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Urban Stormwater: Terms and Definitions

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This publication is intended to provide a summary of common terms and definitions used in urban stormwater management. These terms and definitions are used throughout the Urban Stormwater Best Management Practices (BMP) fact sheet series 1-15, Virginia Cooperative Extension (VCE) publications 426-120 through 426-134. A companion glossary is included with each fact sheet; this document provides a compilation of the terms used in the series.

Glossary of Terms

A

Adsorption – A process by which dissolved compounds separate from the liquid phase and become physically or chemically bound to solid materials and are removed via treatment.

Aerate – The act of incorporating air into soil.

Aeration – The process by which air is mixed with soil.

Anaerobic – Chemical reactions that proceed without the presence of oxygen.

B

Baseflow – The portion of flow in a stream that continues even during extended dry periods.

Best management practice (BMP) – Any treatment practice for urban lands that reduces pollution from stormwater. A BMP can be either a physical structure or a management practice. Agricultural lands use a similar, but different, set of BMPs to mitigate agricultural runoff.

Biodiversity – The number of different species and a measure of the health of the observed system.

Biological uptake – The process by which plants absorb nutrients for nourishment and growth.

Bioretention, bioretention cell – A best management practice that is a shallow, landscaped depression that receives and treats stormwater with the goal of discharging water of a quality and quantity similar to that of a forested watershed. Bioretention cells typically consist of vegetation, soils, an optional underdrain, and an outlet structure. Sometimes called rain gardens.

Braiding – A phenomenon when streams or channels incur bottom erosion to form smaller channels that intertwine.

C

Cationic exchange capacity – The maximum quantity of total cations (metals) that a given soil is capable of holding for exchange within the soil solution. Used as an indicator for nutrient retention capacity and groundwater contamination resistibility.

Check dam – A small structure, either temporary or permanent, usually made of stones or logs and constructed across a ditch, swale, or channel to reduce concentrated flow velocity.

Cistern – A storage tank designed to store rainwater for later use. Also known as a rainwater harvesting system.

Clay – Soils with a particle size smaller than 0.002 millimeter (mm), according to the U.S. Department of Agriculture's (USDA) soil classification system.

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Coastal Plains – A physiographic province of Virginia characterized by flat terrain below the fall line (east of I-95) where the water table is usually high.

Compaction – The loss of soil porosity due to the weight of heavy machinery, continuous lightweight application, or lack of adequate moisture.

Compost – Vegetative or organic matter that has been allowed to fully decompose, leaving a rich, organic medium that can be mixed with soils.

Compost-amended flow path – The practice of restoring soils within the flow path (with redirected roof runoff from rooftop disconnection) using compost. See soil restoration.

Concentrated flow – Occurs when water concentrates into rivulets or channels; the opposite of sheet flow. Concentrated flow leads to greater water velocity and decreased time for infiltration and settling.

Constructed wetland – A wetland that is designed to provide water quality treatment of stormwater. Constructed wetlands have been used to treat domestic wastewater.

Control structure – Structure that regulates water discharge from a best management practice.

D

Detention time – See residence time**.**

Dry swales – Shallow, gently sloping channels with broad, vegetated side slopes and low-velocity flows. They are always located above the water table to provide drainage capacity.

Dry well – A small, underground structure that disposes of stormwater through infiltration. Usually consists of a hole lined with gravel.

E

Environmental site design – A practice intended to minimize the generation of runoff and facilitate infiltration.

Erosion – A natural process by either physical processes, such as water or wind, or chemical means that moves soil or rock deposits from one source and transports it to another. Excessive erosion is considered an environmental problem that is very difficult to reverse.

Evaporation – The process by which water changes from liquid to gas and is "lost" to the atmosphere.

Evapotranspiration – When water is released by a plant and evaporates from leaves and soil.

Exfiltrate – The act of exfiltration.

Exfiltration – When water is lost from the surrounding drainage system to the soil as a result of percolation or absorption. Antonym: infiltration.

