

# WELCOME

## Ballard Natural Drainage System Open House

**Project Goal:** Reduce sewage overflows into Salmon Bay by capturing 95% of the stormwater runoff from up to 20 project blocks.

### What Is Covered At Today's Open House?

- Overview of the sewage overflow problem in Ballard
- Overview of natural drainage systems
- Results of additional soil testing and field analysis used to identify most promising blocks for potential projects
- Proposed approach and timeline for next steps

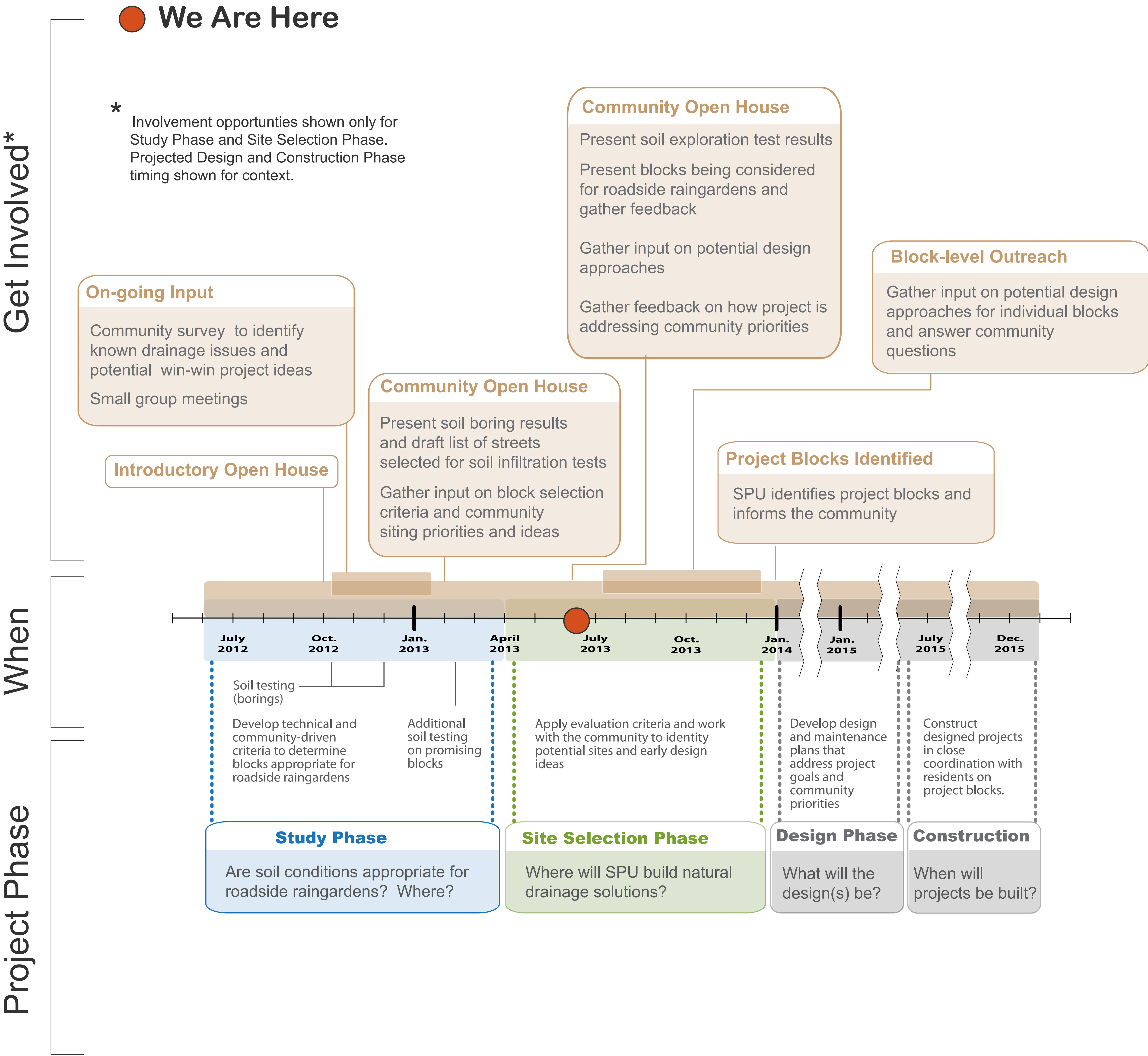


### What Input Are We Asking You For Today?

- Your questions or concerns about natural drainage systems in your neighborhood
- Input on possible design approaches
- More information about the particular opportunities & needs on your street
- Feedback on engagement opportunities



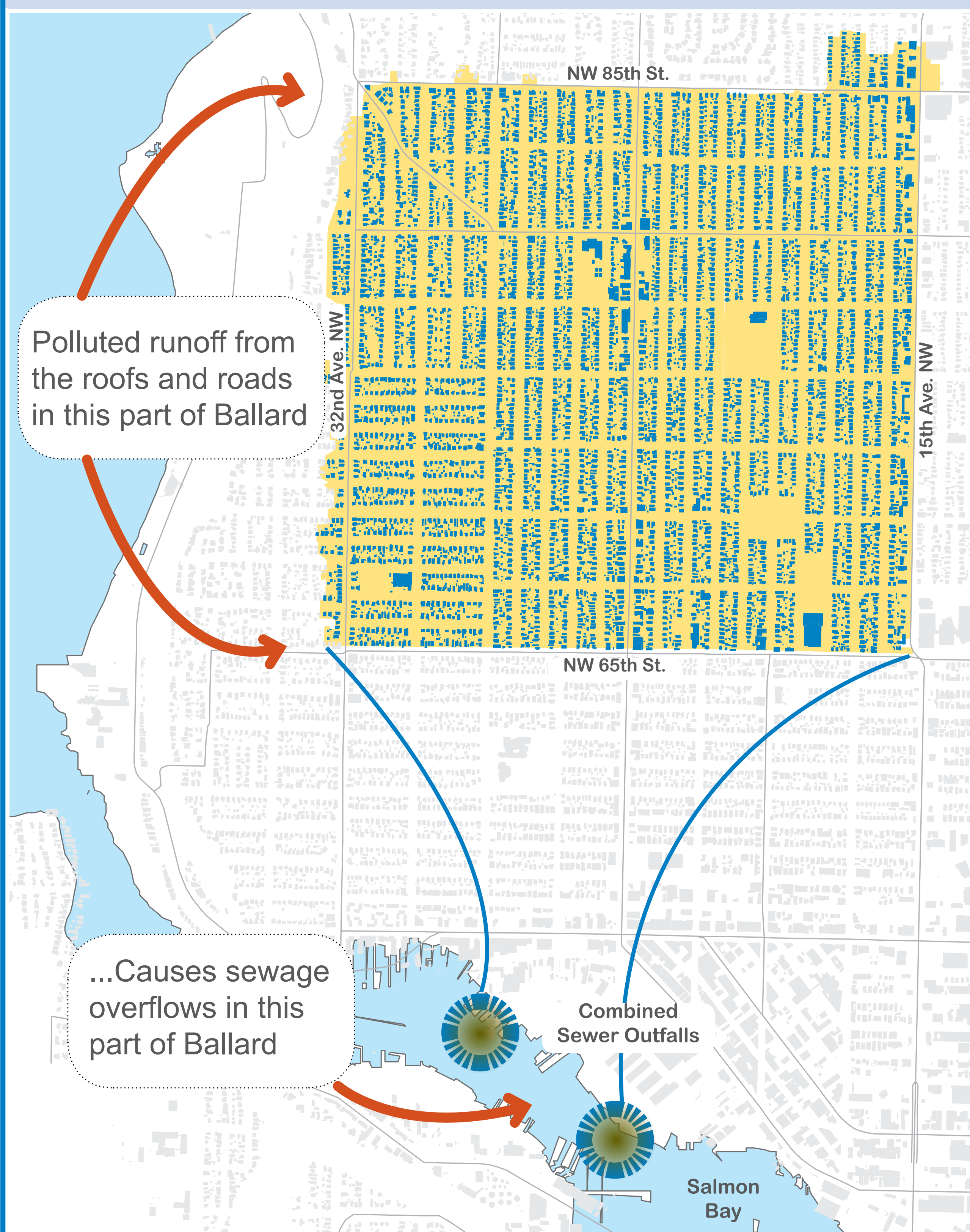
# Timeline





# Overview: Sewage Overflows

## How bad are sewage overflows in Ballard?



In 2012, raw sewage combined with polluted runoff from roofs, roads, and parking lots overflowed a total of 89 times into Salmon Bay. In total, **57 million gallons** were discharged, untreated.

