2017–2018 Overview and Accomplishment Report

Green Stormwater Infrastructure

King County

Seattle Public Utilities

Working Together to Reduce Polluted Runoff with Green Stormwater Infrastructure

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The King County Wastewater Treatment Division (WTD) and Seattle Public Utilities (SPU) are working together to bring green solutions to Seattle's neighborhoods and manage our rainfall runoff naturally. Plants, trees, soils, permeable surfaces, and engineering inspired by natural drainage processes work to capture, slow down, and treat rain where it falls so it doesn't become polluted runoff.

Stormwater runoff is a major cause of pollution in Puget Sound. It carries a soup of trash, bacteria, heavy metals, and other pollutants into local waterways. SPU is using green stormwater infrastructure (GSI) to improve the quality of stormwater before it enters the drainage system in Seattle's three major salmon-bearing creeks: Thornton, Piper's, and Longfellow. In some Seattle neighborhoods, both storm and sewer pipes are connected. Heavy rains in these areas can cause combined sewer overflows (CSOs) into nearby waterways. WTD and SPU are working together to control these overflows using GSI as one solution.

In addition to keeping local water bodies clean, GSI projects provide many other benefits: they can bring nature and beauty to neighborhoods, help calm traffic, improve pedestrian safety, capture rain for reuse, and protect our wastewater system infrastructure.

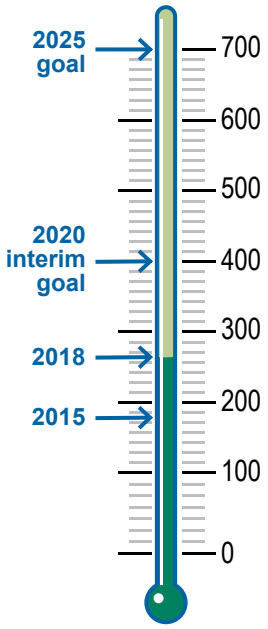
Installing nature-based drainage solutions on both public and private property helps Seattle to be a sustainable and resilient city as we confront the challenges of population growth and climate change. To this end, partnerships with other government agencies, developers, and private-property owners are key to our collective success. This 2017–2018 report highlights current and planned GSI projects. It also highlights opportunities for creating collaborative partnerships and funding sources for future GSI projects to keep our water clean and our city green.

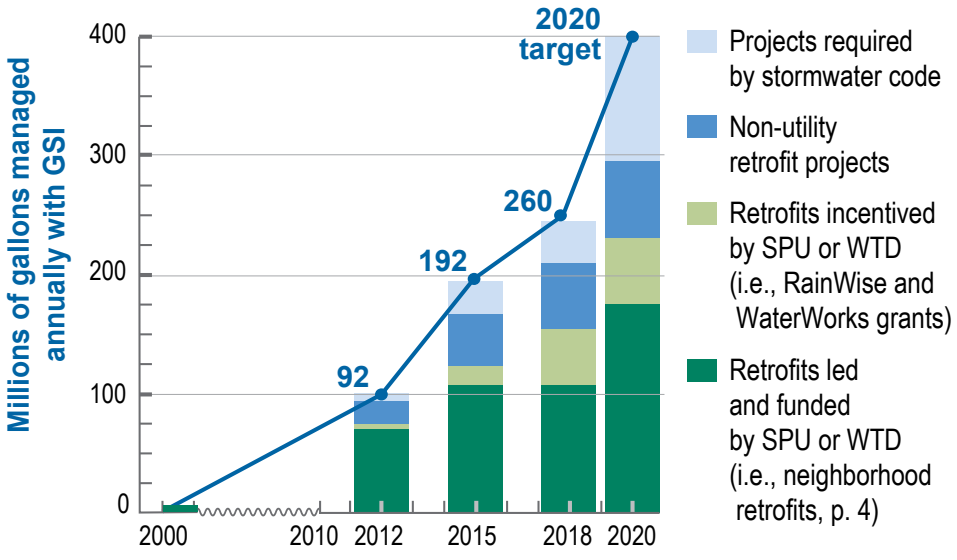
How Are We Doing?

