

Ecology Begins Review of Bioretention Monitoring Data

Ecology has begun reviewing local, preliminary monitoring data from the city of Redmond, city of Tacoma, and Washington State University (WSU). Ecology is reviewing the data to determine if an addendum to Ecology's bioretention guidance is necessary.

Role of bioretention in stormwater management

Infiltrating stormwater onsite helps achieve the objective of low impact development (LID) – to more closely mimic pre-disturbance hydrology. Bioretention and rain gardens are two of the most common onsite best management practices (BMPs) used to meet the objectives of LID due to their hydrologic benefits. Early research from the east coast also indicated that these BMPs provide pollutant reduction benefits. Consequently, Ecology has acknowledged a dual role – hydrologic and treatment benefits – for bioretention in its Municipal Stormwater Permits and guidance documents.

Ecology has:

- Supported the development of bioretention and rain garden design criteria.
- Given grants to fund the monitoring of bioretention BMPs.
- In the 2012 Western Washington Stormwater Management Manual (2012 SWMMWW):
 - Included bioretention and rain gardens into its lists of LID practices to consider at new and redevelopment sites.
 - Published criteria to identify situations in which bioretention and rain gardens can be considered infeasible.
- Incorporated new features within its Western Washington Hydrology Model to estimate the hydrologic benefits of bioretention.

Performance of bioretention in reducing stormwater pollutants

Similar to all treatment BMPs cited within the Stormwater Management Manual for Western Washington, until recently very little to no local data existed concerning bioretention pollutant

WHY IT MATTERS

Bioretention and rain gardens are two of the most common onsite BMPs used to meet the objectives of low impact development (LID) due to their hydrologic benefits.

The 2012 SWMMWW and new five year Western Washington Municipal Stormwater Permits include increased requirements to manage stormwater onsite through either use of listed LID BMPs (such as bioretention and rain gardens) or the achievement of an LID performance standard.

MORE INFORMATION

2012 SWMMWW Webpage:

www.ecy.wa.gov/programs/wq/stormwater/manual.html

2012 Permit Reissuance Webpage:

www.ecy.wa.gov/programs/wq/stormwater/municipal/2012Reissuance.html

Contact information:

Carrie Graul
360-407-7221
carrie.graul@ecy.wa.gov

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removal performance. We now have results – some preliminarily – from three ongoing local monitoring projects:

- City of Redmond: a bioretention swale along 185th Avenue NE.
- City of Tacoma: a bioretention cell and a bioretention swale serving a new residential area.
- WSU Puyallup: mesocosms (four soil types with multiple replicates) serving site runoff, and additional laboratory columns.

General observations of the preliminary data from the project sites above include:

- TSS, dissolved zinc, and fecal coliform decrease significantly.
- PAHs and phthalates decrease.
- Phosphorus and dissolved copper increase significantly.
- Short-term significant increases in nitrate also possible.

Proposed change in Ecology guidance – short-term strategy

Ecology plans to do a more thorough review of the Tacoma and WSU-Puyallup data, which have not yet been officially released, and any other pertinent available information. Upon completion of that review, Ecology will issue an addendum to the bioretention “Applications and Limitations” guidance in Chapter 7, Volume V of the SWMMWW. We hope to complete that review within a couple months. Unless that review reveals yet-unnoticed trends and facts that influence our opinion of an appropriate response, Ecology is considering the following revised guidance:

- Do not install bioretention systems with under-drains that will discharge to surface waters.

- Conduct a more detailed assessment of potential groundwater quality impacts where multiple bioretention facilities would discharge over public drinking water supplies.

Meanwhile, Ecology reminds municipalities and others of the current guidance within the SWMMWW:

- Do not use bioretention within one-quarter mile of phosphorus-sensitive water bodies if the underlying native soil does not meet the soil suitability criteria for treatment in Chapter 3, Volume III of the SWMMWW.
- Do not install an under-drain if the under-drained water would be routed to a phosphorus-sensitive receiving water.
- Do not use bioretention within 100 feet of a drinking water well or a spring used for a drinking water supply.

Long-term strategy

Because of the substantial hydrologic benefits and the capability to reduce the concentrations of some key stormwater pollutants, Ecology sees a continued role for bioretention systems in stormwater management. However, unless the apparent increases in phosphorus and dissolved copper are resolved, Ecology will have to consider additional restrictions to prevent cumulative impacts where bioretention system effluents could eventually comprise a significant source of groundwater recharge. Ecology will look for ways to provide additional financial support for research into treatment and source control solutions that will allow bioretention to provide adequate control of stormwater pollutants of concern.