

Frequently Asked Questions

I. General Questions

What is polluted runoff?

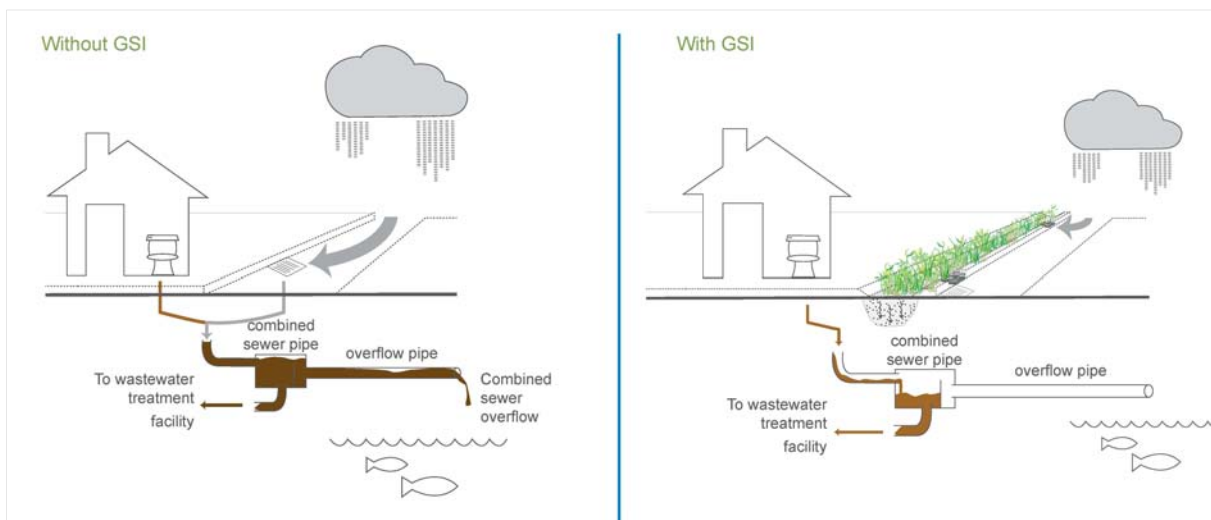
Polluted runoff is stormwater (rain and melting snow) that runs off streets, rooftops, and parking lots. As stormwater runs across these hard surfaces, it picks up pollutants such as oil, grease, and metals, carrying them through the storm drain system to our lakes, streams, rivers, and the Puget Sound. In some parts of Seattle, it also flows into the sewer system and causes overflows of raw sewage and polluted runoff into local waterways. Recent scientific studies have determined that polluted runoff significantly harms local water quality and is the biggest threat to water quality in the Puget Sound.

What is green stormwater infrastructure (GSI)?

GSI—also called natural drainage—mimics nature by slowing or reducing polluted runoff close to its source. It also treats polluted runoff from roads, roofs, and parking lots by capturing and cleaning it before it harms our waterways. GSI helps our city act more like a forest. We can put GSI on private property to help slow and clean polluted runoff from roofs, patios, and driveways. We can put GSI in our public spaces—such as planting strips next to the street—to help soak in and clean stormwater that would otherwise run off streets, sidewalks, and parking lots.

How does GSI work?

Unlike conventional *gray stormwater infrastructure*, which uses pipes, underground storage tanks, and treatment plants to collect and clean stormwater, *GSI* uses plants, trees, and soil to manage stormwater where it falls. The goal of GSI is to manage stormwater by allowing it to soak into the ground or evaporate into the air.



How does GSI help improve water quality?

In the past, industry and raw sewage were the major sources of water pollution. Over time, cities have made significant progress removing these sources of pollution. Now, polluted runoff from streets, roofs, and parking lots is the major source of water pollution. (*National Academy of Sciences*)

GSI can help improve water quality in two ways:

- GSI captures and cleans stormwater at its source, before it can harm our waterways.
- Many neighborhoods in Seattle still have a combined sewer system that carries wastewater from our homes and businesses and stormwater in the same pipes. During dry weather, this system works well. During heavy rains, however, the pipes can run out of capacity. Instead of backing up into our basements or flooding our streets, the pipes overflow into Puget Sound, Lake Washington, or other waterways, discharging millions of gallons of polluted runoff and raw sewage. By keeping stormwater out of the sewer system, GSI can help prevent these sewage overflows, as well as reduce flooding on city streets or private property.