Green Stormwater Infrastructure Implementation Progress

Seattle is well on its way toward achieving its goal to manage 700 million gallons of stormwater annually using green solutions by 2025.
Our interim goal is to manage 400 million gallons annually by 2020.

Green stormwater infrastructure helps make our streets work more like the forests and natural areas we have lost over time.





We are now managing 260 million gallons of stormwater annually, with the goal of 700 million gallons by 2025! 2019 will bring planning and design for multiple new GSI projects described later in this report.

Barton Basin parking strip before GSI.

Barton Basin parking strip transformed into a roadside rain garden.

Green Stormwater Infrastructure Neighborhood Retrofits

WTD and SPU lead large capital projects to help our streets function more like forests and let the rain soak into the ground naturally rather than run off. These projects treat and reduce the volume of stormwater runoff, which improves the quality of water that enters our creeks and helps prevent CSOs into nearby water bodies.

1 Sunrise Heights and Westwood neighborhoods of West Seattle's Barton Basin

LOCATION: between 30th Ave. SW and 34th Ave. SW, and between SW Othello and SW Trenton

Fifteen blocks of roadside rain gardens (bioretention swales) drain to underground injection control wells and manage runoff from about 32 acres. This project captures and infiltrates about 13 million gallons of runoff annually, helping prevent CSOs into Puget Sound.

The WTD Barton Roadside Rain Gardens Project was honored with a Local Outstanding Civil Engineering Achievement Award in 2017. As of 2018, the project has completed its fourth year of operation, monitoring, and maintenance. The rain gardens are effectively managing runoff and meeting performance expectations.

In 2018, public safety was enhanced by clearing and leveling the step-out areas between curbs and the swales, giving residents clear access to their vehicles. In fall 2018, WTD's Mitigation and Monitoring Program will refine the plant palette, lowering the cost of maintenance and increasing year-round coverage and plant diversity.

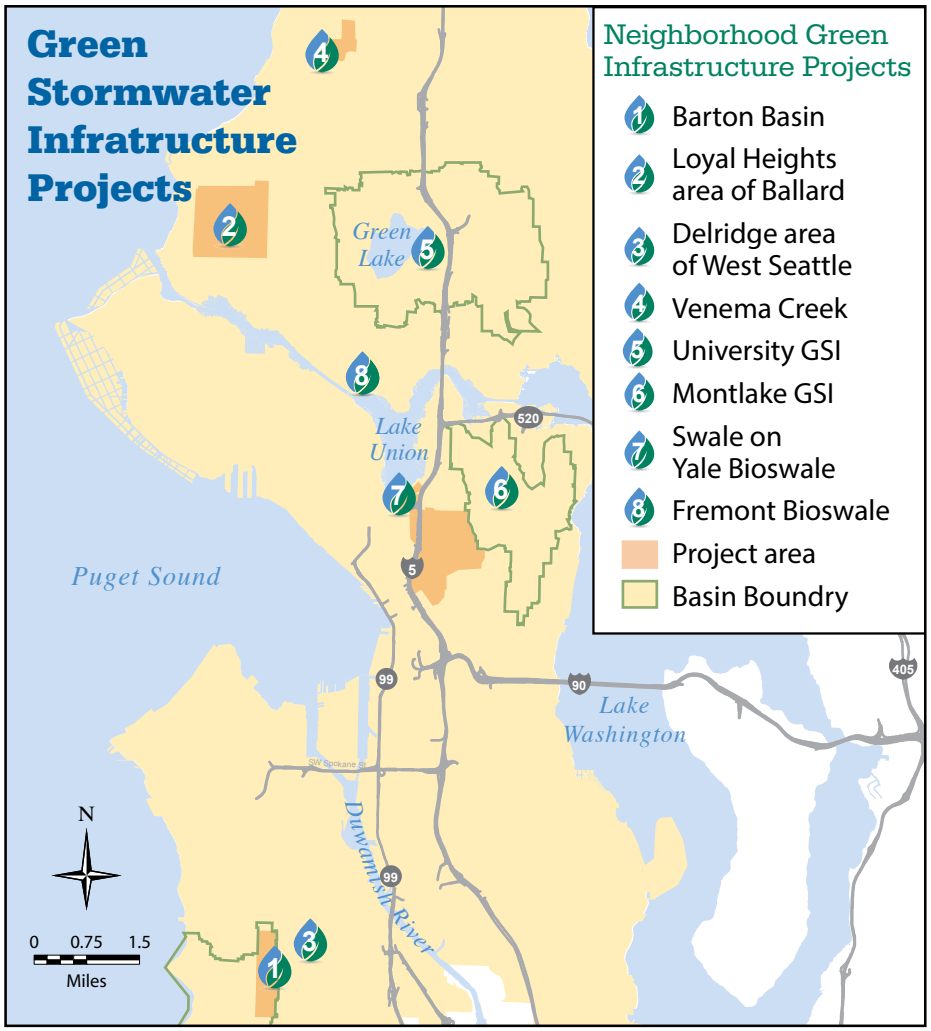
tinyurl.com/BartonRoadsideRainGardens
tinyurl.com/BartonCSOcontrol

