

The Stormwater Problem in Broadview

- Stormwater in Broadview causes flooding, sewage backups and damage to Venema Creek and Piper's Creek.
- Broadview's drainage infrastructure does not include a fully developed stormwater collection system.
- Rain flows across streets and yards, sometimes channeled by ditches and culverts.
- Runoff in this neighborhood builds in volume and speed as it runs down steep slopes toward the creeks.
- That causes problems for your downstream neighbors.
- Surface water runoff picks up pollutants as it flows across streets and yards.
- Because rain can't soak in, there is less "groundwater recharge" for creek flow during the dry season.



On Nov. 19 in the Broadview area two inches of rain fell in a six-hour period. That's what's known as a "100-year storm" - the type that you would not expect to happen very often. In Seattle, we are seeing these intense storms more frequently and the runoff from them is causing many problems. The photo above was taken in the 12200 block of 12th Ave. NW.

Stormwater Problems in Venema and Piper's Creek

- Coho (a species of concern) and chum salmon spawn in Piper's Creek.
- Piper's contains good habitat.
- But stormwater flows cause channel erosion and streambank failure.
- Stormwater transports pollution from yards and streets into the creek.
- The Venema Creek basin contributes 42 percent of Piper's Creek sediment.
- Coho salmon have been seen dying in Piper's Creek before they can spawn.
- Scientists believe that this is due to polluted stormwater runoff.



Salmon swim in Venema Creek, which meets Piper's Creek in Carkeek Park. Local children release salmon fry into Piper's Creek each year hoping they will return.

November 19, 2012 Storm Impacts



12000 block of 11th Ave. NW

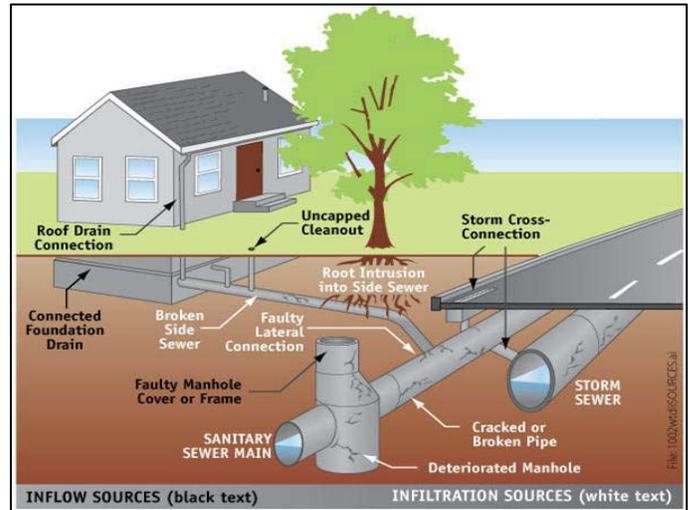


NW 125th St. & 9th Ave. NW

- These photos show the effects of two inches of rain in six hours on the afternoon of Nov. 19, 2012.
- Flooding and sewer backups occurred at several locations.
- Significant problems were experienced at:
 - NW 125th St. & 9th Ave NW
 - 12000 block of 11th Ave NW
 - 12200 block of 12th Ave NW
 - 12th Ave NW/NW 130th St
 - Carkeek Park Sewer Trunk Line

The Problem-Solving Process

Side sewers connect your home's plumbing to sewer main lines in the street. Leaky side sewers and mains, as well as roof drains and sump pumps connected to the system, allow stormwater to get into the sewers. High storm flows can overwhelm sewer mains, causing sewage overflows and backups.



Seattle Public Utilities is working on preventing flooding and sewer backups in Broadview caused by stormwater.

By studying:

- How stormwater flows across your streets and yards
- Existing infrastructure and where new systems are needed
- Soils and groundwater levels
- New stormwater management methods

By managing these kinds of projects:

- Sealing cracks and leaks in sewer pipes and side sewers
- Installing backflow preventers where effective
- Disconnecting roof drains and sump pumps that are connected to the sewer system
- Building natural drainage infrastructure

Natural Drainage Solutions

Natural drainage solutions aim to restore some of the natural ability of the soil to manage stormwater. By slowing and filtering the stormwater, natural drainage allows it to be absorbed into the soils. By giving the water somewhere to go, it channels it safely and helps to prevent flooding.



- Mimics natural hydrology
- Addresses stormwater runoff near the source
- Aids groundwater recharge and creek flow in dry months
- Traffic calming/pedestrian safety
- Added green space



These photos show natural drainage swales in Broadview (left) and Pinehurst (above) as they looked one to three years after construction.

