organisms that create structure and spaces within the soil so that rain water can easily soak into the ground. These soil organisms also break down pollutants, and help move carbon dioxide (a greenhouse gas) from the atmosphere into long-term storage in the soil. Amending your soil with compost and mulch is a simple improvement that helps to reduce stormwater runoff and improve the quality of our environment.

Getting Started

Spread 2-4 inches of **compost** over the entire area before planting, then mix the compost 6-8 inches deep into the soil to provide water, air and nutrients to plant roots. You should mix in compost before:

- Planting lawns, perennials, trees and shrubs.
- Replanting annual beds as needed.

Adding **mulch** (organic material applied to the surface of the soil) to new or existing plantings helps reduce evaporation, limit weed growth, maintain an even soil temperature, and limit erosion that can choke streams and fish. The best mulches are arborist wood chips (available from tree services) and fall leaves. Apply mulch to these depths:

- Compost, leaves, straw, bark (medium ground): 1 to 2 inches
- Coarsely shredded wood chips, bark, or tree trimmings: 2 to 4 inches

Things to remember about mulching:

- Apply annually or as needed to maintain a mulch layer 2 inches thick around annuals and perennials, or 3-4 inches around woody plants and trees. Keep mulch one inch away from stems and trunks of plants.
- Mulch in spring to conserve moisture and prevent weed seedlings from sprouting or mulch in fall to protect soil from erosion, winter weeds, and cold snaps.
- You can also "mulch" your lawn by leaving the grass clippings, which improves lawn rooting depth and drought resistance, as well as reducing the need for fertilizers.

Maintenance

Routinely mulching and adding compost to your soil helps keep plants healthy year round, and can eliminate the need for fertilizer. If you use fertilizers, choose organic forms of the nutrients you need, which are less likely to wash off into streams. Test soil before you apply fertilizer, and add only the amount that the results recommend. Avoid using pesticides as they may hurt beneficial soil life, wildlife, and human health.

Resources

Download the factsheet **Improving Your Soil with Compost and Mulch** from the **RainWise** website at www.seattle.gov/util/rainwise, and the **Growing Healthy Soil** guide at www.seattle.gov/util/services/yard.

For expert advice see the **Master Gardeners** at a Diagnostic Clinic in your area - kcmastergardener@hotmail.com 360.337.7158.

compost and mulch types

	SOIL AMENDMENT CHOICE		BENEFITS	DRAWBACKS
Best All-Purpose Materials		Compost made from yard debris or barnyard manure Tips: yard trimmings can be composted at home	recycled and readily available contains balanced nutrients	homemade compost can contain weeds, pests, and diseases (commercially available composts reduces these problems)
		Leaves (composted or fresh)	no cost rich in nutrients	usually contain some weed seeds
Other Materials		Aged bark or sawdust	improves drainage in clay soils good for trees and shrubs	if not composted until dark brown in color, they can tie up nutrients and inhibit plant growth mix with compost for better results
		Coconut coir	Improves moisture and nutrient storage in sandy soils	does not support soil life
		Topsoil mixes	good for raised beds on top of compacted or poorly drained soil	may contain poor fill soil or weed (best to use mixes containing only compost and clean sand)

	MULCH CHOICE		BENEFITS	DRAWBACKS
Shrubs and Trees The best mulches for shrubs and trees are coarse, woody materials that protect the soil for a year or longer, slowly releasing nutrients for steady plant growth.		Wood chip and shredded prunings ("arborist wood chip mulch")	low or no cost, reuses a potential waste product also works for perennials if soil is amended provides more nutrients than bark	may spread weed seeds
		Fresh bark	readily available	inhibits growth of some plants
		Wood shavings	often free	cannot use wood shavings from chemically treated lumber compost thoroughly before using
Annuals/Perennials/ Berries & Roses Annuals and perennials benefit from mulches like compost which feed plants quickly, and can be mixed into the soil without tying up nutrients.		Composted yard debris, bark, barnyard manure or commercial products that include biosolids	neat appearance	compost does not suppress weeds bark is low in nutrients
		Leaves and grass clippings	leaves and grass clippings are free	may spread weed seeds best to compost before using

Stormwater from downspout disconnects should drain to a conveyance, infiltration or capture system.

disconnecting downspouts

In a one-inch storm, a 1,000 square foot roof receives 625 gallons of water. If your downspout ties into an existing well functioning infiltration system, then there is no need to disconnect. However, if your downspouts flow to ditches or other conveyance systems with no water quality treatment, then look for opportunities to improve the runoff system. A disconnected downspout combined with a rain garden, cistern, or permeable pavement facility can slow peak flows, and reduce stream erosion.