Extended detention ponds – A stormwater treatment practice that mitigates peak flow rates by retaining runoff for 12 to 24 hours before slowly releasing water back to the natural system.

Extensive vegetated roof – A type of vegetated roof with a media depth of 4 to 6 inches; vegetation is composed of drought-resistant plants whose only water source is usually rainwater.

F

Filter media, engineered filter media – Designed material that removes pollutants through filtration; usually consists of sand, organic matter, or propriety product.

Filter strip – Densely vegetated, uniformly graded areas that intercept runoff from impervious surfaces.

Filtering practice – A stormwater treatment practice that passes runoff through a media filter to remove pollutants.

Filtration – A treatment method that removes pollutants by straining, sedimentation, and similar processes.

Floatables – Litter and debris that float and travel with water.

Flow path – The path water takes as it flows over land; in the case of rooftop disconnection, after it exits the downspout.

Forebay – A small basin within a best management practice that removes sediment by settling prior to other treatment processes, thus protecting those processes from excess sediment and potential clogging.

Frost heave – When water in the soil freezes and expands, causing upward movement of the soil.

Frost line – The depth at which groundwater freezes above and remains liquid below.

G

Grass channels – A stormwater treatment practice using open channels with grass sides that can carry runoff with modest velocities while treating stormwater for quality and reducing runoff quantities.

Green roof – See vegetated roof.

Groundwater – Water located beneath the earth's surface and stored in soil pore spaces, rock fractures, and underground aquifers.

Groundwater contamination – The presence of unwanted chemical compounds in groundwater. In the case of infiltrative stormwater treatment, it would normally refer to dissolved compounds, such as nitrates. It could possibly include unwanted bacteria.

Groundwater mounding – Occurs when the water table directly beneath a stormwater infiltration basin is much shallower than the seasonal extreme. Can affect basements and foundations of nearby homes and structures.

H

Habitat – The environment where organisms, like plants, normally live.

Heat Island – this is an effect, observed in urban areas, of elevated ambient temperatures, which occurs due to storage of heat in the mass of concrete. This mass takes longer to cool than surrounding areas, producing the observed effect.

Heavy metals – Elements such as zinc and copper that accumulate in urban areas, mainly due to automobile use. These metals are readily available to bind to soil and clay particles, but in certain conditions can be transported with runoff and contaminate groundwater.

Hot spots – Areas that generate exceedingly high concentrations of pollutants due to land use or activities adjacent to the waterway.

Hydraulic head – The difference in elevation between two points of flowing water.

Hydric soils – Soils that form under saturated conditions. When saturated conditions exist, anaerobic chemical processes dominate, and unique chemical properties develop. A common characteristic of hydric soils is the presence of a rotten-egg odor, indicating the presence of hydrogen sulfide (H_2S) gas.

Hydrocarbons – Molecules containing the elements carbon and hydrogen; classified as pollutants due to their contribution to ground level ozone and smog.

Hydrologic soil group (HSG) – Classes of soils (named either A, B, C, or D) that indicate the minimum rate of infiltration observed after prolonged wetting time.

Hydroplaning – Occurs when a wheeled vehicle loses traction and control when driving over water. The surface of the tire is actually separated from the roadway surface by a thin layer of water.

I

Impermeable – A hard surface that does not allow water to flow through it.

Impermeable liner – A material designed to reduce seepage from ponds and wetlands.

Impervious surfaces – Hard surfaces that do not allow infiltration of rainfall into them; not pervious.

Infiltrate, infiltrated – The act of water entering soils. See infiltration.

Infiltration – The process by which water (surface water, rainfall, or runoff) enters the soil.

Intensive vegetated roof – A vegetated roof with a soil depth ranging from 10 inches to 4 feet. Vegetation can be composed of shrubs and trees in addition to other plants. Irrigation is generally necessary.

Interlocking concrete pavers – Small pieces of concrete designed to attach to other similar pieces to form a contiguous pavement. They typically have a small amount of pervious space between them. Some of these pavers are permeable, but not all.

