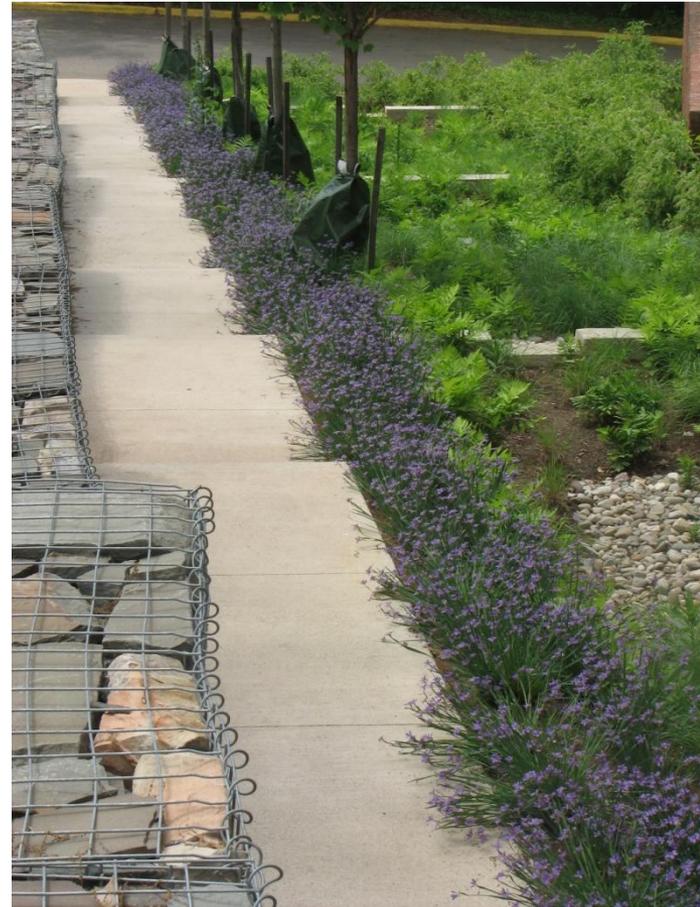


Low Impact Development

An Education Initiative Funded by the Department of Ecology



Larry Matel



- Green Street Infrastructure, LLC
- <http://greenstreetsinfrastructure.com/Home.html>
- BSCP, BSCE, MSCE

Low Impact Development (LID)

- What LID Is
- Stormwater Control and Management
- Regulations and Changes
- LID features / BMPs
- Opportunities
- Questions



Many Opportunities for LID



Low Impact Development (LID)

Is a planning, engineering, design and management approach to stormwater

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



More LID



Stormwater

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



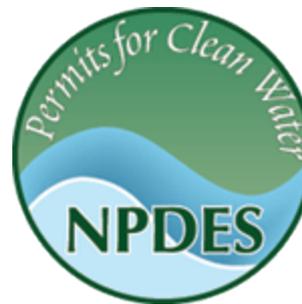
Stormwater Runoff Can Lead To:

- 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





DEPARTMENT OF
ECOLOGY
State of Washington

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
- Deadlines depend on population size
 - Earliest: June 2015
 - Most will adopt by: Dec 2016
 - Latest: June 2018