This was about 37% of the total sewage overflow volume for all of Seattle.

Overflows are **90% polluted stormwater runoff** and 10% raw sewage.



The sewage overflow pipes in Ballard extend out into Salmon Bay at the ends 24th Ave. NW and 28th Ave. NW.





# Overview: Sewage Overflows

## November 2012 Sewage Overflows in Ballard

Date	Amount of Rainfall (inches)	Volume of Sewage Overflow (gallons)	Duration of Sewage Overflow (hours)
Nov. 2	0.12	1,445	0.42
Nov. 4	0.63	74,192	5.00
Nov. 11	0.57	92,388	7.50
Nov. 13	1.03	344	0.50
Nov. 16	5.04	15,236,505	119.0
Nov. 18	5.23	2,801,959	74.47
Nov. 23	0.99	1,128,452	15.57
Nov. 23	0.99	22,572	17.58
Nov. 28	3.71	7,157,117	148.58
Nov. 30	3.81	524,425	97.67
Monthly Total		27,039,399	

This chart shows the duration and volume of combined sewer overflows into Salmon Bay this past November. Note that two overflows lasted for five days each.





# Overview: Sewage Overflows

## The Problem Solving Approach

Seattle Public Utilities is working to prevent sewage overflows into Salmon Bay by:

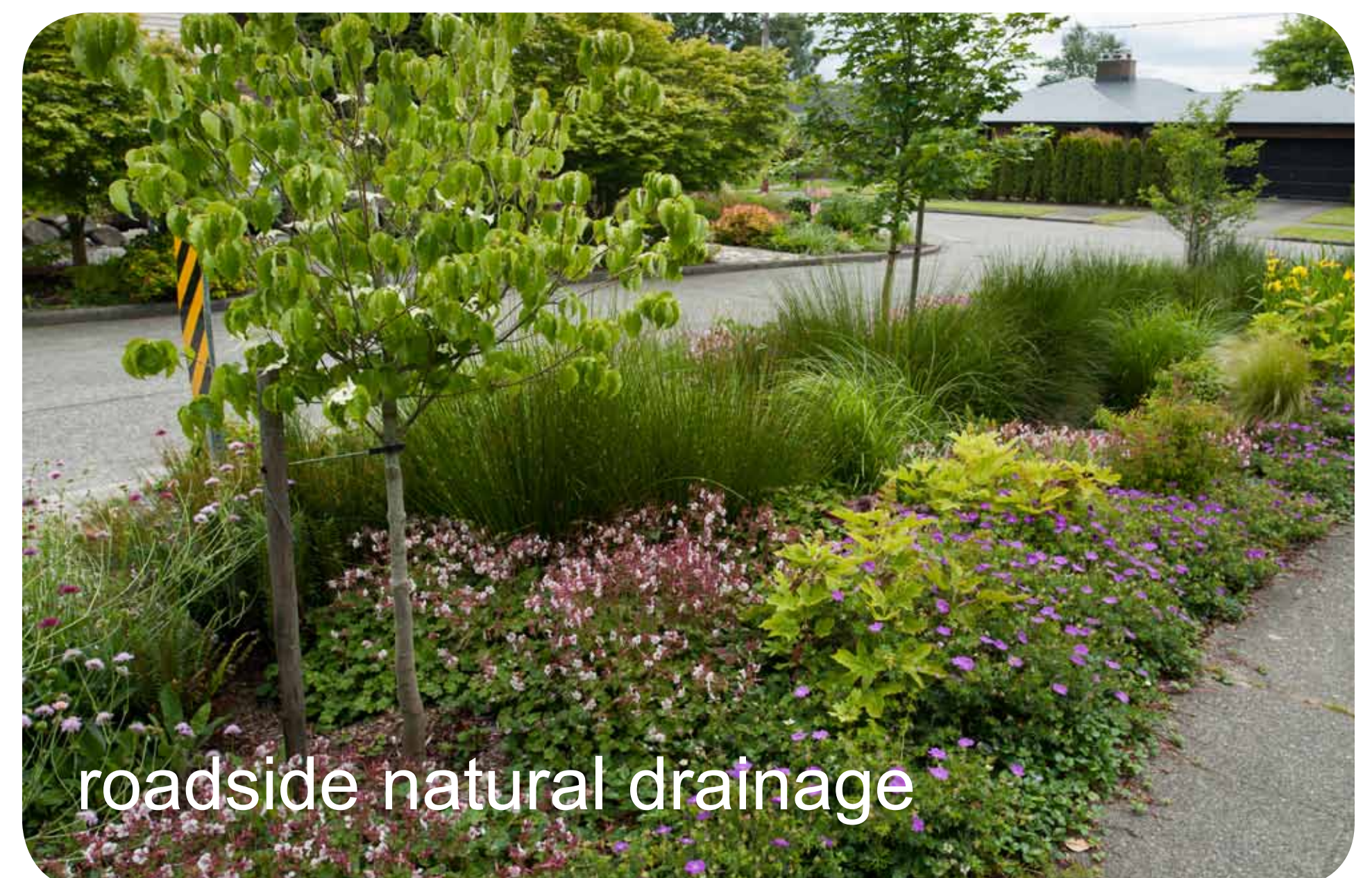
1

Disconnecting roof drains that are connected to the combined pipe and rebating homeowners who channel this runoff to a raingarden or stormwater cistern on their property. This is the RainWise program.



2

Building roadside natural drainage systems to intercept runoff from roads and sidewalks and allow it to soak into the ground instead of draining into the combined pipe.



3

Planning for a large underground storage facility to control the remaining volume. This facility will likely be located in the area of Ballard near the existing outfalls on Salmon Bay.