Why are King County and Seattle Public Utilities implementing GSI projects?

At a time when so much of our infrastructure is in need of replacement or repair, we need sustainable and affordable solutions that meet many objectives at once. GSI is one such solution because it provides these additional benefits:

- **Allows us to adapt to future needs in a cost-effective way**
Regional authorities predict that the number of households in the Seattle area will grow nearly 30 percent by 2040. (*Puget Sound Regional Council 2006 Forecasts of Population, Households, and Employment*) At the same time, current climate change models predict our region will experience more frequent and severe winter storms. (*University of Washington Climate Impacts Group, Rosenberg et al. 2009. <http://cses.washington.edu/cig/res/ia/waccia.shtml>*) With more households and more rain, we can also expect more polluted runoff. That will place higher demand on Seattle's drainage and wastewater treatment system.

We know for sure we will need more sewer capacity to meet federal and state regulations and current and future needs as a result of population growth and climate change, but we have to be careful not to build too much, waste ratepayer dollars and resources, and unnecessarily impact neighborhoods. By decreasing the amount of polluted runoff that gets into our sewer system, GSI reduces the amount of sewer capacity we must build to meet future needs.

- **Preserves open space and creates walkable/bikeable neighborhoods**
GSI becomes especially valuable in neighborhoods where it is possible to provide other benefits at the same time, such as adding more trees to our urban streets, creating better and safer pedestrian and bicycle corridors, slowing down traffic on neighborhood streets, and offering more open and green space to urban residents.
- **Helps prevent floods, improve air quality, and maintain a healthy ecosystem**
Unlike pipes and treatment plants that collect and clean polluted runoff after it travels for miles, GSI uses plants, trees, and soil to manage stormwater where it falls. By using these natural processes, GSI not only manages polluted runoff and prevents sewage overflows; it also prevents floods, improves air quality, and helps maintain a healthy ecosystem. Because GSI uses natural processes to capture and clean polluted runoff every time it rains, we also save money and conserve energy over the long run.

What are some GSI techniques?

- **Rain gardens:** A rain garden is a shallow depression containing spongy soil and a variety of plants that thrive in Pacific Northwest sun, soil, and moisture conditions. Rain gardens can be located on private property to collect stormwater from your roof downspout or in public spaces to collect stormwater from streets and parking lots. The **RainWise** program provides rebates to homeowners who install rain gardens on their private property. Visit www.rainwise.seattle.gov for more information about the RainWise program or refer to the RainWise section of these FAQs.



Rain garden on private property

- **Bioretention swales (also called roadside rain gardens):** A bioretention swale is a type of rain garden designed to absorb larger amounts of stormwater. Bioretention swales are typically located in public spaces, such as in the planting strip alongside a roadway or on neighborhood streets.

Some bioretention swales have a drain underneath, to collect stormwater after it has filtered through and been cleaned by the amended soil. The drain either carries this clean water deep into the ground or sends it back into the sewer system at a slow and controlled rate, so it does not cause a sewage overflow.

King County's Barton CSO Control Project and Seattle Public Utilities' Ballard Natural Drainage Project are locating bioretention swales in the public planting strip alongside the roadway on neighborhood streets. These "roadside rain gardens" capture polluted runoff from the road.



Roadside rain garden in Ballard, 2012



Broadview Green Grid, 2004

- **Permeable pavement:** Permeable pavement is hard but porous material that allows stormwater to soak through into the ground below, rather than running off into waterways or entering the sewer system. Bicycles and cars can travel on permeable pavement. Seattle Public Utilities and King County have investigated replacing some alleys with permeable pavement.
- **Green roofs:** Green roofs consist of shallow layers of soil or another growing medium, short plants, drainage, and a waterproof membrane. Green roofs help slow the speed that polluted runoff enters the sewer system.



Green roof, Seattle City Hall

- **Trees:** Healthy evergreen trees keep their needles through the winter—our rainy season—so they help capture and evaporate stormwater and reduce polluted runoff. Evergreens also provide other benefits to people and the environment. Because they grow so tall in our region, they use the same amount of yard space as other trees but work harder to take in carbon dioxide, produce oxygen, and filter out air pollutants.