2 Loyal Heights area of Ballard

LOCATION: 17th and 26th Ave. NW between NW 83rd St. and NW 77th St., 19th Ave. NW between NW 77th St. and NW 75th St., and NW 75th St. between Jones Ave. NW and 17th Ave. NW

Twelve blocks of bioretention swales manage runoff from 5.5 acres and infiltrate 4.2 million gallons of runoff annually, helping prevent CSOs into Salmon Bay.

This project featured a Safe Routes to School and Neighborhood Greenways collaboration with the Seattle Department of Transportation (SDOT) to shorten crossings and add curb ramps near Loyal Heights Elementary School and the 17th Ave. NW Greenway. It piloted the use of structural soil cells under the sidewalk to increase the bottom/infiltrative area of the cells without bumping out into the street, which would have removed parking.



What do people who live on a street with one of these GSI projects say?

"We can't thank you enough for how the project has enhanced the neighborhood, and quite probably, the value of our homes. During the absolute gully-washer/monsoon we had this winter, the system worked wonderfully. The retention swales filled up fairly quickly, but the overflow was progressively absorbed by the curb cuts and the whole design seemed to work exactly as advertised. Congratulations!

We brag about your project at every chance we get, and our friends from other parts of town are green with envy."
–Bob, homeowner from West Seattle

3 Delridge area of West Seattle

LOCATION: 17th Ave. SW, between SW Henderson St. and SW Kenyon St.

Sixteen blocks of bioretention swales that drain to underground injection control wells manage runoff from 5.7 acres. This project captures and infiltrates 4.4 million gallons of runoff annually, helping prevent CSOs into Longfellow Creek.

Like several other GSI projects, this one also involved the installation of curb ramps on multiple intersections to improve pedestrian accessibility. Specifically, curb bulbs were installed on SW Henderson St., SW Elmgrove St., and 17th Ave. SW to shorten crossing distance, improve visibility and access, and slow traffic. SDOT also planted new street trees on project blocks and enhanced the Neighborhood Greenway route on 17th Ave. SW.

SPU is using funding from a 2018 King County WaterWorks Grant to evaluate the underground injection control wells' performance and the need for operations and maintenance on both this project and the Venema project on page 6. This work includes video inspections, controlled injection rate capacity testing, and water level monitoring, in addition to analyzing data and compiling a summary report.

4 Venema Creek in the Piper's Creek Watershed in the Broadview neighborhood

LOCATION: on NW 120th St. and NW 122nd St., between 3rd Ave. NW and Palatine Ave. N

Five blocks of natural drainage systems drain to underground injection control wells. This project captures and infiltrates 70% of the runoff from 80 acres of roadway and impervious surfaces that originally flowed untreated into Venema Creek, a tributary of Piper's Creek.

SPU's construction and plantings were completed in 2015 to reduce the volume and improve the quality of stormwater runoff in Venema Creek, and increase stormwater conveyance in the surrounding neighborhood of Broadview. The project improved pedestrian accessibility by installing 1,600 feet of new sidewalks and curb ramps and included designs that slow traffic. New street trees were also planted along project blocks.

