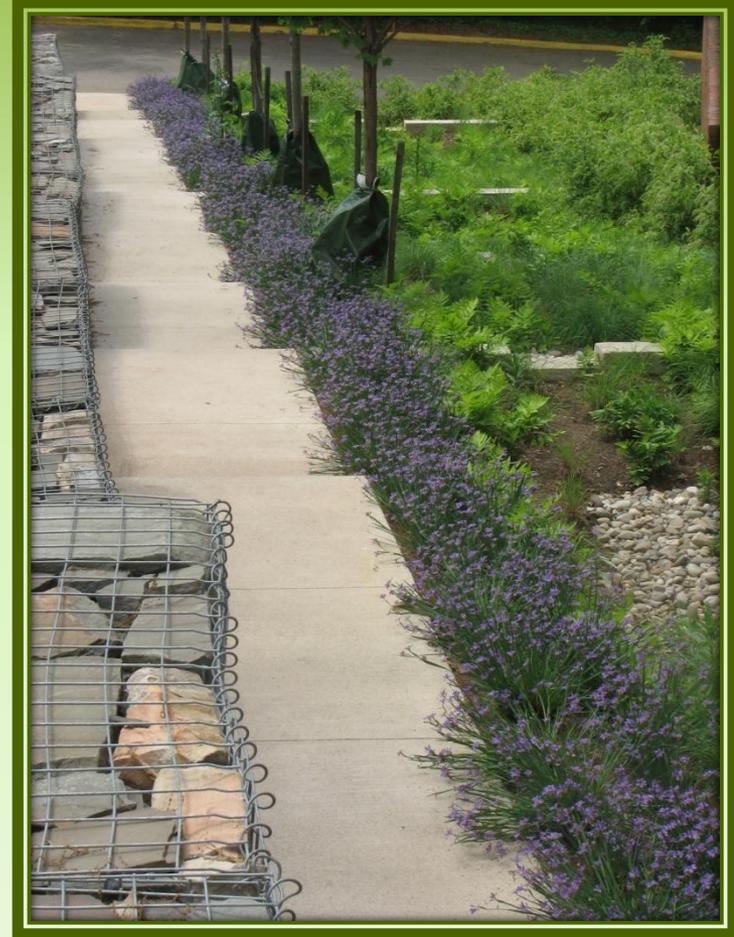


Low Impact Development

An Education Initiative Funded by the Department of Ecology



Disclaimer

Presenters for this PowerPoint presentation are landscape professionals. It is not our intent to endorse their businesses, but rather that they share their experiences designing, installing, supplying, and maintaining LID landscapes as professionals in this field.



Presented by: Bill Peregrine

- **President, Earthdance Organics LLC**
- **President, WA Assoc. of Landscape Professionals, Pierce County Chapter**
- **Certified Sustainable Landscape Professional, Washington State**



Low Impact Development (LID)

- What is LID?
- Stormwater
- Regulations and Changes
- LID features / BMPs
- Opportunities



What is Low Impact Development?

A stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

What is Low Impact Development?

- LID includes:
 - Site Planning to retain native vegetation and soils
 - Rain Gardens
 - Bioretention
 - Permeable pavement
 - Vegetated (Green) Roofs
 - Rainwater harvesting



Stormwater

- Impervious Surfaces
 - Roads
 - Roof tops
 - Lawns and landscapes
- Pollutants
 - Oil
 - Heavy metals
 - Phosphorous
 - Silts
- Affected Natural Areas
 - Wetlands
 - Streams
 - Water bodies



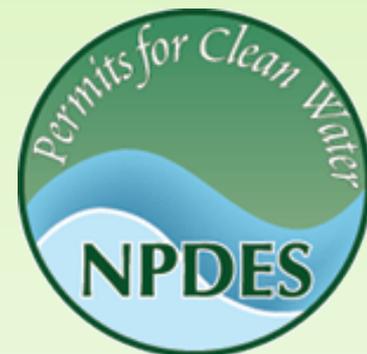
Stormwater Runoff Can Lead To:

- Erosion
- Pollution of Soils and Water Bodies
- Sedimentation to Water Bodies
- Combined Sewage Overflows
- Loss of Wildlife Habitat



Stormwater is Regulated

- Clean Water Act
- National Pollution Discharge Elimination System (NPDES)
- Washington State Department of Ecology
- Municipal permits



The Department of Ecology is making **regulatory changes to stormwater management** and the use of Low Impact Development (LID) to address the negative impacts of stormwater runoff in our urban and natural landscape.



Regulatory Changes are Coming

- Western Washington - LID will be required in new development and re-development
- Eastern Washington - LID allowed
- Deadline depends on population size
 - Earliest: June 2015 (Seattle/surrounding cities)
 - Most: December 2016
 - Latest: June 2018



Municipal Stormwater Programs

- Legal authority
- System mapping
- Coordination within departments & munis
- Public involvement & participation
- **Control runoff from new & redev & construction sites**
- Structural controls
- Source controls on existing development
- Illicit discharge detection & elimination
- O & M
- Education & outreach

