

CEDR glossary definitions

A

Acceptable risk level: the level of risk at which no further improvement in a system or process needs to be made.

Accidental spillages: spillages of liquids or gases on roads/ road infrastructure associated with traffic accidents / incidents. It is generally accepted that the risk on any road is proportionate to the risk of a Heavy Goods Vehicle (HGV) road traffic collision. Where spillages do reach a surface watercourse the pollution impact can be severe, but is usually of short duration, typical of an acute pollution impact.

Acute pollution: the exposure to an organism or habitat to high levels of a contaminant(s) over a short time period causing lethal or serious sub-lethal biological effects.

Aesthetic pollution: visible (and/or) olfactory pollution such as gross solids/litter debris or turbidity which is offensive or unpleasant from the public viewpoint.

Algal bloom: a rapid accumulation or increase of (usually microscopic) algae in a water body. The process may be natural or accelerated by human activity (e.g. phosphate/nitrate pollution).

Aliphatic hydrocarbon: a class of simple organic compounds containing single bonded, straight chained compounds of carbon and hydrogen; common aquatic pollutants arising from incomplete combustion processes.

Annual average (AA) concentration: highest average concentration to which an ecosystem can be exposed to without any adverse effects.

Anoxia: an area of (e.g. water or sediment) totally depleted of oxygen; an extreme form of hypoxia or “low oxygen”.

Antecedent dry period (ADP): the time between the end of a precipitation event and the beginning of another.

Anthropogenic: an effect or object resulting from human activity.

Aquatic Biological Ligand Model: a tool used in aquatic toxicology that examines the bioavailability of metals in the aquatic environment.

Aquatic biota: in ecology, the plant and animal life of an aquatic environment on a regional, landscape or catchment scale (e.g. tropical region).

Aquifer: An underground geological area that retains a substantial quantity of water within permeable rock.

Areal Reduction Factor: the factor (<1) by which the rainfall intensity at a given location is multiplied in order to give the mean rainfall intensity to be applied to a catchment area.

Arid climate: the climate in a region in which the 30 year average evaporation exceeds the precipitation

Aromatic hydrocarbon: a class of organic compounds containing single or multiple fused benzene rings. They may occur in sediments or water from various anthropogenic activities and may have toxic/carcinogenic properties.

Arterial road A road or street intended to move high volumes of traffic over long distances at high speed, with partial control of access. A major arterial connects an interstate highway/motorway to cities and counties. A minor arterial connects major arterials to collectors. A collector connects an arterial to a neighborhood (a collector is not an arterial). A local access road connects individual residences to a collector.

Average daily traffic (ADT) The volume of traffic passing a point on a highway in both directions during an average day of the year.

B

Baseflow: the part of water discharge which enters a stream channel mainly from groundwater, but also from

lakes and glaciers during long periods where no precipitation or snowmelt occurs.

Basin (see catchment; watershed): drainage area of a stream, river or lake.

Best available techniques (BAT): techniques which are the best for preventing or minimising impacts on the environment which can be economically justified. 'Techniques' include both the technology used and the way an installation is designed, built, maintained, operated and decommissioned.

Best Management Practice (BMP): structural measures used to store or treat water resources (e.g. highway runoff to reduce impact), remove pollution and provide other amenities/services. Non-structural BMPs aim to prevent the build-up of pollutants on urban surfaces such as roads.

Bioaccumulation: the process by which a pollutant builds up in the tissue of an organism due to its greater rate of uptake compared to excretion.

Biochemical oxygen demand (BOD): a measure of the amount of dissolved oxygen consumed by aerobic microorganisms in a water sample. It is usually measured over a period of 5 days at 20°C and is a commonly used measure of general water quality.

Biodegradation: the breakdown of organic substances by bacteria or other biochemical processes.

Biodiversity: the total and/or measure of the variety of organisms present in a defined ecosystem.

Biofilter: a combined soil and vegetation system for the filtration, infiltration, adsorption and biological uptake of pollutants in stormwater when runoff flows over and through it. Vegetation growing in these facilities acts as both a physical filter that causes gravity settling of particulates by regulating velocity of flow, and as a biological sink when direct uptake of dissolved pollutants occurs.

Biofiltration: The process of reducing pollutant concentrations in water by filtering the polluted water through biological materials, such as vegetation.

Bioinfiltration The process of reducing pollutant concentrations in water by infiltrating the polluted water through grassy vegetation and soils into the ground.

Biomonitoring: the systematic use of biological responses to evaluate temporal and spatial changes in the aquatic environment to provide information on water quality (to complement the measurement of physical and chemical parameters).

Borehole: a narrow shaft drilled into the ground for sampling or extraction of water.

C

Capital costs: nonrecurring costs required to construct infrastructure, including costs of right of way, facilities, drainage systems, utilities and associated administrative and design costs, as well as financing charges during construction.