# Overview: Natural Drainage Systems

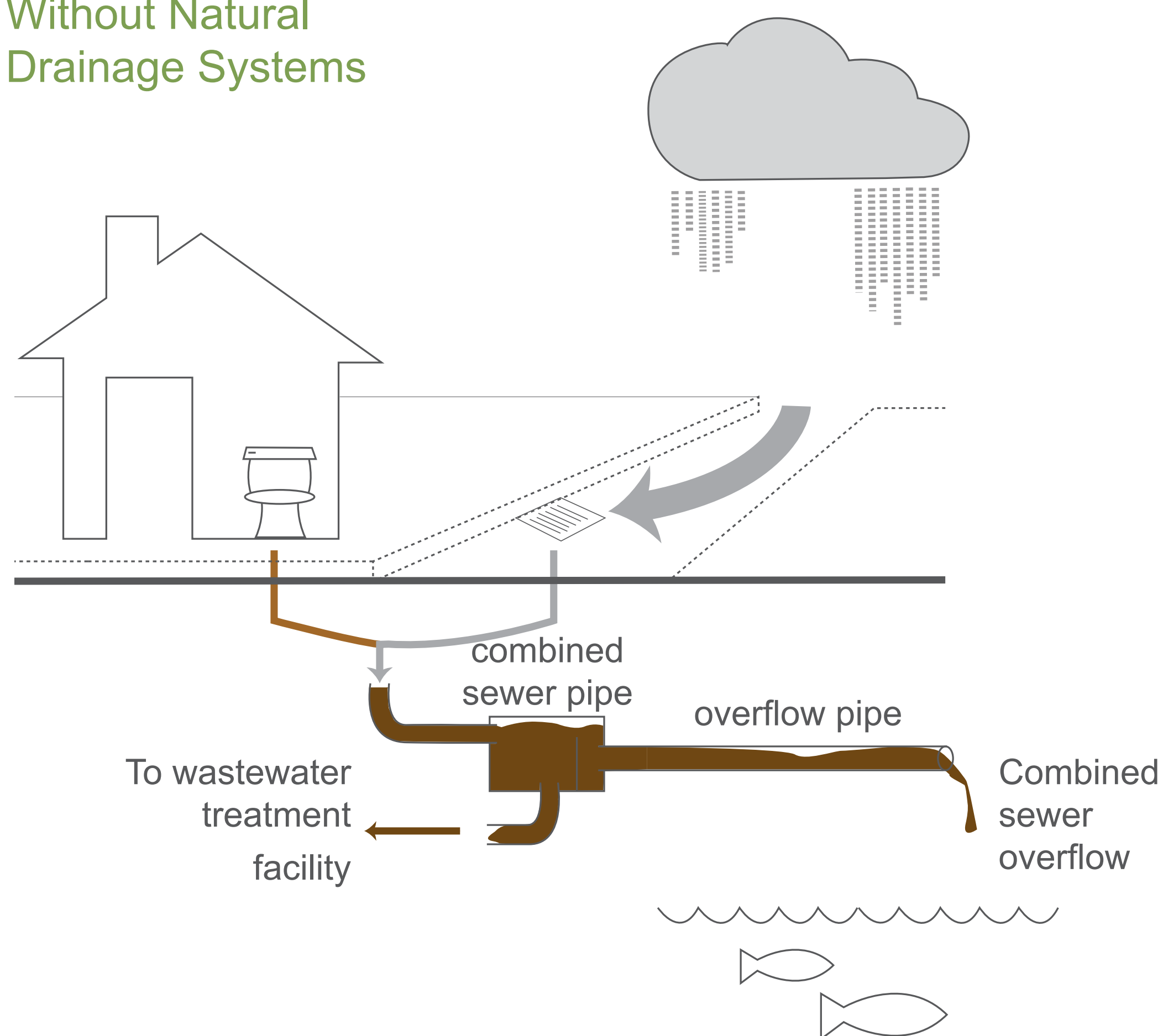
## How do natural drainage systems help?

Natural drainage systems can be designed for a variety of stormwater management goals. In combined sewer areas, natural drainage systems are designed to capture (and clean) polluted runoff at its source.

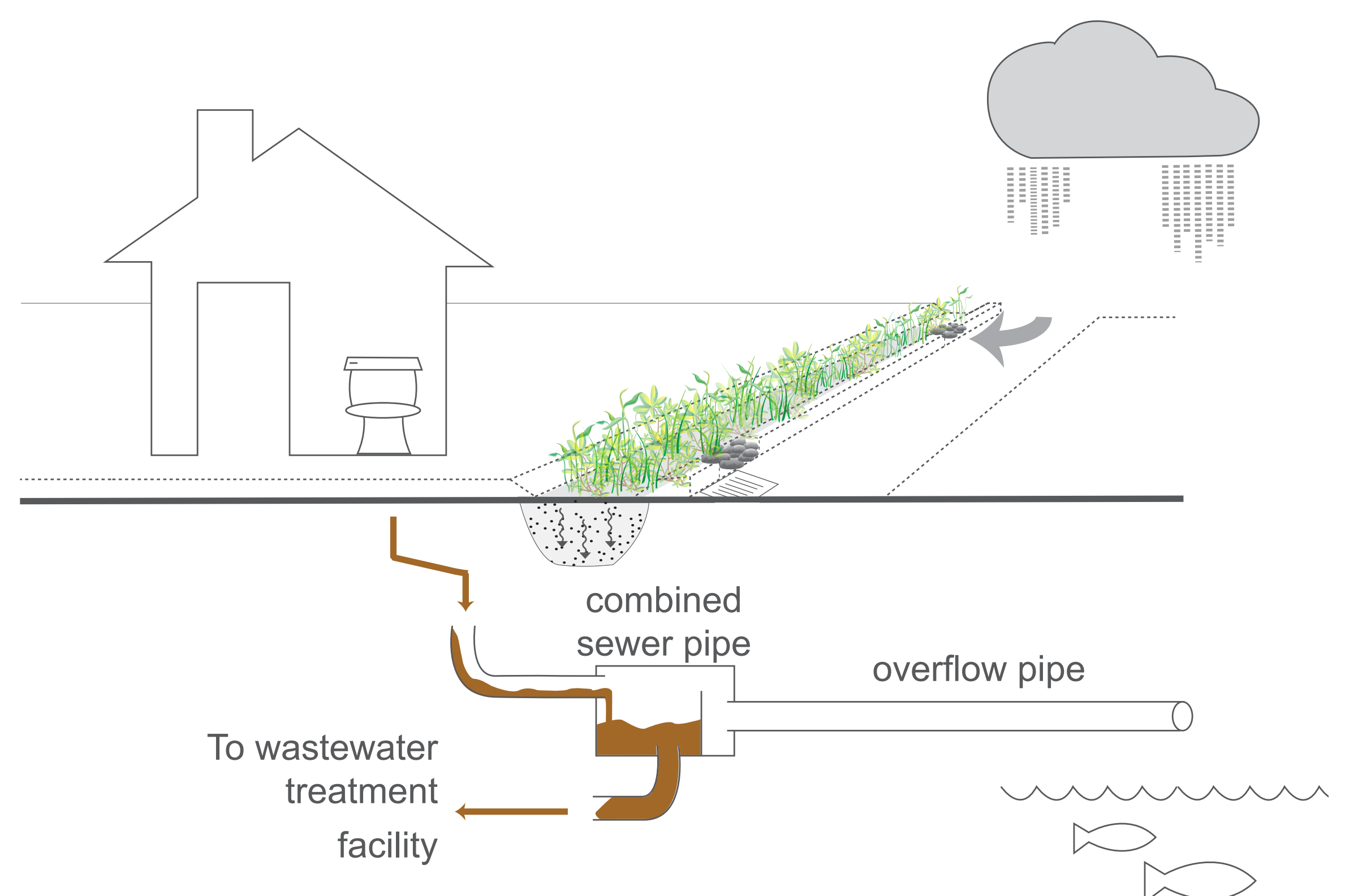
Runoff from roofs on private property and runoff from roads and sidewalks in the public right-of-way add up to too much water. This runoff overwhelms the capacity of the combined sewer pipe during storms and causes overflows. (Overflows are 90% stormwater runoff, 10% raw sewage.)

Removing a portion of this runoff volume from the combined pipe, or delaying when the runoff reaches the pipe, helps prevent overflows into Salmon Bay.

Without Natural  
Drainage Systems



With Natural  
Drainage Systems



Natural drainage systems can be applied on our own property -- to capture and clean the runoff from our roofs -- or in public spaces (like the planting strip next to the street) to capture and clean the runoff from the road.



