Green Stormwater Infrastructure

Overview and Accomplishment Report

Nature-based solutions for managing polluted runoff

King County

Seattle Public Utilities

SPRING 2020

Highland Park Elementary School students help plant two large rain gardens with King County Councilperson Joe McDermott. Seattle Public Schools is an important partner for installations of green infrastructure on their properties.

Green stormwater infrastructure (GSI) cleans our water, builds healthy habitat, and enhances communities.

As we enter a new decade and our region experiences rapid growth and a changing climate, green stormwater infrastructure, or GSI, is more important than ever. GSI uses plants, trees, soil, and a collection system to slow and treat rain once it hits the ground and becomes polluted runoff. Incorporating nature into the built environment helps our developed urban areas work more like forests and natural areas. This, in turn, helps reduce flooding, sewer overflows, and other types of pollution from entering our waterways.

The Murray Pump Station in West Seattle features a green roof, permeable pavement, a bioswale, and two tree box filters that collectively manage runoff from a half acre adjacent to the facility.

GSI is a proven pollution solution that is effective in a variety of locations—from single residences to multi-family housing to commercial buildings to public rights-of-way along parking strips, as well as in parks, schools, and other green spaces. GSI includes, but is not limited to, the following:

- Rain gardens
- Stormwater cisterns
- Green roofs
- Bioretention swales (also called “natural drainage systems” in the right-of-way)
- Depaving (removing unnecessary paved spaces)
- Permeable pavements
- Mulch, soil amendments, and plants
- Tree canopy preservation and expansion, especially conifers

Working together to manage 700 million gallons of rain naturally!

The City of Seattle plans to use green stormwater infrastructure (GSI) to manage 700 million gallons of stormwater by 2025. As we enter 2020, 270 million gallons of stormwater are being managed with GSI every year. Together with the King County Wastewater Treatment Division (WTD), Seattle Public Utilities (SPU) is pursuing a multi-pronged strategy to meet the 700 million gallon target in Seattle. (Visit 700milliongallons.org to learn more about how the two utilities are working together.)

Polluted water, soil, and air have higher impacts on communities of color and lower-income neighborhoods. GSI must be a solution that creates opportunities for addressing public health, workforce development, youth empowerment, walkability in neighborhoods, and safe and inclusive access to green gathering spaces in these communities.

Growing new partnerships across public, private, nonprofit, philanthropic, and education sectors is key to our success. Partnerships help accelerate and amplify our work. They open new avenues for investment that grow expertise, capacity, and awareness of GSI. Partnerships also foster new models to get more—including more innovative—GSI built across Seattle and King County.

GSI is a key tool for protecting clean water and healthy habitat as the region responds to climate change and rapid population growth. For example, thanks to the City of Seattle and multiple partners across King County, the milestone of planting over a million trees on public and private property has been achieved. Trees help offset stormwater runoff and the effects of climate change, and improve public health and increase wildlife habitat. Learn about the County's efforts to plant one million trees here: tinyurl.com/onemilliontrees and the City of Seatle's work here: seattle.gov/trees

This report highlights key GSI efforts underway and opportunities to work together to keep our water clean and our city green.

