

GLOSSARY

alkalinity - A measure of the capacity of water to neutralize acids because of the presence of one or more of the following bases in the water: carbonates, bicarbonates, hydroxides, borates, silicates, or phosphates.

ammonia nitrogen (NH₄-N) - A reduced form of nitrogen produced as a by-product of organic matter decomposition and synthesized from oxidized nitrogen by biological and physical processes.

aspect ratio - Ratio of wetland cell length to width.

attenuation - Reduction in magnitude, as in the lowering of peak runoff discharge rates, in the case of dry ponds; or the reduction of contaminant concentrations, as in the action of biodegradation in wetlands or bioretention facilities.

base flow - Normally refers to the stream levels associated primarily with groundwater or subsurface contributions, as opposed to storm flow which corresponds to stream levels associated with recent precipitation and surface runoff.

bedrock - Layer of consolidated rock over which lies an overburden of soil (regolith), including unconsolidated rock.

benthic - Pertaining to occurrence on or in the bottom sediment of wetland and aquatic ecosystems, including wetlands.

Best Management Practices (BMP) - Activities, facilities, measures, or procedures used to manage the volume, rate and water quality of stormwater runoff.

biodiversity - The number of species of plants and animals in a defined area. Biodiversity is measured by a variety of indices that consider the number of species and, in some cases, the distribution of individuals among species.

biomass - The total mass of living tissues (plant and animal).

biochemical oxygen demand (BOD) - A measure of the concentration of aerobically degradable compounds in water. Measured as the oxygen consumed during degradation of organic and inorganic materials in water.

BMP fingerprinting - A series of techniques for locating BMPs (particularly ponds) within a development site so as to minimize their impacts to wetlands, forest, and sensitive stream reaches.

BOD₅ - Five-day biochemical oxygen demand.

buffer - A vegetated strip immediately adjacent to a water body. The primary function of buffers is to protect the receiving water from sediment and pollutants derived from upstream areas. Ancillary benefits may include infiltration of rainfall and habitat enhancement. A buffer is a special case of a filter strip. Forested riparian buffers are one example of a best management practice related to the use of buffers.

channelization - The creation of a channel or channels resulting in faster water flow, a reduction in hydraulic residence time, and less contact between water and solid surfaces in the water body.

chemical oxygen demand (COD) - A measure of the concentration of substances which can be oxidized in water. Expressed as the oxygen equivalent consumed when an aqueous sample is reacted of the organic matter in water, based on reaction with a strong chemical oxidant.

choker course - A filter layer of finer material, usually crushed stone, that is installed over a coarse road base material. The purpose of the choker course is to provide a stable foundation for the construction of a pavement.

critical depth - The depth of flow at which the specific energy is a minimum for a given discharge rate. Flow is critical when the Froude number is equal to one:

$$F = \frac{V}{\sqrt{gD}}$$

where V, is the velocity of the flow, g, is the gravitational constant, and D, is the hydraulic depth of the flow.

denitrification – The removal of nitrate ions from soil or water, anaerobic microbial reduction of oxidized nitrate nitrogen to nitrogen gas.

dense graded material - Granular mixture characterized by a large range in particle sizes. Dense graded materials have superior structural properties to open graded materials. However, they are less permeable.

detritus - Dead plant material that is in the process of microbial decomposition.

diurnal - Occurring daily or during the daylight.

ecosystem - All organisms and the non-living environmental factors with which they interact.

ecotone - The boundary between adjacent ecosystem types. An ecotone can include environmental conditions that are common to both neighboring ecosystems and can have higher species diversity.

Eh - A measure of the reduction-oxidation (redox) potential of soil according to a hydrogen scale.

emergent plant - A rooted, vascular plant that grows in periodically or permanently flooded areas and has parts of the plant (stems and leaves) extending through and above the water plane.

eutrophic - Water containing an excess of plant-growth nutrients that typically result in algae blooms and extreme (high and low) dissolved-oxygen concentrations.

evapotranspiration - The combined processes of evaporation from the water or soil surface and transpiration of water by plants.

excessively rapid drainage - For purposes of this manual, corresponds to infiltration rates of soils in excess of 6 inches per hour. (Normally 6 inches is considered rapid drainage but the manual indicates that special precautions need to be taken with an infiltration rate of 6 inches per hour or more)

exfiltrate - The leaking of water to surrounding ground through openings in structures.