LID principles

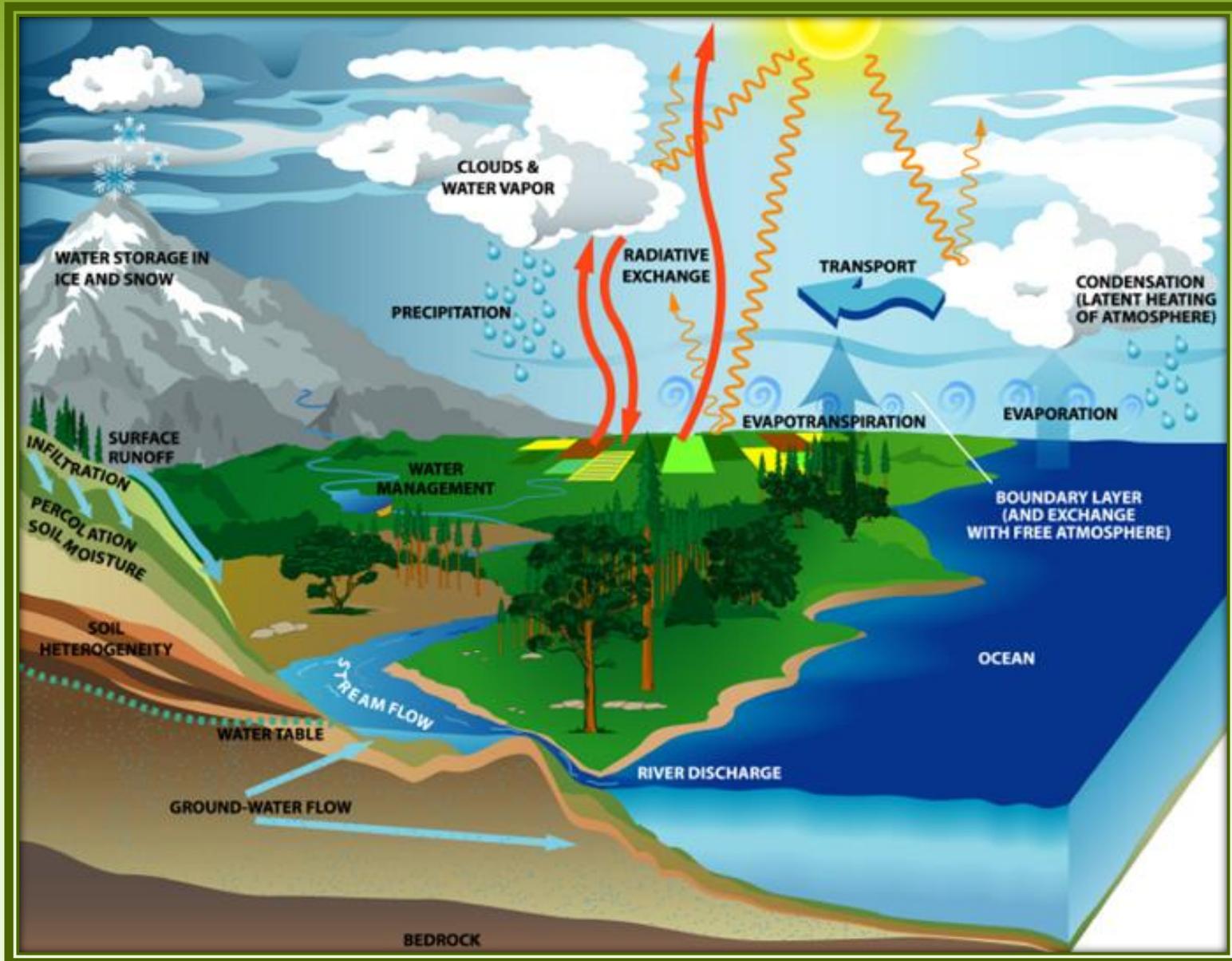
- Conserve
 - trees
 - plants
 - healthy soils
- Minimize
 - impervious surfaces
 - site disturbance
 - native vegetation loss
 - stormwater runoff



LID Benefits

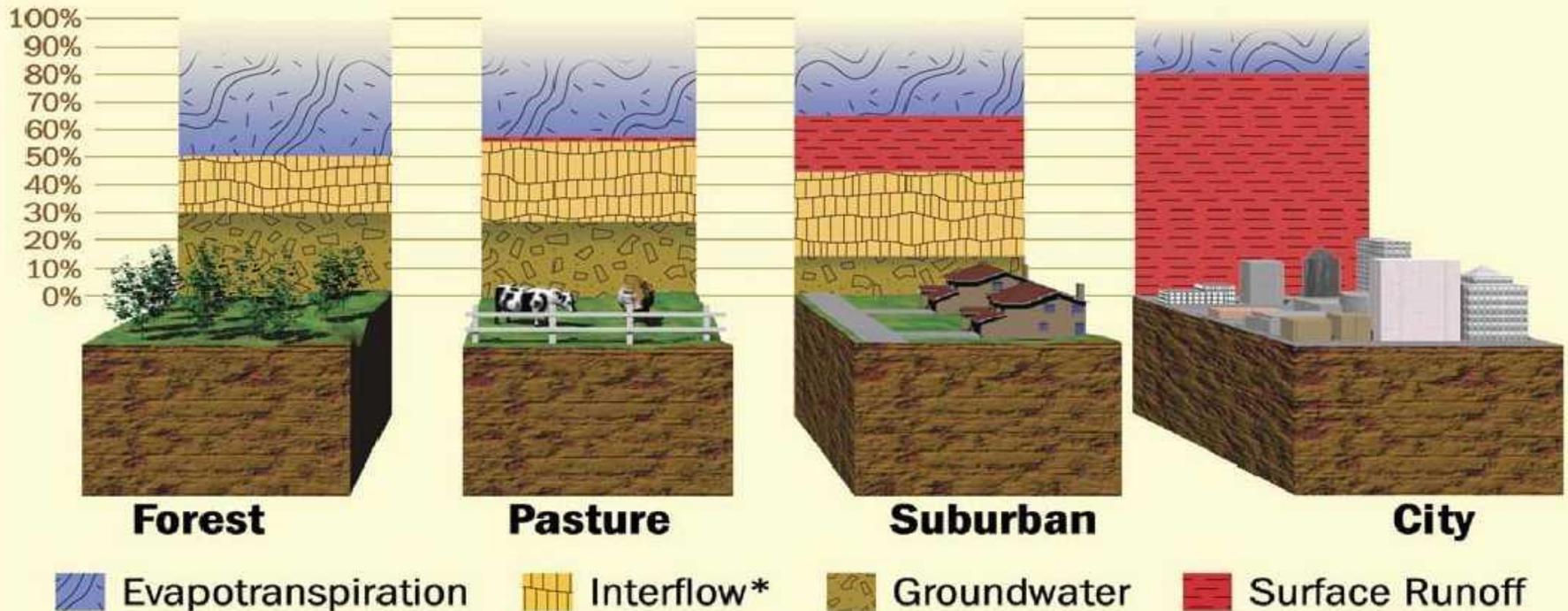
- Reduces and slows stormwater runoff
- Protects water quality
- Restores ecosystem services
 - Water infiltration
 - Groundwater recharge
 - Pollution interception and filtration
 - CO2 sequestration
 - Protection of habitat

