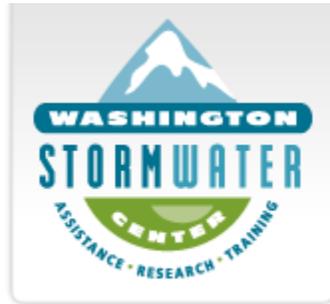


LOW IMPACT DEVELOPMENT and GREEN INFRASTRUCTURE GLOSSARY OF TERMS



Adapted Ornamentals

Non-native plants, or cultivars and hybrids of native plants that are adapted to a climate they will be planted in. These plants do not exhibit invasive behaviors. They are used to add visual interest and to replace native plants that might require too much maintenance.

Best Management Practice (BMP)

Best Management Practices are schedules of activities, prohibited practices, maintenance procedures and structural and/or managerial practices that—when used singly or in combination—prevent or reduce the release of pollutants and other adverse impacts to waters of Washington State. The types of BMPs identified by Washington State are source control, runoff treatment, and flow control.

Bioretention Cells

Shallow depressions in land accepting stormwater from small contributing areas with plants and a soil media designed to provide a specific saturated hydraulic conductivity and pollutant removal characteristics and support healthy plants. A variety of plants are used in bioretention areas, including trees, shrubs, grasses and/or other herbaceous plants. Bioretention cells may or may not have an under-drain and are not designed as a conveyance system.

Bioretention Swales

Bioretention swales incorporate the same design features as bioretention cells. However, bioretention swales are designed as part of a conveyance system that can convey stormwater when maximum ponding depth is exceeded and have relatively gentle side slopes and flow depths that are generally less than 12 inches.

Compost- Amended Soil

Soil that has been amended with compost or other organic materials to help restore the soil's critical functions:

- Restores water infiltration and storage capacities
- Decreases surface water runoff and erosion
- Traps sediments, heavy metals and excess nutrients
- Biodegrades chemical contaminants
- Rebuilds the beneficial soil life that fights pests and disease, and supplies plants with nutrients and water
- Improves plant health, with reduced need for additional water, fertilizers and pesticides; and
- Aids deep plant root growth and vigorous vegetative cover.

Constructed Wetland

Those wetlands intentionally created on sites that are not wetlands for the primary purpose of wastewater or stormwater treatment and managed as such. Constructed wetlands are normally considered as part of the stormwater collection and treatment system.

Ecosystem

A community of living organisms (plants, animals, microorganisms, etc.) that interact among themselves and the environment where they live (on land, in the soil or in the water, etc.). They are often defined by the plants and animals living within the community (a marsh, a wetland or a coral reef, for example). Ecosystems do not always have distinct boundaries; they can be as small as a mud puddle or as large as a continent or even the earth itself.

Green Infrastructure

This includes a wide range of multi-functional, natural, and semi-natural landscape elements located within, around, and between developed areas. This can include forests and meadows, floodplains, and riparian areas. This can sequester carbon, control flooding, purify air, increase property values, and provide recreational opportunities such as urban trails and bike paths.

Green Stormwater Infrastructure

Green stormwater infrastructure includes a range of soil-water-plant systems that intercept stormwater, infiltrate a portion of it into the ground, evaporate a portion of it into the air, provide water to plants, and in some cases release a portion of it slowly back into the collection system. It has also been defined as systems and practices that restore and maintain natural hydrologic processes to reduce the volume and water quality impacts of developed areas while providing multiple benefits. The infrastructure is designed to address the impacts of stormwater runoff from impervious surfaces and developed areas.

Green (Vegetated) Roof

A green roof is a roof partially or fully covered with vegetation and a growing medium which is planted over a waterproofing membrane. It can contain edible plants and walkable gardens. Green roofs reduce and slow stormwater, reduce urban heat island effect, and reduce energy use, air pollution and Greenhouse gas emissions.

Groundwater

Groundwater is water located beneath the earth's surface in the cracks and spaces in soil, sand and rock. It is stored in, and moves slowly through, geologic formations of soil, sand, and rocks called aquifers. Groundwater supplies about half of the drinking water for the U.S. population. Most of the water used to irrigate crops comes from groundwater.

Hydrology (also see: Water Cycle)

Hydrology is the science of the properties, movement, and characteristics of water found on the earth's surface, in the soil and rocks beneath the surface, and in the atmosphere.

Impervious

A non-vegetated surface area that has been developed in such a way that water cannot infiltrate into the soil. Examples of impervious surfaces include roofs, paved and/or gravel roads and parking areas, sidewalks, and soils that have been compacted either by design or by use. Lawns are pollution generating pervious surfaces. Artificial sports fields with underdrains are impervious.