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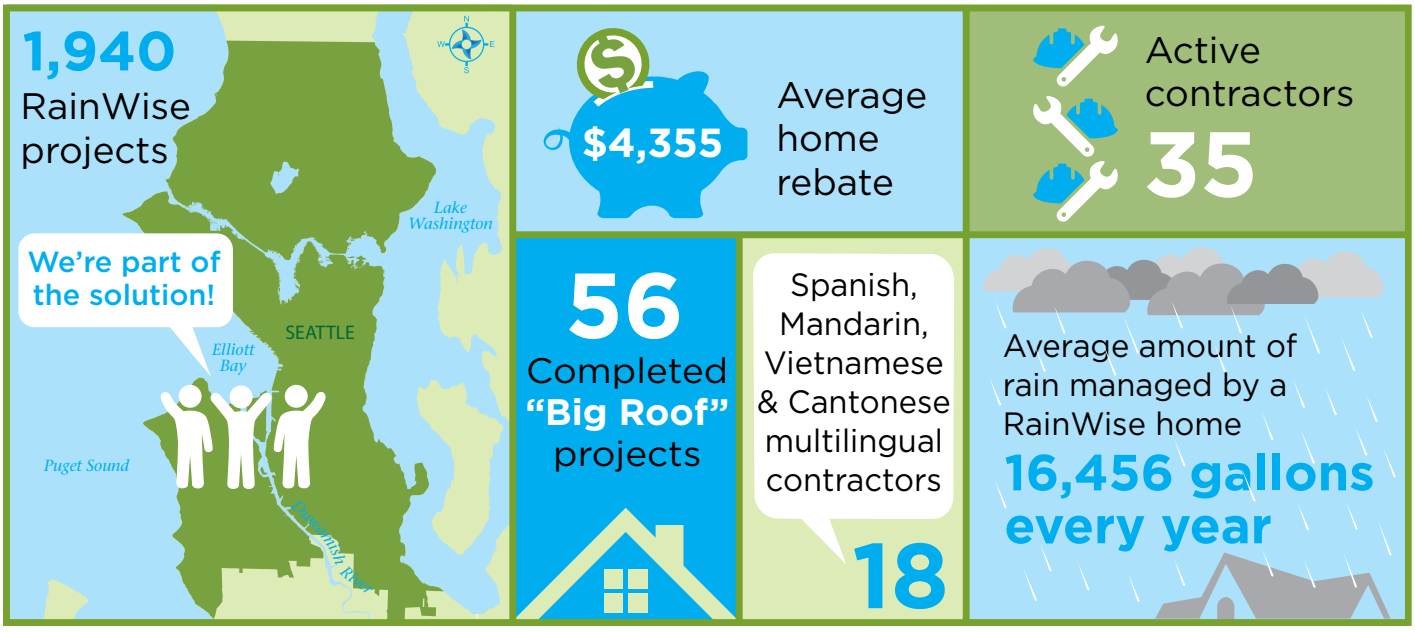
RainWise

Private Property Owners Are an Important Part of the Solution

The RainWise program, a partnership between SPU and WTD, is nationally recognized as a leader in providing incentives for private property owners to install small-scale GSI (rain gardens and cisterns) to help manage the rain that falls on their roofs. These installations add attractive landscaping, can provide water for summer irrigation, and may also help prevent or reduce flooding. Find out if you qualify for rebates, see examples of rain gardens and cisterns, and learn more about how to get RainWise at 700milliongallons.org

RainWise BY THE NUMBERS



Big Roofs Make a BIG Impact

Alpha Omicron Pi members are concerned about environmental justice and climate change. Walking their talk, they installed four large cisterns to mitigate stormwater runoff in 2019. They encourage other members of the Green Greek community to join in the RainWise program to continue the process of sustainability on the University of Washington campus and in the Seattle area.

Extending the reach of GSI beyond single-family residences, RainWise proactively recruits the participation of "Big Roof" properties, which are properties that typically have roofs over 2,000 square feet. In addition to managing a large volume of rain, these projects often serve as demonstration projects and generate a lot of interest from residents in the surrounding neighborhood. The RainWise program's current portfolio of Big Roof projects includes over 37 faith-based organizations, seven multifamily dwellings, five businesses, and seven schools.

Do you have a potential Big Roof project? Let us know at rainwise@seattle.gov
Learn more about how to get RainWise: **700milliongallons.org/rainwise**

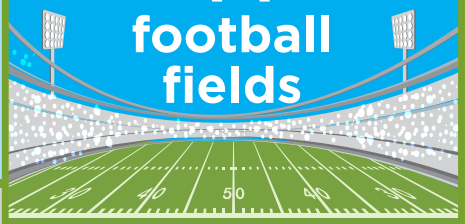
MORE RainWise BY THE NUMBERS

1,323
Average square feet of roof area captured for single family home

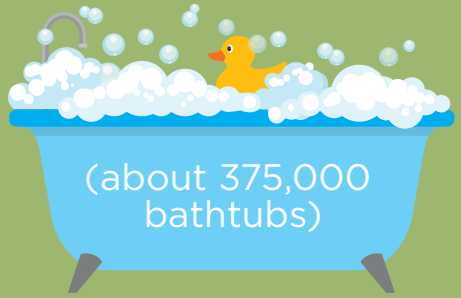
More than **1,140** cistern projects

More than
1,030
rain gardens

2,370,290 total square feet of roof area captured =
44
football fields



Amount of stormwater controlled by RainWise projects
25 million gallons every year



(about 375,000 bathtubs)

RainWise

Making RainWise Work For Everyone

SPU and WTD outreach contracts with ECOSS helped over seven RainWise contractors who speak Chinese, Vietnamese, and Spanish complete the RainWise Orientation in 2019, and supported them through their first projects.