DEPARTMENT OF
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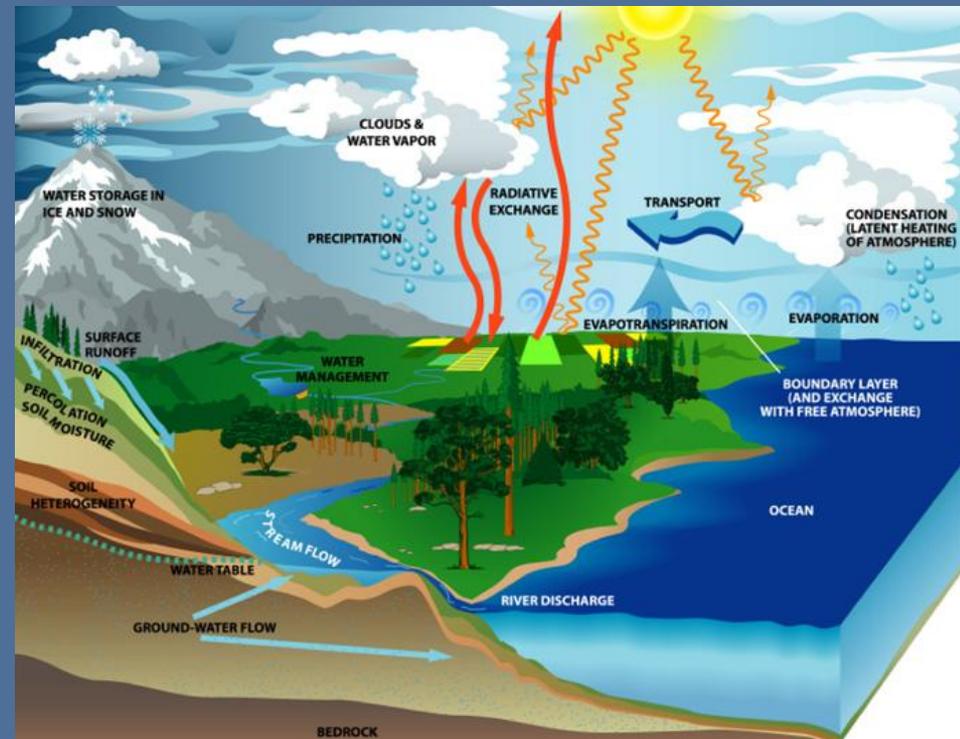
LID principles

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



LID Benefits

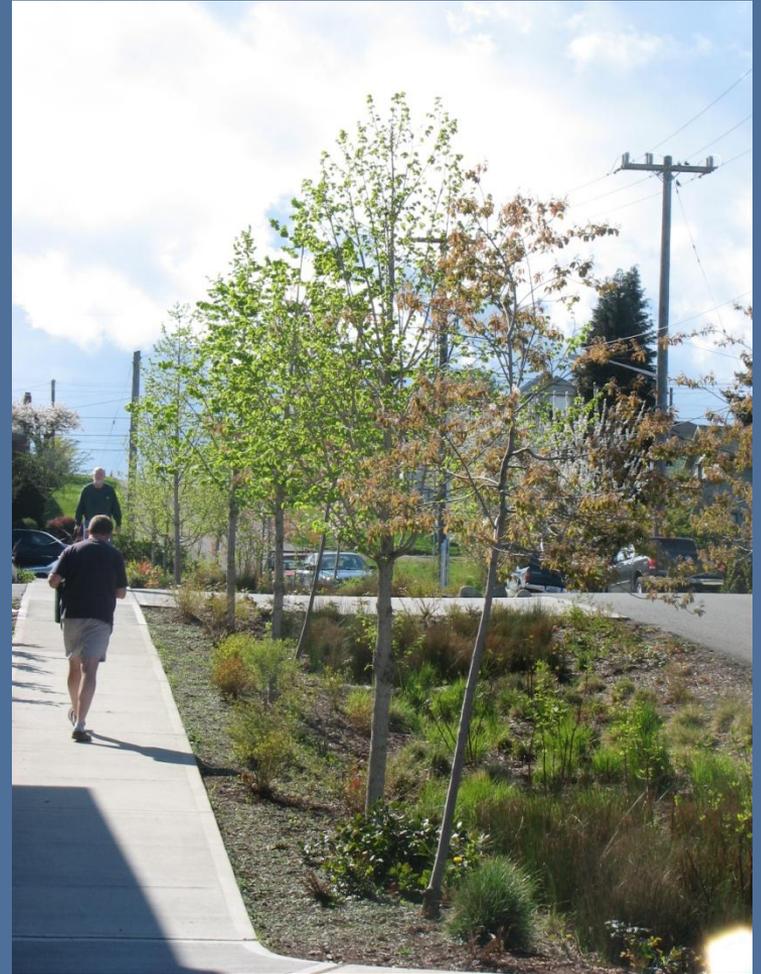
- Reduces and slows stormwater runoff
- Protects water quality
- Restores ecosystem services
 - Water infiltration
 - Groundwater recharge
 - Pollution interception and filtration
 - CO2 sequestration
 - Protection of habitat



Hydrologic (water) cycle

Rain Gardens

- 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



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.



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.



Vegetated Roofs

Roofs layered with waterproofing materials, growing medium and vegetation designed to slow stormwater.



Rain Water Harvesting

The accumulation of rain water for re-use, 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



Opportunities



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>