exotic species - A plant or animal species that has been intentionally or accidentally introduced and that does not naturally occur in a region.

extended detention - A function provided by BMPs which incorporate a water quality storage. BMPs with extended detention, intercept runoff and then release it over an extended period of time.

extended detention (ED) pond - Temporarily detains part of stormwater runoff for up to 24 hours after a storm by using a fixed orifice. ED ponds normally are "dry" between storm events and do not have permanent standing water. An enhanced ED pond is designed to prevent clogging and re-suspension. It provides flexibility in achieving target detention times. It may be equipped with plunge pools near the inlet, a micropool at the outlet, and may have an adjustable reverse-sloped pipe at the ED control device.

extended detention control device - A pipe or series of pipes that extend from the riser of the stormwater pond that are used to gradually release stormwater from the pond over a 12- to 48-hour interval.

fascine - Bundled willow cuttings used to stabilize stream banks. Bundling allows otherwise weak green twigs to reinforce each other and resist the forces of stream currents.

field capacity - The quantity of water which will not freely drain from the root zone of shallow soil layers. Usually measured as the moisture content (by volume) in soil at a capillary tension of .33 bars.

filter strip - A vegetated boundary characterized by uniform mild slopes. Filter strips may be provided down-gradient of developed tracts to trap sediment and sediment-borne pollutants and to reduce imperviousness. Filter strips may be forested or vegetated turf. Filter strips located adjacent to waterbodies are called buffers.

flash boards - Removable boards used in a weir to control water levels.

floating aquatic plant - A rooted or non-rooted vascular plant that is adapted to have some plant organs (generally the chlorophyll-bearing leaves) floating on the surface of the water in wetlands, lakes, and rivers.

flood fringe - The flood fringe occupies the distal parts of the floodplain, outside of the floodway. Complete obstruction of the flood fringe will not significantly increase flood levels. The flood fringe boundary is typically based on an increase in flood level of one foot during the 100-year return frequency flooding event.

floodplain - Lands adjoining a river or stream that have been or may be expected to be inundated by flood waters in a 100-year frequency flood.

floodway - The channel of the watercourse and portions of the adjoining floodplains which are reasonably required to carry and discharge the 100-year frequency flood. Unless otherwise specified, the boundary of the floodway is as indicated on maps and flood insurance studies provided by FEMA. In an area where no FEMA maps or studies have defined the boundary of the 100-year frequency floodway, it is assumed, absent evidence to the contrary, that the floodway extends from the stream to 50 feet from the top of the bank of the stream.

forebay - Stormwater design feature that uses a small basin to settle out incoming sediment before it is delivered to a stormwater BMP.

freeboard - The vertical distance between water surface elevation experienced during the design flood and the crest elevation of a dam, levee, floodwall or other embankment.

fresh water - Water with a total dissolved solids content less than 500 mg/L (0.5 parts per thousand salts).

gabion - Wire cage used to contain rip rap and stone. Gabions are used to increase the resistance of rip rap to movement caused by flowing water.

geotextile - A fabric manufactured from synthetic fiber that is designed to achieve specific engineering objectives, including seepage control, media separation (e.g., between sand and soil), filtration, or the protection of other construction elements such as geomembranes.

greenway - A strip or belt of vegetated land that typically includes both upland and riparian areas. Greenways are often used for recreation, as a land use buffer, or to provide a corridor and habitat for wildlife.

habitat - The environment occupied by individuals of a particular species, population, or community.

headwall - A wall of stone, metal, concrete, or wood at the end of a culvert or drain to protect fill from scour or undermining, increase hydraulic efficiency of conduit, divert flow, retard disjuncting of short sectional pipe, or serve as a retaining wall.

heavy metals - Metallic elements having atomic weights above 21 on the periodic table.

herbaceous - Plant parts that contain chlorophyll and are non-woody.

hydraulic conductivity (K) - An expression of the readiness with which a liquid such as water flows through a soil in response to a given potential gradient. Hydraulic conductivity is a constant physical property of soil or rock, one of several components responsible for the dynamic phenomenon of flow.

hydraulic loading rate (HLR) - Ratio of the surface area of a hydraulic device and the average rate at which water is delivered to the A measure of the application of a volume of water to a land area with units of volume per area per time or simply reduced to applied device water depth per time (for example, $m^3/(m^2/d)$ or cm/d).