Equitable program delivery is important to the RainWise program. Resources continue to be provided for multicultural outreach to recruit and support diverse RainWise contractors, provide financial tools that help low-income private property owners participate in the program, and support workforce development for women and people of color to succeed in the GSI field.

Seattle Housing Authority (SHA) completed their first RainWise installation at Willis House, a residence for low-income seniors. Planning is underway at several other SHA properties.

Young's Restaurant, the first RainWise restaurant, received a Green Globe Award for being a leader in green stormwater solutions. Their three cisterns will help keep more than 11,000 gallons of stormwater out of the combined sewer system each year.

A WTD contract with DIRT Corps funded training in GSI design, construction, and maintenance to underemployed adults, and many graduates are now working in the GSI field. Several have become RainWise contractors.

The Swale on Yale project is an innovative public-private collaboration that reduces the amount of pollution going into Lake Union. tinyurl.com/spotlight-swale

How SPU Is Expanding the Use of GSI within Seattle

SPU strives to accelerate the use of GSI by building innovative cross-sector partnerships, leveraging investments to support a broader set of community outcomes, and expanding its GSI toolbox to create new and innovative green approaches to stormwater management.

- **Growing Partnerships:** Partnerships accelerate and amplify our work. Examples include developer collaboration to manage off-site stormwater as part of a major renovation, work with property owners to retrofit existing areas, and growth of regional relationships to help drive private investment.
- **Supporting Community:** Utility investments can be leveraged to achieve greater community benefits. SPU is expanding its approaches to delivering public health outcomes that extend beyond pollutant runoff reduction. These outcomes can be realized by hiring from within the community, maximizing green and recreational spaces, and improving air quality through increased vegetation.
- **Expanding the GSI Toolbox:** SPU continues to grow its GSI knowledge base. Priority focus areas include optimization and innovation "best management practices," and developing additional delivery models like new incentive programs.

Your Utilities Managing Neighborhood Runoff

SPU and WTD build and maintain their own large-scale GSI projects in public rights-of-way to manage rainwater on streets, sidewalks, and landscapes.

GSI Retrofits in the Public Right-of-Way

SPU and WTD have completed numerous capital projects that help streets function more like natural drainage systems. Completed projects can be found at: tinyurl.com/stormwater-code

Natural drainage projects, like this one in the Delridge neighborhood built in 2016, collect rain that falls on the street and sidewalk, allowing it to soak into the ground.
tinyurl.com/delridgedrainage

Built in 2005, the High Point project is a beautiful example of mature plantings and green infrastructure.
tinyurl.com/highpointdrainage

GSI projects can have benefits beyond stopping polluted runoff. This 2017 project in Ballard created a safer walk to school for neighborhood students by placing a buffer between the sidewalk and street.
tinyurl.com/ballarddrainage

WTD's award-winning Barton GSI project, built in 2015, features 15 blocks of bioretention swales that drain to underground injection control wells and keep polluted runoff out of Puget Sound.
tinyurl.com/BartonRoadsideRainGardens
tinyurl.com/BartonCSOcontrol

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

King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

Seattle
Public
Utilities

GSI in Urban Villages

One example of SPU's work to expand the green infrastructure toolbox and grow partnerships is our new focus on Seattle's urban villages. Part of SPU's 2018–2023 Strategic Business Plan, the Green Infrastructure in Urban Villages Program will deliver multi-benefit projects in dense, mixed-use neighborhoods. Developed at the request of Seattle City Council, the program has flexibility to work on a variety of system problems including flooding, sewer backups, water quality, and creek protection. Early projects moving forward in South Park, Lake City, and Crown Hill will help implement community priorities and accommodate future growth.