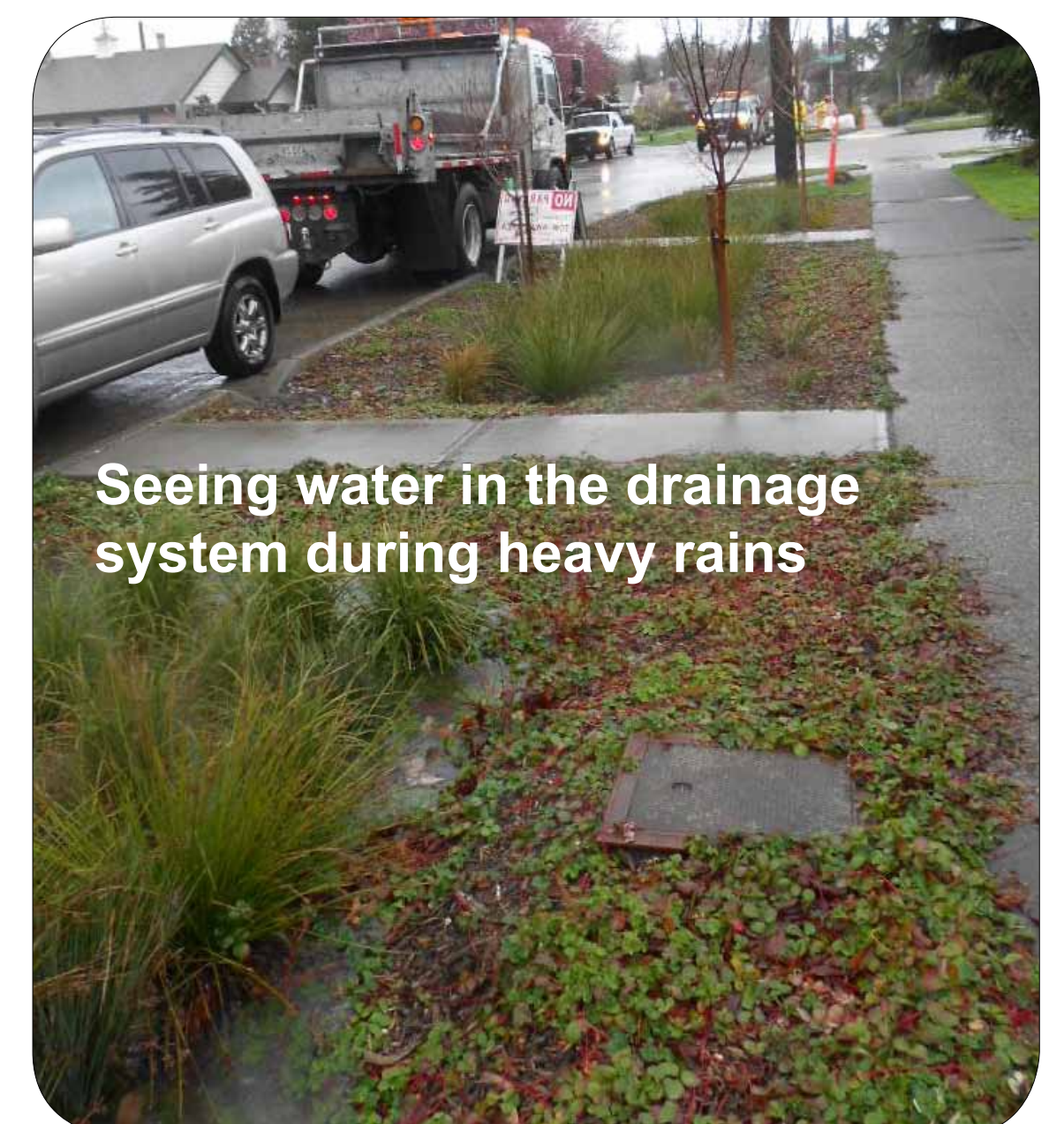
# Overview: Natural Drainage Systems

## How do natural drainage systems change the look and function of the street?

### Short-term Changes (During Construction)



### Possible Long-term Changes (After Construction)



Before and during construction, runoff from the street contributes to combined sewer overflows into Salmon Bay.

Runoff from the street no longer contributes to overflows.



# Overview: Natural Drainage Systems

Natural drainage systems change over time as plants mature and become well-established

January



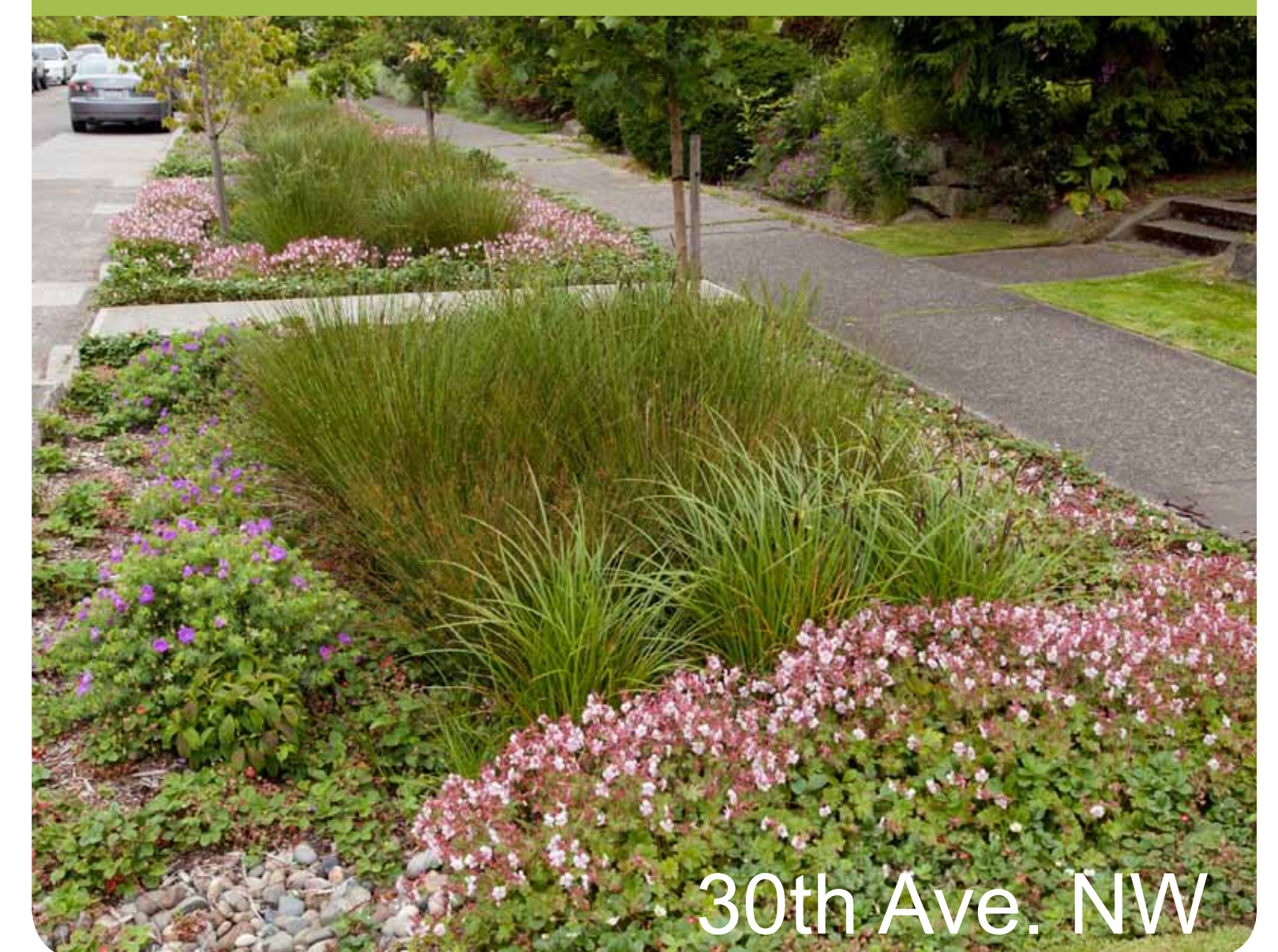
30th Ave. NW

October



30th Ave. NW

May



30th Ave. NW

Seattle Public  
Utilities maintains  
roadside natural  
drainage systems

Mature natural drainage systems have different looks depending on design & plant choices