hydraulic residence time (HRT) - A measure of the average time that water occupies a given volume with units of time. The theoretical HRT is calculated as the volume divided by the flow (for example, $m^3/(m^2/d)$). The actual HRT is estimated on the basis of tracer studies that used conservative tracers such as lithium or dyes.

hydric soil - A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions. Hydric soil that is in areas having indicators of hydrophytic vegetation and wetland hydrology is wetland soil.

hydrograph - A record of the change in flow rate with time.

hydrologic soil group - A designation developed by the NRCS which describes the infiltration capacity of soil. Soil associations are categorized in decreasing infiltration capacity from A to D.

hydroperiod - The period of wetland soil saturation or flooding. Hydroperiod is often expressed as a number of days or a percentage of time flooded during an annual period (for example, 25 days or 7 percent).

infiltration - The entrance of surface water into the soil, usually at the soil/air interface.

infiltration testing - Specific tests designed to measure the saturated movement of water into the soil in a single direction downward through a two dimensional soil surface.

lacustrine - The deep-water zone of a lake or reservoir.

limnetic - Relating to or inhabiting the open water part of a freshwater body with a depth that light penetrates. The area of a wetland without emergent vegetation.

littoral zone - The shoreward zone of a lake or [wetland](#). The area where water is shallow enough for emergent vegetation to dominate.

macrophyte - Macroscopic (visible to the unassisted eye) vascular plants.

manning's equation - A formula for calculating the anticipated uniform flow in an open-channel flow, published by Manning in 1890.

marsh - A wetland dominated by herbaceous emergent plants.

micronutrient - A chemical substance that is required for biological growth in relatively low quantities and in small proportion to the major growth nutrients. Some typical micronutrients include molybdenum, copper, boron, cobalt, iron, and iodine.

mitigation - The replacement of functional values lost when an ecosystem is altered. Mitigation can include replacement, restoration, and enhancement of functional values.

nitrification - Biological transformation (oxidation) of ammonia nitrogen to nitrite and nitrate forms.

nitrogen fixation - A microbial process in which atmospheric nitrogen gas is incorporated into the synthesis of organic nitrogen.

open graded material - Uniform granular mixture with a narrow distribution of grain sizes. Open graded material has higher permeability than dense graded material.

organic nitrogen (Org-N) - Nitrogen that is bound in organic compounds.

palustrine wetland - All nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens; and all such tidal wetlands in areas where salinity from ocean-derived salts is below 0.5 parts per thousand.

peak attenuation storage - The volume set aside within a BMP for the purpose of attenuating the inflow runoff peak rate.

percolation - The downward movement under the influence of gravity of water under hydrostatic pressure through the interstices of the rock or soil.

perennial - Persisting for more than one year. Perennial plant species persist as woody vegetation from year to year or resprout from their rootstock annually.

periphyton - The community of microscopic plants and animals that grows on the surface of emergent and submergent plants in water bodies.

permeability – The ability of rock, soil or other material to transmit a gas or liquid.

permittivity (cross-plane flow capacity) - Rate that water will flow freely through a thin layer, such as a geotextile. Equal to the hydraulic conductivity divided by the thickness of the layer. Permittivity is measured in units of inverse time (e.g., sec^{-1}).

photic zone - The area of a water body receiving sunlight.

piezometric surface - The surface defined by elevation to which groundwater will rise in a well.

plant community - All of the plant species and individuals occurring in a shared habitat or environment.

plug flow - Linear flow along the length of a wetland cell. Ideal plug flow does not involve the dispersion or diffusion of constituents. The flow can be perceived as a series of independent "packets" of water that do not interact with each other.

plunge pool - A small permanent pool at either the inlet to a BMP or at the outfall from a BMP. The primary purpose of the pool is to dissipate the velocity of stormwater runoff.

pollutant removal - Removing pollutants by decomposing them or eliminating them from an area or system (eg. volatilize), or rendering non-harmful or unavailable in a soil or medium by means of adsorption, chelation, and similar binding mechanisms.

pore space - Open space in rock or granular material; also known as interstices.

precipitation - A deposit on the earth of hail, mist, sleet, rain or snow.

protozoa - Small, one-celled animals including amoebae, ciliates, and flagellates.

receiving water - A water body into which wastewater or treated effluent is discharged.