Getting Started

Disconnecting downspouts require proper procedures to avoid risks of flooding, erosion and landslides. Does the water have a path to move safely away from your house? What happens in a big storm? These are questions you need to answer before disconnecting your downspout.

Consider where rainwater would flow from your downspout. Effective downspout disconnection requires adequate grading and vegetation to convey water away from the house and let it soak into the ground. You can direct the water to sheet flow to a natural dispersion area so that there is a low probability that it will flow to a stream, wetland or your neighbors property. Avoid directing runoff toward foundations, contaminated soils, steep slopes and landslide areas. If you can't disconnect all of your downspouts, even one could help infiltrate hundreds of gallons per year.

Doing research before you start and making informed decisions can save a lot of hassle in the future. Contact **Kitsap Conservation District** for technical assistance. www.kitsapcd.org/contact or 360.204.5529.

Maintenance

Disconnected downspouts require simple but regular maintenance. Routinely check your gutters for leaks and remove any accumulated leaves and debris at least twice a year, and more often if you have overhanging trees. Take care of the downspout discharge locations and make sure that they have appropriate erosion control and proper drainage.

ways to manage downspout runoff

Downspout runoff can be managed in various ways. Splashblocks and conveyance furrows direct rainwater to **infiltration** areas like rain gardens or swales, or **capture** systems such as rain barrels.

MATERIAL	SYSTEM TYPE	DESCRIPTION/TIPS	BENEFITS	DRAWBACKS
Splashblocks 	**Conveyance**	Rainwater pouring out of downspouts can cause erosion and moisture problems around your foundation. Splashblocks help disperse runoff away from your home and prevent landscape erosion. Tip: For a more eco-friendly solution, go with a splashblock made from recycled concrete or post-consumer plastic.	low cost disperse runoff prevent landscape erosion	limited varieties and designs available on the market
Rain gardens 	**Infiltration**	Described further on page 12 A shallow depression with a designed soil mix and native plants captures runoff and allows it to soak into the ground.	low long-term maintenance absorb and infiltrate more water than the same size area of lawn attractive and interesting landscape features	require regular maintenance
Permeable paving 	**Infiltration**	Described further on page 14 Permeable pavement, constructed as a **facility**, can accept rooftop runoff and soak it into the soil.	reusable, can be reconfigured extremely durable can serve as a patio, walkway, or driveway	can have a high initial cost most manufacturers require professional installation
Rain barrels and cisterns 	**Capture/ detention**	Described further on page 16 Designed to catch roof runoff, cisterns are big rain barrels that hold hundreds to thousands of gallons of water.	low cost (rain barrels) reduce use of water for irrigation reduce runoff volume and delay peak flow	high initial cost (cisterns) cannot be used for drinking water without expensive filters require regular maintenance
Soakage trenches 	**Conveyance/ infiltration**	Described further on page 17 Soakage trenches offer a more flexible option than piping. These shallow depressions can convey runoff away from buildings to a better discharge location such as a rain garden. Trenches can be vegetated or rock-lined, depending on aesthetic preference and the slope of the site. Deeper rock trenches can hold and infiltrate water.	low cost layout can be flexible does not require extensive disturbance of yard or lawn slow runoff and provide more benefits than piped conveyance options	rocks can collect sediment and debris over time and require weeding

rain gardens

You can improve the look of your home and help the environment by incorporating rain gardens into your yard. A **rain garden** is simply a shallow depression that uses soils and plants to manage runoff from impervious areas such as your roof or driveway. The plants and compost-amended soil can hold several inches of rainwater and allow the stormwater to slowly seep into the ground.

The first half inch of rainfall, also known as the first flush, is responsible for most of the pollutants in stormwater runoff. A rain garden is designed to temporarily hold this first flush and slowly filter out many of the common pollutants in the water, such as oil, chemicals, and pet waste that would otherwise flow into the nearest stormwater system.