Invasive species – Nonnative species that can cause adverse economic or ecological impacts to the environment, usually due to the tendency of these introduced species to dominate local habitats and replace native ecological communities.

K

Karst terrain – Areas where the underlying bedrock is high in limestone composition, making the site subject to underground erosion that often results in sinkholes and unstable building conditions.

L

Level spreader – A gravel trench or other practice, such as a check dam, that intercepts concentrated flow and releases it as sheet flow.

Low impact development (LID) – A way of developing urban lands that attempts to maintain pre-development hydrologic function at a site.

M

Media, media filter bed, filter bed – The topsoil that supports plant growth with a best management practice. Bioretention media is used in dry swale and typically has high sand and low clay content and low phosphorus content.

Microbial decomposition – The breakdown of compounds or organic matters into smaller ones with the aid of microorganisms.

Mulch – An organic material applied on the surface above the media to protect vegetation and underlying media.

N

Nonpotable water – Water that should not be used for drinking. Does not necessarily mean water is of poor quality for an alternate use. Antonym: potable water.

Nutrients – Substances required for growth of all biological organisms. When considering water qualities, the nutrients of greatest concern in stormwater are nitrogen and phosphorus, because they are often limiting in downstream waters. Excessive amounts of these substances are pollution and can cause algal blooms and dead zones to occur in downstream waters.

O

Outlet – The point of exit of water from a downspout or other best management practice, usually through a control such as an outlet structure.

Outlet structure – A structure that regulates water discharge from best management practices and serves as an exit point from the BMP. Also known as control structure.

Overflow – A component of a best management practice that diverts any water that exceeds the capacity of the storage tank to another location.

P

Particulate pollutants – A mixture of small (2.5 to 10 micrometers) particles of acids, organic chemicals, metals, and soil or dust particles.

Pathogen – A microbe or microorganism that causes disease.

Peak runoff – The highest amount of water flowing off a surface during a storm event.

Peak stream flows – The highest water flows within a stream during a storm event.

Percolation rate – The speed at which water will infiltrate into unsaturated soil. Also known as infiltration rate.

Perk test – A test following uniform procedures to measure the vertical speed at which water infiltrates unsaturated soils.

Permeability – See permeable.

Permeable – A surface that water can easily flow through (porous); allows infiltration into it.

Permeable pavement – A modified form of asphalt or concrete with a top layer that is pervious to water due to voids within the mix design.

Pervious – A ground surface that is porous and allows infiltration into it.

Pervious concrete – A permeable pavement material consisting of concrete in which the fine materials are

left out of the mix. The concrete pavement thus contains voids that allow water to pass through.

Porosity – The ratio of void space (air-filled if completely dry) to total volume of a soil sample.

Potable water – Water that can be used for drinking without immediate or long-term harm.

R

Rain barrel – A storage tank where roof runoff is diverted and stored. Rain barrels are often smaller than cisterns, and the water is generally used for outdoor purposes.

Rain garden – Often used interchangeably with bioretention, however it typically refers to a less formal design and installation process. Typically implemented in residential areas by homeowners.

Rainwater harvesting (RWH) – Also known as rainwater harvesting systems, rain barrels and/or cisterns are systems that intercept, divert, store, and release rainfall for later use as a water supply.

Reservoir – A place where excess stormwater is stored.

Residence time – Is the average time it takes water to travel through a treatment system. Residence time can also be called detention time.

Resuspend, resuspension – When sediment that has settled becomes suspended in the water after being disturbed.

Roofshed – The area of the roof that drains to a single downspout. The boundary is determined by the roof and the roof ridgelines.

Rooftop disconnection – RD redirects runoff from streets, storm drains, and streams onto landscaped areas and away from impervious surfaces.

Root barrier – Protects the impermeable liner from root puncture. It must be either a dense inorganic material that inhibits root penetration or a root repellent ingredient, such as copper.

