# **GLOSSARY**<sup>4</sup>

**Aggregate:** A broad category of particulate material used in construction, including sand, gravel, crushed stone, slag, recycled concrete and geosynthetic aggregates, and available in various particulate size gradations.

Anthropogenic: Of, relating to, or resulting from human activity.

**Aquifer:** A porous water-bearing formation of permeable rock, sand, or gravel capable of yielding a significant quantity of groundwater.

**Assimilative Capacity:** Capacity of a water body or watershed to receive and absorb pollutants while maintaining designated uses and water quality standards.

**Beneficial Use:** Uses of a water resource, such as recreation, aquatic life, and human consumption, which is protected by state water quality standards.

**Best Management Practice (BMP):** A practice or combination of practices that are the most effective and practicable (including technological, economic, and institutional considerations) means of controlling point or nonpoint source pollutants at levels compatible with environmental quality goals.

**Bioretention**: Also known as Rain Garden, Bio-Filter and an LID BMP. On-lot retention of stormwater through the use of vegetated depressions engineered to collect, store, and infiltrate runoff.

Bioswale: Shallow channels lined with grass and used to convey and store runoff.

**Buffer:** A vegetated area, forested or otherwise vegetated, located between water bodies such as streams, wetlands, and lakes, that provides a permanent barrier against runoff from development, agriculture, construction, and other land uses. Buffers are designed to filter pollutants in runoff before the pollutants reach surface waters.

**Carbon Sequestration:** The removal and storage of carbon from the atmosphere in carbon sinks (such as oceans, forests or soils) through physical or biological processes, such as photosynthesis.

**Catchment:** A drainage area, stormwater feature or structure that collects rainwater—drain inlet, basin, etc.

**Check Dam**: Structures constructed of a non-erosive material, such as suitably sized aggregate, wood, gabions, riprap, or concrete, used to slow runoff water to allow sedimentation, filtration, evapotranspiration, and infiltration into the underlying native soil. Check dams can be employed in practices such as dry and enhanced grass swales.

**Clean Water Act (CWA):** (33 U.S.C. 1251 et seq.) Requirement of the National Pollutant Discharge Elimination System (NPDES) program are defined under Sections 307, 402, 318 and 405 of the CWA.

<sup>&</sup>lt;sup>4</sup> Sources for the glossary are most recent and available LID design and guidance handbooks, as well as other pertinent sources.

**Cluster Development:** Designs that incorporate open space into a development site. In cluster patterns, buildings and roads are arranged on a compact portion of the site to reserve areas of common open space or greenways; these areas can be used for recreation or preserved as naturally vegetated land.

**Complete Street:** Roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users, including pedestrians, bicyclists, motorists and public transport users of all ages and abilities.

**Connectivity:** A measurement of the continuity of a corridor such as a riparian corridor. Connectivity promotes valuable natural functions, such as movement of animals through their habitat and transport of materials and energy, which help maintain the integrity of natural communities.

**Conveyance System:** Any channel or pipe for collecting and directing stormwater.

**Depression Storage:** A technique for incorporating shallow depressed areas into urban landscaped areas for storing and infiltrating runoff. Typically, depression storage areas are small and have limited capacity and limited duration of retention in order to address property owner concerns relating to insects, damage to structures and inconvenience of ponded water on their property.

**Detention Basin:** The temporary storage of stormwater to control discharge rates, allow for infiltration, and improve water quality.

**Development:** Any construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and any other nonresidential projects, including public agency projects; or mass grading for future construction.

**Drainage Area:** An area that contributes all precipitation falling within its boundaries to a single common or outflow point.

Dry Well: Small excavated trenches filled with stone to control and infiltrate rooftop runoff.

**Dry Swale**: Linear bioretention cells designed to convey, treat and attenuate stormwater runoff. The engineered filter media soil mixture and vegetation slows the runoff water to allow sedimentation, filtration through the root zone, evapotranspiration, and infiltration into the underlying native soil.

**Eco-Friendly Landscaping:** Landscaping intended to conserve, protect, and enhance a site's natural resource systems through careful planning and design of site elements.

**Ecological Integrity:** Supporting and maintaining all components, biological, physical, and chemical components, of an ecosystem to a level comparable to that of natural habitats of the surrounding region.

**Ecosystem:** The network of a biological community and its surrounding interconnected physical and chemical environment.