Rain gardens mimic a native forest's drainage system by collecting, absorbing, and filtering stormwater runoff. They can be shaped and sized to fit your yard and landscaped with plants that fit with surrounding elements, improving the appearance of your home.

Getting Started

Initial research and careful planning can help you avoid damage and future reconstruction costs – saving you time and hassle in the long run. There are several things you need to assess before you start digging and planting. Is your yard fairly level? Do you have a big enough area free of big tree roots and utilities? Is there a way for roof or driveway runoff to flow to your rain garden? What kind of soils and slopes do you have?

Rain gardens are best sited where runoff can flow freely to them, and where there is a safe path for overflow in bigger storms. Their effectiveness will depend on your property's soil type and amendments. You may also want to consider the location of the rain garden that will best fit and enhance the appearance of your home. See the Resources at the end of this section for free assistance in planning your rain garden.

Rain Garden Plants

To plan a successful rain garden, you'll need to familiarize yourself with plants that tolerate both saturated and drought conditions. Rain gardens have three planting zones characterized by different soil conditions. Select plants according to their water needs and sun exposure for these planting zones:

- Zone 1 – Deepest or flat bottom area: plants in this zone absorb and filter stormwater and prefer soil saturation or shallow standing water.
- Zone 2 – Slopes: for plants that can tolerate occasional standing water. Use these plants to achieve good coverage to hold side slopes in place.
- Zone 3 – Upland area: plants at or above grade level and those that prefer drier conditions. This zone allows the widest range of showy ornamental plants.

Maintenance

Once a rain garden is built, new plants need to be watered regularly for the first two to three years until they are well established. Mulching annually conserves water and reduces weeds until the plants are mature enough to cover and shade out the soil. You can also help the plants to establish by weeding in the spring, summer, and fall months. If you use native plants and mulch with leaf litter or arborist wood chip mulch, there should be no need for fertilizers, herbicides or pesticides. Keep the inlet and outlet clear of debris and well protected from erosion with rocks. Appropriate care and regular maintenance can protect your green home investment for many years.

Resources

For landowners in unincorporated Kitsap County, the **Kitsap Conservation District** offers free site visits to provide technical assistance and planning. If your property qualifies for the incentive rebate program, you may receive reimbursement for costs of installation and materials. www.kitsapcd.org

For landowners within the city limits of Port Orchard, Bremerton, Poulsbo or Bainbridge Island, **WSU Exension's Rain Garden Mentors** can provide technical assistance (http://ext100.wsu.edu/kitsap/nrs/rain-garden-program/mentor).

View the **Rain Garden Handbook for Western Washington** online at www.fortress.wa.gov/ecy/publications/publications/1310027.pdf.

Building rain gardens on private property usually does not require a permit for an existing home, but always check with your local jurisdiction.

permeable pavers

Using permeable pavement for driveways, walkways, and patios can add character to your site while maintaining access and durability for vehicle and foot traffic. Permeable pavement can improve water quality by infiltrating or slowing runoff and breaking down pollutants that would otherwise enter local streams and Puget Sound.

Runoff Control Systems

Some types of permeable pavement surfaces can be practical for do-it-yourself home projects, such as pervious pavers. These systems consist of a permeable surface layer and a clean angular gravel subbase of at least 3 inches installed over the approved subgrade. Permeable pavement surfaces are designed to manage only the rain that falls directly on the pavement.

The simplest solution can be converting unnecessary pavement into permeable landscaping with lawn or garden beds. For areas that require pavement, there are a variety of environmentally friendly choices. **Permeable pavements** contain void spaces which allow stormwater to flow from the pavement surface to the subbase and into underlying soils. Options include interlocking concrete pavers, concrete or plastic grids, and poured-in-place permeable asphalt and concrete – all of which can be used to improve the aesthetics of your home and protect the health of your neighborhood and environment.

- ***Allows water to infiltrate***
- ***Filters pollutants and recharges groundwater***
- ***Durable and attractive***

These alternatives reduce the amount of hard surfaces like asphalt and concrete in favor of methods that allow better drainage.

