

Clean Water is Everyone's Business

Puget Sound
Starts Here

Low Impact Development (LID)

Coming to a Neighborhood Near You

Over the last decade, the Puget Sound region has been transitioning from the use of conventional stormwater management practices to the Low Impact Development (LID) approach. In response to a recent ruling by the Washington Pollution Control Hearings Board, the Washington Department of Ecology is currently in the process of adding LID requirements to the Phase I and Phase II municipal stormwater permits. The change will require "non-structural preventive actions and source approaches, including LID where feasible." Previous language simply allowed LID as an option. Skagit County municipalities, including Anacortes, Burlington, Mount Vernon, Sedro-Woolley, and parts of Skagit County (Urban Growth Areas) will be required to integrate LID into their local codes, rules and standards to meet the new requirements by a proposed December 31, 2015 deadline.

In addition, it can provide water quality benefits. Techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Instead of conveying, managing, and treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level ... LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment / revitalization projects.



What is Low Impact Development (LID)?

Low Impact Development (LID) has emerged as a highly effective and cost effective approach to controlling stormwater pollution and protecting developing watersheds and already urbanized communities throughout the country. LID is defined as *"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."*

The primary stormwater management objective for LID is to match pre-development forested hydrologic conditions over the full range of rainfall intensities and durations. In



The Dave Brookings Demonstration Rain Garden collects and filters runoff from the roof of the Skagit County Administration Building on Continental Place in Mount Vernon. The rain garden helps filter pollutants, reduces stormwater runoff, protects the health of Kulshan Creek and the Skagit River, provides valuable wildlife habitat, AND, it is beautiful!



This medical office building on 15th Street in Mount Vernon features one of the few green roofs in Skagit County. Green, or “living” roofs reduce stormwater pollution, cool and clean the air, conserve energy, can double the service life of the roof, reduce sound, provide insulation, create wildlife habitat, and improve the aesthetic environment.

Common LID practices

Preserving, clustering, and dispersing: Protecting or replanting a significant portion of development sites with vegetation, locating development on a smaller part of the site, and directing runoff to vegetated areas. In many cases, the most efficient and cost-effective way to manage stormwater.

Bioretention (rain gardens): Shallow, landscaped areas composed of soil and a variety of plants. Bioretention cells are stand-alone features while bioretention swales are part of a conveyance system.

Soil amendments: Compost added to soils disturbed during the construction process. Restores soil’s health and its ability to infiltrate water.

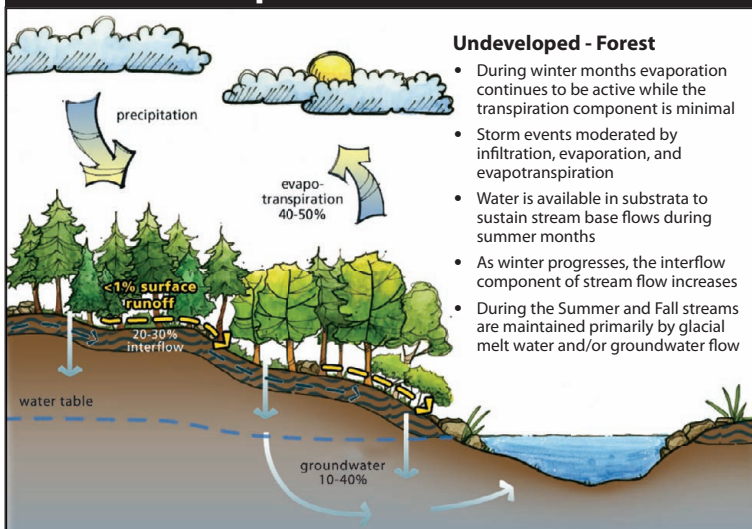
Pervious pavement: Allows water to infiltrate and removes pollutants; includes concrete, asphalt, pavers, and grid systems filled with grass or gravel.