Street Trees, Wedgewood

II. Sewage overflow prevention

What is a combined sewer overflow (CSO)? How does GSI help prevent CSOs?

About two-thirds of Seattle is served by a combined sewer system, which was designed to carry sewage from inside homes and businesses and polluted runoff from streets, rooftops, and parking lots in a single pipe—a “combined sewer.” During dry weather, all raw sewage flows to the treatment plant. When it rains hard, the pipes can become overloaded with stormwater. This mixture of polluted runoff (about 90%) and raw sewage may overflow into lakes, streams, and the Puget Sound.

The mixture of polluted runoff and raw sewage may harm fish, wildlife, and swimmers in the areas where overflows occur. Because of these impacts to water quality, the federal Clean Water Act and state regulations require that we take action to reduce overflows.

By keeping polluted runoff out of the sewer system with GSI, we can leave more room in the pipes for sewage and help prevent these sewage overflows.

Find more information about Seattle’s Sewage Overflow Prevention program at:

www.seattle.gov/util/EnvironmentConservation/Projects/DrainageSystem/SewageOverflowPrevention/index.htm.

Find more information about King County’s Combined Sewer Overflow Control program at:

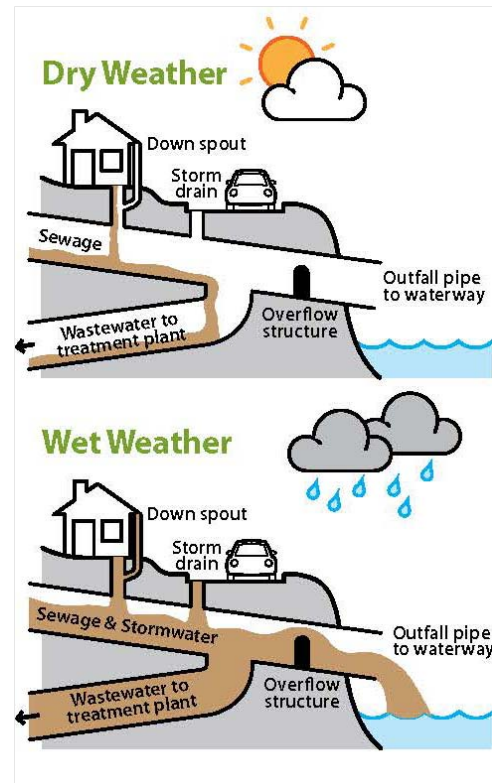
www.kingcounty.gov/csocontrol.

Why are GSI systems being proposed for my neighborhood?

Roadside rain gardens are being proposed because polluted runoff from your neighborhood contributes to sewage overflows into a nearby waterway. Seattle Public Utilities and King County have determined that they will select GSI as the preferred strategy for controlling sewage overflows when it is technically feasible and cost comparable. In March 2013, Seattle Mayor Michael McGinn put into motion development of a citywide GSI plan with the goal to manage 700 million more gallons of stormwater annually by 2025. The Seattle City Council endorsed that goal in July with resolution 31459, “establishing a City policy that green stormwater infrastructure is a critical aspect of a sustainable drainage system and adopting a 2025 goal for green stormwater infrastructure implementation in Seattle.”

CSO Basins

King County and Seattle Public Utilities use a combination of strategies—sewer system improvements to increase the capacity and efficiency of the existing sewer system, GSI, and storage tanks or pipes that can hold excess polluted runoff until the storm passes to prevent sewage overflows. Before selecting the preferred strategy or combination of strategies to address sewage overflows, both agencies conducted extensive analysis and considered all the following factors:



- Technical feasibility
- Cost
- Potential impacts on and benefits to the surrounding neighborhood
- Ability to reduce sewage overflows
- Opportunity to realize additional benefits

Creek Basins

Seattle Public Utilities may also propose roadside rain gardens in your neighborhood if the drainage system is inadequate and polluted runoff from your streets is flowing directly into a nearby waterway, harming water quality.

III. Siting, design, and maintenance

I heard the roadside rain garden pilot project in Ballard had some problems and some of the rain gardens had to be removed. Why is this approach still being proposed? How will this project be different?