recharge - Replenishment of groundwater reservoirs by infiltration through permeable soils.

return period (storm event) - The average period of time between the occurrence of storms of equal or greater magnitude. The probability that such a storm will occur in any given year is equal to the reciprocal of the return period (e.g. there is a 50% chance that a 2-year storm event will occur in any given year, but only a 10% chance that a 10-year storm event will occur).

rhizosphere - The chemical sphere of influence of plant roots growing in flooded soils. Depending on the overall oxygen balance (availability and consumption), the rhizosphere can be oxidized, resulting in the presence of aerobic soil properties in an otherwise anaerobic soil environment.

riparian - Pertaining to a stream or river. Also, plant communities occurring in association with any spring, lake, river, stream, or creek through which waters flow at least periodically.

riparian corridor - Narrow strip of land, centered on a stream, that includes the floodplain as well as related riparian habitats adjacent to the floodplain.

riverine wetlands - Wetlands associated with rivers.

runoff capture design storm - Benchmark rainfall event, used to develop criteria for designing the groundwater recharge function of BMPs. The runoff capture design storm is the largest rainfall event from which no appreciable runoff is expected to occur. Complete specification of the storm includes the rainfall depth in inches, return frequency and storm duration. The distribution of rainfall in Pennsylvania is a Type II rainfall distribution. See Section 5.3 of the Handbook.

runoff capture storage - The combined storage volume provided by BMPs on a site for the retention and eventual infiltration of rainfall.

runoff capture volume - The minimum volume of rainfall that should be retained and completely infiltrated onsite during every storm. It is also equal to the rainfall quantity associated with the runoff capture design storm. The runoff capture volume is conveniently stated as a rainfall volume, in inches, over the area of the site.

runoff curve number (CN) - A parameter developed by the NRCS which is an indicator of runoff potential. Curve number is related to hydrologic soil group and land use type. The larger the runoff curve number, the greater the percentage of rainfall that will appear as runoff.

runoff peak attenuation design storm - Benchmark rainfall event, used to develop criteria for the design of runoff peak attenuation BMPs. The design criteria generally requires that the predicted post development peak runoff rate for the selected runoff peak attenuation design storm will not exceed the peak associated with redeveloped condition. Complete specification of the storm includes rainfall depth in inches, return frequency and storm duration. The distribution of rainfall in Pennsylvania is a Type II rainfall distribution. See Section 5.3 of the Handbook.

saturated soil - Soil in which the pore space is completely filled with water.

seasonally high water table - Shallow water tables associated with periods of recent high levels of precipitation and/or low levels of evapo-transpiration. Frequently determined in the spring.

seed bank - The accumulation of viable plant seeds occurring in soil and available for germination under favorable environmental conditions.

setback - A distance from the edge of a water body within which intensive development is restricted. Setbacks are established by local regulation for the purpose of maintaining open

space next to streams, lakes, and other water bodies. The area within setbacks is frequently used for flood control, recreation, preservation of drinking water supply, and wildlife habitat enhancement.

sheet flow - Water flow with a relatively thin and uniform depth.

short-circuit - A faster, channelized water flow route that results in a lower actual hydraulic residence time than the theoretical hydraulic residence time. This may reduce the effectiveness of a BMP.

spillway design flood (SDF) - Benchmark rainfall event, used to develop criteria for the design of BMPs that incorporate emergency spillways or overflows. Complete specification of the storm includes rainfall depth in inches, return frequency and storm duration. The distribution of rainfall in Pennsylvania is a Type II rainfall distribution. See Section 5.3 of the Handbook.

stage-area curve – A line graph showing the relationship between the depth of water and the surface area of a pond, wetland, or lake.

stage-discharge curve – a line graph showing the relationship between water depth and outflow from a body of water.

subcritical flow - The state of flow when the depth is greater than the critical depth.

substrate - Substances used by organisms for growth in a liquid medium. Surface area of solids or soils used by organisms to attach.

succession - The temporal changes of plant and animal populations and species in an area that has been disturbed.

super critical flow - The state of flow when the depth is less than the critical depth. Transitions between supercritical and sub-critical flow may result in turbulence associated with a hydraulic jump.

surface infiltration rate - The rate at which water enters the soil or other porous surface. The measurement of surface infiltration rates requires that the underlying soil be completely saturated and that infiltration occurs by gravity under a unit hydraulic gradient.