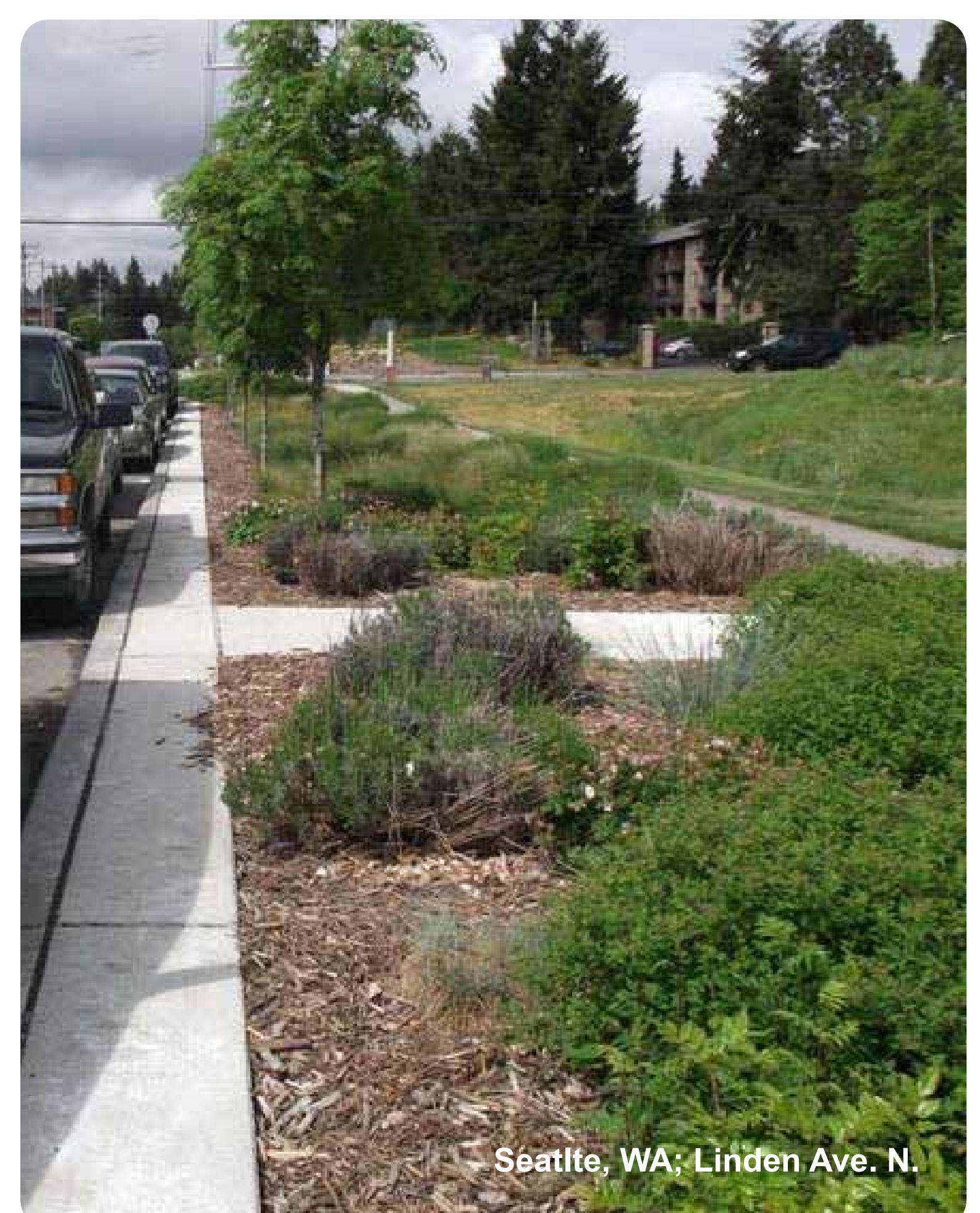
Seattle, WA; Greenlake Neighborhood



Portland, OR



Seattle, WA; Highpoint Neighborhood



Seattle, WA; Linden Ave. N.

We are looking  
for your feedback  
on possible design  
approaches tonight



Seattle, WA; Ballard Neighborhood



# Overview: Natural Drainage Systems

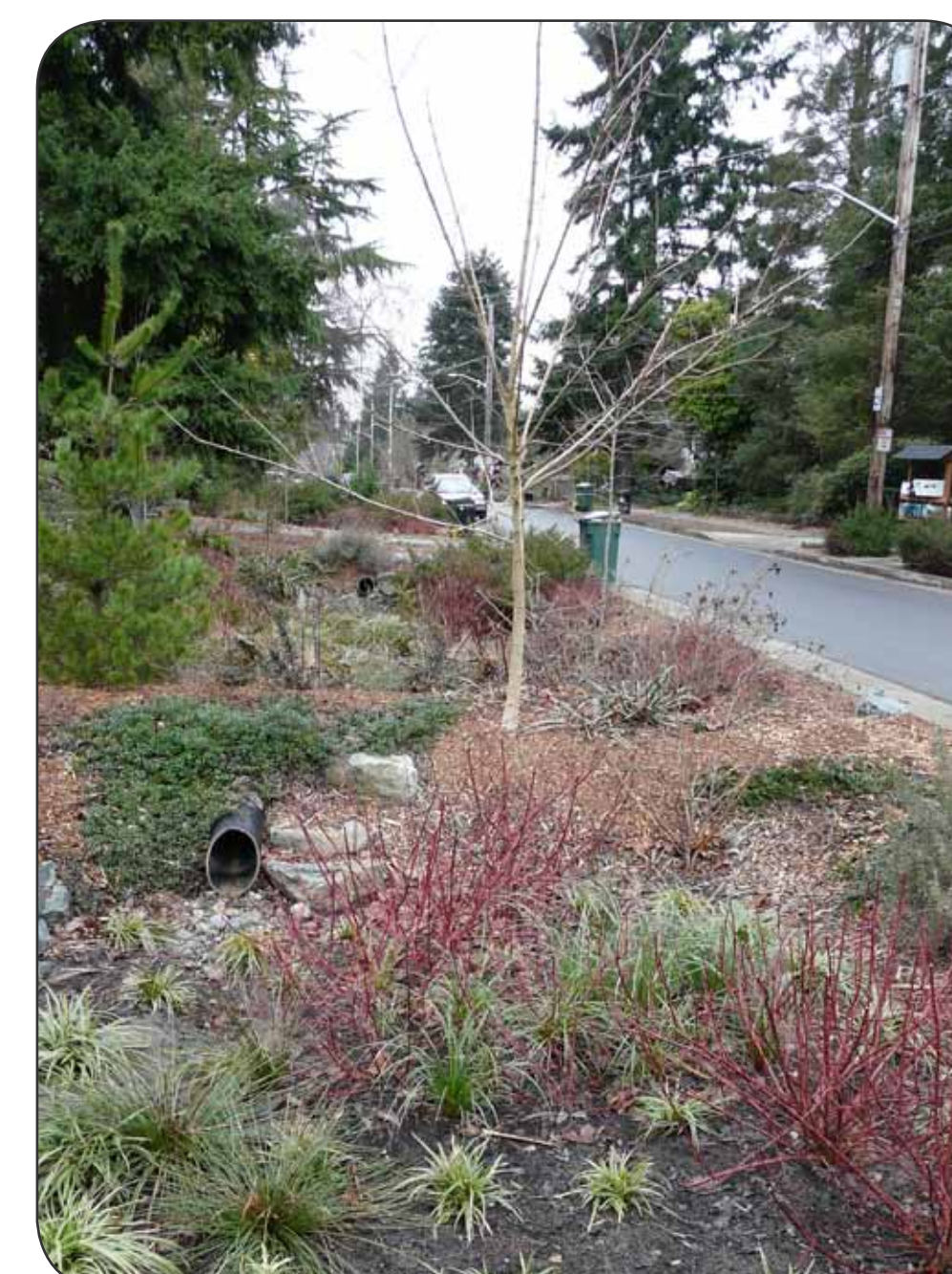
## Roadside Natural Drainage History 2001-2012