Seattle Public Utilities has made changes to how we site and design roadside rain gardens, based on what we learned from the pilot project:

- Leave at least 18 months for the siting and design processes.
- Conduct frequent and extensive outreach to the community to identify their priorities and concerns, understand the existing conditions, mitigate for impacts, and incorporate local knowledge and input into siting and design decisions.
- Conduct thorough technical work before siting, including extensive soil testing, surveys of residents and property owners, and walks through the neighborhood to evaluate the feasibility of potential sites.

King County closely followed the Ballard Roadside Rain Gardens pilot project and applied the lessons learned from that experience to the Barton CSO Control project.

Although Seattle Public Utilities made mistakes with the Ballard Roadside Rain Gardens pilot, both agencies learned a lot about how to work with the community to site and design roadside rain gardens. Seattle Public Utilities and King County strongly believe that roadside rain gardens are an effective strategy for reducing sewage overflows in many neighborhoods, for all of the reasons described in these FAQs.

How do King County and Seattle Public Utilities decide where to implement roadside rain gardens?

King County and Seattle Public Utilities propose GSI in neighborhoods where it can improve water quality by reducing sewage overflows. Seattle Public Utilities also proposes GSI in neighborhoods where it can reduce polluted runoff into a nearby waterway. We consider several factors in making this determination.

Before selecting specific blocks for GSI, we test the soil extensively, carefully examine the blocks under consideration, and conduct outreach to surrounding residents and businesses. Ultimately, the decision about where to site GSI rests on multiple criteria (in no particular order):

- How much stormwater could be managed

- Potential impact to existing trees
- Existing soil conditions
- Location and condition of existing utilities
- Slope of the street
- Community input
- Width of existing public planting strip
- Presence of driveways
- Existing parking congestion and availability of off-street parking
- Project construction, operation, and maintenance costs
- Opportunity to overlap with other neighborhood goals, such as bicycle and pedestrian improvements

What will the roadside rain gardens look like?

Because roadside rain gardens are living systems, their appearance will change over time. The grasses, shrubs, and trees installed at construction will grow and change as the garden matures. The plants and shrubs in the roadside rain garden may not reach full maturity for up to two years following construction, and trees may take longer to mature. In these initial years, the stormwater in the roadside rain garden will be more visible.

The plants will also look different during the different seasons of the year. Some plants will flower in the spring and summer and may go partially dormant in the fall and winter. The plants in the bottom area of the roadside rain garden—mostly grasses and rushes—are well-adapted to wet winters and dry summers. These plants will be green year-round, but they may look golden in the late summer. These changes are part of natural plant life cycles in our Pacific Northwest maritime climate and are a sign of ecosystem function and health.



December 2010



November 2011



June 2012

How are plants selected?

King County and Seattle Public Utilities select plants that help the rain garden do its job: infiltrate and clean stormwater. Plants also need to be able to thrive in the unique growing conditions of the rain garden to withstand winter and dry summers, and be easy to maintain. For projects built in the roadside planting strip, King County and Seattle Public Utilities choose shorter plants to ensure safety and visibility. The project team also works closely with community members to create landscape designs that are attractive and reflect the character of the neighborhood.

Can residents plant vegetables or other plants in the roadside rain gardens?

Specific plants play an important role in the function of the roadside rain gardens and it is important that they operate as designed. The plants in the flat bottom area of the rain garden are particularly well-adapted to thrive in the rain garden and are essential for it to function properly. For this reason, King County and Seattle Public Utilities will decide on a project-by-project basis whether residents may plant smaller plants and flowers—such as spring bulbs like crocuses and tulips and smaller annuals or perennials—along the top edges of the rain garden, away from the plants that help the rain garden function. Residents may not plant any plants in the flat bottom area of the rain garden, as this may interfere with the function of the rain garden.

Because the soils and plants are carefully selected and managed in the roadside rain gardens, it is not an appropriate place to plant vegetables that need to be harvested or dug up on a regular basis.

King County and Seattle Public Utilities typically do not use any pesticides, herbicides, or fertilizers in the roadside rain gardens. They are used only when absolutely necessary and after careful review by the maintenance team. Please do not use pesticides, herbicides, or fertilizers in the roadside rain gardens.

How much does the community have a say? How is my participation/feedback used?

Your involvement is critical, which is why King County and Seattle Public Utilities consult frequently with residents and property owners during siting, design, and construction. We will conduct outreach to the community when we are performing and analyzing soil and site tests, selecting sites, and designing the project. It is important for us to understand specific concerns and interests from residents on each block to inform our siting and design decisions. We will also report back to the community on how your input was considered and addressed in project decisions.