**Edge Effect:** A condition in which otherwise suitable habitat becomes less suitable for a species because it is adjacent to land that is nonsuitable habitat. The degradation of habitat may be due to predator species that live outside the patch, or increased competition with species that live outside the habitat patch.

**EPA:** Environmental Protection Agency.

**Erosion:** The process of soil detachment and movement by the forces of wind, water, gravity, and/or human activities.

Evaporation: Phase change of liquid water to water vapor.

**Evapotranspiration (ET):** The flux of water from land and water surfaces to the atmosphere by the combined processes of evaporation and transpiration. Evaporation can occur from hard surfaces such as rooftops and parking lots, from water surface features such as ponds, lakes, streams, marshes, and oceans, from soil surfaces, especially ponded and wet areas, and from vegetative surfaces such as forest canopies. Transpiration is the general uptake and release of water by vegetation to the atmosphere.

**Filtration:** The passage of a fluid through a porous medium (or media) in order to remove matter held in suspension.

**Filter Strip:** Bands of closely-growing vegetation, usually grass, planted between pollution sources and downstream receiving waterbodies.

Filtration Rate: The rate at which fluid passes through a porous medium (or media).

**First Flush:** Stormwater that initially runs off an area, which is typically more polluted (concentrated) than the stormwater that runs off later.

Flood (Base Flood or 100-Year Flood): The flood having a one percent chance of being equaled or exceeded in any given year.

**Floodplain:** Any land area susceptible to being inundated by water from any source (PCC 15.52, Flood Damage Prevention Ordinance).

**Floodway (aka Regulatory Floodway):** The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

**Flow-Through Planters:** Structural landscaped reservoirs placed on impervious surfaces used to collect, filter, and temporarily store stormwater runoff, allowing pollutants to settle and filter out as the water percolates through the planter soil until flowing through to an approved conveyance.

**French Drain:** A drain consisting of an excavated trench filled with pervious material, such as course sand, gravel, or **crushed** stone; water percolates through the material and flows to an outlet.

**Green Roof:** Conventional rooftops that include a thin covering of vegetation allowing the roof to function more like a vegetated surface. The layer thickness varies between 2-6 inches and consists of vegetation, waterproofing, insulation, fabrics, growth media, and other synthetic components.

**Green Street:** A Green Street uses a natural systems approach to reduce stormwater flow, improve water quality, reduce urban heating, enhance pedestrian safety, reduce carbon footprints, and beautify neighborhoods. Green Street features include vegetated curb extensions, sidewalk planters, landscaped medians, vegetated swales, permeable paving, and street trees. (EPA, 2009)

**Groundwater:** Water that is underground in cracks and spaces in soil, sand, and rocks. The layers of soil, sand, and rocks are also known as aquifers. Groundwater is used for drinking water by more than 50 percent of the U.S. population, including residents of rural areas.

**Groundwater Recharge:** The replenishment of existing natural water bearing subsurface layers of porous stone, sand, gravel, silt or clay via infiltration.

**Habitat Integrity:** Supporting and maintaining the physical and environmental conditions of an aquatic ecosystem to a level comparable to that of natural habitats of the surrounding region.

**Headwater:** The source of a river or stream. Typically a very small, permanently flowing or intermittent, waterway from which the water in a river or stream originates.

**Hydrologic Cycle:** The movement of rainfall from the atmosphere to the land surface, to receiving waters and then back to the atmosphere through evaporation.

**Hydrologically Functional Landscape:** A design approach for the built environment that attempts to more closely mimic the overland and subsurface flow, infiltration, storage, evapotranspiration, and time of concentration characteristic of the native landscape of the area.

**Hydrologic Soil Groups**: A soil classification system created by the National Resource Conservation Service (formerly Soil Conservation Service) based on the ability to convey and store water; divided into four groups:

- A well drained sands and gravel, high infiltration capacity, high leaching potential and low runoff potential;
- B Moderately drained fine to coarse grained soils, moderate infiltration capacity, moderate leaching potential and moderate runoff potential;
- C Fine grained, low infiltration capacity, low leaching potential and high runoff potential;
- D Clay soils, very low infiltration capacity, very low leaching potential and very high runoff potential.

**Hydrology:** The science dealing with the waters of the earth, their distribution on the surface and underground, and the cycle involving evaporation, precipitation, flow to the seas, etc.