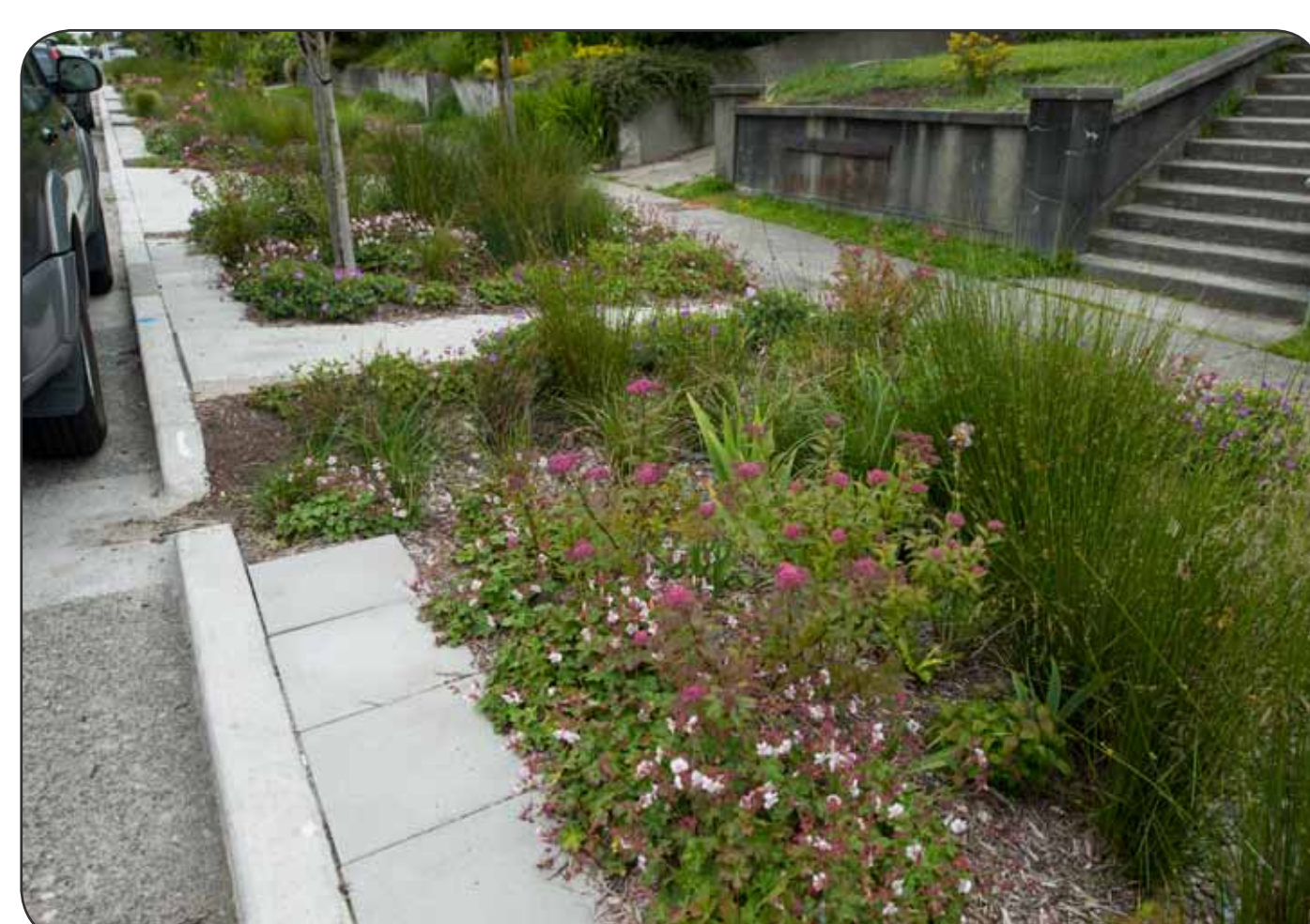
110th St. Cascade



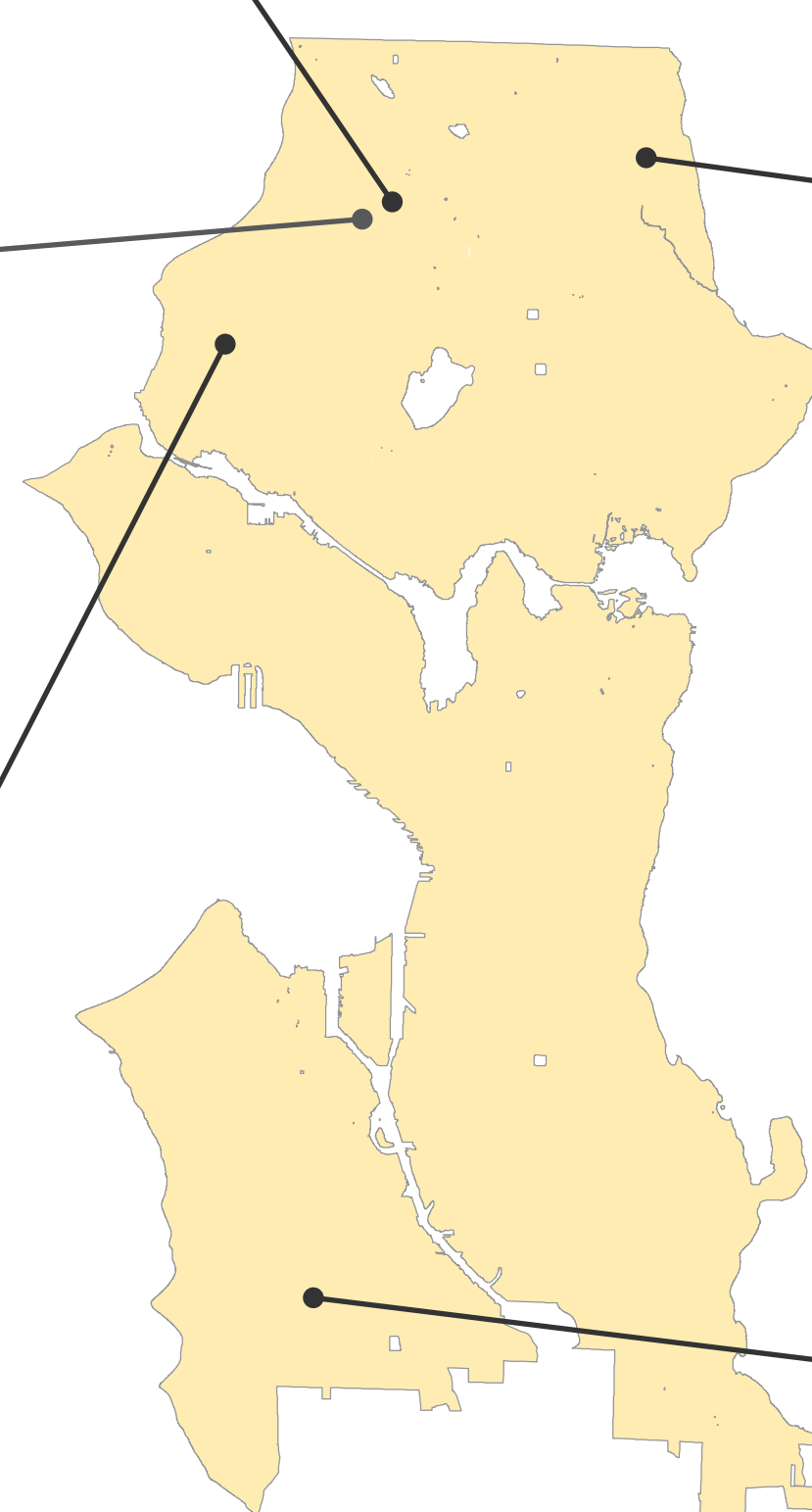
SEA Streets



Pinehurst Green Grid



Ballard 2010 -- Retrofit Design



Highpoint Natural Drainage

Project	Drainage Area	Effectiveness
<b>SEA Streets</b>	2.3 acres	99% reduction in runoff volume
<b>NW 110<sup>th</sup> Cascade</b>	28 acres	48-74 % reduction in runoff volume
<b>Broadview Green Grid</b>	32 acres	70% reduction in runoff volume
<b>Pinehurst Green Grid</b>	49 acres	82% reduction in runoff volume (design estimate)
<b>High Point Natural Drainage</b>	129 acres	Without NDS approach, project would have required detention pond 5x as big
<b>Ballard Natural Drainage 2010</b>	1.4 acres	38000 gallons of control volume removed



# Overview: Natural Drainage Systems

## Ballard Natural Drainage 2010: Lessons Learned and New Approach

The purpose of the Ballard Roadside Raingardens Pilot Project (2009-2011) was to test how well roadside raingardens help prevent sewage overflows into Salmon Bay. The project includes collecting and analyzing performance data to measure results.