Mimic Nature's Natural Processes



Changes to pre-disturbance hydrologic processes

Where the Rain Goes – The Regional Impact of Urbanization on Stormwater Flows



*water that travels just below the surface

Site Planning



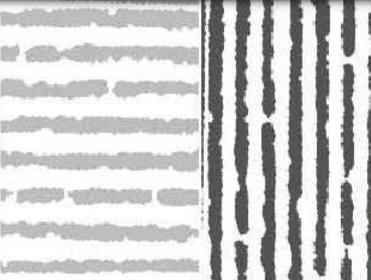
- Area of Alder Trees regrowth following site clearing
- Homeowner has requested removal of Alder Trees and new ornamental plantings
- Preserved Alder Trees as “Natural Area”

Site Planning



Preserved "Natural Area"

Building Healthy Soils



Building Soil

Guidelines and Resources
For Implementing Soil Quality and Depth BMP T5.13
in WDOE Stormwater Management Manual for Western Washington

2009 Edition

Restoring Organic Matter and Beneficial Soil Biology



Compost for erosion control and organic matter

Optional Compost Tea



Inoculating soil-borne bacteria and mycorrhizal fungi

Native/Self-Sufficient Plantings

1. Kaleidoscope Abelia	Abelia 'Kaleidoscope'
2. Edward Goucher Abelia	Abelia grandiflora 'Edward Goucher'
3. Korean Fir	Abies koreana
4. Vine Maple	Acer circinatum
5. Bloodgood Japanese Maple	Acer palmatum 'Bloodgood'
6. Red Lace Japanese Maple	Acer palmatum dissectum
7. Autumn Brilliance Serviceberry	Amelanchier grand. 'Autumn Brilliance'
8. Compact Strawberry Tree	Arbutus unedo 'Compacta'
9. Massachusetts Kinnickinick	Arctostaphylos uva-ursi 'Massachusetts'
10. New England Aster	Aster novae-angliae
11. Yellow Aurea Barberry	Berberis thunberg. 'Aurea'
12. Crimson Pygmy Barberry	Berberis thunberg. 'Crimson Pygmy'
13. Rose Glow Barberry	Berberis thunbergii 'Rose Glow'
14. Dark Beauty Heather	Calluna vulgaris 'Dark Beauty'
15. Victoria Ceanothus	Ceanothus thyrsiflorus 'Victoria'
16. Pink Flowering Dogwood	Cornus florida 'Cherokee Chief'
17. Milky Way Dogwood	Cornus kousa 'Milky Way'
18. Purple Smoke Tree	Cotinus 'Royal Purple'
19. Kramer's Rote Heath	Erica x darleyensis 'Kramer's Rote'
20. Fradesii Escallonia	Escallonia exoniensis 'Fradesii'
21. Dwarf Fothergilla	Fothergilla gardenii
22. Blue Oat Grass	Helictotrichon sempervirens
23. White Oakleaf Hydrangea	Hydrangea quercifolia 'Snow Queen'

24. Grosso Lavendar	Lavandula x intermedia 'Grosso'
25. Golden Boxlf Honeysuckle	Lonicera nitida 'Baggesons Gold'
26. Dr. Merrill Magnolia	Magnolia loeb. 'Dr. Merrill'
27. Royal Star Magnolia	Magnolia stellata 'Royal Star'
28. Royal Raindrops Crabapple	Malus 'Royal Raindrops'
29. Sargent Crabapple	Malus sargentii
30. White Crabapple	Malus x zumi
31. Columnar Crabapple	Malus tschonoski
32. Mt. Fire Andromeda	Pieris japonica 'Mt. Fire'
33. Sword Fern	Polystichum munitum
34. Akebono Flowering Cherry	Prunus yed. 'Akebono'
35. Catawbiense Rhodo	Rhododendron catawbiense
36. PJM Rhododendron	Rhododendron 'PJM compacta'
37. Unique Rhododendron	Rhododendron 'Unique'
38. King Edward VII Currant	Ribes sanguineum 'King Edward VII'
39. Rugosa Rose	Rosa rugosa
40. A.W. Spiraea	Spiraea bumalda 'Anthony Waterer'
41. Limemound Spiraea	Spiraea bumaldii 'Limemound'
42. Excelsa Western Red Cedar	Thuja plicata 'Excelsa'
43. Hamelin Fountain Grass	Pennisetum alopecuroides 'Hamelin'
44. Evergreen Huckleberry	Vaccinium ovatum
45. Shasta Doublefile Viburnum	Viburnum plicatum t. 'Shasta'
46. Periwinkle	Vinca minor