30th Ave NE

Natural Drainage Systems Partnering

The 2016–2025 Natural Drainage Systems Partnering Program (NDS) is an SPU multi-year capital improvement program focused on the Longfellow, Piper's, and Thornton Creek watersheds. The program will construct street-side natural drainage systems that filter and manage stormwater and improve neighborhoods through partnerships with the Seattle Department of Transportation (SDOT), Office of Arts & Culture, and King County Flood Control District. Current and completed projects include the following:

- Thornton South NDS (northeast Seattle)
- 30th Ave NE (northeast Seattle) tinyurl.com/30thAveNE
- Longfellow NDS (southwest Seattle) tinyurl.com/longfellow-drainage
- Thornton North NDS (northeast Seattle)
- Broadview/12th Ave NW Drainage Project (northwest Seattle)

Promoting Code-Required Projects: Redevelopment of Seattle Properties Is Part of the Solution through the Stormwater Code

The City of Seattle Stormwater Code requires new property construction to meet stormwater regulations triggered by their building permit. The City of Seattle requires the use of green infrastructure best management practices (BMPs) when public or private land is redeveloped. Project requirements are defined by Municipal Stormwater Code, and include on-site green infrastructure BMPs such as rain gardens, cisterns, and permeable pavements. The projects are designed and funded by the developer, which may be a private entity or a public agency, such as SDOT. Code-required projects reduce polluted stormwater runoff from new construction into Seattle water bodies.

Photo credit: Johnston Architects

GreenFire Campus

This sustainable mixed-use development replaced an asphalt parking lot in the Ballard neighborhood, dedicating 50% of the site to vegetated open space. This site uses GSI practices to meet and go beyond stormwater code compliance. Bioswales and a stream running across the campus serve the dual purposes of filtering stormwater and providing habitat for urban wildlife. Rainwater is collected from building roofs and stored in two large cisterns for irrigation, with 100% of runoff either treated or re-used on-site.

U.S. Army Corps of Engineers Northwest District Headquarters (Duwamish River)

The U.S. Army Corps of Engineers Northwest District Headquarters is a highly flexible and sustainable redevelopment of a restored 4.6-acre former brownfield site and warehouse building along the Duwamish River. Runoff is treated with stormwater ponds and rain gardens with the capacity to drain and treat large storm events on-site.

Green Stormwater Infrastructure Mini Grants

The Green Stormwater Infrastructure Mini Grants help eliminate cost as a barrier for property owners to install rain gardens, cisterns, or other GSI on their properties. Developed by Stewardship Partners and funded by WTD's WaterWorks Grant Program and other sources, these grants provide up to $1,500 for homeowners and $4,500 for income-qualified individuals and nonprofits within the WTD service area. Additional funding will be available spring 2020 and there is already a waiting list of about 50 projects ready to help be a part of the solution to stormwater pollution. For more information, visit 12000raingardens.org/gsi-mini-grants

The program is especially proud of success in the following areas:

Equity of access and resource distribution.

The GSI Mini Grants incorporate an incentive model that offers three times as much financial support for property owners with limited incomes and nonprofit organizations. Working closely with ECOSS and King County, and taking into account community and partner feedback, the granting guidelines and eligibility were revised to allow for larger grants of up to $4,500 for income-qualified and nonprofit applicants. That degree of flexibility and responsiveness to community input demonstrated King County's commitment to equity and social justice and its integration into all programs.

Modest financial support amplifies water quality benefits.

The small amount of funding invested in GSI Mini Grants results in a large amount of stormwater runoff being treated. Since the program launched in 2017, 41 GSI Mini Grants have been awarded for projects that collectively manage an estimated 1,517,102 gallons of runoff each year from 68,007 square feet of impervious area.

GSI MINI GRANTS BY THE NUMBERS

Number of grants awarded: **41**

Amount of money awarded: **$74,188**

70% of capital awarded to limited income or nonprofit applicants

Square footage of contributing area across all projects: **over 68,000 ft²**

52% to income-qualified individuals

18% to nonprofits

Stormwater managed annually: **1,517,102** gallons/year

Installations funded by project type:

Cisterns:	41
Rain gardens:	7
Cistern pumps:	7
Depave:	1

12000raingardens.org Resource Library

There are multiple resources and incentives available around Western Washington to help property owners install GSI. Many thanks to the 12,000 Rain Gardens Campaign for keeping a comprehensive resource library.

Volunteers help plant a large demonstration rain garden beside the Cross Kirkland Corridor, part of a regional trail network. This rain garden will treat runoff from one-third of an acre.

WaterWorks Grant Program

King County's WaterWorks Grant Program provides $4 million in funding every two years for projects that improve water quality and encourage community partnerships within the Wastewater Treatment Division service area.