Before any new project is initiated, we will develop a timeline that shows key decision points and opportunities to provide your input.

What happens if it rains so much that the roadside rain gardens overflow?

The roadside rain garden is designed so that it will drain completely within 24 hours of the storm passing. The roadside rain garden will only capture the volume that can drain out within 24 hours after the rain stops. If there is an unusually large storm or a series of back-to-back storms, there may be more stormwater than the roadside rain garden can drain in 24 hours. In this case, any excess stormwater will flow out of the roadside rain garden and into the storm drain in the street or the combined sewer system.

To reduce sewage overflows, we only need to capture some of the stormwater, not all of it.

Will I see water in the roadside rain gardens?

During storms, roadside rain gardens will temporarily hold up to 12 inches of water and then drain within 24 hours after the rain ends. When there are back-to-back storms or an unusually large storm, the water level in the roadside rain gardens will rise and fall. This rising and falling water level is a sign that the roadside rain gardens are functioning properly. If the rain is falling very hard, it may look like the roadside rain garden is not draining, but it should empty within 24 hours of the storm passing.

What happens if the roadside rain garden does not drain within 24 hours?

For every roadside rain garden project, King County and Seattle Public Utilities will establish a 24/7 hotline that people can call to report a rain garden that is not draining or requires maintenance.

King County and Seattle Public Utilities monitor roadside rain gardens during storms to ensure that they are working properly. King County and Seattle Public Utilities will fix any that are not working properly.

Who is responsible for maintenance? Do residents need to maintain roadside rain gardens near their homes?

King County and the City of Seattle are responsible for maintaining the roadside rain gardens, including watering, weeding, and general upkeep to ensure the roadside rain gardens function properly. We will also prune trees and shrubs as needed.

Residents will not be asked to pay for or perform any maintenance.

The City of Seattle will do any necessary pruning of trees or shrubs. If you have a concern about tree pruning, particularly if you think there may be a public safety hazard, please call the City Arborist: (206) 684-TREE (8733)

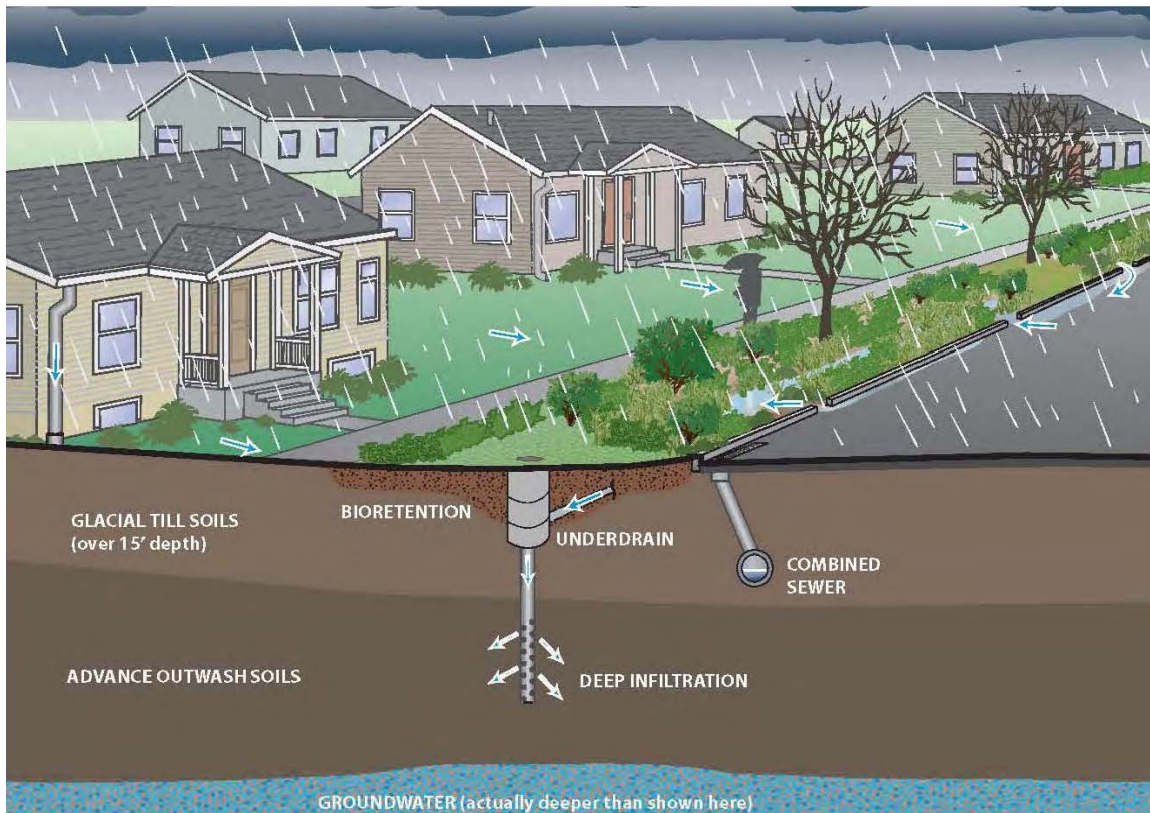
IV. Potential Impacts to Neighborhoods and Residents