Venema Creek neighborhood bioretention swale.

5 University GSI Project

LOCATION: For a map of the basin area and more information, go to kingcounty.gov/NaturalDrainage

WTD's University Green Stormwater Infrastructure Project is investigating the use of GSI to help control CSOs at Portage Bay. In 2017–2018, the project team studied soil, groundwater, surface water flow, and street conditions in the project area to identify the best locations for GSI projects to be installed. WTD will consider what types of GSI it should build, and where within the study area they should be installed. Construction is planned for 2021–2023, with early action projects planned for 2019.

6 Montlake Basin GSI Concept Development Project

King County is taking a preliminary look at opportunities to use GSI solutions in the Montlake, Central, and Capitol Hill areas to control sewer overflows in Lake Washington and Lake Union. The project is looking at factors such as geology, topography, and water table to see if there are areas where natural drainage solutions would be feasible. Recommendations are expected in late 2018. If the findings are positive, then more thorough planning, investigation, and outreach will begin in 2019.

Capitol Hill Water Quality Project–Swale on Yale

LOCATION: on Yale Ave. N and Pontius Ave. N, between Republican St. and Thomas St.

When it rains, polluted runoff from over 600 acres of North Capitol Hill drains into Lake Union. The Capitol Hill Water Quality Project–Swale on Yale is an innovative public-private collaboration between Vulcan Inc. and SPU to reduce the amount of pollution flowing into Lake Union.

About 190 million gallons of polluted runoff from a portion of the storm drains flows by gravity through this project's biofiltration swales. The runoff is filtered by the root structures of the rushes and sedges and the soil systems in the swales so the water flowing to the lake is cleaner.

This project uses an innovative partnership to support Seattle's effort to provide water quality treatment to polluted stormwater runoff and meet the citywide goal of managing 700 million gallons of stormwater with GSI. The cost of this project was about $12 million. SPU received a Stormwater Retrofit and Low Impact Development Competitive Grant from the Washington State Department of (Ecology) and a loan from the Washington State Water Pollution Control Revolving Fund Loan Program. Vulcan Inc., a private company, provided technical and professional services and a portion of the funding for design and construction of the project.

Swale on Yale

GSI Integration into transportation improvements

SPU worked with SDOT to integrate new design guidance and updated policies for GSI in the public right-of-way for Seattle's Right-of-Way Improvement Manual and the Pedestrian Master Plan update.

streetsillustrated.seattle.gov

GSI can help stop erosion and clean stormwater before it enters Seattle's three major salmon-bearing creeks: Thornton, Piper's, and Longfellow.

Green Stormwater Infrastructure Community Programs

Natural Drainage System Partnering Program (NDS)

SPU's NDS Partnering Program will build about four miles of bioretention swales within street rights-of-way within the Thornton, Longfellow, and Piper's creek watersheds by 2025. The program will manage flow and provide water quality treatment for 44 acres of impervious area. SDOT and SPU's localized flooding program are key partners.

This effort is on track to complete construction of the first project in 2019, on the east side of 30th Ave. NE, between NE 130th St. and NE 137th St.

The package of projects currently under design includes new facilities in all three creek watersheds, and is projected to treat 67% of the program's total acreage requirement with 52% of the program costs. This partnership is a key part of SPU's 2015 Integrated Plan.

GSI in Urban Villages Program

SPU and Seattle City Council created the GSI in Urban Villages Program to compliment proposed upzones through the Housing Affordability and Livability Agenda, as well as the City's overall growth strategy. Upzones are areas where zoning changes add development capacity and expand affordable housing options. This new program has flexibility to address a variety of system problems within urban villages and urban centers, including flooding, sewer backups, water quality, and creek protection. In addition to providing new GSI facilities that provide near-term benefits in growing neighborhoods, SPU intends to use this program as a way to develop new partnerships and approaches to GSI implementation. Stay tuned to learn more about Phase 1 projects in 2019.

The RainWise program provides incentives for private-property owners to be part of the stormwater pollution solution.