“Right Plant... Right Place”

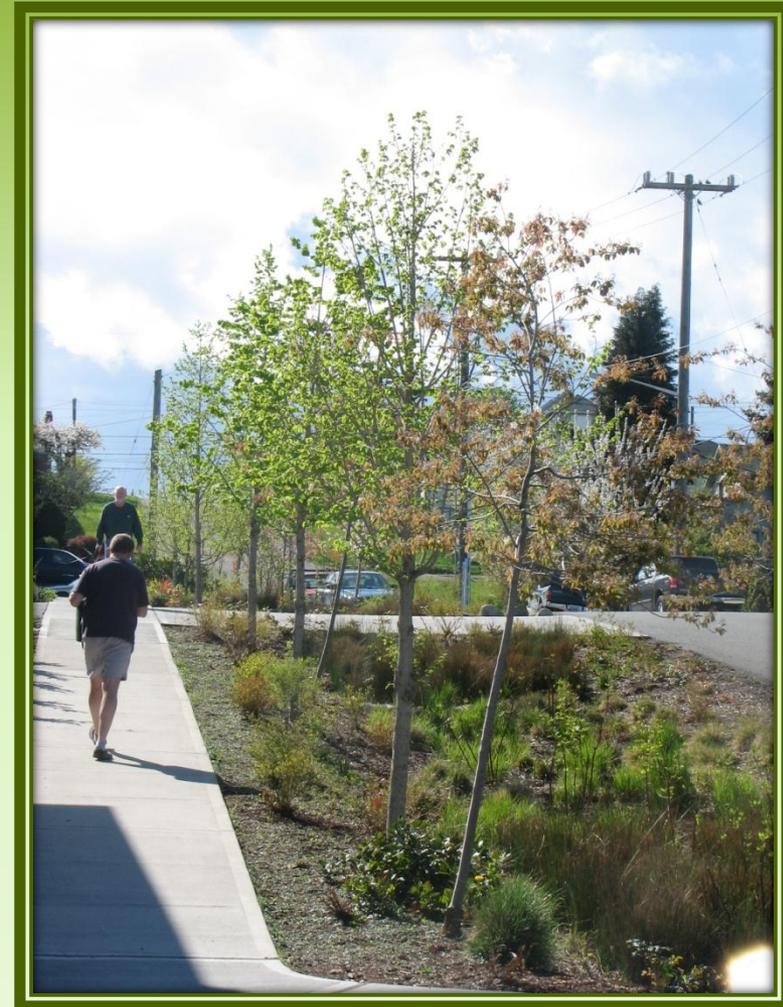
Bioretention

Engineered facility with specific design, sizing and modeling to store and treat stormwater by passing it through a designed soil mix often with under drains and control structures.



Rain Gardens

- Non-engineered planted depressions designed to mimic forest floors
- Amended soils or designed soil mix with high organic matter content (35-40%) to increase water infiltration
- Native plantings, suited to their environmental conditions
- Allows water infiltration into native soils providing treatment of stormwater



Specialty Metals Office Building

- Asphalt removal + planting beds
- Existing catch basins captured in Rain Gardens