Catchment/catchment area: The area within which runoff water moves to a single point based on the topography (synonym for basin or watershed).

CEDR: Conference of the European Director of Roads

Channel: the bed and banks in which a river runs; the deeper part of a river; in hydraulics, generally used as open-channel flow - for describing flow with free water surface.

Chemical Oxygen Demand (COD): a water quality parameter designed to assess the dissolved oxygen which is available for the oxidative breakdown of organic substances within a polluted water sample (see also the complementary Biological Oxygen Demand (BOD)).

Chronic toxicity Toxicity that acts over a long period of time and that typically affects a life stage (e.g. reproductive

capacity); it can also refer to toxicity resulting from a long-term exposure.

Climate change: long term modification of the climate resulting from one or more of the following factors:

1. Internal changes within the climate system
2. Interactions between the climatic components
3. Changes in external forces caused by natural phenomena or by human activities

Clogging: a build-up of solids which create a partial or total blockage (e.g. of a pipe or urban drainage system).

Coagulate/coagulation: the process by which colloids and fine suspended particles in water are caused to coalesce to form flocs which are able to separate out under gravity.

Code of practice: a set of rules without direct legal effect commonly intended to promote best practice and adopted by a firm, industrial group or regulatory agency.

Coir: coconut fibre used for erosion control blankets and wattles.

Colloids: sub-microscopic particles with a diameter usually in the size range 0.8 to 400nm; includes mineral substances, aggregates of precipitated and flocculated matter, silt, bacteria, plankton, viruses, biopolymers and macromolecules. In natural water systems, colloids exist which are both organic (humic/fulvic acids; organic fibrils) and inorganic (iron and manganese hydrous oxides) in nature.

Compaction The densification, settlement, or packing of soil in such a way that its permeability is reduced. Compaction effectively shifts the performance of a hydrologic group to a lower-permeability hydrologic group.

Confined aquifer: an aquifer that is bounded by impermeable layers.

Connected area: the proportion of the catchment or impervious area connected to the piped network.

Constructed wetland: man-made vegetated treatment system with extended retention time. Sub-surface flow: constructed wetlands flow typically contain a gravel substrate, planted with reeds, through which the water flows. Surface flow constructed wetlands usually contain a soil substrate, planted with reeds, over which the water flows.

Contaminants of emerging concern (CECs): substances which are not regulated under existing EU water quality regulations but which have been identified as having the potential to impact negatively on human health and/or environmental endpoints.

Contingency planning: preparation of actions that need to be undertaken in response to situations that cannot be readily predicted but which can be put into effect before or during an emergency event. For example rescheduling of operations to minimise assets and areas at risk during flooding or pollution events such as chemical spillages.

Contributing area: the parts of a catchment which contribute runoff to the flows at the catchment outlet during a particular storm event

Cross-section (area of flow): is the two-dimensional area of flowing fluid measured perpendicular to the direction of flow and is used to determine flow rate when multiplied by the cross-sectional average flow velocity.

D

Degradation: damage to or deterioration of the ecosystem; breakdown of chemical compounds into simpler components

De-icing: the process of removing snow, ice or frost from a surface.

Design flow rate: maximum flow rate which runoff treatment BMPs are designed to receive to achieve required runoff storage /pollutant removal.

Design storm: a rainfall event of specified size and return frequency that is used to calculate the runoff volume and peak discharge rate to a stormwater facility.

Design storm frequency: the anticipated period in years that will elapse before a storm of a given intensity or total volume will recur, based on the average probability of storms in the design region. For instance, a 10-year storm can be expected to occur on the average once every 10 years.

Detention The temporary storage of stormwater runoff in a stormwater facility, which is used to control the peak discharge rates and provide gravity settling of pollutants.

Detention basin: dry most of the time and able to store runoff during wet conditions; often possess a grassed surface basin which reduces peak flood flows from highways by means of storage thereby also providing pollutant removal, particularly by sedimentation.

Detention time: the average time that a volume of water is held in storage, particularly for a treatment process to occur.

Deterministic model: model that excludes consideration of random variables

Diffuse (non-Point) pollution: pollution arises from various land uses such as urbanisation and agriculture with no obvious discrete source.

Direct toxicity assessment (DTA): whole-effluent assessment of treated/untreated runoff flows using one more species for an evaluation of acute toxicity impacts.

Dissolved fraction: that part of a water sample which passes through a 0.45 μm filter.

Dissolved oxygen concentration: actual quantity of dissolved oxygen in water which varies with temperature, salinity and turbulence.

Drain: a conduit or small open channel to remove water by gravity, use to control the water level.

Drainage area/basin: the area of land drained by a stream or pipe network.

Drainage network: the system of stream channels or human-made pipes and channels which drains a certain area.

