

## Scientific Basis of the Rain Garden Project

The recently release Puget Sound Action Agenda (Puget Sound Partnership) listed stormwater among the most significant threats to the water quality of Puget Sound. Rain gardens are designed to capture and infiltrate stormwater in an individual, home or business setting. This infiltration potential can be determined based on the rigorous scientific guidelines delineated in the WSU Rain Garden Handbook for Western Washington Homeowners. Curtis Hinman, Professor at WSU Pierce County Extension and the handbook's principle author, states that "Accordingly the flow control benefits stated in the handbook are based on WWHM3 (Western Washington Hydrology Model version 3) PRO from Clear Creek Solutions. This latest version of WWHM includes enhanced capabilities for modeling rain gardens and is calibrated to three years of monitoring data collected at the City of Seattle's SEA Street project by University of Washington."<sup>1</sup> We will monitor the infiltration potential of our rain garden installations for two years following construction.

The project's rain garden class curriculum and installation workshop design elements are based on information published in the handbook. For the installation workshops, our site criteria is to size and design rain gardens in locations that infiltrate 95-99% of the expected rainfall. The manual includes technical information on appropriate site requirements for rain gardens including slope limitations, soil types, and drainage patterns. Other information includes guidance on size and shape, layout and excavation, soils, compost and rock materials, and native planting plans. Other LID practices discussed during the workshops will be based on the Low Impact Development Technical Guidance Manual for Puget Sound, produced by the Puget Sound Partnership and authored by an interdisciplinary panel of scientific experts.<sup>2</sup>

In addition to effectively infiltrating stormwater, another key benefit of rain gardens is their ability to significantly reduce stormwater pollutants through bioinfiltration (Table 1). Rain gardens work as bioinfiltration facilities that remove storm water pollutants through various physical and biological processes including: "adsorption, filtration, plant uptake, microbial activity, decomposition, sedimentation and volatilization."<sup>3</sup> Significant reductions are expected for these common pollutants: total phosphorus, metals such as copper, zinc and lead, total kjehldahl nitrogen (TKN), suspended solids (clay and silt), organics and bacteria.<sup>4</sup>

**Table 1: Rain Garden Pollutant Removal Capability**

Pollutant	Removal Capability
Metals (Cu, Zn, Pb)	93-98%
TP	70-80%
TKN	60-70%
NO <sub>3</sub>	20- 194%
TSS	90%
Organics	90%
Hydrocarbons	95+%

Source: Davis et al. 1998 and Hong et al. 2002

<sup>1</sup> [http://www.pierce.wsu.edu/Water\\_Quality/LID/RainGardenFlowControlModeling.pdf](http://www.pierce.wsu.edu/Water_Quality/LID/RainGardenFlowControlModeling.pdf)

<sup>2</sup> [http://www.pierce.wsu.edu/Water\\_Quality/LID/LID\\_manual2005.pdf](http://www.pierce.wsu.edu/Water_Quality/LID/LID_manual2005.pdf);  
[http://www.pierce.wsu.edu/Water\\_Quality/LID/Raingarden\\_handbook.pdf](http://www.pierce.wsu.edu/Water_Quality/LID/Raingarden_handbook.pdf)

<sup>3</sup> <http://www.epa.gov/owm/mtb/biortn.pdf>

<sup>4</sup> <http://www.epa.gov/owm/mtb/biortn.pdf>