Before



During



After

Specialty Metals Finished Landscape



Rain Garden off overflow from Infiltration Trench-System



Reverse view of Rain Garden before overflow water enters Pine Lake



Creative Movement of Stormwater

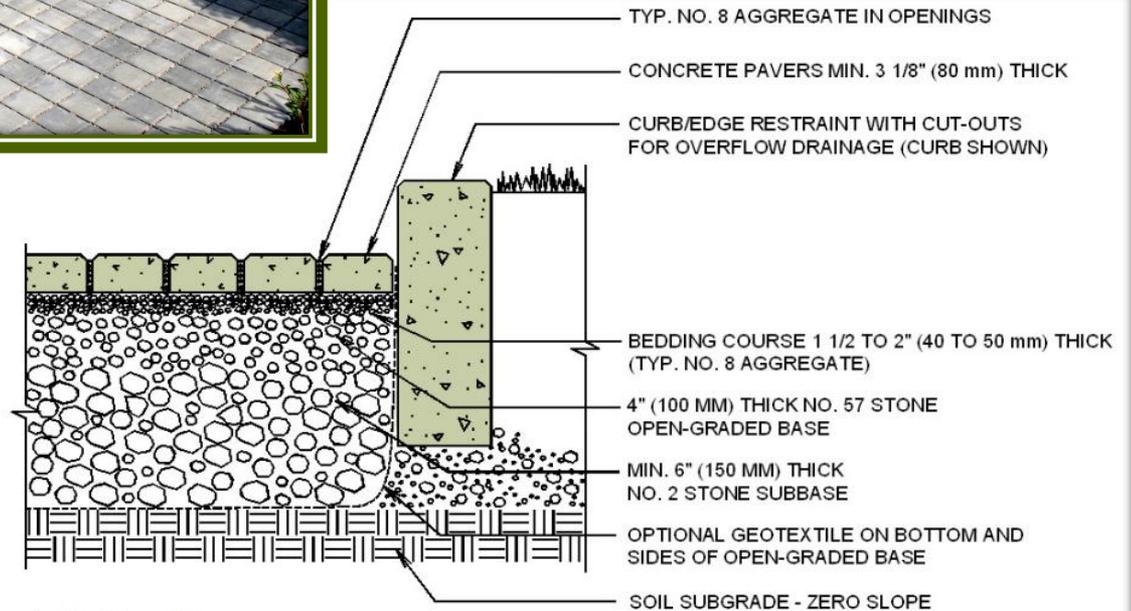


Permeable Pavement

Pervious concrete, porous asphalt and permeable pavers allow passage of water through the pavement and into the ground reducing and filtering stormwater. Stormwater is filtered when passed through the pavement into a subgrade of appropriate native soils or an engineered treatment layer.