Broadview Natural Drainage Solutions (2001-2005)



The Broadview neighborhood was the first place in Seattle where a natural drainage system was built. The first project, SEA Street, was so effective that two more projects were constructed. Those have also shown measurable results at reducing polluted runoff.

Project	Completion Year	Effectiveness
SEA Street #1	2001	99% reduction in runoff volume
2nd Ave NW from NW 117 th St. to NW 120 th St.		
NW 110 th Cascade	2003	48-74 % reduction in runoff volume across 28 acres
(NW 110 th St. from 3 rd Ave NW to Greenwood Ave.)		Removed pollutants: Motor oil, - 92% Total lead, - 90% Total copper, - 83% Total zinc, - 76% Total nitrogen, -63%; Total phosphorus, - 63%
Broadview Green Grid	2005	Manages runoff from 32 acres
NW 107 th to NW 110 th between 4 th Ave NW and Palatine Ave NW		Includes a "Cascade" system for N 107 th St., from 4 th Ave N. to Phinney Ave N Provides safer pedestrian pathways

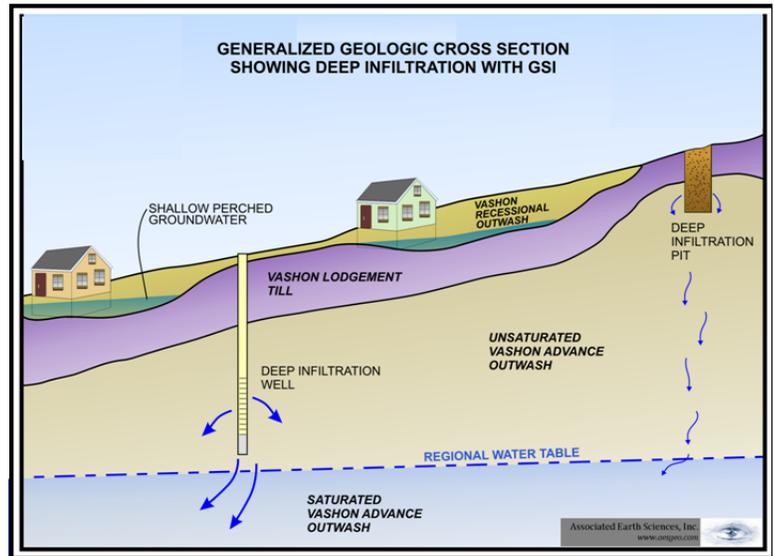
New Stormwater Management Science

After analyzing new sets of soil data, the results showed:

- Dense, concrete-like material was deposited by glaciers more than 15,000 years ago.
- This “glacial till” does not allow stormwater to be absorbed effectively.
- Perched groundwater (“perched” on top of glacial till) is present at many locations in the Venema Basin.
- However, “glacial outwash” sand and gravel lay underneath the glacial till layer, which effectively absorb stormwater.

During 2012, we studied deep infiltration that allows stormwater to be effectively absorbed into free-draining outwash soils beneath the glacial till. Deep infiltration features:

- Wells constructed to channel stormwater into the outwash soils.
- Swales to filter the stormwater and channel it to the wells.



Soil samples were taken at many depths in several locations to find where stormwater could best be absorbed. Deep wells were drilled to see how far beneath the surface we would have to go to reach absorbent soils.

Testing Performed in May/June 2012

- Characterized site geology and hydrogeology
- Identified “receptor zone” for deep infiltration wells
- Characterized aquifer
- Provided basis for impacts analysis

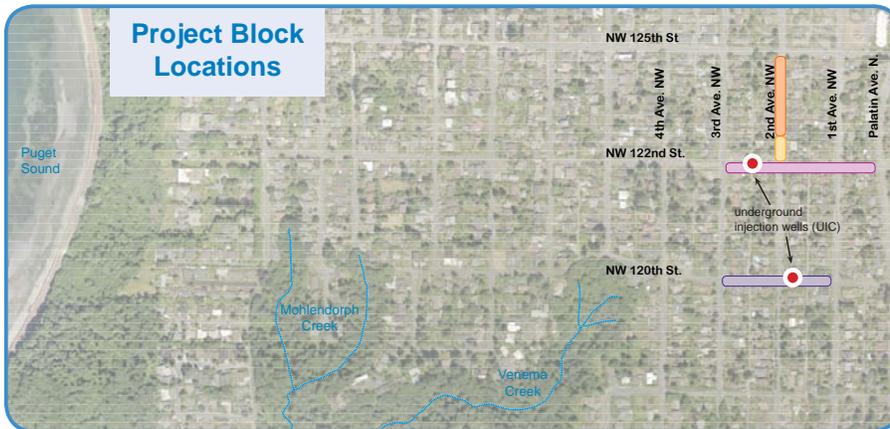


These photos show the drill rig (above) and one of the wells (left) used to find out more about the subsurface conditions.