Will roadside rain gardens cause water to seep into basements or drainage problems around homes?

Roadside rain gardens are designed to carry stormwater straight down into the ground, not toward yards or basements. To make sure roadside rain gardens in the public right-of-way do not cause wet basements or ponding on private property, King County and Seattle Public Utilities test soils and groundwater extensively and evaluate whether the soils are porous enough to allow water to drain down. Engineers use the information gathered from the tests to locate roadside rain gardens only where the conditions are good for infiltrating stormwater straight down into the ground, away from homes and basements.

Note that the most common sources of rainwater entering homes are the roof downspouts, which can discharge water too close to the home's foundation.

Bioretention with Deep Well Infiltration Design



Source: King County Barton CSO Control Project

How will the roadside rain gardens affect street parking?

Roadside rain garden projects in the public right-of-way are likely to affect some street parking. King County and Seattle Public Utilities know that parking and access from the street to the sidewalk are very important to residents and will carefully consider and address the impacts on parking with every roadside rain garden project. We also look at alleys and assess the condition and availability of off-street parking in alleys.

How will the roadside rain gardens affect access to my house or where I put my recycling and trash bins for pickup?

During the siting and design process, we will work with residents to ensure access to your house from the street and sufficient space for your recycling, yard waste, and trash bins for pickup. Access will be maintained, but the exact location may change slightly.

How do roadside rain gardens affect existing plants and trees in the planting strip?

Roadside rain garden projects in the public right-of-way are likely to affect some trees. However, trees are also important to reducing stormwater and we will replace any trees removed. Some smaller or unhealthy trees may need to be replaced or transplanted. A certified arborist conducts a full tree assessment on all blocks under consideration for GSI to determine which trees should be protected and which may be replaced or transplanted. It is a priority to protect trees during project construction.

How do roadside rain gardens affect property values?

It is not possible to say for sure how these projects affect the value of a particular property, as there are many factors that contribute to property value. Many property owners in close proximity to GSI projects report that they believe their property values have increased and view the roadside rain gardens as an enhancement.

V. Environmental, Health, and Safety Concerns

Will the roadside rain gardens attract mosquitoes?

Roadside rain gardens do not attract mosquitoes. Mosquitoes take 10-14 days to breed, hatch, and develop in shallow standing water and roadside rain gardens are designed to drain within 24 hours. Mosquitoes also need stagnant water (found in bird baths, old tires, dog water bowls, etc.) and roadside rain gardens are designed to constantly drain and keep water moving. Most of Seattle's rain falls in the fall and winter, when air and water temperatures are far below the minimum temperature (77° F) that mosquitoes need to thrive.

For more information on mosquitoes and prevention, please visit: www.kingcounty.gov/healthservices/health/ehs/westnile.aspx or www.seattle.gov/environment/WestNile.htm.

What about safety of children and pets when the roadside rain gardens have water in them?

Roadside rain gardens are designed with safety in mind. The roadside rain gardens will typically drain out within 24 hours following a storm and in most cases will drain much more quickly.

Will the water in roadside rain gardens be polluted or increase soil contamination in the area?