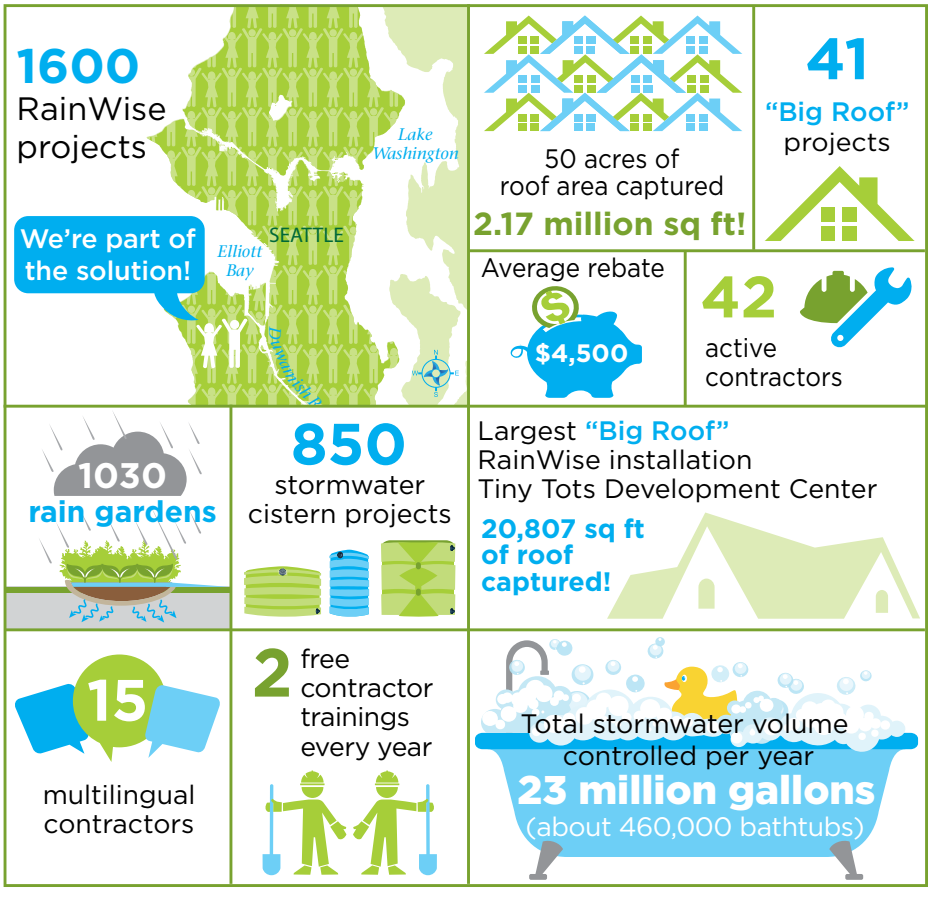
The RainWise program, a partnership between SPU and WTD, is available to about 50,000 properties in Seattle. RainWise is nationally recognized as a leader in providing incentives for private-property owners to install small-scale GSI–rain gardens and cisterns–to help control stormwater pollution.

Jennifer loves her cistern!

RainWise rain gardens add beauty and function to a yard.

"We are delighted with our new RainWise water storage system. We have three new 250-gallon tanks that irrigate our gardens perfectly. The RainWise application and refund process worked very well. Our HUGE rebate makes us smile every time we see the tanks… and we'll save money every summer on water. It's also nice that everyone who visits, from friends to contractors to mail delivery, is so impressed by the tanks. We have often heard, 'Wow, that's brilliant!' Thanks, RainWise, for a super smart program that really benefits homeowners."
–Burt H., homeowner in Seattle

More information:
700milliongallons.org/RainWise
facebook.com/SeattleRainWise/



Highland Park United Methodist Church congregation appreciates their cisterns.

Big Roofs Make a BIG Impact

RainWise enthusiastically recruits the participation of "Big Roof" properties—non-residential properties that usually have roofs over 2,000 square feet. In addition to managing a lot of rain, these projects are typically demonstration projects and generate lots of interest from the surrounding neighborhood. The current portfolio of Big Roof projects includes over 20 faith-based organizations, six community centers, apartment complexes, several schools, and several businesses. Do you have a potential Big Roof project? Please reach out to RainWise staff at rainwise@seattle.gov.