Three designs were piloted:  
1) working fully within the existing planting strip 2) curb extensions 3) full-block curb shift

The pilot led to important lessons learned and informed significant changes in the way Seattle Public Utilities develops and implements similar projects.

Learned	Looking Forward
TAKE YOUR TIME	<p>Allow sufficient time for project scoping, meaningful community engagement, site selection, design, construction, and monitoring.</p> <p>Build in time to respond to community input and technical analysis.</p>
DO YOUR HOMEWORK	<p>Conduct wet-weather soil testing and groundwater monitoring a full year in advance and validate test results with outside geotechnical experts.</p> <p>Conduct additional tests to assess soil conditions and measure how well water soaks into/through the soil.</p>
LISTEN TO THE COMMUNITY	<p>Gather information from residents about what they know about soil conditions, drainage, and groundwater in their neighborhood.</p> <p>Engage residents early in siting and design discussions.</p> <p>Identify locations and designs that provide opportunities to improve community safety and livability.</p>



# Overview: Natural Drainage Systems & Neighborhood Greenways

## What is the potential connection?

Neighborhood Greenways are residential streets designed to improve bicycle & pedestrian travel for people of all ages and abilities. They usually have lower traffic volumes and vehicle speeds.

SPU and SDOT are exploring how natural drainage systems may enhance Neighborhood Greenways and vice versa.



Seattle, WA; Highpoint Neighborhood roadside natural drainage system

Natural drainage systems can also bring benefits to residential streets that are not official Neighborhood Greenways by:

- Providing traffic slowing benefits
- Improving vehicle sightlines and pedestrian crossing distances at key intersections
- Enhancing streetscape aesthetics and continuity
- Contributing to tree canopy goals



Portland, OR Neighborhood Greenway with natural drainage system

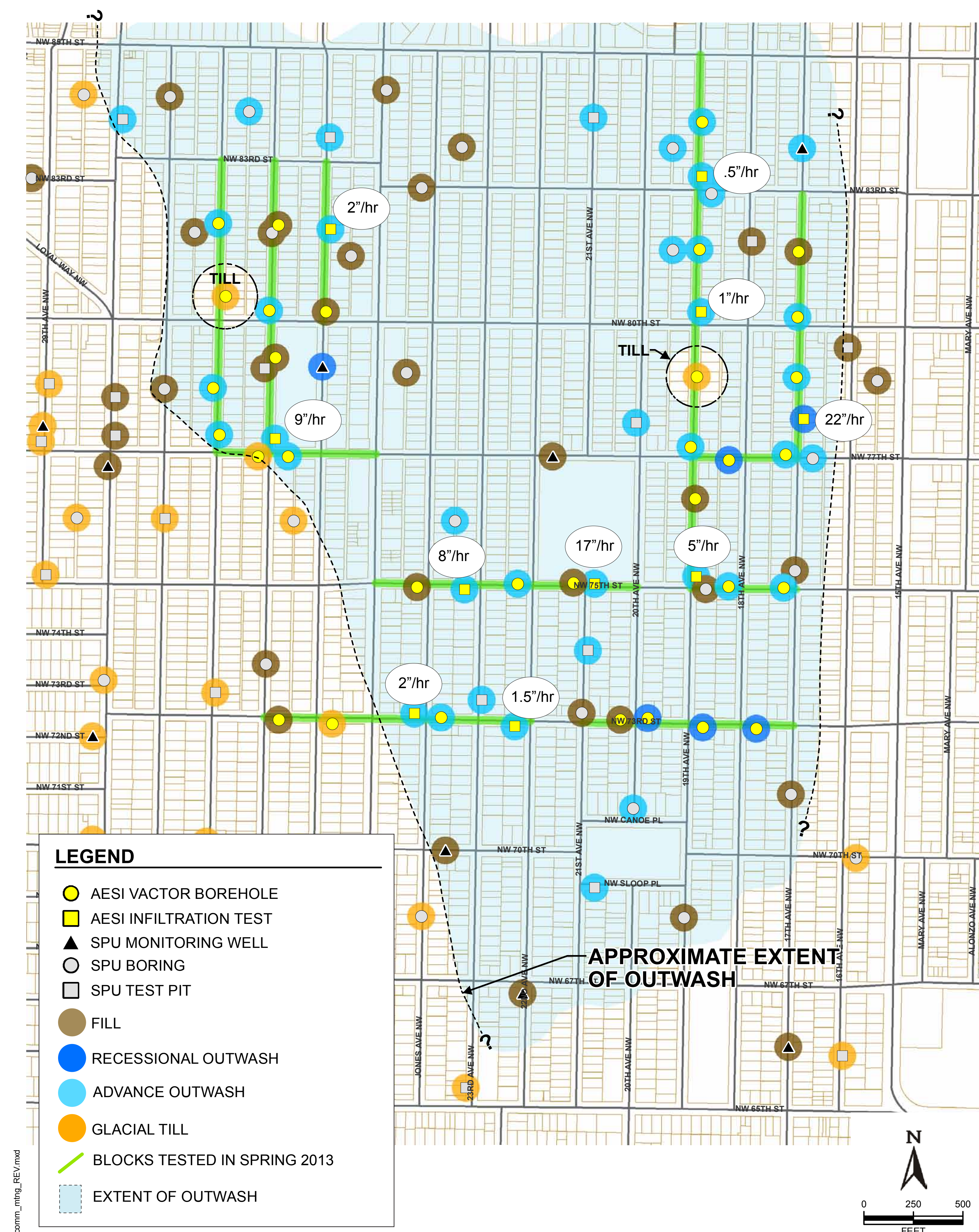


Portland, OR Neighborhood Greenway with natural drainage system



## Results: Soil Testing

## Additional Tests Performed in the Spring of 2013



The map at left summarizes the soil testing results. The number listed next to some of the test sites is the stormwater infiltration rate in inches per hour -- this is a measure of how quickly the water soaks into (drains through) the soil.

## Summary of Soil Testing Process

- Soil analyses were conducted in 2009, 2010, and 2012
- Additional tests in spring 2013
- Tests helped SPU develop better understanding of soil conditions
- SPU identified areas where outwash soils are likely

**Glacial Till** soils have been tightly packed and densified by the weight of 3000-foot-high glaciers.

Glacial till soils may also be referred to as “hard pan” and do not allow stormwater to soak into them (or flow through them) as easily as outwash soils do.

## Outwash

soils are sandy soils that were deposited in streams in advance of glaciers and during their retreat.