Dry weather flow (DWF): streamflow consisting exclusively of groundwater contribution during dry weather.

E

Effective Concentration (EC_{50}): the concentration of a substance to produce a certain effect in 50% of the test organisms in an environmental medium.

Ecosystem: a biological community and its pattern of interaction with its environment.

Ecosystem services: direct and indirect contribution of ecosystems on which human well-being depends e.g. clean air and water.

Ecotoxicology: science that deals with the detection of chemical compounds in the environment and their effect on organisms.

Effective rainfall: part of the rainfall which contributes to runoff.

Empirical model: a model founded on experience or experimental data only, not deduced from purely theoretical considerations.

Environmental flow: the flow regime required in a river to achieve specified ecological objectives

Environmental Impact assessment: a systematic process to evaluate the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Environmental/water quality objective (EQO/WQO): a target or statement of the quality to be aimed for in the receiving water body.

Environmental/Water quality standard (EQS/WQS): a standard normally expressed in quantitative terms specifying the maximum and/or minimum permissible levels for particular water quality parameters.

Environmental stress: pressure on the environment caused by human activities or natural events

EPA: Environmental Protection Agency

Ephemeral stream A stream or portion of a stream that flows in direct response to precipitation, receiving little or no water from groundwater or snowmelt.

Erosion: the loosening and gradual wearing away of soils, rocks or land by natural agents

Eutrophication: addition of nutrients, especially nitrogen and phosphorus, to a body of water, resulting in high organic production rates that may overcome natural self-purification processes. Frequently resulting from pollutant sources on adjacent lands, eutrophication produces undesirable effects, including algal blooms, seasonally low oxygen levels, and reduced survival opportunities for fish and invertebrates.

EU Water Framework Directive (WFD): Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy, finally adopted on 23 October 2000. Amendments have been introduced since its first publication.

Evaporation: the conversion of water held in soil, vegetation and bodies of water into water vapour.

Evapotranspiration: the net loss of water caused by the joint effect of evaporation and transpiration when analysing the hydrological balance of a system

Event mean concentration (EMC): the average concentration of a pollutant measured during a storm runoff event. Using different statistical techniques this can be calculated by dividing the storm event pollutant load (mass) by the total storm event runoff volume on every sampling point.

Exposure assessment: The estimation (qualitative or quantitative) of the magnitude, frequency, duration, route and extent of exposure to one or more contaminated media. The estimation (qualitative or quantitative) of the magnitude, frequency, duration, route and extent of exposure to one or more contaminated media

Extended detention basin: a basin which is dry most of the time and able to store rainwater during wet conditions for up to 24 hours.

F

FHWA: Federal Highway Administration

Filter drain: a gravelled trench systems where runoff can drain through the gravel to be collected in a pipe; unplanted but host to algal growth.

Filter strip: grassed or vegetated strip of ground that runoff flows across.

First flush: it refers to the observation of high concentrations of pollutants within the first part of the storm, usually defined in terms of the cumulative pollutant load (%) over cumulative runoff or time (%)

Flash flood: a hydrological event of short duration, characterised by a rapid rise in discharge and stage of streams or small rivers often occurring within a matter of minutes

Flocculation: the coagulation and agglomeration of colloidal and finely divided suspended matter to form gelatinous masses, known as flocs

Flood: a hydrological event characterised by an abnormally high increased discharge, stage or water level in water bodies

Flood plain: land adjoining rivers which is subject to inundation by overflow or overbank flooding

Flow regime: refers to the hydraulic conditions in a system

Flow routing: the determination of the progressive time and shape of a flow hydrograph at successive points along a conveyance channel (such as a sewer or an open channel)

Flow weighting: a statistical technique used to adjust a series of pollutant concentration measurements to allow for the effects of flow volume

Freeboard: an extra allowance applied to water surface levels to provide a safety factor for circumstances which will raise this level, such as floods, debris, obstructions to flow and uncertainties in calculations.

G

Gabion: a rectangular or cylindrical wire mesh cage filled with rock and used as a protection or revetment against erosion.

Gauge / gauging station: a device (or station) that is used to continuously record field measurements such as rainfall, water level, flow etc.

Green infrastructure: Soft engineering (as opposed to concrete) approaches which contribute to mitigating the impacts of road runoff through mimicking natural hydrological process e.g. the use of constructed wetlands, infiltration trenches and swales to manage stormwater volumes and pollutant loads.

Grit chamber: a structure designed to capture and retain the readily settleable solids.

Groundwater: water located beneath the earth's surface in rock fractures and soil and rock pore spaces.

Groundwater protection zone: refers to a system of groundwater protection; established to ensure that groundwater used for drinking water is protected from any activities that might cause it to become polluted.

Groundwater recharge: the hydrological process through which water moves downwards from surface water to groundwater.