The urban pollutants that are commonplace in the public right-of-way may be present in roadside rain gardens. The natural bacteria and fungi that live in healthy soil effectively break down some of these pollutants—such as oil and grease, pesticides and fertilizers, or pet waste. Microorganisms cannot break down metals, such as trace amounts of copper from our car brakes; instead, these metals stick to soil particles. In most cases, this is a good thing, because it means the metals do not run into our creeks, lakes, and Puget Sound.

Typically, Seattle Public Utilities and King County construct multiple roadside rain gardens along a single block. These rain gardens are planted to achieve dense growth for natural treatment. This approach allows stormwater to be dispersed and treated over a large area, which helps prevent pollution from building up in a single location within a roadside rain garden. If a build-up of sediment and associated pollution should occur, we would remove and replace the topsoil at the affected location.

VI. RainWise

What is the RainWise program?

RainWise is a program offered by Seattle Public Utilities and King County Wastewater Treatment Division. It helps pay to install rain water cisterns and/or rain gardens on private properties in parts of

Seattle to reduce the polluted runoff going into the combined sewer system. The rebates cover 50 percent to 100 percent of the project cost depending on site conditions and customer choices. To receive a rebate, homeowners must live in an eligible RainWise drainage basin. Check eligibility at the RainWise tools web site at www.rainwise.seattle.gov.

What is the purpose of RainWise rain gardens and cisterns?

By having rain gardens and cisterns on private property, Seattle residents help soak up and filter rain rather than having it run off their property and into the sewer system. This helps prevent sewage overflows.

We can all slow the flow of polluted runoff from our rooftops by taking simple steps that make our yards act more like a forest, with absorbent soil. If we capture the rain water in a large cistern, it can provide some water during the summer.

Why are King County and Seattle Public Utilities providing this funding?

Seattle Public Utilities and King County are working to reduce sewage overflows in Seattle using a combination of conventional solutions (constructing big pipes and underground storage tanks) and GSI like rain gardens and rain cisterns. As part of that investment, RainWise rebates are helping residents reduce polluted runoff from their property in parts of Seattle where sewage overflows happen.

How are RainWise-eligible areas chosen?

RainWise rebates are available only in areas where sewage overflows occur and where implementing RainWise can help solve the problem cost-effectively. RainWise rain gardens and cisterns provide extra capacity in the system.

Additional eligible RainWise areas are slated to be added in the future, so check www.rainwise.seattle.gov periodically to check the eligibility of the area where you live.

I'm not in a target basin; can I still install a rain garden or rainwater cistern?

Yes, but you will not be eligible for a rebate. Doing this will help the environment and give you the benefits of having a rain garden (beautiful landscape, helps with drainage around house, provides habitat for birds and pollinators) or a cistern (source of irrigation water in summer).

How can I participate in the RainWise Rebates Program?

1. Check your eligibility by typing in your address at www.rainwise.seattle.gov or if you don't have web access, call the Garden Hotline at 206-633-0224.
2. Get bids and choose a RainWise-trained contractor by clicking on the 'Find Contractor' section at www.rainwise.seattle.gov.
3. Your contractor will handle construction and required inspections.
4. Submit your rebate request forms within 90 days after approval of the inspection and enjoy your RainWise yard.

How much is the average rebate?

The average rebate amount is about \$4,400 (as of 09/03/13). Currently the program pays \$3.50 per square foot of roof area where the runoff is being directed into a rain garden. For example, if there is 1,000 square feet of roof area being collected, the rebate for a rain garden would be \$3,500. Cisterns (not connected to a rain garden) are rebated at a lower rate because they are not as efficient. The rebate for a

cistern will vary depending on the size and number of cisterns. Your contractor will help you figure out what your rebate will be before the project starts.

What do I need to get started?

Your address is all you need to check your eligibility at www.rainwise.seattle.gov.

What else can I do to help protect our waterways and Puget Sound?

Besides slowing the flow of polluted runoff with RainWise rain gardens and cisterns, it is also important to keep pollutants out of our streams, lakes, and Puget Sound. Here are some ways you can help:

1. Don't use pesticides
2. Fertilize moderately
3. Clean up pet waste
4. Keep soap, cleaners, paints etc. out of storm drains
5. Fix oil and fluid leaks in cars

For more, visit www.kingcounty.gov/environment/wtd/Education/ThingsYouCanDo or www.seattle.gov/restoreourwaters.