**Hydromodification:** Alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources.

**Impervious Area:** A hard surface area (e.g., parking lot or rooftop) that prevents or retards the entry of water into the soil, thus causing water to run off the surface in greater quantities and at an increased rate of flow.

**Incised Channel:** A stream, river or channel where the bottom is lowered by erosion to the point where flood flows no longer reach the floodplain. Incised channels typically form in areas where changes in watershed land use increase the frequency, duration and volume of peak flow rates.

**Infill:** The development of undeveloped or underdeveloped land within a developed urban area with infrastructure (link services) available.

**Infiltration:** Best management practices (bed, trench, basin, well, etc.) that allow for rainfall to soak vertically into the soil mantle.

**Invasive Species:** A non-native plant species whose introduction has the potential to cause economic or environmental harm, or harm to human health.

**Leadership in Energy and Environmental Design (LEED):** A measuring system created by the U.S. Green Building Council that rates buildings based on their eco-friendliness in the areas of energy efficiency, water consumption, materials usage, indoor air quality and other contributions that promote sustainability in buildings.

Life Cycle Analysis (LCA): A technique to assess the environmental aspects and potential impacts associated with a product, process, or service, by:

- Compiling an inventory of relevant energy and material inputs and environmental releases;
- Evaluating the potential environmental impacts associated with identified inputs and releases;
- Interpreting the results to help the consumer make an informed decision.

**Lot-Level**: The treatment of urban runoff as close to the source area as possible through application of small scale stormwater management practices on individual properties that are linked to downstream conveyance and end-of-pipe practices.

**Low Impact Development (LID):** A total site design approach that conserves and uses existing natural site features and systems integrated with distributed, small-scale stormwater management controls (BMPs) to mimic or recreate the natural water balance for a site (definition used for purposes of this Guidebook).

**Monitoring:** Repeated observation, measurement, or sampling at a site, on a scheduled or event basis, for a particular purpose.

**Municipal Separate Storm Sewer System (MS4) Permit:** A NPDES permit issued by the Regional Water Quality Control Board for the discharge of stormwater from Municipal Separate Storm Sewer Systems.

**National Pollutant Discharge Elimination System (NPDES):** A regulatory program in the Federal Clean Water Act that prohibits the discharge of pollutants into surface waters of the United States without a permit.

**Native Vegetation:** Plants that historically co-evolved with the local ecology, geology and climate. EPA has categorized native (presettlement by Europeans) plant groups by Ecoregions.

**Open Space:** Land set aside for public or private use within a development that is not built upon.

**Operations and Maintenance (O&M)**: The continuing activities required to keep storm water management facilities and their components functioning in accordance with design objectives.

**Ordinance:** A law, a statute, or a decree enacted by a municipal body, such as a city council or county board of supervisors. **Ordinances** often govern matters not already covered by state or federal laws (such as local zoning, safety and building regulations), but may also be used to require stricter standards in local communities than those imposed by state or federal law.

**Outfall:** The point where water discharges from a conduit, pipe, or drain to a stream, river, lake or other water body.

**Outlet:** The point at which water discharges from a structure such as a basin, a trench or a concrete structure to another structure or a pipe or channel.

**Peak Discharge Rate:** The maximum instantaneous rate of flow (volume of water passing a given point over a specific duration, such as cubic feet per second) during a storm, usually in reference to a specific design storm event.

Permeable: Soil or other material that allows the infiltration or passage of water or other liquids.

**Permeable or Pervious Pavement:** Asphalt or concrete rendered porous by the aggregate structure surfaces that allow water to pass through voids in the paving material and/or between paving units while providing a stable, load-bearing surface. An important component to permeable pavement is the reservoir base course, which provides stability for load-bearing surfaces and underground storage for runoff.

**Pollutant**: An elemental or physical material that can be mobilized or dissolved by water or air and creates a negative impact to human health and/ or the environment. Pollutants include suspended solids (sediment), heavy metals (such as lead, copper, zinc, and cadmium), nutrients (such as nitrogen and phosphorus), bacteria and viruses, organics (such as oil, grease, hydrocarbons, pesticides, and fertilizers), floatable debris, and increased temperature.

Porosity: Ratio of pore volume to total solids volume.

Potable Water: Water that is of suitable quality for drinking purposes. Drinking water.