Gully: channel caused by the concentrated flow of stormwater runoff over unprotected erodible land.

Gully Pot/chamber: a roadside structure designed to collect stormwater runoff washed from roads/paved areas and trap grit / litter prior to entry into the piped network.

H

HAWRAT: Highways Agency Water Risk Assessment Tool

Hazard: A biological, chemical, physical or radiological agent that has the potential to cause harm.

Hazard control: The application or implementation of preventive measures that can be used to control identified hazards.

Hazard identification: The process of recognising that a hazard exists and defining its characteristics.

Hydraulic conductivity: the rate of movement of water in a specified direction through a media such as soil or

gravel.

Highway: a main road connecting towns and cities.

Hydrobrake: a self-regulating device used as a flow controlling outlet at a storage facility.

Hydrograph / Hyetograph: plots of the flow rates in a channel or pipe and of the corresponding rainfalls respectively, as they vary with time.

I

Illicit connection: deliberate or accidental connection of waste appliances (e.g. toilet, bath and sink) to the surface water system.

Impact: An effect on end points, such as people, plants, soil, biota and/or water.

Impermeable: the property of a material that prevents rainfall runoff moving through it.

Indicator: a measure, generally quantitative, that can be used to illustrate and communicate complex phenomena simply, including trends and progress over time.

Infiltration: the movement of water from e.g. the surface to the subsoil or from groundwater into a pipe.

Infiltration basin: a designated area of land designed to retain and store stormwater runoff and to allow it to slowly percolate through the soil of the basin floor or through a specially constructed under-drain system containing gravel and/or sand filter beds.

Infiltration pit / soakaway: an underground chamber or rock-filled volume: stormwater soaks into the ground via the base and sides; unplanted but host to algal growth.

Infiltration rate: the volume of water passing through the surface of a known mass of soil or other permeable surface in a specified time.

Infiltration trench: a linear form of infiltration pit.

Inflow: the inward movement of water into a channel, basin/tank or pipe.

Initial losses: the volume of rainfall retained by the initial wetting of a surface material which hence does not result in runoff during a storm event.

Intensity-Duration-Frequency (IDF) curves: Intensity-duration-frequency curves represent the properties of a time-series of single-point rainfall data in a comprehensive form. They are derived from rainfall records using frequency analysis, usually applied to annual rainfall maxima of durations ranging from 5 minutes to 24 hours.

Inundation: the rise and spread of water over land that is not usually submerged.

L

Lagoon: pond designed for the settlement of suspended solids; fringing vegetation can sometimes occur.

Land use: the categorisation of land based on an assessment of the primary activities which take place *in situ* (e.g. highway, residential, commercial, industrial or open); influences the volume and quality of runoff generated.

LC₅₀: The term LC₅₀ refers to the concentration of a pollutant which leads to the mortality of 50% of the population of a target species.

LCA: Life Cycle Assessment Tool

Leachate: fluid which is the result of flow percolating through a matrix e.g. soil.

Leaching: the removal of constituents from soils or other material by percolating water.

Lentic: still freshwater habitats (e.g. in lakes or ponds).

Load/loading (pollutant): mass of a pollutant transported in a specified unit (e.g. of time, area or volume) from pollutant sources to a water body' commonly expressed as e.g. kg per impervious hectare, kg per unit rainfall.

Low impact development: a storm water management approach modelled on the natural water cycle (e.g. to reduce the impact of pollution or surface runoff).

M

Macrophyte: aquatic vegetation that is large enough to be seen by the naked eye.

Major impact: Event that potentially causes a major ecological shift within the local ecosystem.

Maximum allowable concentration (MAC): the highest concentration of a contaminant that does not cause harm to selected indicator species.

Maximum risk: risk in the absence of preventive measures.

Micro-plastics: plastic debris less than 5mm in length.

Minor impact: event that is potentially harmful to the local ecosystem.

Moderate impact: event that is potentially harmful to the regional ecosystem.

Multiple barriers: use of more than one preventive measure as a barrier against hazards.

Mineralisation: the process by which organic matter is converted into inorganic compounds.

Mitigate: to make less serious or severe; for example, reduce the impacts of road runoff on receiving waters by the use of stormwater best management practices.

Mixing zone: in aquatic systems represents the area in which a polluted discharge (such as from a highway) enters a receiving water and the initial gradient in water characteristics becomes equalized.

Model (simulation): a mathematical approximation of a physical system, in the form of computational algorithms attempting to reflect real cause-effect relationships.

N

Nanofiltration: membrane filtration technology (10^{-7} - 10^{-9} m) that retains the lowest particle (colloidal) size ranges including virus.

No observed effect level/concentration (NOEL/NOEC): the highest concentration of a substance that causes no adverse chronic effect from long term, continuous exposure in a specific organism.