Getting Started

Certain characteristics make some sites more suitable for permeable pavement than others. Analyze your site: does it have gentle slopes (<5%, or less than 1 ft. drop per 20 horizontal ft.)? Do the subgrade soils have a percolation rate of at least ¼ inch per hour? What are the intended traffic loads and frequency? Is there an overflow route for runoff from big storms to flow to street drains or a rain garden? Understanding the site helps with design decisions and avoiding flood risks.

Driveways and parking areas need careful design and installation to support the weight of cars and trucks. Patios and walkways are better tasks for do-it-yourself installation, but you still need to follow the manufacturer's directions exactly. If you install the pavement yourself, remember to excavate at least 3 inches below the pavement and fill in with angular rock or gravel to provide a stable base and help drain the surface. Consider hiring a qualified professional with green experience for big projects to advise you, create a design, or do the work.

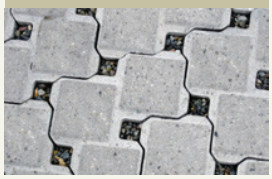
Maintenance

The maintenance requirements of permeable surfaces will depend on the materials used and the location of the installation. For permeable concrete and asphalt, it is recommended that the surface be vacuumed or pressure-washed two to four times a year, or as required to ensure that the surface does not become clogged. Concrete and plastic grid systems will require semi-annual inspection by the homeowner to discourage weed growth and to ensure that the system rings are not exposed. Exposed areas should be raked and weeds should be removed without the use of herbicides.

Resources

See the "Reducing pavement and permeable paving options" factsheet and **Materials and Suppliers** link on the **RainWise** website (www.seattle.gov/util/rainwise) to learn about area sources for permeable pavement materials. The best way to decide what you want is to see the various products, and talk to suppliers and installers.

permeable paving choices

PAVER TYPE	DESCRIPTION	BENEFITS	DRAWBACKS	TYPICAL LOAD
Pavers 	Interlocking concrete pavers are shaped to interlock but also allow water through the joints, and the aesthetic of brick and stone pavers.	low maintenance available in a variety of styles and colors reusable; can be reconfigured extremely durable ideal for driveways or high-use patios and walks	some manufacturers require professional installation can't be sanded for ice and snow require excavation to allow for a base course	medium - high
Concrete open celled paving grids 	Concrete lattice with open area for drainage to be used with grass or crushed stone has a traditional yet modern appeal.	works well on level sites for occasional parking areas or low-use walkways	requires routine landscape maintenance of lawn, weeding, reseeding, and irrigation (for grids with grass) can be difficult to avoid compaction which can kill vegetation uneven surface can be difficult for wheelchair travel	medium-low
Plastic lattices 	Plastic grid system, sometimes with filter fabric, to be used with grass or crushed stone ("grasscrete" and "gravelcrete").	works well on level sites for occasional parking areas or low-use walkways an eco-friendly option -often made with 100% recycled plastic	requires routine landscape maintenance of lawn, weeding, reseeding, and irrigation (for grids with grass) can be difficult to avoid compaction which can kill vegetation only certain products are suitable for wheelchair travel	low
Permeable concrete 	Permeable concrete is made with larger pea gravel and fewer fines to achieve a pebbled, open surface that allows stormwater infiltration.	even surface good for wheelchair accessibility accommodates relatively high traffic volumes long-lasting if installed correctly	like conventional concrete, permeable concrete is energy-intensive to make and has a large carbon footprint good installation depends on contractor's experience difficult and expensive to install in small batches	medium-high
Permeable asphalt 	Open-graded asphalt with reduced fines and stable air pockets allow water to drain to the soils below.	works well with pedestrian-only areas and for low-volume, low-speed areas such as overflow parking even surface good for wheelchair accessibility	wears out faster than concrete or pavers good installation depends on contractor's experience difficult and expensive to install in small batches	medium
"Hollywood driveways" 	Any attractive approach to improving your driveway, this approach consists of a vegetated strip running between two parallel strips of concrete, spaced so that a vehicle's wheels can drive on them.	cheaper than driveways constructed with solid concrete reduces impervious surface since less concrete is needed adds green space and character to your driveway can be low maintenance	long driveways may be hard to follow or back up on works better on straight driveways where the automobile can stay on the tracks if used on a driveway or alley that requires turning, the center strip will become compacted over time maintenance level depends on what is planted between strips	medium-low

rain barrels & cisterns

Capturing rainwater helps keep your garden green while reducing water use for irrigation. It is also a simple and effective way to keep your rooftop runoff out of the public drainage system, reducing negative impacts to wildlife and receiving waters.

