

## **Seattle's High Point Project**

Seattle's Public Utilities department (SPU) is currently working on innovative stormwater management techniques to manage its excessive runoff problem. The SPU has realized that mainstream engineering projects are not capable of resolving the stormwater problems of the city and are looking at the natural environment for ideas. In 1999, the SPU began developing its pilot program for "natural drainage systems," a unique approach to street design that minimizes the negative effects of stormwater runoff on surface and groundwater<sup>1</sup>. In this essay I will briefly discuss Seattle's natural drainage program and I will highlight its most ambitious and large-scale project, the High Point Project.

### **Background on Seattle Public Utilities**

Seattle is a medium-sized seaport city with a population of 563,374. Known for its cloudy and rainy climate, Seattle is nestled in between two large bodies of water, the Puget Sound on its west and Lake Washington on its east. The majority of Seattle's landscape, like other dense urban environments throughout the county, is made up of impervious surfaces. These streets, sidewalks, and building rooftops that cover the once forested landscape prevent rain from sinking down naturally to the soil that lies beneath. Instead, the water travels over these surfaces and into an elaborate drainage system of ditches and pipes and eventually ends up in the Puget Sound.

This typical pattern of stormwater management, although functional, has a number of disadvantages. First, stormwater that runs off of the impervious surfaces carries a high level of contaminants, such as oil, fertilizer, and heavy metals. Second, the speed and volume at which stormwater moves out of pipes and into the creeks causes high amounts

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<sup>1</sup> "Natural Drainage Overview," Seattle Public Utilities, accessed October 2006, [www.seattle.gov/util/](http://www.seattle.gov/util/)

of erosion. Both of these issues lead to a decrease in water and wildlife quality and ends up affecting the citizens of Seattle as well.

As a response, Seattle Public Utilities (SPU) has been exploring innovated approaches to manage stormwater. They have found that a “natural drainage system” that allows rainwater to infiltrate the soil, not only retains and absorbs the water, but also cleans it. The SPU’s natural drainage system includes natural features such as open, vegetated swales, stormwater cascades, and small wetland ponds to filter and bio-remediate pollutants, reduce impervious surfaces, increase vegetation, and improve the pedestrian experience<sup>2</sup>.

The projects they have designed try to meet four main goals: to manage stormwater in neighborhoods, to improve the appearance and function of the street right-of-way, to provide responsible stewardship of the environment, and to help the City meet local, state and national environmental regulations<sup>3</sup>. Since 1999, SPU has produced five natural drainage projects. Each is unique in their size and form yet they all have extensive tree and shrub planting that improve drainage function and street aesthetics<sup>4</sup>.

The first pilot project completed in 1999 is the Street Edge Alternatives (“SEA Streets”) program. In this project SPU retrofitted a residential block in northwest Seattle with a natural drainage stormwater management system that addressed the flooding problems of the area and protected and restored the salmon habitat in the nearby Piper’s Creek. The SEA Streets project reduced runoff from the block by 98%.

The second project completed is the 110<sup>th</sup> Cascade program. In this program the SPU replaced a ditch and culvert system along a collector road with a series of shallow pools

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<sup>2</sup> “Case Study: City of Seattle. Natural Drainage Systems Manage Stormwater, Create Greenspace,” [Evergreen](http://www.evergreen.ca), accessed October 2006, [www.evergreen.ca](http://www.evergreen.ca)

<sup>3</sup> “Natural Drainage Overview,” [Seattle Public Utilities](http://www.seattle.gov/util/), accessed October 2006, [www.seattle.gov/util/](http://www.seattle.gov/util/)

<sup>4</sup> Ibid.

and dams to maximize infiltration on a moderately steep slope<sup>5</sup>. This project handles water from approximately 21 acres of land in the Piper's Creek watershed.

In 2002, SPU completed its third project, the Broadview Green Grid program (pictured below). In this program SPU took



Photo Source: Seattle Public Utilities

elements from the previous two projects (SEA Streets and 110<sup>th</sup> Cascade) to create a neighborhood-scaled natural drainage system. This project spanned 15 residential blocks in northwest Seattle and, through collaboration with the Seattle Department of Transportation, enhanced

the community with attractive stormwater management systems, traffic calming measures, and pedestrian safety techniques.

The fourth project completed is the largest urban natural drainage systems in the country. In this project, the High Point Project, SPU pulled together its various techniques to create a stormwater plan for an entire development. The SPU worked with Seattle Housing Authority (SHA) in their redevelopment efforts for the High Point neighborhood in West Seattle, a mixed-income housing project. SPU used swales, porous paving, downspout disconnects, rainwater gardens, tree preservation, and bioretention to manage runoff from 129 acres. Additionally, public art and open space are integrated into the project.