Non-point source pollution: see diffuse pollution

Non-structural measures: water management strategy that does not involve physical constructions but uses knowledge and policy to reduce risks and impacts.

NRA: National Road Administration

O

Offline / online: offline refers to the additional capacity of a treatment system that handles wet weather flows that

are not an online (in series) part of the system.

Oil (oil products): a collective term referring to all mineral oils derived from petroleum and coal tar.

Oil sheen: an extremely thin and glistening or iridescent layer of oil on a water surface.

Oil or oil/water separator or oil trap/interceptor: a chamber (often underground) designed to provide a quiescent environment to separate oil from water.

Organochlorines: chlorinated aliphatic and aromatic hydrocarbons; often used to refer to compounds known to pose particular environmental problems e.g. organochlorine pesticides, polychlorinated biphenyls and dioxins.

Orifice control: a hole which can act as a flow control by restricting flow to below that possible in other parts of a drainage system.

Outfall, outlet, outlet control or outlet structure: the openings, orifices or structures at the end of a pipe, ditch, stormwater BMP or channel from which flow or overflow is discharged into a receiving water body.

Overflow: a chamber incorporating some form of overflow device, usually in the form of a transverse weir, a low side weir or a siphon, to provide a relief outlet from a chamber in the event of overload.

Oxygen depletion/deficit: the reduction (or exhaustion) of oxygen in flowing water caused by biochemical oxygen demand (BOD) resulting from decomposition of organic matter and from nitrogen oxygen demand caused by nitrification.

P

Participatory approach: ensures that every stakeholder in an intervention has a voice, either in person or by representation, in order to engage the public in the decision making process.

Particulate(s): see sediment

Pathogen: a bacteria, fungus, parasite or virus that causes disease

Pervious surface/area: that part of a catchment where rainfall will initially be intercepted and infiltrate the surface, contributing no runoff to the drainage network.

Pipe: a closed conduit manufactured in various materials (e.g. concrete, steel, plastic), capable of conveying water from one point to another.

Plug flow: flow through a body of water or chamber where incoming flow moves through without significant dispersion or mixing.

Point source pollution: a discernible and discrete entity (such as a highway surface) from which pollutants are discharged.

Polluter pays principle: underpinning concept enshrined within many regulatory measures that the polluter is responsible for rectifying any environmental damage caused by its emissions.

Pollution: the presence in or introduction into the environment of a pollutant.

Pollution load: the mass load of pollutants released to either the environment or a storage / treatment process as a function of time.

Pollution flux: a measure of the rate of pollutant load that is being discharged per unit area (mass per time per area; kg/a/m^2).

Pollution retention/removal efficiency: measure of treatment system performance (e.g. as percentage mass removal)

Polyaromatic hydrocarbons (PAH): compounds containing a number of fused aromatic hydrocarbon rings; also known as polycyclic aromatics or polynuclear aromatics

Porous asphalt: open graded powdered/crushed stone with binder: high void ratio; no geotextile liner present.

Porous paving: continuous surface with high void content, porous blocks or solid blocks with adjoining infiltration spaces; an associated reservoir structure provides storage; no geotextile liner present; host to algal growth.

Precipitation: water of atmospheric origin which falls to the ground in the form of rain, snow, hail or sleet.

Preliminary treatment/pre-treatment: first stage of stormwater treatment usually comprised of grit/settlement chambers or coarse screening to remove relatively large grit, detritus and floatable matter.

Protection level: design parameter for hydraulic structures related to risk characterisation that is usually derived from the statistical concept of the return period.

PSD: Particle size distribution

R

Rainfall-runoff model: a mathematical model which converts rainfall inputs to runoff volumes.

Rainfall time series: a sequential set of rainfall data values usually expressed as rainfall intensities.

Rainfall depth: amount of rain (expressed as depth of water on a horizontal surface).

Rainfall intensity: rate at which rainfall occurs expressed in units of depth per unit of time.

Rational method: formula expressing the estimated peak rate of storm runoff as the product of the catchment area, the peak rate of rainfall and the runoff coefficient.

Real time: knowledge of the variables characterising the dynamic process at the time it is happening.

Real time control: using the real time variables of the process to improve the performance of the system.

Receiving water: a body of water into which treated or untreated surface water runoff is discharged.

Recharge: the addition of water to the zone of saturation (that is, an aquifer).

Reed bed: see constructed wetland.

Release rate: the rate of discharge of water in volume per unit time from a detention/storage facility.

Retention basin/pond: a wet storage basin designed to temporarily hold a portion of stormwater runoff and subsequently release it when the downstream flood risk is reduced.

Retrofit: the renovation of an existing structure or facility to meet changed conditions or to improve performance.

Restoration: the act of returning something such as a channel, habitat or water quality to its original condition prior to anthropogenic disturbance.