Delridge Wetlands Restoration and Stewardship Project—Grant for $50,000

The Delridge Neighborhoods Development Association engaged community members and leveraged funding from multiple agencies to construct a roadside bioswale, community garden, urban greenspace, and outdoor classroom, and replaced an old culvert on a former Seattle City Light transfer station site. The bioswale treats stormwater runoff before it enters the wetland and, along with native plantings, will improve the health of the wetland and Longfellow Creek. dnda.org/dnda-nature/wetlands

Students use the site as an outdoor classroom, and are helping design a children's garden with an ethnobotany focus.

Research on Floating Treatment Wetlands—Grant for $65,000

This University of Washington research project tested how well floating treatment wetlands (FTWs) can treat urban runoff and help salmon. Their results found stormwater treated with FTWs had a 31% coho survival rate after 24 hours, while untreated stormwater resulted in 100% coho death within five hours. The tank with FTWs also showed significant reduction in metals.

Floating treatment wetlands are human-made structures designed to float on the water's surface and house wetland plants and other organisms.

Contact WaterWorks staff to discuss project ideas at **kingcounty.gov/waterworks-grants**

Volunteers and partners help install a 2,200 square foot rain garden, named "Reclaiming Home," by local students who worked on the design.

Paradise Plots Community Garden—Two Grants for $219,227

World Relief Seattle and the Hillside Church are building on their previous award-winning GSI project in Kent. They installed multiple rain gardens to reduce runoff and flooding at this demonstration site, which is used by hundreds of community members annually for gardening, community events, and many volunteer work parties.
worldreliefseattle.org/garden and tinyurl.com/HillsideParadiseParkingPlots

Cisterns provide rainwater for a large community garden for refugees and immigrants.

Community engagement includes workshops, garden tours, and refugee student internships.

Stay tuned for a very exciting development of an additional voluntary green infrastructure retrofit program to accelerate and scale-up project delivery, cultivate new sector-based partnerships, further integrate racial equity outcomes, and leverage SPU dollars for broader community benefits.

Workshop volunteer adds oyster shells to remove heavy metals from stormwater.

Volunteers get plants ready for installation in this Grattix "rain garden in a box."

Cross-Sector Partnership: Equinox Studios "Industrial Strength" GSI in Georgetown

The nonprofit, ECOSS, partnered with Equinox Studios to develop a large-scale GSI demonstration site in an industrial area. Equinox Studios, located in the industrial heart of Georgetown, attracts over 18,000 visitors per year and is ideally situated to promote GSI options to local industrial businesses and communities. The site showcases emerging and cost-effective GSI solutions that can be easily adopted by property owners seeking to control polluted runoff. When completed in 2020, the Equinox installation will collect stormwater from 62,000 square feet of roof space and passively filter 1.3 million gallons of stormwater annually.

An ECOSS staff member and a GSI contractor review the Grattix design.

The first phase of the project, completed in 2019, installed four Grattix systems (rain gardens in large boxes) and two cisterns with oyster shells as downspout filters that remove zinc, copper, and other pollutants from roof runoff, and can work in small spaces.

Runoff from heavily trafficked streets can produce elevated levels of copper in stormwater, which is harmful to fish and other aquatic species. Copper can be introduced to stormwater from vehicle brake pads, which produce brake dust. Oyster shells have shown promising results for removing dissolved copper from water by adsorption inside the barrel, which acts as a flow-through filter.

This project represents an example of a successful partnership with funding coming from a variety of sources: grants from the Boeing Company, King County Flood District, and the Rose Foundation and in-kind donations from The Port of Seattle and WTD. Stay tuned for phase two in 2020 that includes permeable paving, large rain garden boxes and vegetated walls.

For more information or to schedule a site tour, visit ecoss.org/projects/equinox

Workforce Development in this Growing Field

GSI offers a natural and sustainable solution for stormwater management. It also provides opportunities for living-wage jobs. As a result, expertise in the design, construction, and maintenance of green infrastructure is in demand.

Landscapers with operations and maintenance (O&M) specialization can start in entry-level positions with a clear path to higher-paying careers in clean water utilities. Because access to living-wage employment is a key indicator of the health of a population, job training in the growing GSI industry offers widespread advantages. The following examples illustrate job training efforts currently underway in the region.

Duwamish Infrastructure Restoration Training (DIRT Corps)

thedirtcorps.com

For several years, DIRT Corps has received grants from WTD to provide hands-on training sessions to young women, people of color, LGBTQ people, and others outside of the typical landscape or construction career paths. Over 90 people have successfully completed the program and gone on to start their own businesses, join landscaping firms, work for municipalities, or pursue other opportunities. In 2019, DIRT Corps, LLC, became a licensed and bonded design and construction company, and continues to work on community-based green infrastructure projects.