Promoting equity and inclusiveness

The RainWise program strives to provide an equitable program in a number of ways.

A big achievement in 2017–2018 with the creation of a user-friendly funding mechanism for working with community-based organizations to help with outreach. King County created the RainWise Outreach Grant Program that allows nonprofit and small businesses certified as a Small Contractor and Supplier with King County's Business Development and Contract Compliance Office to apply for grants.

tinyurl.com/RainWiseOutreachGrants

Reaching out to multicultural communities

RainWise funds outreach efforts to multicultural residents that include providing additional customer service and coaching of clients that need extra help navigating the installation and rebate process of the program. Cultivating demonstration projects at places of worship and community gathering places is also a strategy for engaging specific, diverse communities. ECOSS is a key partner in this effort, with a staff that speaks over 16 languages.

Recruiting and coaching diverse contractors

As a result of an ongoing effort to maintain a diverse contractor pool and provide support through training and coaching, RainWise now has four Vietnamese contractors, two Chinese contractors, and nine contractors that speak Spanish in the RainWise contractor pool.

Creating financial tools

- The RainWise Access Grant provides funding to make up the difference (up to $500) between what the rebate covers and the final cost of a RainWise installation for low-income clients.
- The RainWise Pilot Access Loan, offered through Craft3, allows contractors to get funding up front and eliminate the need for out-of-pocket expenses from income-challenged clients.

rainwise.seattle.gov
facebook.com/SeattleRainWise/
rainwise@seattle.gov

ECOSS staff demonstrating how a cistern works.

"The members of Prospect United Church of Christ are excited to have these two cisterns as tangible evidence of our willingness to walk the talk about caring for our environment. We talk about environmental justice and climate change and are pleased to be taking this step to mitigate stormwater runoff in our community."
–Meighan Pritchard, Church Pastor

Imagine a city where we are capturing and treating road runoff from all our bridges!

Innovation and Partnerships

Fremont Bioswale Project

LOCATION: Troll Ave. N, between N 35th St. and N 34th St.

"We saw a video showing baby salmon being put in water runoff from the 520 bridge and instantly dying. And then we saw them surviving after they were put in water that had been passed through soil a few times." This video inspired the fish-friendly Fremont Bioswale Project at the corner of 34th and Troll Ave. in Fremont, where two new buildings, the Data 1 and Watershed buildings, are being built. Stephen C. Grey & Associates is developing the GSI projects with First Western Development Services.

The two new buildings capture runoff from the Aurora Bridge and pass it through soil cells, cleaning the runoff before it reaches Lake Union. The bridge's runoff at this site impacts a critical migration route for salmon on their trip out to the Pacific Ocean as well as their return trip to the upper watershed spawning grounds. The developers chose to certify their projects through Salmon-Safe. Salmon-Safe conducted water quality testing from the downspouts of the bridge. Bridge runoff samples were taken in 2017 to determine what pollutants were in the water and provide a water quality baseline for testing bridge runoff and treatment over the next five years.

In the future, the developers aspire to go further by building a bioretention swale under the bridge across North 34th St., adjacent to Lake Union. When the bioswale is complete, 1,835,000 gallons of runoff will be treated annually. Currently, 98 million gallons of polluted water drains from the six bridges that span the Lake Washington Ship Canal, so this project serves as an inspiration for future retrofits of all of these bridges. To date, the Aurora Bridge project has been supported entirely by private funding from landowners at Stephen C. Grey & Associates, Boeing, and an anonymous donor.

This project serves as an excellent example of the type of innovative partnership SPU and WTD would like to see more of and support.

Green Infrastructure Partnership (GrIP)

The Green Infrastructure Partnership (GrIP) is a group of interested parties that fosters the voluntary adoption of GSI. GrIP is free and open to all. It supports collaboration and offers ongoing monthly forums to learn about advances in GSI. SPU and WTD serve on the steering committee and offer operational support to GrIP.