Return period: the average recurrence interval of time (usually in years) between rainfall events equaling or exceeding a specified magnitude. The probability of the N-year event (e.g. a flow, rainfall depth or flow stage) being exceeded is $1/N$ in every year.

Risk: the likelihood of a hazard causing harm in exposed populations in a specified time frame, including the magnitude of that harm.

Risk assessment: the overall process of using available information to predict how often hazards or specified events may occur (likelihood) and the magnitude of their consequences (impact).

Risk characterization: the integration and summary of information from hazard identification, exposure assessment and dose-response assessment into quantitative or qualitative expressions of risk.

Risk governance: is a systemic approach to decision-making processes, based on the principles of cooperation, participation, mitigation and sustainability and adopted to achieve more effective risk management.

Risk management: the systematic evaluation of a system (e.g. a road runoff drainage system) involving the identification of hazards, risk assessment and the development and implementation of strategies to manage identified risks.

River basin management plan (RBMP): management tool used in Integrated Water Resources Management and the EU Water Framework Directive (2000).

Roughness coefficient (also resistance coefficient or friction factor): a factor in formulas for computing the average velocity of flow of water in a conduit or channel which represents the effect of roughness of the confining material upon the energy losses in the flowing water.

Runoff: the portion of precipitation on a drainage area that is discharged from the area into receiving waterbodies.

Runoff coefficient: the percentage or the amount of precipitation that appears as runoff; sometimes referred to as the volumetric runoff coefficient.

Runoff control: procedures to manage and to control rainfall runoff in drainage systems.

Runoff losses: the fraction of rainfall which does not contribute to runoff. Such losses are comprised of interception, evaporation, evapo-transpiration, depression storage and infiltration.

Runoff model: a mathematical approximation of the rainfall/runoff processes in a drainage catchment in the form of computational algorithms attempting to reflect actual cause-effect relationships.

S

Sample/sampling: a substance/process of collection of (e.g. water, sediment) as representative of the system/environment under investigation by a defined procedure. In statistics and quantitative research methodology, a data sample is a set of data collected and/or selected from an identified statistical population.

Sand filters: Rapid sand filters use relatively coarse sand and other granular media to remove particles and impurities that have been trapped in a floc. Slow sand filters: use a complex biological film that grows naturally on the surface of the sand which acts as a substrate.

Scour: Erosion of channel banks due to excessive velocity of the flow of surface and stormwater runoff.

Screens: latticed metal grilles, (normally constructed of steel) intended to capture gross solids, litter and detritus in stormwater flows at outfalls prior to discharge into receiving waters.

Sediment: fragmented material that originates from weathering and erosion of rocks or unconsolidated deposits and is transported by, suspended in, or deposited by water.

Sediment transport: the term is commonly used to cover all aspects of the movement of sediment particles. The transport of sediment is comprised of erosion, transportation and deposition.

Sediment oxygen demand (SOD): the amount dissolved oxygen required by the sediment measured in mg per square metre per day.

Sedimentation: the process of the sinking of suspended sediment particles to the base of the water column which contains them. Sedimentation may be used as a treatment process for the separation of settleable solids from fluid.

Sedimentation tank/chamber: a structure within a stormwater system, with the purpose of creating suitable flow conditions to encourage the sedimentation or settling of the particles.

Sediment trap: a structure designed to intercept and retain sediments transported by surface runoff flows.

SELDM: stochastic empirical loading and dilution model.

Sensor: a primary instrument-system element that converts measured variable energy into a quantitative form suitable for measurement.

Separate sewer system: Two different piped systems within a given land area that separately provide for collecting and transporting wastewater and stormwater runoff.

Settleable solids: the coarser suspended solids (SS) that settle relatively fast under the influence of gravity.

Settling velocity: the gravitational or terminal fall velocity of a discrete (and assumed spherical) particle in fluid media where the fall velocity (V_s) = depth/time e.g. in cm/s.

Sheet flow: runoff that flows over the ground surface as a thin, even layer, not concentrated in a channel.

Short-circuiting: the passage of runoff through a stormwater treatment facility in less than the design treatment time.

Sludge: a semi-solid residue produced from various water treatment processes

Snowmelt: water derived from melting snow.

Soakaway: underground chamber or rock-filled volume: stormwater soaks into the ground via the base and sides; unplanted but host to algal growth.

Soil stabilisation: improvement of soil erosion resistance or load bearing properties by a variety of measures e.g. vegetative cover, stone, concrete, asphalt or plastic etc.

Soil water: water suspended in the uppermost layer of soil, or in the aeration zone near the ground surface, that can be discharged into the atmosphere by evapotranspiration.

Soil water deficit: the difference between the amount of water actually in the soil and the amount of water that the soil can hold.