Infiltration

This is the process by which water on the surface enters the soil. Infiltration is often expressed as a rate (inches per hour), which is determined through an infiltration test. Infiltration rate is the rate at which soil is able to absorb rainfall or irrigation. These rates decrease as the soil becomes saturated.

Low Impact Development (LID)

LID is a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices (BMPs) that are integrated into a project design. LID BMPs emphasize pre-disturbance hydrologic process of infiltration, filtration, storage, evaporation and transpiration. Common LID BMPs include: bioretention, rain gardens, permeable pavements, minimal excavation foundations, vegetated roofs, and rainwater harvesting (Washington State Department of Ecology Definition).

Low Impact Development (LID) is an approach to, and suite of tools for, land development and re-development that works with natural systems and elements to manage stormwater as close to its source as possible by capturing, slowing and detoxifying these polluted waters. LID employs principles such as preserving and recreating natural landscape features, minimizing imperviousness to create

functional and appealing site drainage that treats stormwater as a resource rather than a waste product. The tools used are primarily natural but also involve engineered structures such as pipes and cisterns. LID strategies integrate green space, native and adapted ornamental landscaping, natural hydrologic functions, and other techniques to generate less runoff, and less polluted runoff, from developed land (Common language definition).

Mulch

A covering of chipped bark or wood, shredded leaves, compost, or certain inorganic materials such as rocks spread on the ground around plants to prevent excessive evaporation or erosion. Some mulch also enriches the soil and inhibits weed growth.

Native Plants

Plant types historically located in a particular geographic area. These plant species have not undergone change or improvement by humans, and are still found growing in uncultivated or relatively undisturbed areas within their home region. Due to their historic presence, these plant species are extremely well adapted to the climate and natural disturbances (e.g., fire, grazing, and/or flooding) of the region. These plant species have co-evolved with a suite of insects, microbes, and other wildlife. As a result, these plant communities are drought tolerant, disease and insect resistant, and hardy. However, some native plants are not visually appealing, and are replaced by adapted ornamentals.

Permeable Pavements

Permeable Pavements refer to the three primary categories, including pervious concrete, porous asphalt and permeable interlocking concrete pavers (PICP). Permeable Pavements are a particularly good LID strategy for parking lots, residential roads, parks, sidewalks and shoulders. It is considered a beneficial tool in urban stormwater strategies. They are not a good option for high use sites (industrial, gas stations).

Pervious Concrete

(Sometimes called porous concrete or pavement, permeable concrete, or no fines concrete,) Pervious concrete is a special method of installing concrete that allows for many small voids to form. These voids allow for stormwater to infiltrate into a base layer of crushed gravel that is typically deeper than traditional concrete installation. Pervious concrete is typically installed on sidewalks, parking lots, streets, roads and other heavy commercial or industrial uses.

Porous Asphalt

Porous asphalt allows water to drain through the pavement surface into a stone recharge bed (a layer of clean appropriately sized gravel) and infiltrate into the soil. There may be a need for additional treatment before infiltrating into the soil, depending on the type of existing soil. This stone bed, often 18 to 36 inches in depth, provides a tremendous sub base for the asphalt paving. Porous asphalt is used mostly in parking lots that do not experience heavy commercial traffic or low use roadways.

Permeable Interlocking Concrete Pavement (PICP)

Permeable interlocking concrete pavement (PICP) is comprised of concrete pavers separated by joints filled with small stones or sand. Water enters the joints between solid concrete pavers and flows through an "open-graded" base, i.e. crushed stone layers with no small or fine particles. The void spaces among the crushed stones store water as it infiltrates back into the soil. The stones in the joints provide 100% surface permeability and the base filters stormwater and reduces pollutants. There are also other types of permeable pavers such as GrasPave and GravelPave.

Rain Barrel

A rain barrel is a system that collects and stores rainwater from a roof that would otherwise be lost, either as runoff into a yard or drainage system, or diverted to storm drains and streams. Usually a rain barrel is composed of a 55 gallon drum, a hose, PVC couplings, and a screen to keep debris and insects out. This is relatively simple and inexpensive to construct and can sit conveniently undermost residential gutter down spouts. However, currently it is not advised to use the water from a rain barrel to irrigate food-bearing plants or as a water source, there is research ongoing to determine what impact the roof material has on water quality.

Rain Garden

A non-engineered, shallow landscape depressions with native soil or a soil mix and plants that are designed to capture stormwater from small, adjacent contributing areas. It contains inlets from the impervious and pervious surface, and outlets to other stormwater structures that can appear as a pipe or as attractive stone "riverbeds." These can be shaped and sized to fit a particular site, and are typically landscaped with a variety of plants to fit the surroundings or be aesthetically pleasing. Ecology does not consider Rain Gardens capable of providing any level of stormwater quality treatment.