Vegetated Roofs: Roofs composed of a waterproof layer, root barrier, drainage layer, growth media, and plants. Provides slower release of runoff, improves energy efficiency, extends roof life, and provides wildlife habitat and recreational amenities.

Rooftop rainwater collection: Catchment systems or cisterns that collect rooftop runoff for irrigation or other purposes. Reduces runoff and demand on groundwater supplies.

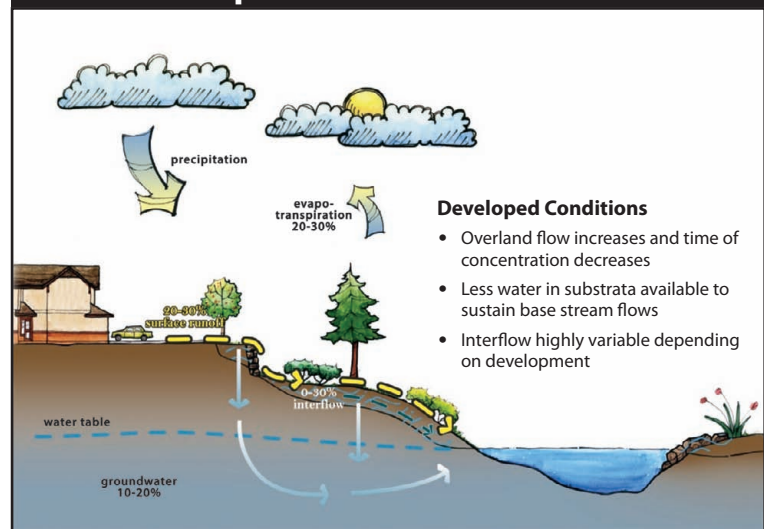
Minimal excavation foundations: Alternative building foundations composed of driven piles and a connector at or above grade. Eliminates the need for extensive excavation and reduces soil compaction.

Before Development



The low impact development approach to developing land and managing stormwater is to **imitate the natural hydrology (or movement of water) of the site**. In a mature Pacific Northwest forest, for example, almost all the rainfall (or snowmelt) disperses along the forest floor, where it infiltrates into the ground, is taken up by the roots of plants and trees, or evaporates. Researchers estimate that about less than one percent becomes surface runoff.

After Development



But when forests and natural open spaces are cleared, and buildings, roads, parking areas and lawns dominate the landscape, rainfall becomes stormwater runoff, carrying pollutants to nearby waters. Much less water infiltrates and is taken up by plants, less evaporates back to the atmosphere, and much more (about 20-30 percent in a suburban neighborhood) becomes surface runoff or stormwater runoff.

Why LID?

By the year 2025, it is projected that another 1.4 million people will call the Puget Sound region home (*source: Washington State Office of Financial Management*). Accommodating this growth while still protecting our natural resources and quality of life presents many challenges. Growth results in more rooftops, pavement, and stormwater runoff. Traditional ways of protecting water resources from stormwater runoff have not proven fully effective and the health of our community and the Puget Sound region are threatened by storm flows and pollutants carried by stormwater.

LID can help enhance our ability to protect surface and ground water quality, maintain the integrity of aquatic living resources and ecosystems, and preserve the physical integrity of receiving streams.

Key LID Site Design Objectives:

1. Conservation Measures

- Maximize retention of native forest cover and restore disturbed vegetation to intercept, evaporate, and transpire precipitation.
- Preserve permeable, native soil and enhance disturbed soils to store and infiltrate storm flows.
- Retain and incorporate topographic site features that slow, store, and infiltrate stormwater.
- Retain and incorporate natural drainage features and patterns.

2. Site Planning and Minimization Techniques

- Utilize a multidisciplinary approach that includes planners, engineers, landscape architects, and architects at the initial phases of the project.
- Locate buildings away from critical areas and soils that provide effective infiltration.
- Minimize total impervious surface area and eliminate effective impervious areas.