SPU GSI Training Program

An example of SPU's work to support communities across Seattle is the workforce development program partnership with South Seattle College in 2020. Initial efforts have been focused on curriculum development and planned delivery of "The RainWise Bootcamp" (an 11-week contractor incubator program), followed by GSI-focused training. This work is a foundational step toward leveraging SPU's RainWise, GSI public works, and O&M contracts to advance equity, provide pathways to living-wage jobs, and support anti-displacement efforts for underserved communities and communities of color while building capacity to support increased GSI installation.

Seattle Conservation Corps (SCC)

tinyurl.com/seattle-conservation

SPU has been working with SCC since 1986. SCC focuses on employment training and supportive services for homeless adults in Seattle. SCC enrolls members into a one-year work training program, paying minimum wage plus premium pay for 40 hours a week. SCC provides work experience, education, training, and support services that lead to stability and self-sufficiency. SCC has supported the City of Seattle's GSI program for over 16 years by conducting vegetation management of GSI, concrete work, hydrant and irrigation system management, large capital improvement program retrofit projects, problem solving, and working with communities in diverse neighborhoods that are highly impacted by homelessness.

Regional Partnerships

Green Infrastructure Partnership (GrIP)

700milliongallons.org/grip

GrIP is a group of interested parties that foster 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 offer operational support to GrIP.

Green Infrastructure Summit

12000raingardens.org/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 to realize cleaner waters and healthier, more equitable communities.

City Habitats

cityhabitats.org

City Habitats is a coalition that 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.

Seattle 2030 District Partnership (District)

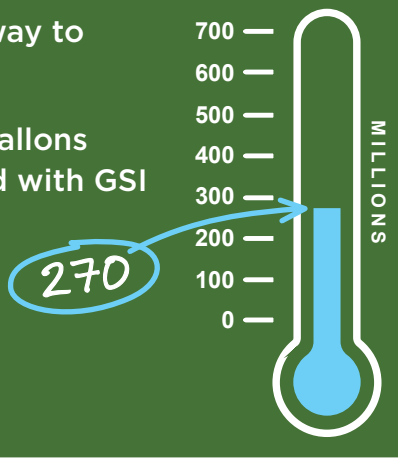
2030districts.org/seattle

The District works with building owners, developers, architects, engineers, local government, and nonprofit organizations to reduce the environmental impacts of building construction and operations. In addressing stormwater, the District focuses on opportunities to incorporate GSI solutions and identifying ways to collectively manage communal stormwater. Check out their StoryMap and website to see their recent work.

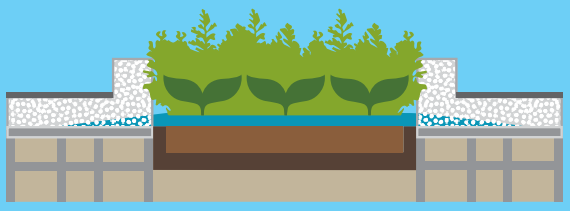
700 MILLION GALLONS: GSI BY THE NUMBERS

36 new neighborhood rights-of-way blocks in design

On our way to **700** million gallons managed with GSI



1,109 bioretention swales within City of Seattle rights-of-way managing stormwater built since the year 2000



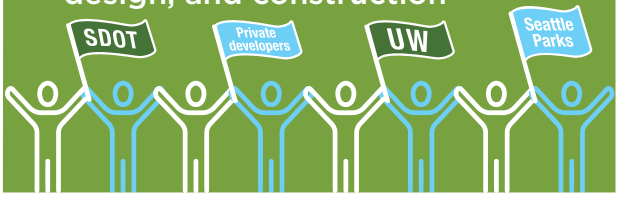
100 public and private sector partners planted

1,000,000 TREES

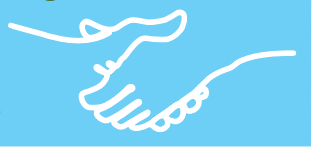
in King County as of 2020

11.5 acres of bioretention landscape area installed by public or private projects within City of Seattle right-of-way since the year 2000

8 SPU Project Implementation Partnerships in planning, design, and construction



1 coordinated GSI program contract between SPU and WTD to maximize efficient use of funds by aligning efforts in GSI procedures and approaches



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