Rainwater harvesting uses rain barrels or cisterns (larger systems that hold 200-1000 gallons or more), to capture and store rainwater for beneficial use. These storage systems installed near downspouts or in your yard can capture roof runoff for irrigation use. This can significantly reduce or even eliminate the need to use well or municipal water for landscape purposes, especially when combined with drought-tolerant plants. Cisterns and rain barrels offer the added benefits of reducing stormwater peak flows during winter and water demand during summer.

Getting Started

Before you buy any type of cistern, consider how much rainwater is available from your roof and how much you intend to use. A cistern or rain barrel requires a level foundation, as well as a place to safely discharge the rainwater when the barrel overfills. To learn more about other safety precautions visit www.kingcounty.gov/environment/stewardship/nw-yard-and-garden/rain-barrels.aspx

Underground cisterns require pumps to operate, but are out of sight and do not compete with other uses in your yard.

Maintenance

Keep your gutters clean and sloped so they dry quickly between rains and ensure that no particulate matter or other parts of the roof are entering the gutter and downspout to the rain barrel or cistern. Rainwater harvesting systems require relatively low maintenance, however components of your system should be inspected twice a year. In the fall you'll need to clean leaves and other debris off of roofs, out of gutters, and off the top to keep the screen from clogging and make sure the overflow is not blocked. In the winter when rains are heaviest, you may want to reconnect your downspouts if you do not have sufficient vegetation or a raingarden to capture the overflow runoff.

Resources

Want to learn more? Visit **Seattle Public Utilities' Rainwater Harvesting** website at www.seattle.gov/util/Services/Yard/Natural_Lawn_&_Garden_Care/Rain_Water_Harvesting. To learn how to make your own rain barrel, see www.youtu.be/oeR8Sq4GEco.

While smaller systems generally do not require land use or building permits, large cisterns may. For further information on methods, materials, contractors and technical assistance, visit www.kitsapcd.org/programs/raingarden-lid or contact the **Kitsap Conservation District** at 360.204.5529.

Worried about mosquitoes? Don't be. Rain barrels and cisterns have screens to keep out mosquitoes. Opaque container materials also reduce the growth of algae and other organisms.

soakage trenches

Soakage trenches come in two varieties. They can be visible at the surface or they can be constructed under the surface hidden from view. Visible soakage trench systems typically consist of a surface trench filled to the top with small washed rocks, while below ground systems are filled with washed rock and may be beneath the surface of your lawn or landscaping area. Both types collect runoff and direct it away from structures and allow runoff to soak into the underlying soil where it can recharge groundwater. Many soakage trenches include an underground perforated pipe to help move water to a better location.

These systems are simple, cost effective and take up little space. Used in combination with downspout disconnection, they can be an effective way to handle your home's runoff in an invisible or esthetically pleasing manner.

Getting Started

Before you install a soakage trench, check your site for limitations. Soakage trenches need fairly level ground, no more than a 15% slope. They must also be installed in soils that can infiltrate water – there must be at least one foot from the bottom of the trench to the water table, hardpan or other impervious layer. Because they disperse water into the ground, they should be situated so that they carry water away from buildings, property lines, slopes or slide prone areas.

Vegetation planted over buried soakage trenches should be lawn or shallowly rooted bedding plants. Do not plant trees over or near a soakage trench because water-seeking tree roots will damage your system.

Contact Kitsap Conservation District for advice on where to locate your soakage trench for proper drainage, and away from obstructions like septic systems, underground utilities or tree roots.

Maintenance

Although fairly low maintenance, underground soakage trenches can be out of sight, out of mind. If you have installed a cleanout port, a collection box or silt basin connected to your trench, inspect it periodically and remove sediment as it builds up. For open systems, inspect the trench periodically and after major storms. Leaves, dirt and other debris can impact your trench's ability to function, so keep it clean to prolong its lifespan - control erosion and debris accumulation, and replace clogged rocks or stones. Clean, repair and replace your system's pipe as necessary.

It is important to keep sediments and debris from clogging your soakage trench. To accomplish this, install a collection box or silt basin to receive runoff before it disperses into the soakage trench.

