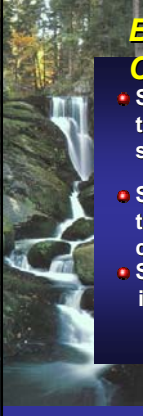




## Practical Designs for Bioretention

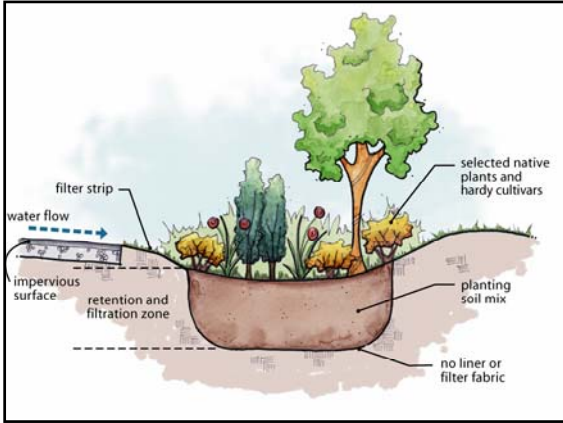
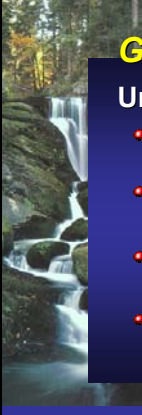
**Curtis Hinman** *chinman@wsu.edu*  
 WSU Extension Pierce County  
 Extension Faculty  
 Puget Sound Water Quality Field Agent

WASHINGTON STATE UNIVERSITY  
 PIERCE COUNTY EXTENSION



## Basic Design Characteristics

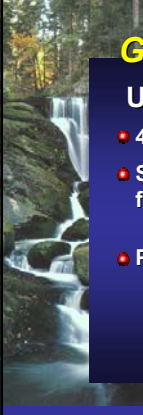
- Shallow landscaped depressions that receive stormwater from small contributing areas
- Soil mixes and plants selected to more closely mimic native conditions
- Small scale, dispersed facilities integrate into the design as a landscape amenity

## Guidelines

### Under-drains... use when

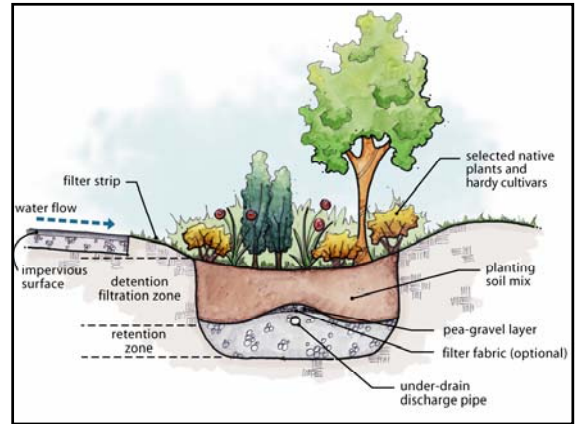
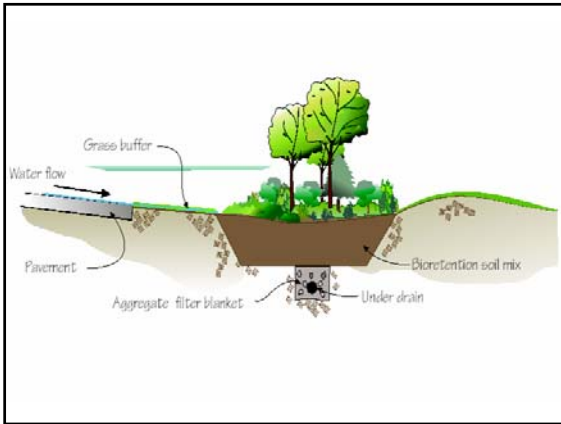
- Near sensitive infrastructure that may flood
- Filtering flows from pollution hotspots (impermeable liner required)
- Soil infiltration rates are not adequate to meet maximum pool and system dewater rates.
- Improved nitrogen removal desired



## Guidelines

### Under-drain

- 4-8 inches typical
- Slotted sch 40 PVC and aggregate filter blanket with proper gradation best
- Perforated PVC or slotted HDPE can be used with 1/2 - 1 1/2 washed drain rock
  - Pea gravel diaphragm
  - Filter fabric—do not wrap pipe, do not line facility unless flow restriction desired



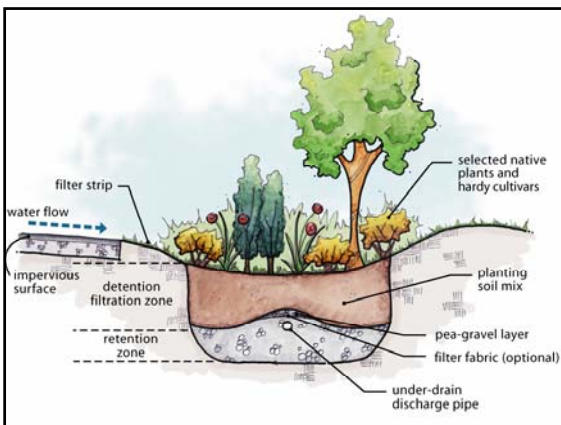
### Guidelines

#### Depth to groundwater

- If contributing area has <math>< 5,000 \text{ ft}^2</math> of PGS; and <math>< 10,000 \text{ ft}^2</math> TIA; and <math>< \frac{1}{4}</math> acre landscaping then 1 foot minimum from bottom of facility
- If over contributing area thresholds then 3 foot minimum

### Bioretention Flow Credits

- Represent as a pond with consistent infiltration rate
- Pond equals above ground and soil storage
- Facilities with under-drains: only storage below under-drain considered



### Bioretention Flow Credits

#### Determine infiltration rate

- Use the lower of:
  1. the estimated long-term rate for the planting soil mix; or
  2. the initial (short-term) rate of the underlying soil



## **Bioretention Flow Credits**


### **Determine infiltration rate**

#### **1. Underlying soil**

- Use 2001 SMMWW Volume V, Chapter 7: textural classification, grain size, infiltration tests
- Use 1 as the infiltration correction factor

#### **2. Planting soil mix**

- Use ASTM D 2434 at 80% compaction per ASTM D 1557
- If contributing area has <5,000 ft<sup>2</sup> of PGS; and <10,000 ft<sup>2</sup> TIA; and <¼ acre landscaping then use correction factor of 2
- If over above thresholds use correction factor of 4



## **Erosion and Sediment Control**