Rainwater Harvesting or Rainwater Collection

Rainwater collection is a method of collecting and storing rainwater from rooftops, land surface or rock catchments. The system includes catchment, pre-treatment, storage, treatment, use, reuse and operations and maintenance. In Washington State, you do not need a water right for rooftop collection and use up to a maximum daily amount.

Riparian Buffer

Riparian buffers are the distance, measured in feet or meters, between a water body and a human induced landscape change (such as agriculture, development). These riparian buffers are set by a variety of methods: political decisions, based on "soil type, typography, etc. or based on legal requirements. An example of a legally defined buffer includes those defined by shoreline master programs, critical area ordinances, required by grant funding, based on "stream type", or based on site characteristics, or different management goals (The contribution of Large Woody Debris (LWD), Shade, livestock exclusion, etc.).

Riparian Zone

A vegetated area (also called a "buffer strip" or "buffer") near a stream, usually forested, which helps shade and partially protect a stream from the impact of adjacent land uses. It plays a key role in improving water quality in associated streams, rivers, and lakes, thus providing environmental benefits. With the decline of many aquatic ecosystems due to agricultural production, riparian buffers have become a very common conservation practice aimed at improving water quality and reducing pollution.

Site assessment

This is the initial planning stage of low impact development. It includes analyzing topography, soils, hydrology, vegetation and habitat, adjacent land uses, zoning, access and utilities.

Soil Compaction

The physical compaction of a soil by an applied force, such as traffic, that destroys the soil's structure, reducing its ability to absorb water.

Stormwater runoff

Surface water, typically rain but it can also be melted snow that travels over surfaces such as roofs, roads, and other constructed surfaces. It includes debris, chemicals, sediment, and other pollutants that adversely affect water quality. If it is not slowed down or allowed to infiltrate, it can have adverse impacts, such as flooding and polluting the habitat of fish, invertebrates, and mammals.

Surface water

Surface water resources include any water that flows over the land, such as rivers, lakes, reservoirs, ponds, streams, stormwater runoff, and estuaries.

Wastewater

Water that has been used for a human purpose and conveyed by plumbing systems toward a point of treatment and disposal, such as a wastewater treatment plant. The pipes that transport wastewater from the source to a treatment plant are typically called a sanitary sewer system. This differs from stormwater in that stormwater is a direct result of precipitation or snowmelt and is not created by humans. Some stormwater conveyance systems are separated from sanitary sewer systems and are not treated at wastewater treatment facilities.

Water Cycle

The circulation of the earth's water as it evaporates from the sea and into the atmosphere, where it condenses and falls as rain or snow, returning to the sea by rivers or returning to the atmosphere by evaporation or evapo-transpiration from trees.

Wetlands

Wetlands can exist where the surface is flooded for extended periods or where there is soil saturation because the groundwater is at or near the land surface. Recurrent, sustained saturation of the upper part of the soil profile is the most basic requirement for wetlands.

(<https://fortress.wa.gov/ecy/publications/publications/9694.pdf>)

References

1. Low Impact Development Technical Guidance Manual for Puget Sound: Publication No. PSP 2012-3. Washington State University Extension, Puyallup Research and Extension Center and Puget Sound Partnership. 2012
2. Stormwater Management Manual for Western Washington.
<https://fortress.wa.gov/ecy/publications/SummaryPages/1410055.html>
3. U.S. Green Building Council: <http://www.usgbc.org/glossary>
4. U. S. Environmental Protection Agency's LID Page: <http://water.epa.gov/polwaste/green/>
5. Seattle Public Utilities, Green Stormwater Infrastructure:
<http://www.seattle.gov/util/EnvironmentConservation/Projects/GreenStormwaterInfrastructure/index.htm>
6. Washington State Department of Ecology, Stormwater and LID:
<http://www.ecy.wa.gov/programs/wg/stormwater/municipal/LID/Resources.html>
7. Puget Sound Partnership

<http://www.psp.wa.gov/stormwater.php>
8. Philadelphia Water Department: http://www.phillywatersheds.org/what_were_doing/green_infrastructure
9. Vermont Department of Natural Resources:
http://www.anr.state.vt.us/dec/waterq/stormwater/htm/sw_green_infrastructure.htm
10. Clean Water Honolulu:
http://cleanwaterhonolulu.com/storm/learning_center/pdf/Green%20Infrastructure%20for%20Homeowners-FINAL.pdf
11. Estimating the Extent of Impervious Surfaces and Turf Grass Across Large Ecoregions
http://www.chesapeakebay.net/documents/Estimating_Impervious_Surface_Extent_10-13.pdf
Peter R. Claggett, Frederick M. Irani, and Renee L. Thompson