Soakage trenches used to move runoff to another location must be designed correctly to not have adverse affects. You must maintain the historic path of water and not deliver stormwater runoff to other properties.

Resources

Want to learn more? Visit www.kitsapcd.org/programs/raingarden-lid/what-is-lid

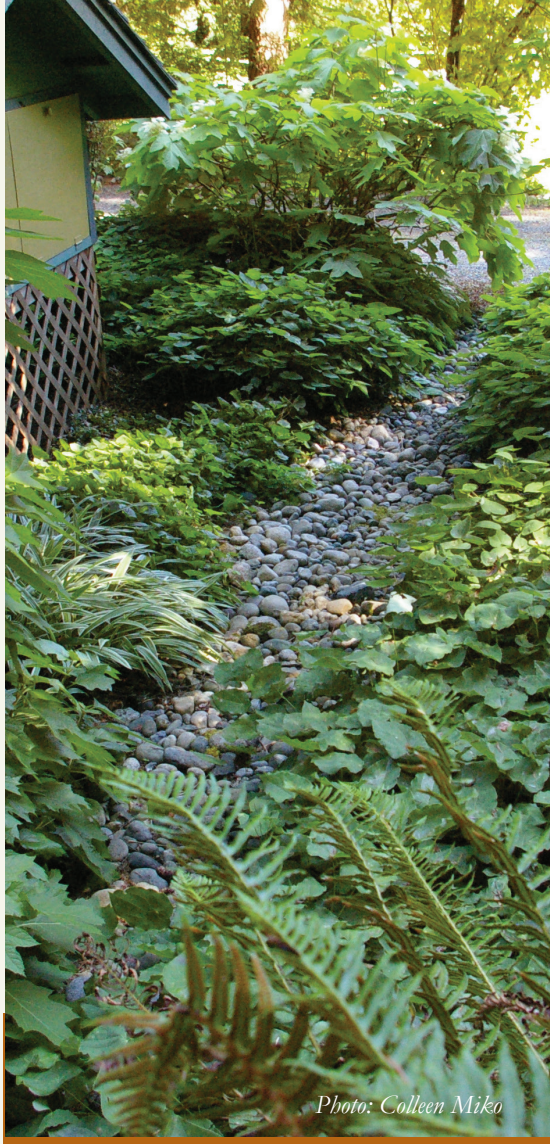


Photo: Colleen Miko

Soakage trenches collect and carry water away from buildings and foundations. They can also be an attractive landscape feature.

get help to go green

rain garden incentive rebate program

The projects in this booklet provide homeowners ways to reduce flooding and erosion, save on water bills, increase wildlife habitat and protect Puget Sound waterways.

To support your efforts, Clean Water Kitsap is helping residents of unincorporated Kitsap County reduce runoff from their property. Homeowners may receive technical and financial assistance for installing the green stormwater solutions. Financial assistance may come in the form of incentives or rebates, as well as materials needed to complete your project.

- Rain gardens
- Rain barrels/cisterns
- Soakage trenches
- Soil amendments
- Downspout splash blocks
- Pervious pavers
- Native plants
- And more

To find out if you qualify and how to apply, contact:
Kitsap Conservation District
10332 Central Valley Road, Poulsbo, WA 98370
360.204.5529
www.kitsapcd.org

resources

Local and Regional Resources

Below are general resources. Refer to each section for more specific resource listings.

- Stormwater and Kitsap County www.cleanwaterkitsap.org
- Low Impact Development www.kitsapcd.org/programs/raingarden-lid/what-is-lid
- Rain Garden Incentive Rebate Program in unincorporated Kitsap County www.kitsapcd.org/programs/raingarden-lid
- Technical Assistance about Rain Gardens in Cities www.ext100.wsu.edu/kitsap/nrs/rain-garden-program/mentor/
- Rain Garden Handbook for Western Washington www.kitsap.cd.org/programs/raingarden-lid/resources

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Visit *Clean Water Kitsap*, your resource about stormwater, water quality and helping Puget Sound

Clean Water Kitsap

Partners in Stormwater Solutions

www.CleanWaterKitsap.org

KITSAP PUBLIC HEALTH DISTRICT

Kitsap Conservation District

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