Sorption: the generic term applied to the physical or chemical binding of a dissolved substance (sorbate) to a particulate substance (sorbent).

Source control: term referring to a range of approaches and techniques for local, on-site management of water flow volumes and pollutants.

Speciation: refers to the chemical form or compound in which an element occurs. It may also refer to the quantitative distribution of an element.

Spill/spillage: see accidental spillage.

Spill control device: a tee section or down-turned elbow designed to retain a limited volume of a pollutant that floats on water, such as oil or antifreeze. Spill control devices are passive and must be cleaned out in order to remove the spilled pollutant

Spreader: a device for spreading stormwater over a surface area.

Stakeholders: individuals/organisations that have something at stake e.g. are impacted by or have influence on the decision being taken.

Stochastic model: describes the characteristics, relationships and processes of an actual physical system involving the use of probability levels for each of the variables identified as a way to tackle uncertainty related to available data sets.

Storage basin/tank: temporal reservoir intended to hold stormwater, typically when the volume of flow from an event exceeds the carrying capacity of the system.

Storage capacity: the space (volume) available for storage of water in natural or artificial water bodies.

Storm: high intensity rain, snow or hail event identified as a separable meteorological event.

Stormflow: the portion of flow (normally the effective rainfall runoff), which reaches a stream or river shortly after the start of a storm event

Storm frequency: is a measure of the time interval between storms and is often used to specify the interval, on average, between storms of similar severity e.g. storms producing the same total volume per unit area of catchment. Storm frequency is often associated with other parameters defining the characteristics of storms on a catchment to provide historical storm information for use in drainage design.

Stormwater runoff: the water flowing over ground surfaces and in natural streams, artificial channels and pipes as an immediate effect of precipitation over a catchment.

Stormwater management: the provision of pervious surfaces, drainage types and morphologies, flow detention measures and interception measures to achieve a range of drainage and receiving water related flood protection, water supply, aesthetic, recreation, conservation and economic benefits.

Stormwater quality pond: see retention basin and detention basin.

Storm sewer: a piped system that carries intercepted impervious and pervious surface rainfall runoff e.g. highway and car park runoff; designed to exclude wastewater and other inappropriate cross-connections.

Strategy: the art of devising plans to achieve a goal e.g. pollution abatement strategy.

Stream: a small natural waterway flowing in a defined channel

Street sweeping: the removal of dust and litter from street surfaces by sweeping or vacuuming, either manually or using specialized vehicles and equipment.

Structural measures: (a) set of policies oriented to modify the state of a system or its behaviour (b) Physical solutions (e.g. stormwater ponds, swales, infiltration trenches etc.) used to improve the state of a hydrological system

Subgrade: a layer of stone or soil used as the underlying base for a stormwater BMP.

Substrate: the natural soil base underlying a stormwater BMP.

Subsurface flow: flow that occurs above the zone of saturation but beneath the land surface.

Surface runoff: see runoff

Surcharge: flow that occurs under pressure conditions when the sewer flow exceeds the hydraulic carrying capacity of the sewer line. Surcharging can be caused by hydraulically overloading a system, or by a downstream control such a blockage.

Surface water: all runoff water naturally open to the atmosphere (rivers, lakes, reservoirs, streams,

impoundments, wetlands, estuaries, seas, etc.)

Sustainable development: concept was first defined by the 1987 Brundtland Commission Report as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

Sustainable drainage systems: a wide range of constructed systems used to manage rainfall runoff quantity and quality - from wetlands and ponds to infiltration trenches and swales - which mimic natural hydrological processes including infiltration, detention, groundwater recharge and evapotranspiration

Swale: a grassed channel used to intercept surface runoff draining from impervious surfaces and directing the intercepted water to streams or other drainage structures, such as a retention pond.

T

Telemetry: apparatus for measuring, transmitting, receiving and storing information for a particular set of parameters e.g. regulating flows, real time control, water quality.

Temporal distribution of rainfall: describes in tabular or graphical form (see hyetograph) the variation with time of rainfall intensity or volume within a storm event.

Threshold: a point or level beyond which certain effects are known to occur e.g. an EC₅₀ concentration.

TKN: Total Kjeldahl nitrogen

Time of concentration: period of time required for storm runoff to flow to the outlet from the inlet point of a drainage basin.

Time of travel: time elapsed during the passage of a volume of water from one given point to another point downstream.

Time to peak: time period covering the rising limb of the storm hydrograph.

Total maximum daily load (TMDL): a method developed to calculate permissible total loadings from all pollutant sources to ensure receiving water quality standards are achieved.

Total nitrogen: sum of all the forms of nitrogen.

Total organic carbon (TOC): the total amount of carbon in a sample determined by total combustion.

Total suspended solids (TSS): the portion of solids retained on a 2.0µm pore filter under specified conditions.