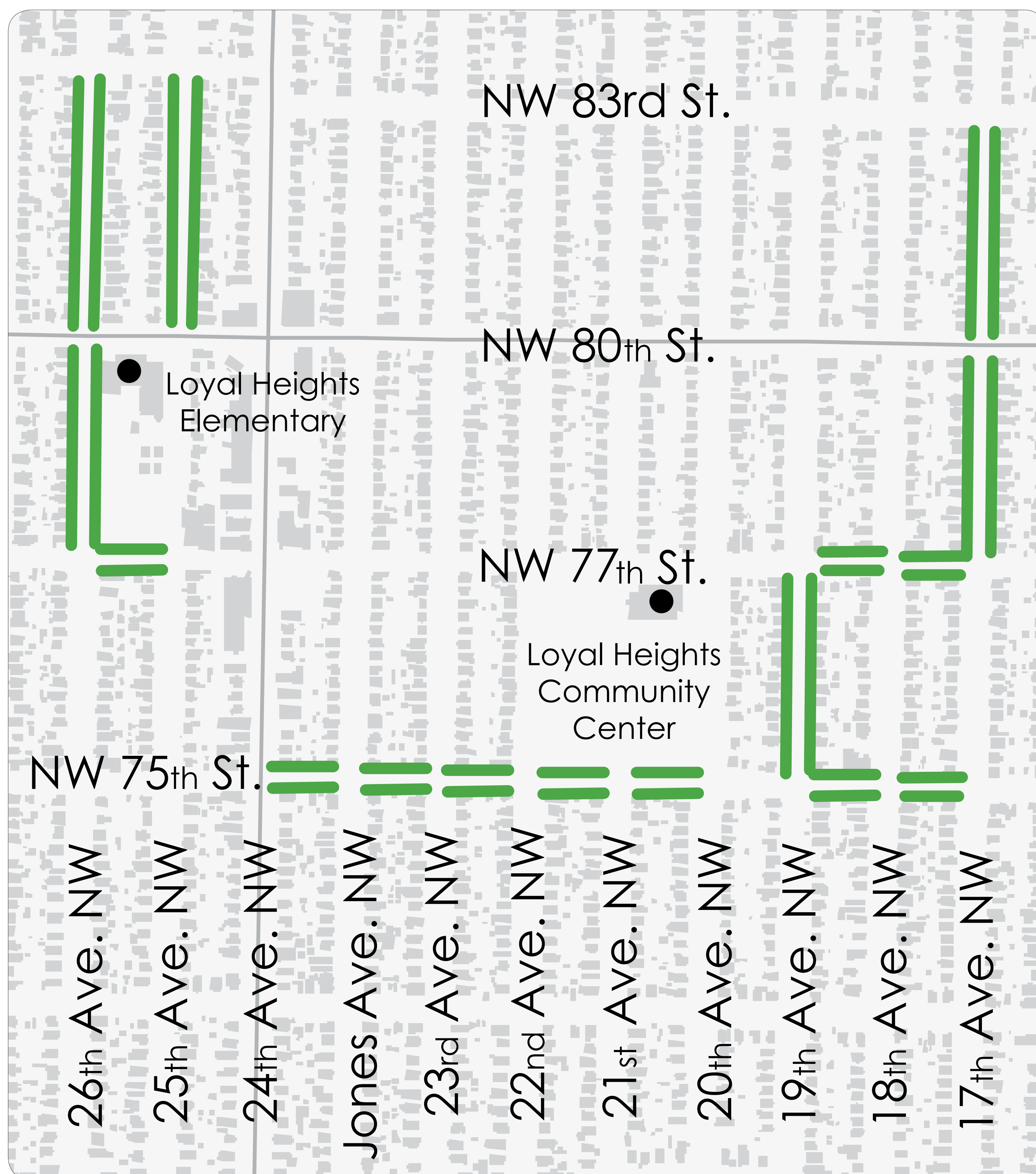
These soils allow stormwater to soak in (or flow through them) more easily than till soils do.



# Results: Most-Promising Project Blocks

## How were these blocks identified?

Seattle Public Utilities combined the results of all soil testing with the results of the December 2012 community survey, feedback from the February 2013 Open House and data collected via extensive field investigation (walking potential project blocks) to identify the most promising blocks outlined in green below.



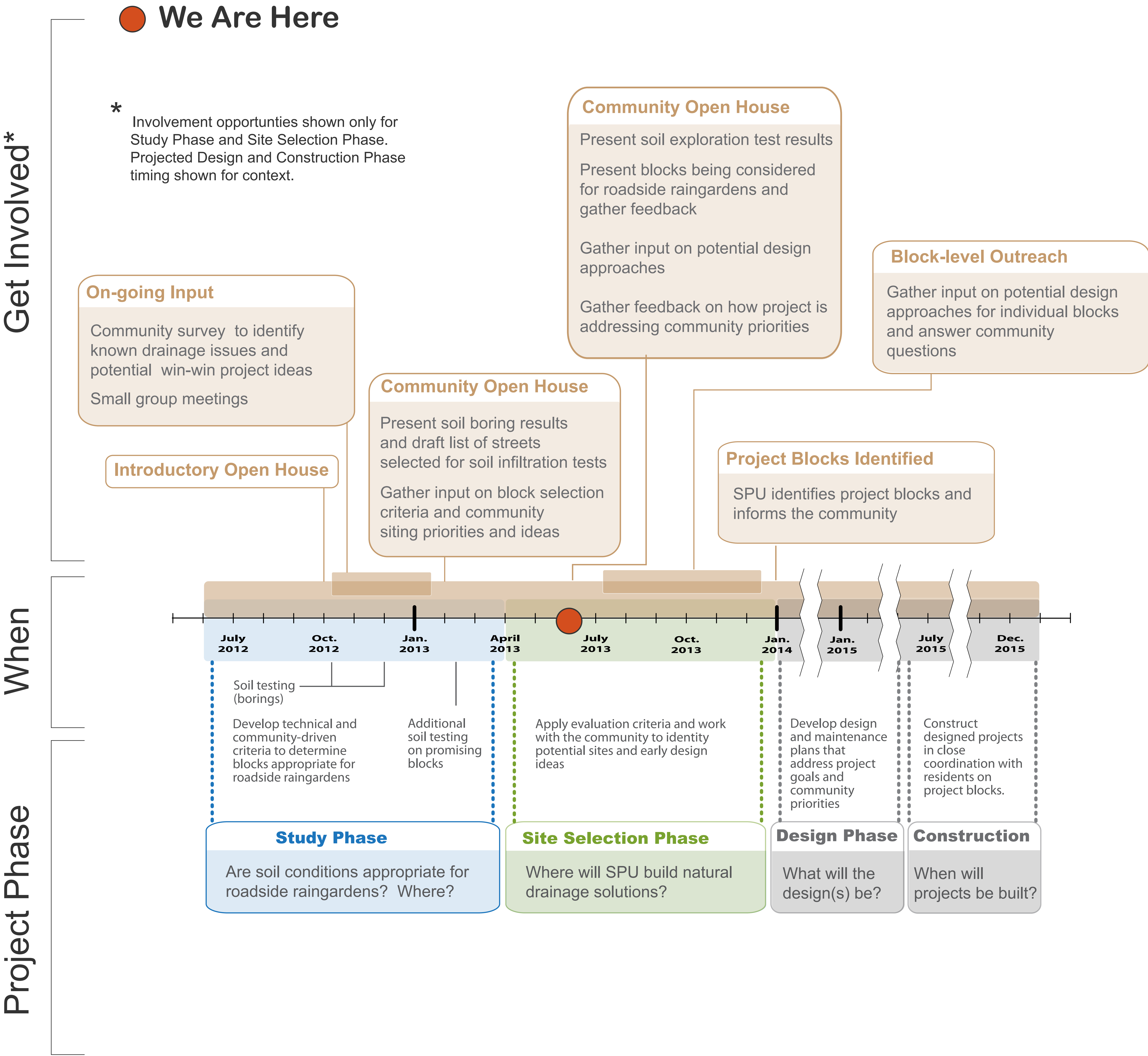
### Variables considered:

- Soil type and drainage issues
- Presence of high groundwater
- Street slope
- Presence of mature trees
- Presence of mature plantings
- Traffic circles
- Homes lower than street level
- Planting strip width
- Presence of alley parking
- On-street parking use
- Slope across the planting strip
- Existing or proposed bike route
- Walking route or destination
- Need for traffic calming
- Proximity to school
- Safety of intersections

**Project Goal:** Reduce sewage overflows into Salmon Bay by capturing 95% of the annual stormwater runoff from up to 20 project blocks



# Timeline





## Next Steps

### Before you leave...

- Provide your e-mail address on the sign-in sheet so we can keep you updated
- Discuss your questions and express your concerns with any of the Seattle Public Utilities staff members here tonight
- Fill in a comment card with detailed comments or questions  
For example...
  - Would you like to invite us to a neighborhood meeting to give a presentation or discuss design approaches?
  - Are there other ways you would like us to inform and engage you and your neighbors?
  - Do you or someone you know want to be a block liaison?

**THANK YOU**  
**for coming tonight**