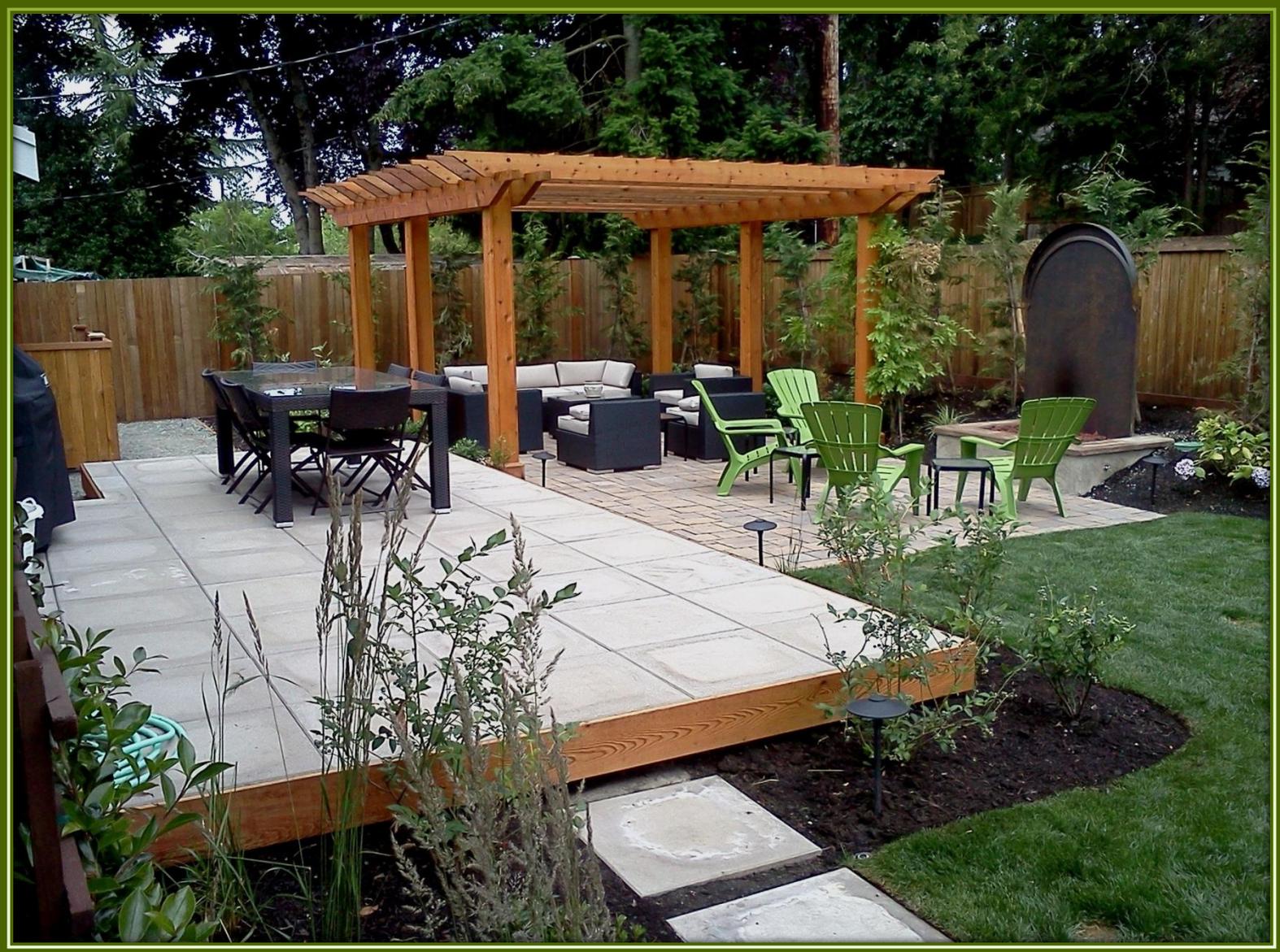


Permeable Systems

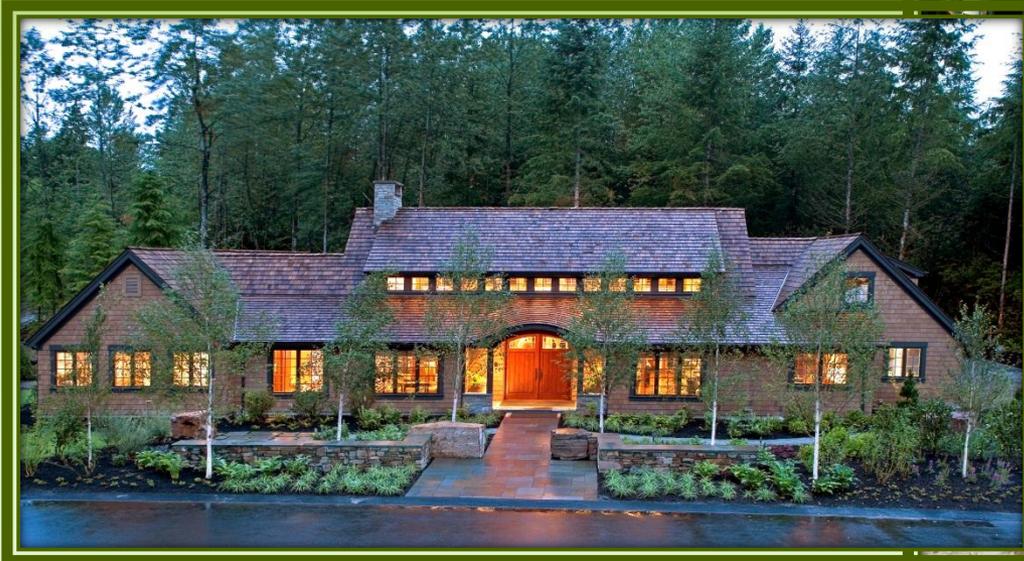
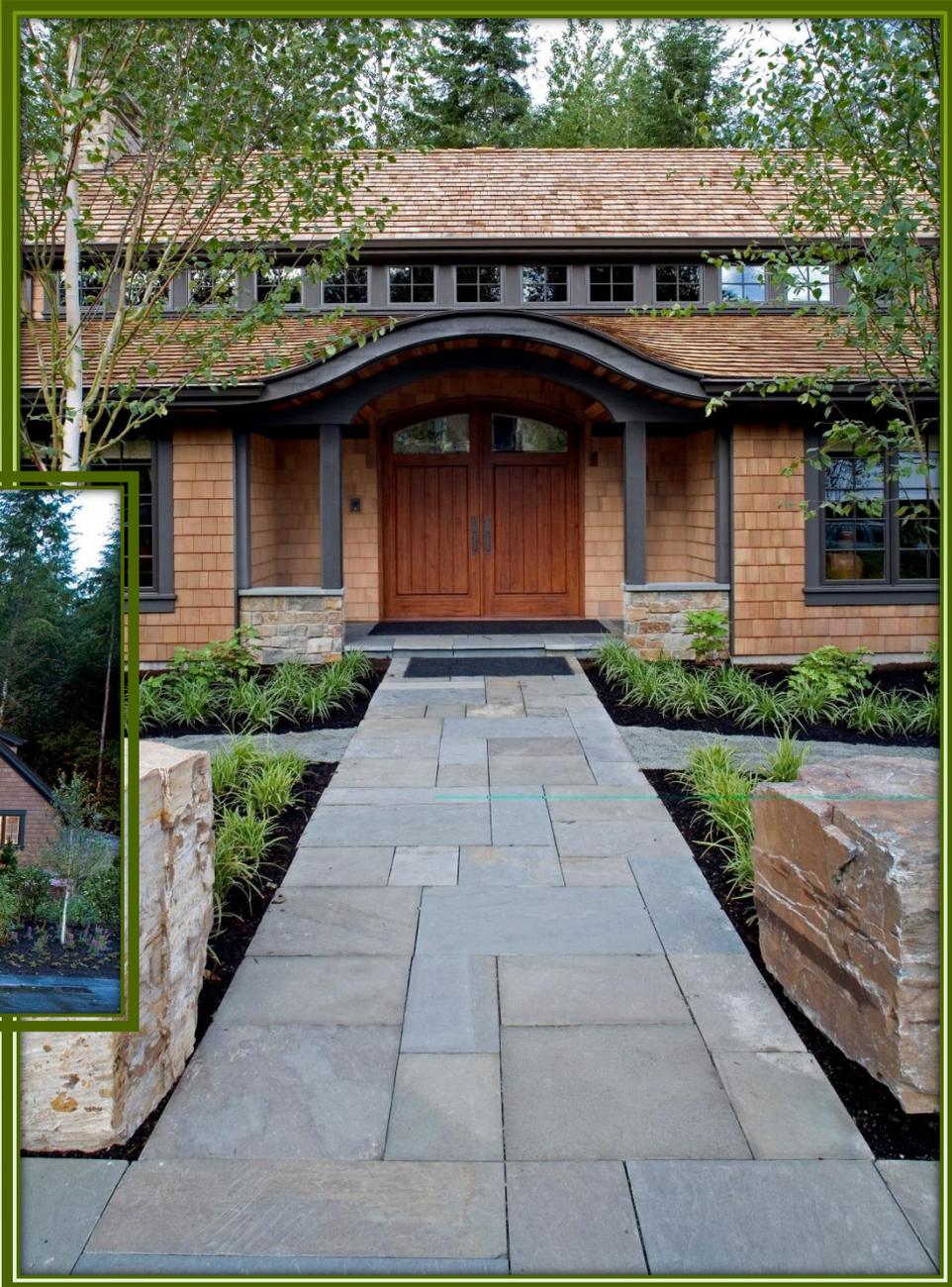


Eco-Priora® is a trademark of Uni-Group USA.