700milliongallons.org/grip/

Green Infrastructure Summit

The annual Green Infrastructure Summit, convened by Stewardship Partners, draws GSI thought leaders from across the region to learn about and collaborate on ways our region can realize cleaner waters and healthier, more equitable communities. The 2018 summit emphasized green infrastructure jobs and pathways for youth of color. The next summit will take place on February 8, 2019.

12000raingardens.org/summit

Regional Capacity Building City Habitats Coalition

King County and the City of Seattle are active partners in the City Habitats Coalition, alongside The Nature Conservancy, Stewardship Partners, and The Washington Environmental Council. The coalition works across the Puget Sound region to address barriers to incorporating nature into our cities. Over 100 partners collaborate on policy and funding opportunities to build a movement around nature-based solutions, implement on-the-ground projects to address stormwater pollution, and much more.

cityhabitats.org

Guy Michaelsen, landscape architect, discusses the water quality and habitat benefits of the Magnuson Park wetlands project as part of a GrIP field trip.

The Green Infrastructure Leadership Exchange

The Green Infrastructure Leadership Exchange is a national network of public GSI program staff that develop, host, and share resources to advance the benefits and viability of green infrastructure. The exchange provides opportunities for peer learning, problem solving, partnerships, and advocacy. Both SPU and WTD participate in the exchange and benefit from the opportunities for collaboration and tackling common issues.

giexchange.org

King County Water and Land Resources Division Stormwater Services

The Water and Land Resources Division is developing a GSI incentive program for commercial and private-property owners in unincorporated King County. The hope is to include rain gardens, cisterns, tree planting, and depaving as part of the program. As of 2018, two pilot projects are currently underway.

Seattle 2030 District Partnership

The Seattle 2030 District (District) works with building owners, developers, architects, engineers, local government, and nonprofit organizations to reduce the environmental impacts of building construction and operations. As part of their green stormwater programs, the District created the Greener Belltown = Bluer Sound report that identified ways to repurpose underutilized land to manage stormwater in Belltown. They also created a guide to educate developers and building managers on opportunities and resources available to build GSI installations on their properties.

2030districts.org/seattle

WaterWorks Grant Program

King County's WaterWorks Grant Program provides grants of $20,000 to $250,000 for projects that improve water quality and encourage community partnerships, including GSI projects. Feel free to contact WTD's WaterWorks grant program staff to discuss future project ideas.

kingcounty.gov/waterworks-grants

More than 350 volunteers contributed over 1,100 volunteer hours to make this project happen.

Paradise Plots not only reduces impervious surface and polluted runoff, the transformed site offers a place for community members to bond while growing food.

PARADISE PLOTS COMMUNITY GARDEN—TWO GRANTS FOR $219,227

World Relief Seattle and the Hillside Church are reducing stormwater pollution and controlling flooding through the inventive use of GSI. The organizations removed asphalt, built 50 garden plots, and installed four 4,000-gallon cisterns. Cisterns provide 80% of the garden's watering needs. Rain gardens will be added next, and community engagement and education is ongoing.

tinyurl.com/HillsideParadiseParkingPlots

Bio-barges in the Duwamish River.

Wetland plants growing on a bio-barge.

Students building floating wetlands.

DUWAMISH FLOATING WETLANDS—$236,000 GRANT

Floating wetlands are an innovative technology that may improve water quality and help young salmon survive as they migrate to the ocean. In 2018, four floating wetland "bio-barges" were constructed by students in the floating wetland studio taught by the University of Washington's Green Futures Lab. These will be deployed to different sites along the Duwamish River and monitored.

...continued on p. 14

WaterWorks Grant Program continued from p. 13

LABATEYAH HOUSE—
$59,000 GRANT

United Indians of All Tribes runs Labateyah House, a transitional youth home that provides housing and other services, with a focus on culturally appropriate services for Native youth. They will install a rain garden at the youth home, and also establish an environmental internship program and water stewardship education program with Native cultural components.

kingcounty.gov/waterworks-grants

MINI-GRANTS

Small grants of up to $1,500 for homeowners and up to $4,500 for limited-income landowners are available to increase the number of GSI projects throughout the King County Wastewater Treatment Division service area.