**Precipitation:** Any form of rain or snow.

**Rain garden**: A lot-level bioretention cell designed to receive and detain, infiltrate and filter runoff, typically used for discharge from roof leaders.

**Rainwater Harvesting**: The practice of intercepting, conveying and storing rainwater for future use. The captured rainwater is typically used for outdoor non-potable water uses such as irrigation and pressure washing, or in the building to flush toilets or urinals or other uses that do not require potable water.

Receiving Waters: Surface waters, whether natural or man-made, into which materials are discharged.

**Recharge**: The infiltration and movement of surface water into the soil, past the vegetation root zone, to the zone of saturation or water table.

**Redevelopment:** Land-disturbing activity that results in the addition or replacement of impervious surface area on an already developed site. This may include the expansion of a building footprint, changes that are not part of routine maintenance, change to or an addition of a structure, and any related land disturbing activities.

**Retrofit (Stormwater application):** The installation of a new stormwater practice or the improvement of an existing one in a previously developed area.

**Riparian:** Of, or pertaining to, stream systems or stream corridors. Riparian areas usually include a stream channel, its banks, the floodplain, and associated vegetated buffers.

**Riparian Habitat:** The area adjacent to a stream or river (sometimes also used for lakes) that preserves water quality by filtering sediments and pollutants from stormwater before it enters the waterbody, protects banks from erosion, provides storage area for flood waters, preserves open space, and provides food and habitat for wildlife.

**Runoff:** Water flowing across the land that does not infiltrate the soil, but drains into surface or groundwater, or when rainfall exceeds the infiltration capacity of the land.

Runon: Stormwater surface flow or other surface flow that enters property that did not originate onsite.

**Sand Filter:** A packed-bed filter of sand or other granular material used to provide advanced secondary treatment of settled wastewater or septic tank effluent. Sand/media filters consist of a lined (e.g., impervious PVC liner on sand bedding) excavation or structure filled with uniform washed sand that is placed over an underdrain system. The wastewater is dosed onto the surface of the sand through a distribution network and allowed to percolate through the sand to the underdrain system, which collects the filter effluent for further processing or discharge.

**Sedimentation:** Particles of soil, sand, silt, clay, or organic matter that are deposited onto the bottom of any surface water or are left behind when water leaves.

**Setback:** The minimum distance that design elements must be placed from other elements. For example, houses usually have front, side, and rear yard setbacks from streets and other buildings.

**Soil Amendment:** Minerals and organic material added to soil to increase its capacity for absorbing moisture and sustaining vegetation.

**Stormwater Management:** The process of collecting, conveying, storing, treating, and disposing of storm water to ensure control of the magnitude and frequency of runoff to minimize the hazards associated with flooding and the impact on water quality caused by manmade changes to the land.

**Storm Water Pollution Prevention Plan (SWPPP):** A written document that describes the activities required to control the discharge of pollutants in storm water and non-storm water runoff. It is intended to facilitate a process whereby the operator evaluates potential pollutant sources at the site and selects and implements appropriate BMPs.

**Stream Corridor:** The ecosystem surrounding a stream, linear in shape, that includes the stream channel, riparian vegetation, floodplains, streambank, tributary streams, and trails, roads, and other development.

**Suspended Solids:** Organic and inorganic particles suspended in the water column and carried by the water. The presence of suspended solids in water may reduce the amount of light reaching the water column, clog the gills of fish and other animals, and are often associated with toxic contaminants that bind to particles.

**Sustainability:** Sustainability means using, developing and protecting resources at a rate and in a manner that enables people to meet their current needs and also provides that future generations can meet their own needs.

**Swale:** A shallow stormwater channel that can be vegetated with some combination of grasses, shrubs, and/or trees designed to slow, filter, and often infiltrate stormwater runoff.

**Topography:** The detailed mapping or charting of the elevation and features of a relatively small area, district, or locality.

**Total Maximum Daily Load (TMDL):** Calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards and allocation of that amount to the pollutant's sources.

Total Suspended Solids (TSS): The weight of all suspended solids in water.

Tributary: A stream or river that feeds into a larger stream, lake, or river.

**Turbidity:** Measures the clarity of water. High turbidity results when there are a lot of particulates floating around and the water is cloudy. Low turbidity results when there are few floating particulates and the water is clear.

**Variance:** A request to a zoning authority to deviate from the approved development standards of a particular area. For instance, a variance might be requested to reduce a 40-ft front yard setback to 20 ft so that houses might be sited closer to the street.