Total dissolved solids (TDS): the portion of solids that passes through a 2.0µm pore filter under specified conditions.

Toxicity test: a test to determine the harmful effect of a pollutant(s) on aquatic organisms.

Transboundary waters: surface or ground water bodies which straddle national boundaries.

Transpiration: process by which water from vegetation is transferred into the atmosphere in the form of vapour.

Trash rack: a screen placed across a waterway inlet or outlet to prevent blockage with debris.

Treatment train: a combination of two or more runoff treatment facilities connected in series.

Tributary: a watercourse that flows into a larger watercourse or lake.

Turbidity: optical property of a water sample which causes light to be scattered and absorbed rather than transmitted due to the presence of fine suspended material.

U

Ultrafiltration: membrane filtration technology (10^{-6} - 10^{-8} m) that retains bacteria and colloidal suspensions.

Uniform flow: steady flow which does not change its properties e.g. velocity along a section of pipe or channel.

Unit hydrograph: direct runoff hydrograph resulting from unit depth of excess rainfall produced by a storm of uniform intensity and specified duration.

Unsaturated zone: subsurface soils above the water table.

Unsteady flow: a state of flow in a pipe or channel system in which flowrates and other flow characteristics change with time

Uptake: the process by which pollutants are taken up e.g. by aquatic species.

Urban drainage area: the area where surface runoff is collected and conveyed by means of a man-made or natural drainage system (sewers, infiltration devices, ditches, ponds, etc.).

Urban hydrology: the study of the hydrological cycle in urban contexts, particularly of rainfall-runoff processes on urban catchments characterised by impervious areas and artificial drainage systems.

Urbanisation: the conversion of rural areas into towns and cities resulting in alterations to catchment surfaces and drainage systems which modify natural water cycles (e.g. by reduced infiltration due to soil sealing).

V

V-notch weir: a triangular channel section / obstruction placed across the entire width of an open flow, channel or conduit in order to measure discharge values.

Void: an unfilled space as in air pockets / pores within the soil.

Volatile Solids: the fraction of total solids which is lost on heating to 550-600°C in a furnace; used as a measure of organic material load.

Vulnerability: susceptibility to damage or risk e.g. from inundation during flood events or receiving water impacts from stormwater runoff.

W

Wash-off (surface): the removal or flushing of solids from an impermeable surface during rainfall events which is a function of the maximum rainfall intensity and the hydraulic transport capacity of the surface flow.

Water balance: a description of the flow of water in and out of a system usually in the form of an equation.

Watercourse: any stream or channel which carries flowing water

Water deficit: cumulative difference between potential evapotranspiration and precipitation during a period when the precipitation is the smaller of the two.

Water discharge: the volume rate of water flow, passing through a predetermined section in a given time; Q (water discharge) = A (cross sectional area under consideration) x V (mean flow across the same section)

Water logging: the prolonged saturation of soils with water

Water protection zone: area with specific protective rules for drinking water or groundwater protection.

Water quality: refers to the chemical, physical, biological, and radiological characteristics of water; a measure of

the condition of water relative to the requirements of any environmental or human need or purpose.

Water quality criteria: established factors, principles or rules on which judgements, evaluations or decisions on water quality can be based; provide the scientific and technical foundation for water quality standards.

Water quality index: a numeric scaling to represent and classify water quality expressed in terms of water use.

Water quality parameters: a set of chemical and/or physical factors used to characterise the quality of a water body. Commonly used water quality parameters include temperature, pH, dissolved oxygen, suspended solids, nitrates and phosphates.

Water quality standards: legally binding norms or exemplars for the definition of water quality with approved methodologies and specified limits against which compliance is judged.

Water resources: refers to all forms of surface and ground waters, used for drinking water, industrial processes, agriculture and irrigation. They also provide opportunities for recreation, such as fishing, boating and swimming and, in some communities, to support and maintain traditional cultural practices and ceremonies.

Water resources management: a process which promotes the development and use of water in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems

Water sensitive urban design (WSUD): an approach which integrates water cycle management into urban planning and design to sustainably manage the impacts of stormwater from development. WSUD principles can be applied at all levels (lot level, street and precinct level, as well as regional scales) with the aim of protecting and improving waterway health by mimicking the natural water cycle as closely as possible.

Water table: The upper surface or top of the saturated portion of the soil or bedrock layer, indicating the uppermost extent of groundwater.

Weir: a raised section of the bed of a flow, channel or conduit over which water must flow.

Wetlands (including artificial or constructed wetlands): a generic term for an area that is regularly saturated by surface or groundwater and subsequently is characterised by a prevalence of vascular vegetative species that is adapted for life in saturated soil conditions.

Wet weather flow: the flowrate to be expected in a drainage system during wet weather conditions.