FOR DETAILS, VISIT
12000raingardens.org/gsi-mini-grants

A stormwater cistern being installed by DIRT Corps.

DIRT Corps crew members mulch and weed a rain garden at United Methodist Church in Highland Park.

Green Job Training

Duwamish Infrastructure Restoration Training (DIRT Corps)

The bilingual Duwamish Infrastructure Restoration Training (DIRT Corps) Program provides robust green infrastructure on-the-job training for diverse cohorts of young adults. Women, people of color, and un/underemployed adults are encouraged to join and develop leadership skills. Over 40 individuals were trained in 2017–2018. Graduates have gone on to start their own companies, work for RainWise contractors, and are sought after by firms in the GSI field. King County WTD has consistently funded this training program.

In 2018, DIRT Corps provided monitoring and maintenance support for over 45 residential and five "Big Roof" RainWise installations. It also offered maintenance troubleshooting for property owners, hosted educational events, and provided repair services when needed.

As part of King County's 1 Million Trees Initiative, DIRT Corps procured, distributed, and planted over 830 trees on public and private properties from January 2017 to April 2018 through free neighborhood tree pickup events.

thedirtcorps.com

SPU and WTD monitor all GSI projects to determine the level of work needed to maintain healthy plants and ensure the facilities function properly.

Green Stormwater Infrastructure Maintenance

Seattle Conservation Corps

SPU partners with Seattle Conservation Corps (SCC) to maintain its GSI facilities in the public rights-of-way. SCC trains homeless adults and provides them with opportunities to work on projects that directly benefit Seattle neighborhoods and the environment. SCC sells and delivers rain barrels, cisterns, and other natural yard care supplies to Seattle residents.

seattle.gov/parks/about-us/do-business-with-us/supplies-for-sale

Ongoing maintenance for capital projects

SPU and WTD have 24/7 hotlines to report drainage problems or other maintenance concerns for roadside rain garden/bioretention swale projects:

- For SPU facilities, call 206-386-1800
- For WTD facilities, call 206-263-3801

tinyurl.com/BioretentionCareGuide

RainWise contractors

The RainWise program generates green jobs. Over 42 contractors have added RainWise to their business offerings. Additionally, 1,600 installations have gone in since the program started in 2010. Participation is open to any business that obtains the appropriate licenses and insurance and completes a free training.

700milliongallons.org/rainwise/contractor-resources/

Multiple Benefits of Green Stormwater Infrastructure

Unlike pipes and treatment plants that collect and clean polluted runoff after it travels for miles, GSI uses plants, trees, soil, and engineering inspired by natural drainage systems to manage stormwater where it falls. By mimicking natural processes, we protect our waterways AND enjoy numerous other benefits.

Green Stormwater Infrastructure...

- brings nature to where we live, work, and play
- increases the number of trees and plants in our neighborhoods
- creates "mini parks" and more plants
- provides habitat for pollinators
- improves air quality–naturally
- replenishes groundwater

To learn more, visit:
www.700milliongallons.org

Calms traffic and creates safer walkable and bike-able streets

- slows down traffic on neighborhood streets with curb bulbs
- gives us beautiful streetscapes and bicycle corridors

Contributes to health and wellness by adding in more green space

- research supports this link between green space and improved health:

tinyurl.com/TNCCascadingBenefits

Helps prevent flooding and erosion damage

- slows flows and reduces runoff volume
- provides conveyance where there is none

Increases sewer capacity in a cost-effective way

- saves money and energy
- protects existing sewer system infrastructure
- provides resiliency in planning for population growth
- helps mitigate climate change challenges

Thank you to the King County and SPU staff and other partners who work on GSI and contributed to these accomplishments.

Project management, writing, editing:
Jo Sullivan, King County Wastewater Treatment Division
Cari Simson, Urban Systems Design

Copy editing:
Kathleen White, King County Wastewater Treatment Division

Graphic design:
Andrea Rouleau, King County Department of Information Technology (KCIT), Design & Civic Engagement (DCE)

Alternative formats available
206-477-5371 TTY relay: 711

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Wastewater Treatment Division

Seattle Public Utilities

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