**Vegetated Filter Strip**: Gently sloping, densely vegetated areas that treat runoff as sheet flow from adjacent impervious areas. They function by slowing runoff velocity and filtering out suspended sediment and associated pollutants, and by providing some infiltration into underlying soils. Also known as buffer strips and grassed filter strips.

**Vegetated Swale**: A long and narrow, trapezoidal or semicircular channel, planted with a variety of trees, shrubs, and grasses or with a dense mix of grasses. Stormwater runoff from impervious surfaces is directed through the swale, where it is slowed and in some cases infiltrated, allowing pollutants to settle out. Check dams are often used to create small ponded areas to facilitate infiltration.

**Underdrain**: A perforated pipe used to assist the draining of soils in some LID applications that have impaired infiltration.

**Urban Heat Island:** An urban heat island (UHI) is a metropolitan area which is significantly warmer than its surrounding rural areas.

**Water Balance**: The accounting of inflow and outflow of water in a system according to the components of the hydrologic cycle.

**Water Sensitive Urban Design:** A philosophical approach to urban planning and design that aims to minimize hydrologic and water quality impacts of urban development.

**Water Table**: Subsurface water level defined by the level below which all the spaces in the soil are filled with water; the entire region below the water table is called the saturated zone.

**Watershed:** Ecosystem consisting of three major components—stream channel, floodplain, and upland areas—that function together and drain to water bodies, including lakes, rivers, estuaries, wetlands, streams, and the surrounding landscape.

**Zoning**: Regulations governing the use, placement, spacing, and size of land and structures within a specific area.

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		Site Condition Factors									Runoff Man.			Pollutant Control					Impl	emen	tatior	1		Ancillary Benefits							
	Legend: Very Effective Moderately Effective Mildly Effective X Applicable Not Applicable Low Impact Development (LID) Measure	Minimum Infiltration Rate Requirement	Vinimum Head Requirement	Setback Distance Requirement	slope > 25%	Viinimum Depth to Groundwater Limitation	substantial Additional Footprint	Vector Concerns	-ong Life Expectancy, >= 20 years	Provides Detention / Impoundment Storage	ncreases SW Runoff Travel Time	Reduces Volume of Overall SW Runoff	Vetals Reduction	Vutrient Reduction	Oil and Grease/ Hydrocarbon Reduction	sediment Reduction	Temperature Reduction	Construction Cost (\$ / cf)	Construction Cost (\$ / feature)	Annual O\$M Cost (\$)	Reduces Public Agency Maintenance Costs	High Elevation Winter Conditions	Provides Evapotranspiration (ET)	Provides Habitat	Promotes GW Recharge	Provides Shade (Reduces Heat Island Effect)	Reduces Greenhouse Gases	Reduces Energy Use	Aesthetically Pleasing	Reduces Downstream Erosion and Flooding	Enhances Property Value
ID SD-1 SD-2 SD-3 SD-4	LID Site Design (SD) Measures Protect Natural Conditions and Sensitive Areas Optimize Site Layout Control Pollutants at Source Integrate Eco-Friendly Landscaping									6,9,10, BPEJ 10,13, BPEJ 1,7, BPEJ 10,14, BPEJ			6,9,10, BPEJ 10, 13, BPEJ 1, 7, BPEJ 10, 14, BPEJ				10,11,12, BPEJ TAC			5, TAC, BPEJ	S, BPEJ, TAC										
	LID Runoff Management (RM) Measures																														
RM-1 RM-2 RM-3	Stormwater Disconnection Rainwater and Snowmelt Harvesting Infiltration Trench / Dry Well	2,4 1,2, 3, 4 1,2, 4							-	2,3, BPEJ				2,3, BPEJ									<u> </u>								
RM-4 RM-5 RM-6	Bioretention Vegetated Filter Strip Vegetated Swale	3 1,2, 3, 4 2,3						3	1,	1,7,8, BPEJ			1,7,8, BPEJ 2,3				10,	10,11,12, BPEJ BPE. TAC			5, TAC, BPEJ	BPEJ, TAC									
RM-7 RM-8	Permeable Pavement Green Roof							<u> </u>	2,3		<u> </u>	-																			

TAC Technical Advisory Committee (TAC)

**BPEJ Best Professional Engineering Judgment** 

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