Permeable Paver Deck and Patio



Natural Stone can be Permeable



First, 5-star  BUILT GREEN™
Home in Snohomish County

Permeable Natural Stone Patio with overflow into Storm System



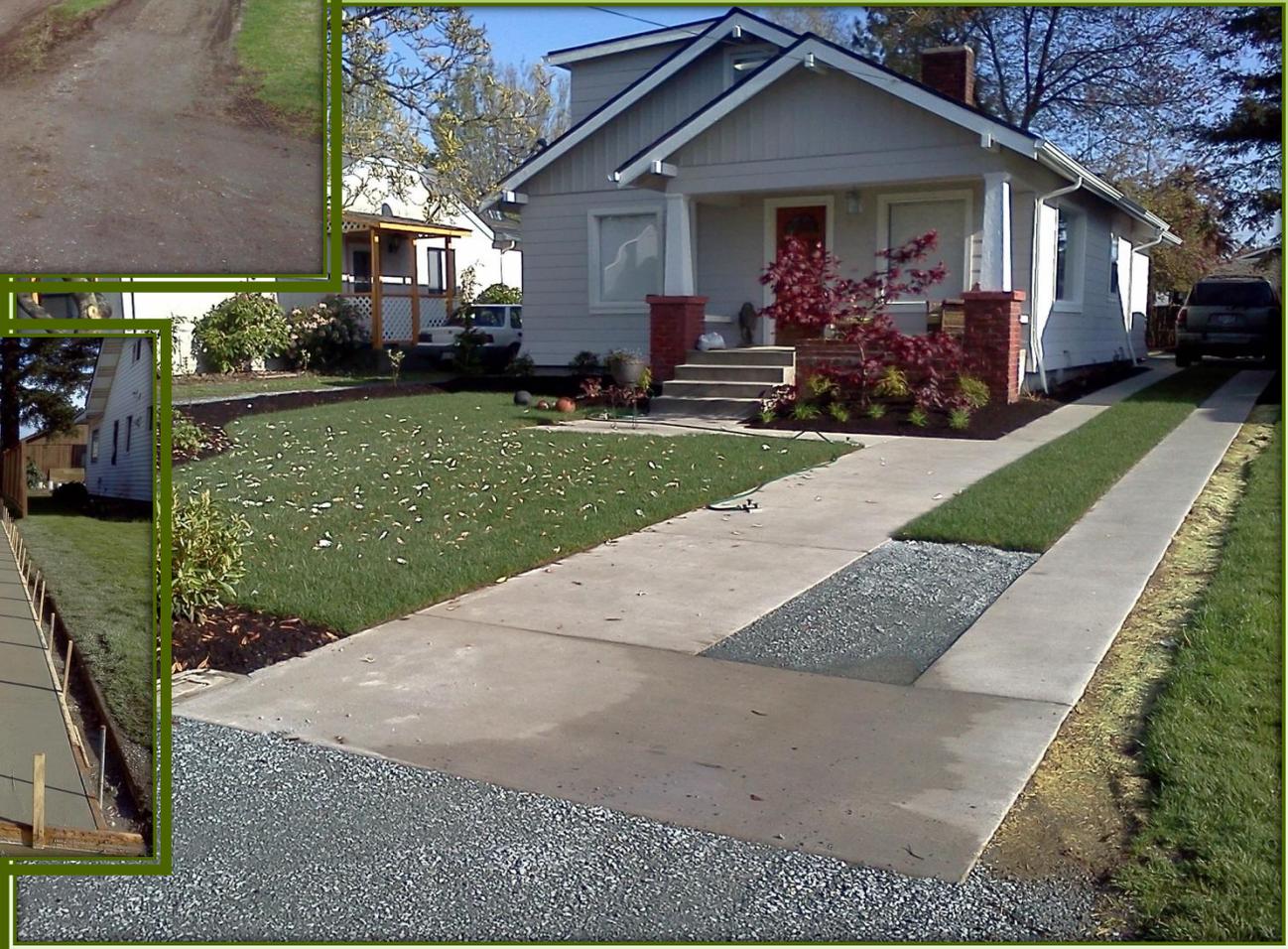
Permeable Natural Stone Patio with overflow into Rain Garden