3. Distributed and Integrated Management Practices

- Manage stormwater as close to its origin as possible by utilizing small scale, distributed hydrologic controls.
- Create a hydrologically rough landscape that slows storm flows.
- Increase reliability of the stormwater management system by providing multiple or redundant LID flow control practices.
- Integrate stormwater controls into the development design and utilize the controls as amenities – create a multifunctional landscape.
- Reduce the reliance on traditional conveyance and pond technologies.

4. Maintenance and Education

- Develop reliable and long-term maintenance programs with clean and enforceable guidelines.
- Educate LID project homeowners and landscape management personnel of the operation and maintenance of LID systems and promote community participation in the protection of those systems.

** Source: 2005 Low Impact Development Technical Guidance Manual for Puget Sound*



Porous paved walkways and patios are featured at Tursi Park, located on Pennsylvania Avenue in Anacortes.

Benefits

Municipalities and Communities

- Protect regional flora and fauna
- Balance growth needs with environmental protection
- Reduce municipal infrastructure and utility maintenance costs
- Increase collaborative public/private partnerships
- Increase the appearance and aesthetics of communities
- Can help increase property resale values
- Helps reduce contamination of sediments in bays and associated clean up costs

Developers

- Provide new options for site layout, stormwater facilities, and recreation
- Reduce land clearing and grading costs
- Potentially reduce infrastructure costs (streets, curbs, gutters, sidewalks)
- Reduce stormwater management costs
- Can help produce more attractive neighborhoods that sell faster and for a premium

Environment

- Preserve integrity of ecological and biological systems
- Protect water quality by reducing pollutant loads
- Reduce impacts to local terrestrial and aquatic plants and animals
- Preserve trees and natural vegetation
- Reduce flooding potential
- Protect shellfish growing areas and beaches from bacterial contamination





The bioretention swales incorporated into the N. Burlington Boulevard Project add aesthetic appeal in addition to providing numerous environmental benefits.

Web Resources:

Center for Watershed Protection: www.cwp.org

Washington Department of Ecology: Municipal Stormwater Permits/NPDES: www.ecy.wa.gov/programs/wq/stormwater/municipal/PermitsPermittees.html

LID Standards: www.ecy.wa.gov/programs/wq/stormwater/municipal/LIDstandards.html

Low Impact Development Center, Inc.: www.lowimpactdevelopment.org

Low Impact Development (LID) Urban Design Tools Website: www.lid-stormwater.net

Puget Sound Partnership: www.psp.wa.gov

Soils for Salmon: www.soilsforsalmon.org

Stormwater Management Manual for Western Washington: www.ecy.wa.gov/programs/wq/stormwater/manual.html

The Economics of Low-Impact Development: A Literature Review: www.econw.com/reports/ECONorthwest_Low-Impact-Development-Economics-Literature-Review.pdf

U.S. Environmental Protection Agency (EPA) LID resources: LID Literature Review and Fact Sheet: www.epa.gov/owow/NPS/lid/lidlit.html

Costs Fact Sheet: www.epa.gov/owow/NPS/lid/costs07/factsheet.html

University of Washington Professional and Continuing Education: www.pce.uw.edu/certificates/low-impact-development.html

Washington State University Extension: LID Research: www.puyallup.wsu.edu/stormwater



For more information, contact your local municipality:

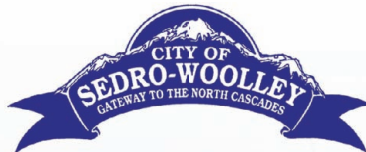
City of Anacortes – 293-1901

City of Burlington – 755-9715

City of Mount Vernon – 336-6204

City of Sedro-Woolley – 855-0771

Skagit County – 336-9400



Published by Skagit Conservation District –
For information about other stormwater education
programs and volunteer opportunities contact the
Skagit Conservation District office at (360) 428-4313 or
visit our website: www.skagitcd.org

Do your part to keep the Skagit waterways clean. You can make a difference!