S

Sand – Soils with a particle size larger than 0.05 mm, according to the USDA's soil classification system.

Sediment – Soil, rock, or biological material particles formed by weathering, decomposition, and erosion. In water environments, sediment is transported across a watershed via streams.

Seepage – Water lost through the bottom of a lake or pond.

Settling – The process by which particles that are heavier than water fall to the bottom under the influence of gravity.

Sheet flow – When runoff travels in a sheet over the surface of the ground.

Sheet flow to open space – When sheet runoff flows from an impervious surface to open space, usually a vegetated filter strip.

Silt – Soils with a particle size between 0.002 and 0.05 mm, according to the USDA's soil classification system.

Soil amendment – Any material mixed into the soil; usually compost to improve overall soil quality and structure.

Soil analysis – Soil testing procedure available through Virginia Cooperative Extension (VCE) that analyzes soils for nutrient, mineral, and organic matter content, among other options.

Soil moisture – Amount of water contained in a sample of soil; expressed as a fraction of the volume of soil.

Soil restoration – The technique of using compost to amend soils to improve their porosity and nutrient retention. The restored soils are less compacted and can replicate runoff from forested areas.

Soil structure – How individual soil particles bind together, and the arrangement of soil pores between them.

Soil texture – Describes the composition of soil based upon its particle sizes. According to the U.S. Department of Agriculture's classification, soils are classified as sands (larger than 0.05 millimeter, or mm), silts (0.002 to 0.05 mm), and clays (smaller than 0.002 mm).

Stormwater – Water that originates from impervious surfaces during rain events; often associated with urban areas. Also called runoff.

Stormwater conveyance system – Means by which stormwater is transported in urban areas.

Stormwater management – The management of runoff from pre- to post-development, often using stormwater treatment practices and best management practices to manage quality and control release into receiving bodies of water.

Stormwater treatment practice – A type of best management practice that is structural and reduces pollution in the water that runs through it.

Sustainable – The ability of the system to endure and remain productive over a long period of time.

Sustaining – The act of enduring. See sustainable.

T

Tilling – The process of mechanically or otherwise agitating compacted soil to produce looser, more aerated media.

Topsoil – The outermost layer of the soil, which has the highest content of organic matter and microorganisms.

Tree planter – An ultra-urban, small best management practice that is a bioretention system designed to exist inside a concrete box or tree planter. See bioretention.

U

Underdrain – A perforated pipe in the bottom of a treatment practice, such as bioretention or permeable pavement, designed to collect water that does not infiltrate native soils.

V

Vegetated roof – A roof designed and constructed to support living vegetation; also known as green roof.

Vegetated roof media – A composite of inorganic material and organic materials that supports plant growth and filters runoff.

W

Watershed – A unit of land that drains to a single "pour point." Boundaries are determined by water flowing from higher elevations to the pour point. A pour point is the point of exit from the watershed, or where the water would flow out of the watershed if it were turned on end.

Water table – The depth at which soils are fully saturated with water.

Wet ponds – Stormwater impoundments that have a permanent pool of water used to treat water pollution.

Wetland – Land that has hydric soil and wetland vegetation, and is periodically saturated with water.

Wet swale – A shallow, gently sloping channel with broad, vegetated, side slopes constructed to slow runoff flows. It typically stays wet by intercepting the shallow groundwater table.

Additional Information

The Virginia departments of Conservation and Recreation (VA-DCR) and Environmental Quality (VA-DEQ) are the two state agencies that address nonpoint source pollution. The VA-DCR oversees agricultural conservation; VA-DEQ regulates stormwater through the Virginia Stormwater Management Program.

Additional information on best management practices can be found at the Virginia Stormwater BMP Clearinghouse website at http://vwrrc.vt.edu/swc. The BMP Clearinghouse is jointly administered by the VA-DEQ and the Virginia Water Resources Research Center, which has an oversight committee called the Virginia Stormwater BMP Clearinghouse Committee. Committee members represent various stakeholder groups involved with stormwater management.

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