What We Heard from Broadview Residents & What We Did About It

What We Heard	What We Did
Groundwater levels are high in Broadview	<p>Measured depth of groundwater from surface in wet season</p> <p>Designed to avoid shallow infiltration in areas of shallow glacial till and high groundwater</p>
Don't remove parking along one side of north-south streets	Proposed design maintains parking on both sides of 2 nd Ave NW
Don't take away any sidewalks	Designed to retain or replace all existing sidewalks
There is hard till that won't allow stormwater to be absorbed	Investigated the subsurface conditions and designed to provide for deep infiltration

Early Design Concepts

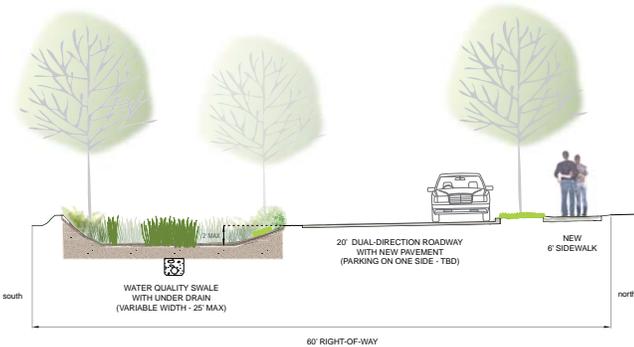
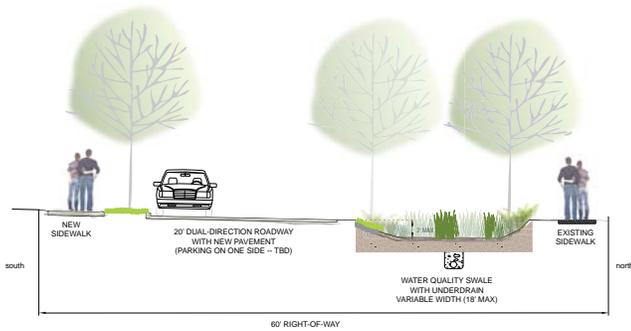


The concept drawings below show what natural drainage swales could look like on these blocks.

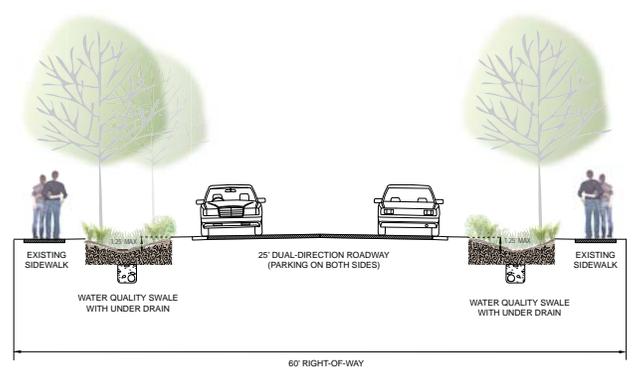
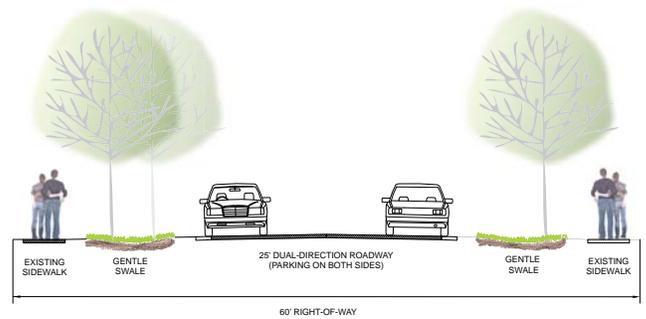
“Early design” means about 5% of the total design has been completed. Your input and the specific conditions on each block will be used to develop the remaining design.

Please submit any questions you have about the early design concepts using the comment sheets on the clipboards.

NW 120th St. & NW 122nd St.



2nd Ave. NW



Next Steps

Work with residents on project blocks to:

- Determine block priorities
 - What's important to people on your block?
 - What's important to you as a resident?
- Work with residents about project design in front of their homes
- Work with residents to select plantings
- Work with residents to lessen and manage construction impacts
 - Final design starting in 2013
 - Construction starting in 2014



Next Steps