The most recent project completed is the Pinehurst Green Grid project located in the Thorton Creek watershed in northeast Seattle. It is fashioned after the Broadview Green Grid project. This project, like Broadview, is a neighborhood-wide stormwater retrofit to improve streets and drainage.

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<sup>5</sup> Ibid.

According to the City of Seattle, SPU's projects have increased the amount of urban green space in Seattle, encouraged community stewardship, and improved the City's bottom line<sup>6</sup>. These projects are funded through the drainage fees that Seattle property owners pay based on impervious surface coverage. The drainage fee supports many different drainage projects and programs at Seattle Public Utilities<sup>7</sup>.

### **High Point Project**

The redevelopment of the Seattle Housing Authority's (SHA) High Point neighborhood in West Seattle offered Seattle Public Utilities (SPU) the opportunity to create a neighborhood-scale natural drainage system in an urban environment. This is the first large-scale natural drainage project the city has worked on and the first one in a high density environment in the country. Located in the Longfellow Creek Watershed system, this neighborhood falls within one of Seattle's top priority watersheds and is approximately 10% of the Watershed, providing an opportunity to have a positive impact on the water quality and stream flows.

By creating a partnership, the SPU and SHA collaborated to meet the needs of the community and to improve the protection of the Watershed. They are attempting to "integrate affordable housing, open space interests, and critical creek habitat protection by developing and evaluating several natural drainage options..." as stated in their mission statement<sup>8</sup>.

In general, a natural drainage system uses natural features that try to mimic the functions of nature by incorporating open spaces, vegetated swales, stormwater cascades, and small wetland ponds. The most important aspects of this type of system are the plants and trees and the deep healthy soils that support them<sup>9</sup>. The main goals of the system are to improve infiltration, flow attenuation, filtering and bioremediation of pollutants by soil

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<sup>6</sup> "Case Study: City of Seattle. Natural Drainage Systems Manage Stormwater, Create Greenspace," Evergreen, accessed October 2006, [www.evergreen.ca](http://www.evergreen.ca)

<sup>7</sup> "Natural Drainage Overview," Seattle Public Utilities, accessed October 2006, [www.seattle.gov/util/](http://www.seattle.gov/util/)

<sup>8</sup> "Stormwater Low Impact Development Practices," Seattle Public Utilities, accessed October 2006, [www.seattle.gov/util/](http://www.seattle.gov/util/)

<sup>9</sup> Ibid.

and plants, reduce impervious surfaces, increase vegetation, and provide pedestrian amenities. These goals help SPU create a living infrastructure that, unlike traditional stormwater management, will increase in functional value over time<sup>10</sup>.

For this project, SHA and SPU tried to create a system that could manage and treat stormwater closer to its source, while at the same time meet SHA's goal of building affordable housing with a traditional New Urbanist feel. In order for the community to blend in with the adjacent older neighborhoods, curbs and gutters (which are usually left out) were necessary.



Photo Source: Seattle Public Utilities

The major stormwater mitigation measures included were creating roof drainage that moved water across the lawn and plantings area, improving the absorption capability of the soil, developing filtration drainage swales to treat stormwater runoff from adjacent properties and streets, and using porous pavement.

The drainage system for the sub-basin includes a combination of natural drainage, such as vegetated swales and conveyance swales, along with the traditional catch basin/inlet structures with a drainage conveyance-piping network for large storm events. A stormwater detention pond was also created to provide flow control for the 2-year, 25-year, and 100-year, 24-hour design storms. The traditional stormwater systems of pipes and detention basins were necessary to cope with large storm events.

The most interesting aspect of this project is the fact that infrastructure design was placed as a main priority of the site layout, contrary to existing development patterns that usually place infrastructure design as an afterthought. The system created provides a better opportunity to cleanse, cool, and infiltrate stormwater runoff than the traditional system<sup>11</sup>.

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<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

This project is an excellent example of a performance-based design approach to sustainable development. Most importantly, “the High Point model challenges beliefs that dense urban design and ecological performance are mutually exclusive.<sup>12</sup>”

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<sup>12</sup> “Case Study: City of Seattle. Natural Drainage Systems Manage Stormwater, Create Greenspace,” Evergreen, accessed October 2006, [www.evergreen.ca](http://www.evergreen.ca)

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