tailwater condition—minimum and maximum - The depth of water in the receiving water body at a structure outfall.

terrestrial - Living or growing on land that is not normally flooded or saturated.

total nitrogen (TN) - A measure of all organic and inorganic nitrogen forms in a water sample. Functionally, TN is equal to the sum of TKN and $\text{NO}_3 + \text{NO}_2\text{-N}$.

total organic carbon (TOC) - A measure of the total reduced carbon in a water sample.

total phosphorus (TP) - A measure of the total phosphorus in a water sample, including organic and inorganic phosphorus in particulate and soluble forms.

total suspended solids (TSS) - A measure of the filterable matter in a water sample.

tractive force - The total cross-sectional force experienced by a rigid channel or conduit as a result of channel flow (expressed in units of force per length). This force tends to displace soil particles, rocks and channel liners in the downstream direction and must be resisted by friction or by structural anchors. The tractive force is equal to the unit tractive force multiplied by the wetted perimeter of the conduit.

transition zone - The area between habitats or ecosystems (see ecotones). Frequently, transition zone is used to refer to the area between uplands and wetlands. In other cases, wetlands are referred to as transitional areas between uplands and aquatic ecosystems.

transmissivity (in-plane flow capacity) - Rate that water can be made to flow through the cross section of a thin layer or conduit under the influence of a unit hydraulic gradient. Measured as a volumetric rate per unit width (e.g., square feet meters per minute, or gallons per minute per foot). Equal to the hydraulic conductivity times the thickness of the layer or conduit.

transpiration - The transport of water vapor from the soil to the atmosphere through growing plants.

type II rainfall distribution - Standard NRCS 24-hour rainfall distribution which applies to the state of Pennsylvania. The distribution allocates rainfall as a percentage of total rainfall over discrete time intervals.

uniformity coefficient - A measure of the range in particle sizes associated with a granular mixture. Materials with the lowest uniformity coefficients are most uniform. Uniform materials are also called open graded materials. If the uniformity coefficient is less than 4 or 5, the material is considered uniform in particle size. The uniformity coefficient is computed as follows:

$$C_u = (D_{60} / D_{10})$$

D_{60} is the sieve opening size through which 60 percent of the layer material will pass. D_{10} is the sieve opening size through which 10 percent of the layer material will pass.

unit tractive force (or tractive stress) - The stress (expressed in units of force per area) induced by open channel flow on the bottom and sides of its conduit or channel. This stress is responsible for sediment erosion and the downstream transport of streambed materials. The average unit force acting on a channel cross-section is equal to the product of the unit weight of water, the slope of the channel, and the hydraulic radius of the flow.

upland - An area that is not an aquatic, wetland, or riparian habitat. An area that does not have the hydrologic regime necessary to support hydrophytic vegetation.

water quality design storm - Benchmark rainfall event, used to develop criteria for the design of water quality BMPs. Water quality design storms are used to size BMPs that are intended to achieve specific quality treatment objectives. Criteria based on water quality storms generally require that the design treatment efficiency be achieved during the water quality design storm and all smaller events. Complete specification of the storm includes rainfall depth in inches, return frequency and storm duration. The distribution of rainfall in Pennsylvania is a type II rainfall distribution. See Section 5.3 of the Handbook.

water quality storage - The volume set aside within a BMP to detain storm runoff. The detained water is released over an extended period of time. The water quality storage is frequently expressed as a multiple of the water quality volume.

water quality velocity - The maximum flow velocity encountered in a water quality BMP during the course of the water quality design storm.

water quality volume - The total volume of runoff which is delivered to the inlet of a water quality BMP during the course of the water quality design storm.

wattles - Fence or barrier constructed of interwoven twigs and branches used to stabilize soil from erosive forces.

weir - A device used to control and measure water flow.

weir gate - Water-control device used to adjust water levels and measure flows simultaneously.

wetland - An area that is inundated or saturated by surface water or groundwater at a frequency, duration, and depth sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs and similar areas.

wilting point - Quantity of water which will not be removed from soil under normal conditions of evaporation and plant transpiration. Usually measured as the moisture content (by volume) in soil with a capillary tension of 15 bars.

zonation - The development of a visible progression of plant or animal communities in response to a gradient of water depth or some other environmental factor.