Permeable Driveway with overflow into Rain Garden



Cost-Effective Permeable Alternative



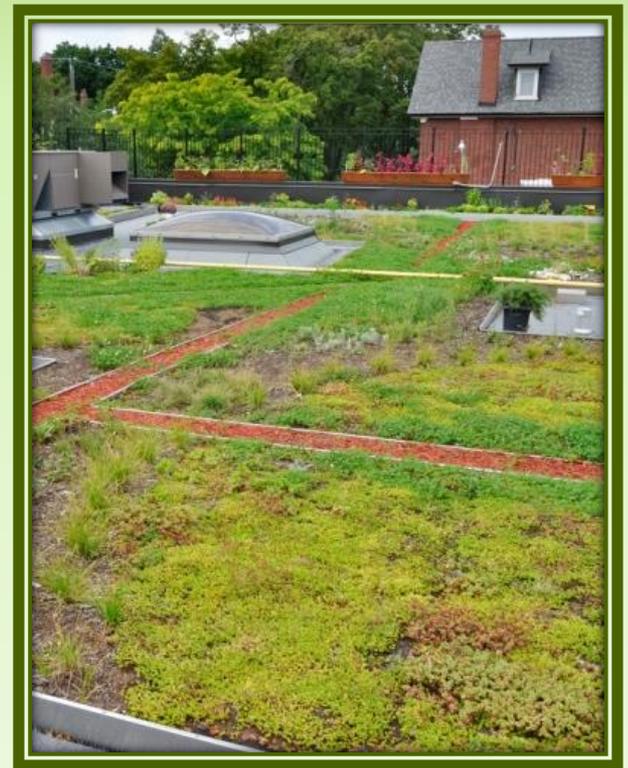
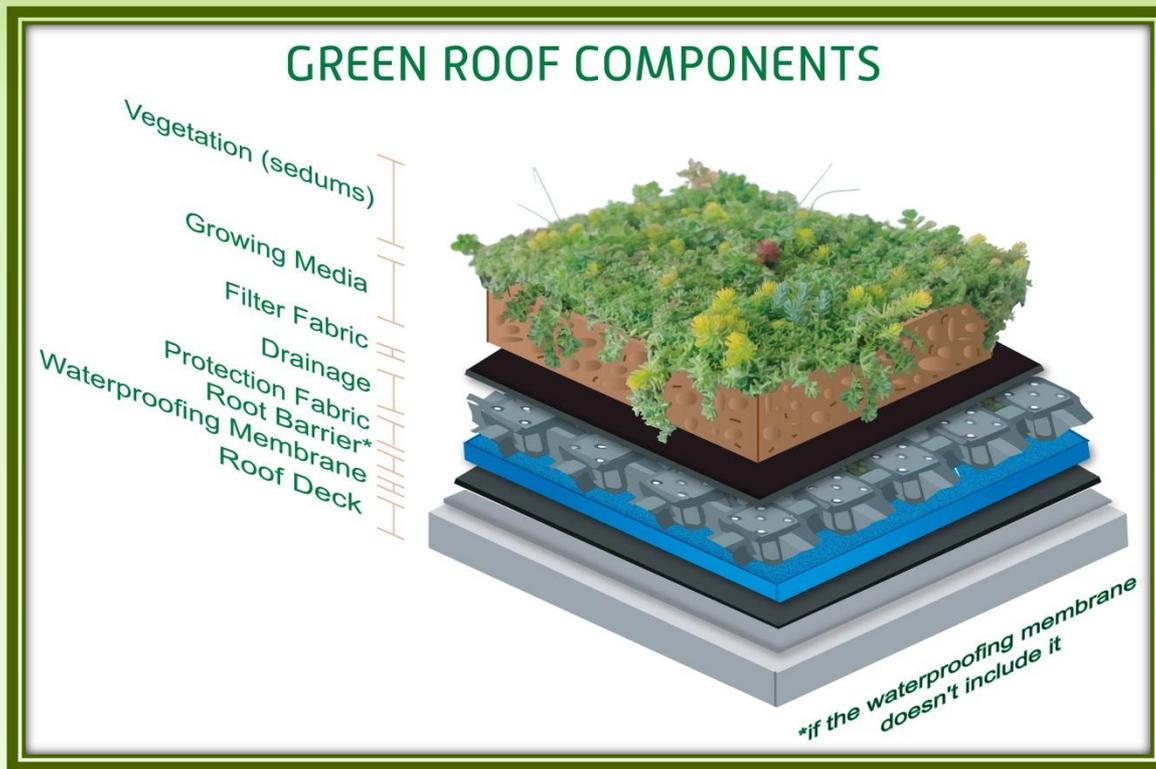
Vegetated (Green) Roofs

Roofs layered with waterproofing materials, lightweight soils and specialized plantings are designed to slow stormwater, improve building insulation and reduce urban heat sink.



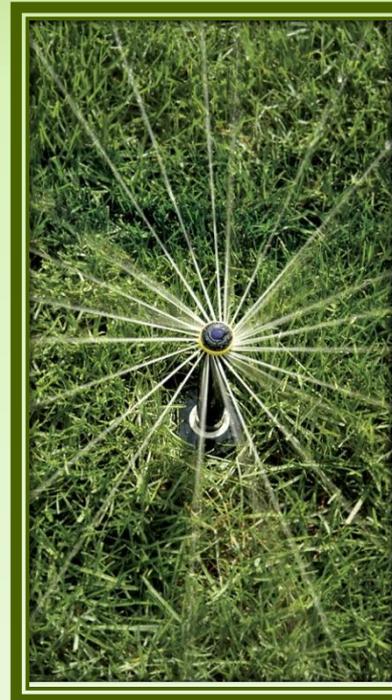
Green Roofs

Green Roofs treat both the impact water by slowing down, storing and filtering rain water and act as a pre-conveyance system to other on site storage or filtration systems



Rain Water Harvesting

Collecting rain water can reduce stormwater surge and then be re-used or slowly released back into the environment. Harvested rain water is stored in cisterns or barrels above or below ground.



Opportunities

- As new development and redevelopment occur an increasing amount of LID will be used.
- Opportunities for participation in design, installation and maintenance will exist on:
 - Commercial property
 - Public land
 - Right of ways
 - Private property



Resources

- Washington State Nursery and Landscape Association, www.wsnla.org
- Washington Association of Landscape Professionals, www.walp.org
- Department of Ecology Stormwater Page: <http://www.ecy.wa.gov/programs/wq/stormwater/index.html>
- Details of trainings offered by the Department of Ecology: <http://www.ecy.wa.gov/programs/wq/stormwater/municipal/EcyWorkshops.html>